CARPENTRY AND BUILDING

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INDEX.

C

D

E

F

G

N

O

P

Q

R

T

U

V

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JANUARY, 1902.

Exhibition of the Architectural League.

For some years past the Architectural League of New York has made a practice of holding annual exhibitions of architectural drawings which have attracted a great deal of attention on the part of those interested in the study and development of architecture and drawn to the rooms of the society a large attendance. The League now makes announcement that the seventeenth annual display will be held from February 16 to March 8, inclusive, in the building of the American Fine Arts Society, on West Fifty-seventh street. According to the programme the exhibition will consist of drawings in plan, elevation, section, perspective and detail; drawings of decorative works, cartoons for stained glass, models of executed or proposed work, sketches and paintings of decorative subjects and work executed in wood, bronze, wrought iron, stone, mosaic, glass and leather. At this exhibition will be judged the work of competitors for the gold and silver medals, the Henry O. Avery prize and the President's prize. Contestants for the gold and silver medals will be required to submit ground plans and water color elevations for an imaginary suburban public library. The Avery prize will be awarded for the best design for a caryatid for a mantel in Louis XV style, while the President's prize, a bronze medal, will be awarded to the member of the League who presents the best design for mural paintings representing architecture and the allied arts, to be placed in the two spandrels between windows in the main room of the league.

Elevator Annex to Office Building.

The rapid increase of the modern office building, or skyscraper, as it is commonly called, has brought out many interesting features in connection with its construction and development which are a source of admiration and delight to the progressive architect and builder. These relate not alone to the methods employed in the work of erection, but also to the precautions which are often taken to insure plenty of light for the tenants of the upper stories, more especially when the building rises to a great hight. Where the adjacent property consists of buildings considerably less in hight than the office structure they are often leased by the owners of the latter for a long term of years so as to control any future building operations which might possibly interfere with the question of light for the main edifice. The latest development in connection with the modern office building is an annex, which is to contain a series of elevator shafts and be constructed on the north side of the Manhattan Life Insurance Company's building, near the head of Rector street, on Broadway. This in itself considered will probably be the most novel thing in metropolitan construction, and will be unique in the fact that it is the only separate building of its kind in the city. According to the plans of Architect G. K. Thompson it is to be of the same general exterior design as the original building, which, by the way, was the first skyscraper erected in New York City, and will be 19 stories in hight. The annex is to occupy the entire space between the building of the company named and the site of the 21-story structure now in process of erection by the Century Building Company, while at the same time it will aid in forming an almost unbroken line of towering office buildings along the east side of lower Broadway. The five elevator shafts in the present structure having proven inadequate for the purpose, they will be torn away and ten new and more commodious ones will be built in the annex.

Pittsburgh's New Bank Building.

The new structure which the officers of the Farmers' Deposit National Bank of Pittsburgh have decided to erect will be a notable addition to the architecture of the city. It will occupy a site having a frontage of 140 feet on Wood street and the same on Fifth avenue, and will tower 22 stories above the street level. The first five stories of the exterior will be of white marble, above which they will be of brick with trimmings of terra cotta, the entire *façades* being as ornamental as harmony and good taste dictate. The power plant as well as machinery for heating and lighting will be in the lower cellar, far away from all interference with the rest of the appointments of the great structure. The system of elevators will include both express and locals. The contract, which has been awarded to a well-known concern recently incorporated, calls for the completion of the building a year from April, 1902, and involves an expenditure of over $1,500,000. An interesting feature of the construction lies in the fact that the contractors, it is said, will erect the building on what is known as the "commission plan," they doing the entire work and arranging for all the materials, just as though it was being done for themselves, but subject, of course, to the approval of the real owners of the building. The main floor will be largely occupied by the bank in question.

Importance of Technical Education.

In a recent article on the influence of technical education upon the industrial prosperity of a country, Prof. V. C. Alderson referred to the advantages gained by Germany in recent years as a proof of the superiority of the industrial educational system followed in that country. Professor Alderson finds that the system of training in technical colleges and schools is the main source of Germany's industrial power, enabling her within recent years to become one of the great manufacturing nations of the world, and to force her way into foreign markets in competition with the United States and Great Britain. Nevertheless, he is of the opinion that the technical schools in the United States, while not equal to the German schools in point of theoretical training, excel them on the practical side, the American tendency being not only to master knowledge, but to apply it at once. It is this practical efficiency that accounts for the remarkable industrial progress of this country. With the increased facilities for technical training which are constantly being provided there is little doubt this progress will be still further stimulated and accelerated. Not only in the constant improvements which are being made in the production of iron and steel, but in their manipulation as they are transformed into the finer finished products, are illustrations to be found which emphasize the practical utility of technical training. The American alertness in applying the discoveries of science and in-adopting improved methods, which are not always simply labor saving, has much to do with the country's marvelous success in manufacturing.

Foundations for the St. Louis Fair Buildings.

In discussing the subject of the construction of the World's Fair buildings at St. Louis, Philip J. Markmann, chief engineer, states that there will be no necessity of using piling even for wind anchors. "We shall resort," he says, "to the less expensive method of weighting or ballasting the wind side of the building, which will stand the wind stresses. Few, if any, of the structures at the exposition will have roof spans of extraordinary dimensions like the Manufacturers' Building in Chicago. The roofs will be supported by interior timber posts and the span of no roof truss will much exceed 125 feet.

"These interior posts do not detract from the appearance of the buildings, as when once the exhibits are in place the posts are obscured and unnoticed. In the Manufacturers' Building in Chicago the great sweep of the roof trusses attracted no attention from visitors unless their eyes were directed to it."

"The reason we shall use timbers chiefly in our big exhibit buildings," says Director of Works Isaac S. Taylor, "is because there might be trouble in getting steel work if we built the entire trussing of steel. If we make the lower chords of the trusses, which are open to view, of steel, we shall lose nothing whatever by the timber construction. We shall have the sightliness of steel. Those chords of the trusses immediately under the roof are not seen, whether they are of timber or steel. These buildings will be as fire proof as if the trusses and posts were of steel. Steel construction is not fire proof unless the surrounding materials are fire proof. Where wood lath and wood studding and wood joists and staff coverings are used the steel would yield to fire more easily than wood. Structural steel of small section, such as is used, heats rapidly, and heated steel loses its resistance.

"The floors of the Electricity and Machinery buildings, which will house big machines in motion, will be made rigid, so that the exhibits can be installed without compelling the exhibitors to brace the floor under the big castings. Of course, the machines of tremendous size must rest directly on the ground, without touching the building anywhere. The fact that the buildings are not on piles will make the construction of their foundations much easier."

A Handsome Memorial Church

Judge Elbert H. Gary, chairman of the Board of Directors of the United States Steel Corporation, has given to Wheaton, a suburb of Chicago, one of the finest Methodist Episcopal memorial churches in America. It is erected in honor of his parents, Erastus Gary and Susanna Vallette Gary, who were among the Western pioneers.

The Gary Memorial Church is perhaps the most modern in its equipment in the West. There is a steel fire proof vault for the storing of church records and the communion service, an up to date hotel kitchen, banquet hall and dressing rooms for participants in entertainments.

In addition a nursery for babies who must be brought to church by poor mothers is provided, and a large parlor for the women with rocking and easy chairs. For the boys and young men there is a splendid gymnasium. The lantern in the tower, when lighted by electricity, can be seen in every township in Du Page County.

The building is of Gothic architecture, and is of stone, with a steel frame work. The windows are of stained glass, the subjects being "The Three Marys at the Tomb," "Easter Morning," "The Nativity" and "The Christ Child."

THE United States Department of Agriculture has recently issued an interesting bulletin known as No. 31, and entitled "Notes on the Red Cedar," which deals with the economic value, uses and character of red cedar timber. The cedar forests of the various States are described, including their yield of timber, while at the same time the structure and uses of red cedar wood are dealt with in a way to prove of value. The information given in the bulletin is of interest, not only to the consumers of red cedar, but to tree planters and owners of cedar bearing lands.

Builders' Association of New South Wales.

A meeting of the Master Builders' Association of New South Wales was held in Australia in the latter part of October. The members were chiefly interested in the proposals of the Government to pass a bill dealing with the building trades, and the following resolution was adopted:

Resolved, That an investigation of impending legislation in regard to the regulation, erection and maintenance of steam cranes, scaffolding, awnings, &c., within this State be at once made by this association, and that a committee be forthwith elected for that purpose.

The following committee was appointed: D. Stewart, R. D. Syme, C. W. Colton, Mr. Wall and G. Baldwin.

A report was read from the joint conference of representatives of the Master Builders' Association, the Brick Makers' Association, Chamber of Manufacturers, Colliery Owners' Association, Stevedores' Association, the Colonial Sugar Company, Limited, Morse Dock & Engineering Company, Limited, the Stock Owners' Association and the Steamship Owners' Association in regard to the compulsory arbitration act. This report set forth the attitude of the employers in respect to the proposed legislation and recommended various amendments. These amendments suggested some doubt as to the wisdom of employing compulsion in the settling of labor strikes, lock outs, &c. It was also recommended that nothing in the act should empower a court by an order to restrain the use of any machinery or the output of any machine or employee. The report of the joint conference was received and adopted by the Master Builders' Association.

Raising a Sagging Wall.

An interesting piece of work was recently executed in connection with a new building in process of erection on East Eighteenth street, near Fifth avenue, in this city. The steel frame work of one entire side wall of an eight-story building sagged so as to be 17 inches out of plumb and it was necessary to straighten it. Much of the brick work was already in place when the sagging wall was discovered, and its removal required almost a week to accomplish. The contract provided for taking down such sections of the brick and terra cotta work as were necessary and then lifting the steel frame without disjointing any part of it. The work of raising the wall was done by means of huge jack screws, operating on long needles extending through openings made in the wall. After the frame had been lifted to the requisite hight the detached brick and terra cotta were replaced in the same relative position they occupied before. The cause of the sagging of the wall is thought to have been due to the manner in which the foundations of the large building adjoining were constructed, these having been laid by means of open caissons.

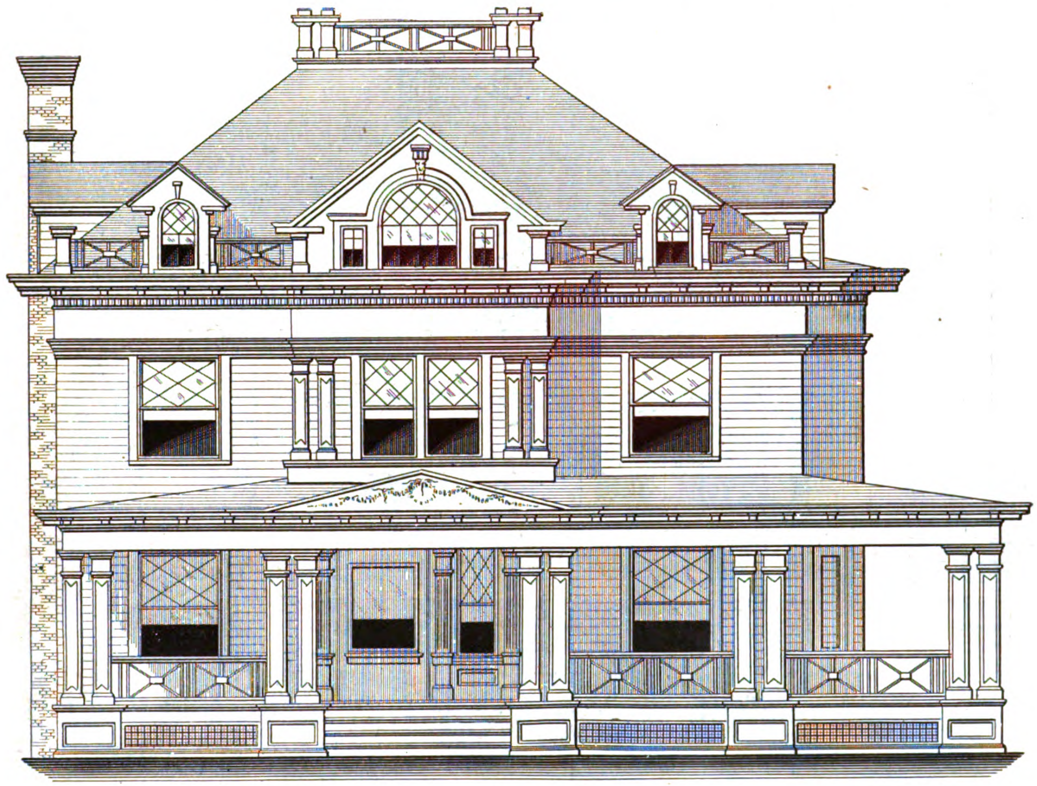
PROMINENT among the building improvements contemplated in the city of Baltimore, Md., is a 13-story apartment house for which the plans are being drawn by Hodges & Leach of that city. The building will have a frontage of 53 feet and a depth of 130 feet, occupying the site at the corner of Eutaw place and Laurens street. The first story will be of Indiana limestone, above which the outside walls will be of buff and silver gray brick with terra cotta trimmings. The thirteenth story will have a mansard roof. The first story will be decorated in the French Renaissance style, and the treatment of the building throughout will be of a high order.

COLONIAL RESIDENCE AT CRANFORD, N. J.

ONE of the two half-tone engravings which serve as supplemental plates this month represents a Colonial residence attractively located in Cranford, N. J. The surroundings are most picturesque and the treatment of the design such as to admirably adapt it to the location. Noticeable features are the broad veranda extending entirely across the front and around one side as far as the dining room bay, the style of the dormers and the generally harmonious effects which are produced. The elevations, floor plans and details of construction presented upon this and the following pages give an idea of the interior arrangement and construction employed. It will be noticed that a broad hall extends nearly through the center of the building, with the parlor at the left and library at the right. Beyond the library is the dining room, communicating with it by means of sliding doors and well lighted by a swelling bay. A door from the dining room gives direct access to the veranda. The kitchen is directly in the rear of the parlor and communicates with the dining room through a butler's pantry. The kitchen is lighted by means of three windows, and has opening from it an ice box closet and a pantry for kitchen utensils. A flight of stairs between the kitchen and butler's pantry leads to the cellar, and there is also a flight to the cellar from the outside under the rear stairs which give access to the second story. Ascending to the second floor we find four sleeping rooms, a sewing room, bathroom and linen closet, as well as closets for the principal rooms. In the attic are two finished rooms with ample storage facilities.

According to the specifications of the architects the framing is balloon style, the outside of the house being covered with 1 x 9 inch hemlock sheathing and clapboards, with a good quality of two-ply building paper between. The main roofs, as well as the dormers, are covered with 18-inch sawed red cedar shingles, laid about 5½ inches to the weather. The shingles on the roof and side walls were treated with two coats of shingle stain after being laid. The hips are run up "Boston style," the shingles being laid on 1 x 2 inch lath.

The sills are 4 x 6 inches, laid in mortar on the flat side; girders, 6 x 8 inches; first and second floor joist, 2 x 10 inches; third floor joist, 2 x 8 inches, and the outside wall joist, 2 x 4 inches, all joist being placed 16 inches on centers. The posts at the corners and angles are 4 x 6 inches; the common rafters, 2 x 6 inches, placed 20 inches on centers; the valley rafters are 2 x 8 inches; the veranda sills, 4 x 10 inches; the veranda beams, 2 x 10 inches, placed 20 inches on centers; veranda ceiling beams, 2 x 4 inches, tied to the rafters and also placed 20 inches on centers; the ribbon strips of hard pine, 1 x 6 inches; ties and braces, 4 x 6 inches; the partition studs, 2 x 3 and 2 x 4 inches, placed 16 inches on centers, and collar beams, 2 x 4 inches, placed 20 inches on centers.



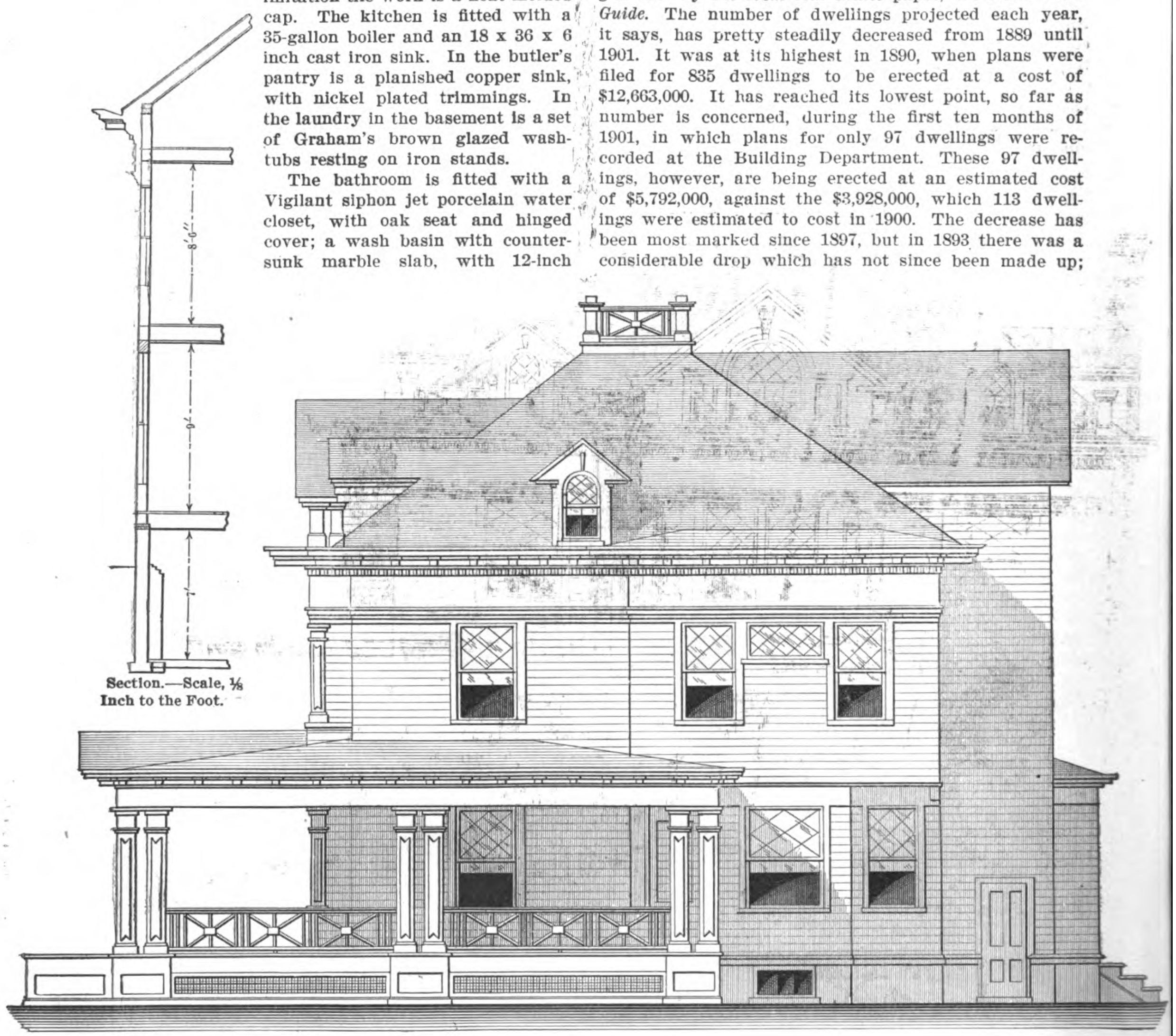
Front Elevation.—Scale, ⅛ Inch to the Foot.

Colonial Residence at Cranford, N. J.—J. A. Oakley & Son, Architects, Elizabeth, N. J.

The foundation walls are of hard burned brick, laid in cement mortar, with headers from sixth course. The bottom of the cellar has 4 inches of cinders and cement, topped with ½ inch of Portland cement and sand.

The trim throughout the house is white pine. The floors are double, the lower ones being of rough 1 x 9 inch hemlock, laid diagonally, with a finishing floor of ½ x 2 inch North Carolina comb grained pine, the strips being tongued and grooved and blind nailed. Between the upper and under floors is a good quality of building paper. The third-story floor is of 3½ x ⅞ inch North Carolina pine. The veranda floor is of white pine, tongued and grooved, driven up with white lead in the joints, and blind nailed to the beams, the floor being finished with round edge and cove.

The bathroom has between the beams a filling of concrete, on which is laid tile flooring. The walls to a hight of 4 feet are also covered with tiling, laid in Portlanu cement on metal lath. The kitchen walls to a hight of 5 feet from the floor are finishel with a coat of Adamant Company's No. 3 finish and lime putty, lined off into 6 x 6 inch squares, while around the top of the imitation tile work is a neat molded cap. The kitchen is fitted with a 35-gallon boiler and an 18 x 36 x 6 inch cast iron sink. In the butler's pantry is a planished copper sink, with nickel plated trimmings. In the laundry in the basement is a set of Graham's brown glazed washtubs resting on iron stands.


Section.—Scale, 1/8 Inch to the Foot.

The bathroom is fitted with a Vigilant siphon jet porcelain water closet, with oak seat and hinged cover; a wash basin with countersunk marble slab, with 12-inch wall slabs of marble and 5-inch marble aprons, resting on nickel plated offset legs and nickel plated wall sockets. There is also a Majestic roll rim porcelain lined bathtub, made by the Standard Mfg. Company, the pipes, bibs, &c., being nickel plated. All exposed plumbing pipes on the first floor have a coat of aluminum bronze.

The house is wired for electric lighting and bells, and piped for gas. A speaking tube runs from the hall on the second floor to the kitchen. The heating is by means of a Richardson & Boynton No. 147 New Perfect hot air furnace. The registers on the first floor are 10 x 12 inches and on the second floor 8 x 10 inches.

The house was erected for T. A. Sperry in accordance with plans drawn by J. A. Oakley & Son, architects, of Elizabeth, N. J. The contract for the carpenter work was executed by M. Byrnes and the electrical work by John Good Company, both of Elizabeth. The mason work was done by James Ledley of Westfield, N. J.; the plumbing work by John Doyle and the painting and decorating was by Philip Jahn, both of Cranford, N. J.

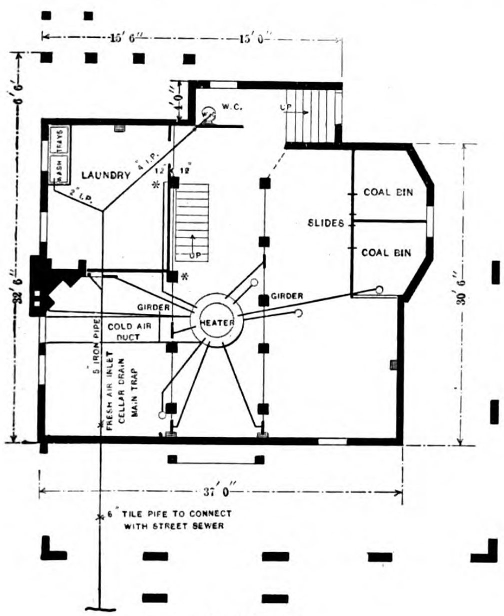
Colonial Residence at Cranford, N. J.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot

Decline of Dwelling Houses in New York City.

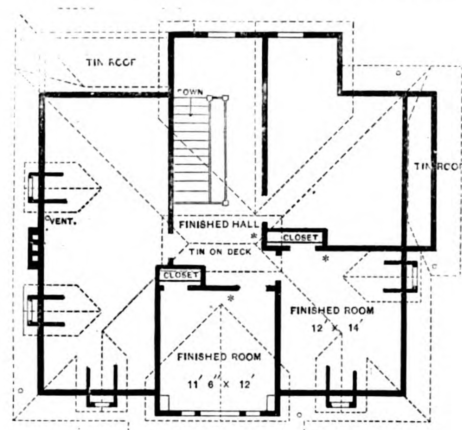
Some interesting statistics concerning the decline in the number of individual dwelling houses in New York, and especially on the West Side—a district long a favorite one for buildings of this class—have been gathered by the local real estate paper, the *Record and Guide*. The number of dwellings projected each year, it says, has pretty steadily decreased from 1889 until 1901. It was at its highest in 1890, when plans were filed for 835 dwellings to be erected at a cost of $12,663,000. It has reached its lowest point, so far as number is concerned, during the first ten months of 1901, in which plans for only 97 dwellings were recorded at the Building Department. These 97 dwellings, however, are being erected at an estimated cost of $5,792,000, against the $3,928,000, which 113 dwellings were estimated to cost in 1900. The decrease has been most marked since 1897, but in 1893 there was a considerable drop which has not since been made up; and the same is true of the years 1898 and 1900. The decrease has been much more marked in the number of dwellings than in their estimated cost; and the consequence is that the average cost per dwelling has surprisingly increased. In 1889 it was $16,700. From that year until 1899 it did not vary more than about $3000 on either side of the above figure, the high water mark being $19,000 in 1893, and the low water mark, $13,400, in 1896. In 1899 the average started to increase very rapidly. During that year it jumped up to $24,600; during 1900 it became $35,000; and during the first ten months of the present year it has reached the extraordinary figure of $59,700.

A notable cause for these changes has been the new type of seven-story elevator apartment house. These new apartment houses, in the accommodations they offered, not only competed more effectually with private dwellings than ever before, but they tended to increase the value of unimproved property, and so narrow the field of speculative operations in residences. The builders of dwellings found it difficult to sell those which they erected, and the consequence is that the speculative construction of residences to the north and west of the Park almost entirely ceased.

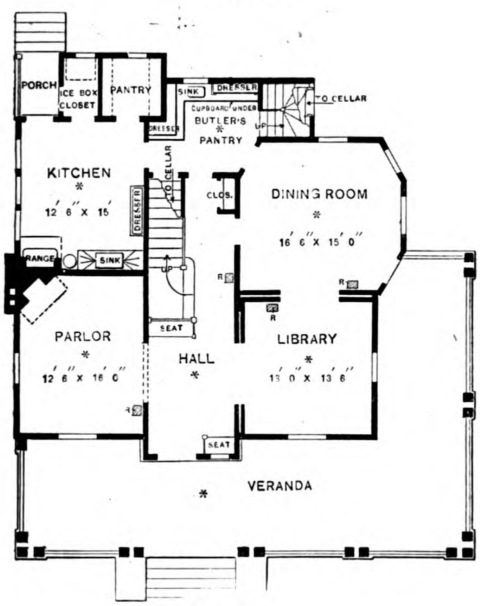
From 1889 until 1892, inclusive, there were projected for the West Side every year from 420 to 470 private dwellings, which were estimated to cost somewhere near $8,000,000—an average of a little more or less



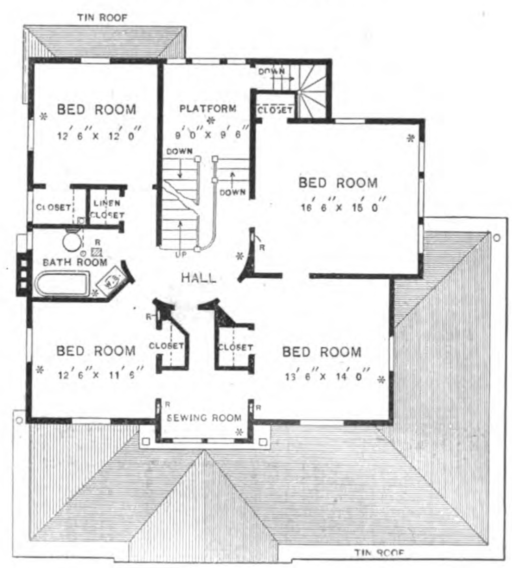
Foundation.



Attic, with Outlines of Roof.



First Floor.



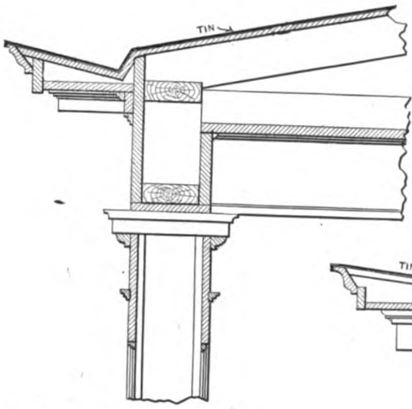
Second Floor.

Colonial Residence at Cranford, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.

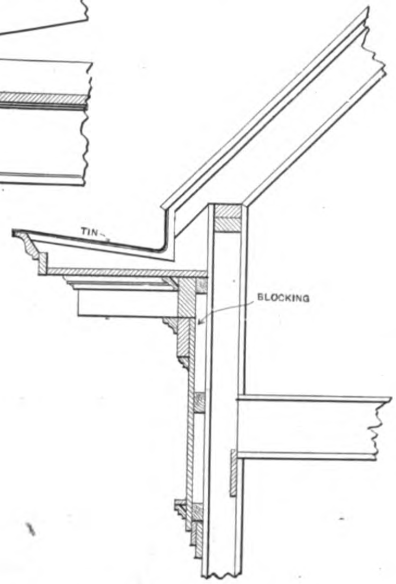
than $18,000 a dwelling. As far back as 1884 this average cost per dwelling was probably not more than $10,000 or $12,000 per residence. But by 1889 a relatively expensive dwelling was already being erected on the West Side, and the theater for cheaper $10,000 operations was shifted to the district immediately north of the Park and that north of 125th street. For the years 1893-'95 there were only about 230 dwellings planned each year on the West Side, at a cost of about $5,000,000. During the last year the average cost of these residences jumped to nearly $25,000, but the increase was only temporary, and this average cost did not reach the same level again until 1899. In the meantime, however, the total estimated cost had decreased to only a little over $2,500,000 a year. More recently even these small figures have been lessened, and the culmination was reached during the first ten months of 1901, when plans for only 28 dwellings, estimated to cost $932,000, have been filed. The average cost of these 28 dwellings, however, was $32,000, the highest ever known on the West Side.

AMONG the building improvements contemplated on Broadway, New York City, is a 12-story loft building, which will cost in the neighborhood of $400,000, excluding the site, which cost $300,000. The building will be put up by Henry Corn, and will be a noteworthy addition to the district in which it is to be erected. It is the present expectation to have the structure ready for occupancy by January 1, 1903.

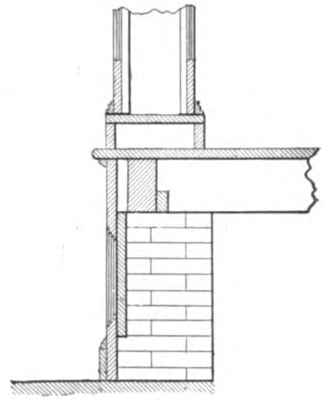
THE 19-story structure to be erected on the west side of Park avenue, extending from Forty-first to Forty-second streets, New York City, and known as the Hotel Terminus, will cover an area of 197½ x 105 feet. The drawings, which were prepared by Warren, Wetmore & Morgan, call for a building of brick, stone and terra cotta, which will rise to a hight of 253 feet above the level of the street.



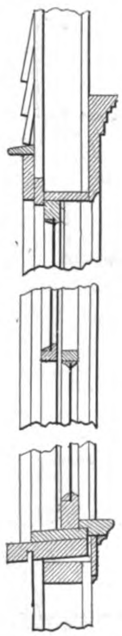
Detail of Veranda Cornice and Column.—Scale, ½ Inch to the Foot.



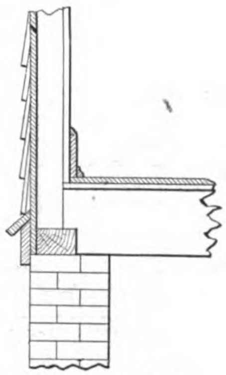
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



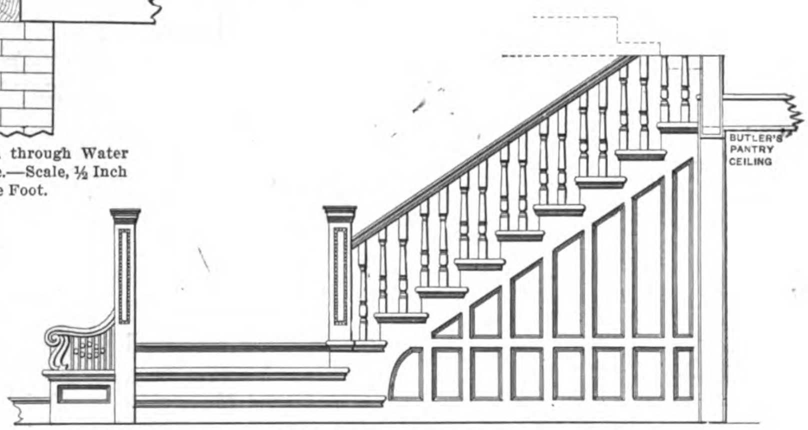
Detail of Porch Floor and Pier Construction.—Scale, ½ Inch to the Foot.



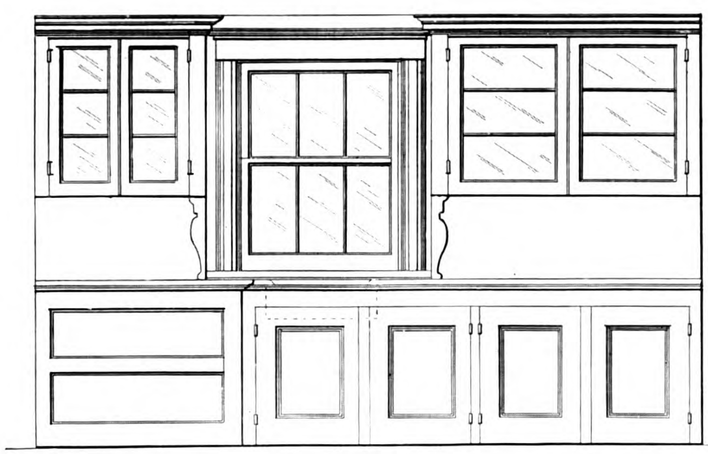
Vertical Section through Window Frame.—Scale, ¾ Inch to the Foot.



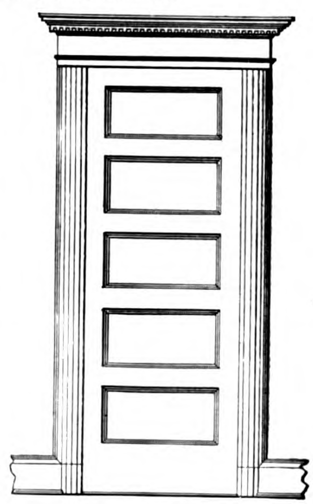
Section through Water Table.—Scale, ½ Inch to the Foot.



Detail of Main Stairs with Seat at the Left.—Scale, ¼ Inch to the Foot.



Elevation in Butler's Pantry Looking Toward the Window and Showing Low Ceiling Under Stair Platform.—Scale, ⅜ Inch to the Foot.



Elevation of Door, Showing Inside Finish.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of Colonial Residence at Cranford, N. J.

STEEL FRAMES IN BUILDINGS.

THE question of the durability of the steel frames which are the skeletons of most of the modern office buildings now under construction or of comparatively recent date has given rise to much discussion. Of the contributions to this discussion which have appeared in the technical press, it may be said as of the virgins of the parable, that some are wise and some foolish. The optimists have waved the whole subject aside and contented themselves with the assertion that steel skeleton frames would last a thousand years, if necessary, and that when the buildings into which they enter are pulled down—as they ultimately must be, since the fashion of this world passeth away—every pound of material would be found intact and as good as the day it was made. The pessimists, on the other hand, have shaken their heads and speculated as to rust and electrolysis and brittleness induced by vibration, and have amused themselves and those who listened to them by oracular prophecies that some day it would be found that hundreds of thousands of millions, more or less, have been invested in superstructures resting upon nothing more substantial than rust piles and mortgages. We are not sure that there has not been some speculation as to whether there is not some sort of cimex, or microbe, capable of acquiring an appetite for architectural steel, which will so far adapt itself to its new environment as to take a hand, so to speak, in punching skeleton frames full of holes. Between these confident extremists have stood the great mass of conservative and practical people, who have admitted that steel skeleton frames were an experiment, but that steel was the best material for frames yet found, and that its use in architecture represents the present "state of the art"—which is equivalent to saying that we are using the best material we have in the best way we know. What experience may teach us we shall know when we have learned it; meanwhile it is not necessary to lose sleep speculating as to whether steel frames will last only as long as the buildings they are in, or a good deal longer.

Rust Protection.

However, the question is one of both technical and practical interest, and any facts of value bearing upon it merit attention. The subject of rust protection was discussed in some detail in a lecture lately delivered before the School of Architecture in the University of Pennsylvania, by William Copeland Furber, C.E., which he has digested for *Insurance Engineering*. That his views are of the kind well calculated to challenge attention and provoke controversy may be judged from the following sentence, which serves by way of introduction: "The present architectural design of buildings in which an iron frame is used for supporting the masonry is the cheapest form of dissimulation, and we can imagine the disgust with which our successors in years to come will regard the work of the present generation." We imagine that Mr. Furber's indignation is aroused less by the steel frame, which serves an extremely useful purpose and represents the best possible constructive use of the material, than by the shams and pretenses of a style of architecture applicable to *façades* in which the console, dentil, pediment, column, &c., all of which once meant something and had a function, are used as incidents in a scheme of decoration which violates all the canons of art. But art is long, as has been sententiously remarked in familiar verse, and whether the architecture of the steel frame building of to-day is a hollow sham or not may be left to those who forget that they wear vests with cloth fronts and muslin backs; and that the buttons on the skirts and sleeves of their coats are mere survivals of long discarded utilities in masculine raiment. The question of deterioration from rust is of vastly more practical importance, and this should be considered as carefully as the facts available permit. The covering of steel members leaves us dependent very largely upon theoretical deductions, and as comparatively few steel frame structures have been pulled down we really know very little about the condition of frames put into use at any time within the past ten years or so.

As Mr. Furber points out, the rusting of iron or its variants depends upon the co-ordinate action of three agents: water, an acid and oxygen. If we can break up this combination in any way we have stopped rusting effectually. To keep water in all forms away from iron is difficult so long as it is in the ground and works up through walls by capillary attraction. Oxygen will go wherever air can penetrate, and will usually carry more or less water with it, or find it there. The water is reasonably certain to be more or less acidulated, and we thus have the trinity of destructive agents, like the poor, with us always. But by neutralizing the acid the combination is broken and rusting cannot take place. Chemically this line of reasoning is all right, but its usefulness in the case under consideration depends upon its application. Mr. Furber is of the opinion that rust proofing a structure is really a very simple matter, since we have a material available for use in connection with steel frames which possesses the property of rendering harmless for purposes of deterioration any water which may reach them. This is Portland cement, which, being a product of lime, furnishes an admirable base for any acid which may work its way to the steel, and so renders rusting impossible. To secure the best results the metal should be clean and the concrete of Portland cement and sand in intimate contact with it. The cleanliness required consists in freedom from mill scale and incipient rust, and from paint. Mr. Furber is of the opinion that "in time to come specifications will require that all metal work shall have the surfaces cleaned with the sand blast, so that the covering can be applied directly to the metal and not to the scale or skin, which usually covers it when it is received from the rolling mills." On this point we think he is mistaken, but that is unimportant. His practical directions will have interest for engineers doing this class of work:

> After the surface of the metal work is clean, it is best, if possible, to cover its surface with a simple mixture of Portland cement and sand, but as this is not always practicable, a close contact can be made by using a concrete made with a liberal proportion of mortar and the aggregate or filler in small pieces, ranging in size from particles as large as a pea to those which will just pass through a ¾-inch ring. If the material forming the aggregate is larger than this it is apt to bridge over voids and prevent the ramming of the concrete into a solid, homogeneous mass. The rate of expansion from heat being practically the same in iron and cement, if the contact is properly made between them they will act together thereafter, so that success in this rust protection demands that the work be done right in the first place.

Protection in Foundations.

These directions would seem to apply to steel members in the foundation courses. For the protection of external columns and girders which are liable to be reached by moisture and air which will work through stone and brick walls, he recommends protecting envelopes of Portland cement concrete, which is best secured in place by a fabric of wire netting of small mesh, with juxtaposed edges bound together. The concrete material is then molded in temporary boxes, which are removed when the setting is completed.

This method of treatment is simple and relatively inexpensive, and has much to commend it to favorable consideration in all kinds of structures which have any claim to be classed as monumental architecture. It has the further advantage of imparting to steel members to which it is applied a high degree of fire resisting power. It requires employment in a very different way from that recommended for rust prevention if absolute fire proofing is sought, which it seldom is. Experience has shown that such a thing as a fire proof building, if possible, would be uncomfortable and undesirable for occupation, and that what the underwriters recognize as "slow burning construction" is practically better.

SALISBURY CATHEDRAL has the peculiar feature of containing the same number of windows as there are days, as many gates as there are moons, and as many marble pillars as there are hours in the year.

COMPUTING SIZES OF TRUSS MEMBERS.

By F. E. KIDDER, Consulting Architect.

THE safe and proper dimensions of any member* of a truss cannot be fixed with any degree of accuracy until the stress which the maximum load on the truss will produce in that member is known. The method of determining the stresses in simple trusses, symmetrically loaded, has been explained in the recent issues of this journal, and we will now endeavor to show how to proportion the members to the stresses.

In a well designed truss every member will be either in tension or in compression, and some of the members may also be subjected to a transverse or cross strain. This gives us four kinds of members—namely:

TIES, which are in tension only.

STRUTS, which are in compression only.

TIE BEAMS, which are subject both to tension and cross strain.

STRUT BEAMS, subject to compression and cross strain.

In computing the size of any one of the above the first step should be to determine the least area of cross section required to resist the stress, and then increase the size of the piece sufficiently to allow for bolt holes and for making practical connections at the joints.

The following rules and tables will enable the reader to determine the least net sectional area of any member:

Ties.

RULE 1. To find the net or least sectional area of a tie divide the stress in pounds by the following values and the answer will be in square inches:

White pine	1,400
Spruce	1,600
Norway pine	1,600
Oregon pine	1,800
Long leaf yellow pine	2,000
Wrought iron	12,500
Steel	15,000

The strength of a tie is not affected (theoretically) by its length nor by the shape of the cross section.

Thus, if the net area required in a wooden tie is 12 square inches the tie may be made either 3 x 4 inches, or 2 x 6 inches, or 1 x 12 inches. The 2 x 6 or 1 x 12 shape, however, will be better for making the connection at the joints. If the material composing the tie were perfectly homogeneous from end to end the strength would not be affected by the length, and in computing the size of wrought iron or steel ties the length is not usually taken into account. In a timber tie a long piece of timber would generally contain more knots than a shorter piece, and in this way its strength be reduced. When rods are used for ties the size of the rod may be determined directly from the following table:

Safe Loads for Round Rods of Wrought Iron and Steel.—Table I.
(Based on 12,500 pounds per square inch for iron and 15,000 pounds for steel.)

Diameter of rods. In inches.	Rods not upset. Wrought iron.	Rods not upset. Steel.	Rods with raised threads or upset. Wrought iron.	Rods with raised threads or upset. Steel.
½	1,570	1,884	2,453	2,944
⅝	2,453	2,944	3,835	4,600
¾	3,750	4,500	5,520	6,627
⅞	5,250	6,300	7,516	9,020
1	6,780	8,140	9,815	11,780
1⅛	8,570	10,290	12,425	14,900
1¼	11,060	13,270	15,330	18,400
1⅜	13,370	16,050	18,550	22,260
1½	16,080	19,300	22,080	26,500
1⅝	18,750	22,500	25,910	31,090
1¾	23,000	26,400	30,060	36,070
1⅞	25,250	30,300	34,500	41,400
2	28,500	34,200	39,270	47,130
2⅛	33,000	39,600	44,320	53,190
2¼	37,500	45,000	49,700	59,680
2⅜	41,870	50,250	55,370	66,450
2½	46,500	55,800	61,350	73,620

Struts.

The resistance of a strut, unlike that of a tie, is affected by its length, and consequently the method of determining the safe strength of a strut is much more complicated. By means of the following table, however, one can find the necessary size of strut to use for almost any stress or length that would occur in ordinary wooden trusses. No additional resistance should be allowed for lengths less than those for which values are given in the table.

Maximum Safe Loads for Wooden Struts, in Pounds.—Table II.

Struts of white pine or spruce.

Size in inches.	Length in feet. 6	8	10	12	14
2 x 6	4,900	3,040	....	....	....
2 x 8	6,540	5,390	....	....	....
3 x 6	8,650	7,790	6,930	....	....
3 x 8	11,540	10,390	9,240	....	....
4 x 4	8,270	7,690	7,120	6,540	....
4 x 6	12,400	11,520	10,550	9,800	8,700
4 x 8	16,540	15,390	14,240	13,080	11,930
4 x 10	20,640	19,240	17,800	16,360	14,920
6 x 6	19,900	19,080	18,216	17,352	16,490

Size in inches.	Length in feet. 8	10	12	14	16
6 x 8	25,440	24,290	23,140	21,980	20,830
6 x 10	31,800	30,360	28,920	27,480	26,040
8 x 8	35,450	34,300	33,150	32,000	30,850
8 x 10	44,320	42,480	41,440	40,000	38,560
8 x 12	53,180	51,450	49,730	48,000	46,270
10 x 10	62,500	55,400	53,960	52,520	51,080
10 x 12	75,000	66,480	64,800	63,000	61,300
12 x 12	....	90,000	79,780	78,000	76,320
12 x 14	....	105,000	93,170	91,050	89,000

Struts of Oregon pine (Douglas fir) and long leaf yellow pine.

Size in inches.	Length in feet. 6	8	10	12	14
2 x 6	7,680	6,240	....	....	....
2 x 8	10,240	8,820	....	....	....
3 x 6	13,680	12,240	10,800	9,360	....
3 x 8	18,240	16,320	14,400	12,480	....
4 x 4	13,120	12,160	11,200	10,240	9,280
4 x 6	19,680	18,200	16,800	15,360	....
4 x 8	26,240	24,300	22,400	20,480	18,560
4 x 10	32,800	30,400	28,000	25,600	23,200
6 x 6	31,680	30,200	28,800	27,400	25,900

Size in inches.	Length in feet. 8	10	12	14	16
6 x 8	40,300	38,400	36,500	34,600	32,600
6 x 10	50,400	48,000	45,600	43,230	40,800
8 x 8	64,000	54,400	52,500	50,600	48,600
8 x 10	80,000	68,000	65,600	63,200	60,800
8 x 12	96.000	81,600	78,700	76,800	73,000
10 x 10	....	100,000	85,600	83,200	80,800
10 x 12	....	120,000	102,700	99,800	97,000
12 x 12	....	....	144,000	123,800	121,000
12 x 14	....	....	168,000	144,500	142,800

Tie Beams and Strut Beams.

Determining the size of a tie beam or strut beam involves two computations—finding the size of beam to resist the cross strain, and, second, the sectional area required to resist the tension or compression, and then adding the two together.

To Find the Size of Beam to Resist the Cross Strain.

RULE 2. When the load is distributed over the whole length of the beam: Assume the depth, multiply the length, or span, in feet by the load in pounds and divide by twice the square of the depth multiplied by the constant given below. The answer will be the breadth of the beam in inches.

If the load is concentrated at the center of the span multiply by 2 and proceed as above.

If the load is concentrated at one-third of the span multiply by 1.78, if at one-fourth of the span multiply by 1.5, and if at one-fifth of the span, by 1.28.

Constants for Transverse Strength.

White pine	60
Norway pine	70
Spruce	70
Oregon pine	90
Long leaf yellow pine	100
Texas yellow pine	90

Example I.

The application of the above rules to tie beams will be more clearly shown in connection with the following example, where we will determine the size of the members in the truss shown by Fig. 1 of the September number. The stresses in this truss are given in Fig. 6 of the October issue.

Rods.

The stress on the center rod is 9100 + 1989, or 11,089 pounds. Assuming that the rods will be of wrought iron with the screw thread cut from the body of the rod, we find from Table I that a 1¼-inch rod has a safe strength

* The pieces of wood, iron or steel composing a truss, and extending from one joint to another, are called "members." Bolts or straps used in making joints and superfluous pieces are not included in this term.

of 11,060 pounds, or 29 pounds less than the stress. As a large allowance was made for wind and snow in the roof loads we may safely use the 1¼-inch rod. The short rods E and H, Fig. 6, have a stress of 1930 pounds each, which will require a ⅝-inch rod.

Struts.

The lower portion of the main strut or rafter has a stress of 21,300 pounds, and is about 10 feet long between the joints 1 and 2. Supposing the wood to be white pine we find from Table II that a 6 x 8 timber 10 feet long has a safe resistance of 24,290 pounds, hence this size will answer for the rafter. The stress in the upper half of the rafter is not as great as in the lower portion, but on account of the construction of the joints it will be much better and about as cheap to make the rafters 6 x 8 for their full length, rather than to use a smaller section for the upper portion.

The braces E F and G H have a compressive stress of 6900 pounds each, and are of the same length, 10 feet.

From Table II we find that a 4 x 4, 10 feet long, has a safe resistance to crushing of 7120 pounds, but as it will be better to have the brace of the same width as the rafter we will make the braces 4 x 6 inches.

Tie Beams.

We now come to the tie beam. The direct tension in the tie beam is 16,260 pounds. By Rule I we find that the sectional area required to resist this tension is 16,260 ÷ 1400, or 11.6 square inches, or say, 12 square inches. This is equivalent to 1½ x 8 inches, or 2 x 6 inches.

The tie beam also supports the ceiling joists, and we must compute the sectional area required to resist the transverse strain.

As the tie beam is supported by the rods the span of the beam should be taken as the distance between two

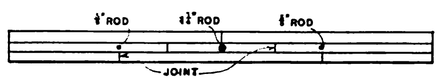


Fig. 1.—Plan of 6 x 8 Tie Beam, Showing Manner of Breaking Joints.

adjacent joints. In this case the longest span is from 6 to 7, or 7 to 8. This distance is 8 feet 6 inches. The load on this span will be the same as that at joint 7, or 1989 pounds. We determine the size of beam required to support this load by Rule II. Assume the depth as 8 inches. The span multiplied by the load (8½ × 1989) = 16,907. Twice the square of the depth multiplied by the constant for white pine (2 × 64 × 60) = 7680. 16,907 divided by 7680 = 2¼ inches, nearly. Hence, to resist the cross strain will require a beam 2¼ x 8 inches. As we found that it will require 1½ x 8 inches to resist the direct tension the beam must have a sectional area equal to their sum, or 3¾ x 8 inches. It is desirable, however, that the tie beam shall be as thick as the rafter, on account of making a good joint at the support. We will therefore see if a 6 x 6 will answer.

Assuming the depth as 6 inches we would have for our divisor, under Rule II. 2 × 36 × 60 = 4320. This is contained in 16,907 3.9 times, or practically 4 inches. Our area of 12 square inches to resist tension is equal to 2 x 6 inches, hence a 6 x 6 inch timber will just answer for the tie beam. If we use this dimension, however, the tie beam cannot be spliced, but must be in one piece, 34 feet 4 inches long. If a timber of this length cannot be readily obtained we must increase the size to 6 x 8 inches, and build the beam of three thicknesses of 2 x 8 inch planks, breaking joint as shown in Fig. 1, and spiked and bolted together. This gives a net area between the rods of 4 x 8 inches, which we found was sufficient, and opposite the center rod of 2⅝ x 8 inches. As there is no cross strain at the joints we there require only sufficient area to resist the direct tension.

When tie beams are built up it is very important to arrange the joints of the planks so that the net area will be everywhere sufficient to resist the strain and to give space for enough bolts and spikes to transmit the strain from one set of planks to another. It is always best to use a single stick for the tie beam whenever practicable.

After the size of all the truss members has been determined they should be put on the figured truss diagram shown herewith in Fig. 2, which is Fig. 6 of the October issue with the sizes of members added. This gives all of the data for the truss, except the details of the joints, which will be considered in another article.

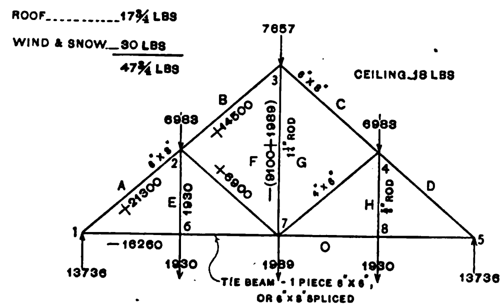


Fig. 2.—Truss Diagram Completely Figured.

Computing Sizes of Truss Members.

The Missouri Building at the St. Louis Exposition.

The building which the State of Missouri will erect at the coming St. Louis Exposition will be a permanent structure, and after the fair will be utilized as a museum for relics of the Louisiana domain. The site selected by the Missouri State Commission is now heavily wooded with oak, hickory and other forest trees. Not a single tree will be molested, except where the necessities of foundation and walks demand the sacrifice. The trees will be preserved to serve as a background and a foil for the architectural embellishment of the edifice, which will be in the style of the French Renaissance, which is the characteristic style selected for the exposition. The building, which was designed by Director of Works Isaac S. Taylor, is of the shape of a long parallelogram, with a center wing extended to the rear. It will be two stories in hight and will have a basement story.

The two side wings of the three which branch from the main rotunda will have a corridor the full length of the wing, with rooms on either side, large and spacious and capable of being used either as reception or exhibit rooms. The hight of the stories gives them a monumental appearance, and permits a thorough illumination and ventilation.

A great dome crowns the center, and the second story is formed into a balcony opening the view from the level of the first floor to the ceiling of the dome. Sixteen columns will carry the balcony of the second floor, and, following the plan of the dome, will carry the perspective from the floor line to the vault of the dome.

The interior of the dome will be covered with Missouri lead and zinc. The rotunda is to be finished in the marble and onyx so abundant in Missouri, and the most delicate mosaics can be used in this construction, as there will be perfect protection from the weather. There will be no plastering in the rotunda. Walls, columns and dome will show the original materials in their most highly finished state.

In the finish of the interior the beautiful woods produced by the forest of the State will be exclusively used. Oak, walnut, sweet gum, elm, yellow pine, maple, ash and many others, highly polished in their natural state, will be used. The chandeliers will be of Missouri iron, and the floor of the rotunda of Missouri marble. The building will be fire proof.

Benefits of Membership in a Builders' Exchange.

In view of the activity which has prevailed in building circles in all parts of the country, and the extent to which Builders' Exchanges have been organized in the leading centers, it is interesting to note the views of a prominent member of one of these organizations regarding the benefits which are to be derived from an association of builders. Edward A. Roberts, the genial secretary of the Cleveland Builders' Exchange, has recently expressed some very interesting views on the subject, which we present for the consideration of contractors and builders generally.

The benefits to be derived from a well organized and properly managed Builders' Association are twofold, and may be considered primarily under two heads, direct and indirect. When reputable contractors and dealers in materials in any given community come together in a central body for an interchange of business among themselves and confine their trade to each other, the benefits are directly shown in dollars and cents. When they adopt rules and regulations elevating their business and condemning evil practices, or gather around the banquet table to discuss subjects of mutual interest, the benefits may be classed as indirect, and yet they are none the less real.

Whether one is or is not benefited by belonging to a Builders' Exchange depends largely upon the individual. True, the usefulness of the organization is an important factor, but unless a member goes in to make it pay and exerts himself to get what there is in the organization for him, he is likely to be disappointed. I have known new members to put in their application and then loll back in their office chairs expecting silver and gold to pour into their tills through the medium of their membership, and the silver and gold failing to come, regard their connection with the association as of no value.

It is the member who hustles a little while he waits, taking advantage of the opportunities the organization gives him to meet those with whom he would do business, visiting the exchange and keeping in touch with building operations, who properly values his membership and would not surrender it for many times its cost. Joining an exchange is much like joining a church. If you never attend you cannot expect to be benefited much by the preaching.

To contractors the following benefits suggest themselves to me as among the most important to be derived from a well regulated builders' association.

United action in times of labor trouble affording mutual protection and uniform wage scales.

The maintenance of a central meeting place where business can be facilitated and extended and appointments kept.

The fostering of helpful legislation and the defeat of hurtful legislation by standing together and making desires known.

The upbuilding of the trades, inculcating just principles of dealing between contractors and other branches of the building industry.

The settlement of disputes through a Committee on Arbitration, avoiding expensive litigation and bitter feeling.

The broadening of ideas through frequent business meetings.

The cultivation of the social side of life through numerous entertainments and dinners.

To the foregoing may be added the maintenance of a library of builders' publications; the convenience of private figuring rooms and telephones, and many other minor advantages which come to those who band together in an exchange to make it pay.

To material dealers some of the practical benefits are: The opportunities afforded to meet contractors and extend acquaintance with them; the aiding of enterprises for the upholding of the community and the improvement of building laws; co-operation in times of trouble in the building trades; the securing of pointers on new work coming from the architects' offices; the conveniences of the rooms and the chances for social development along business lines.

Concrete in Building Construction.

A great deal of attention is just now being given to the use of concrete in building construction and everything pertaining to the method of doing the work is perused with more than usual interest. There have occurred a number of instances recently where concrete has been employed with marked success in the construction of buildings intended to be used both for manufacturing and business purposes. In one instance the framing for the concrete work was built up of scantling 3 x 6 and 3 x 8 inches, with 1½-inch boards used for the concrete facing. The frames for the two sides of the wall were built up together and bolted through the uprights, the concrete being filled in between as the frame work rose. When the concrete work was completed the frames were taken down, the bolts removed and the holes filled with cement mortar. In this way the material in the frames and forms was used many times over.

In this particular instance the proportions of the materials used were 1 part Portland cement, 4 parts sand, 8 parts crushed stone and 2½ parts rough stone, 1 barrel of cement making 1.35 cubic yards of concrete. The walls were left rough as they came from the forms, except about the windows, which were finished off with cement and sand. A good finish can be given by plastering the surface with a mortar composed of 1 part Portland cement and 3 parts fine, sharp sand. In putting up walls of concrete the thickness naturally varies with the hight. In one case a wall 45 feet high was 17 inches thick for the first 30 feet and 12 inches thick for the remaining distance, while others 16 to 25 feet high ranged from 10 to 12 inches in thickness.

In another instance, where the buildings was to be used as an electric power plant, cement concrete was used throughout the structure. The proportions were 1 part Portland cement, 2½ parts sand and 4½ parts broken stone for the piers and arches of the chambers in which the turbine wheels were placed, also for walls and their foundations and for the finishing layers of floors. The walls were made of concrete blocks laid in ashlar masonry, the blocks being molded in boxes and allowed to remain until set. Water tables, cornices, window courses and other special forms were molded separately to give them their full architectural effect. The roof was of concrete, re-enforced with expanded metal, covered with asphalted paper and slag concrete. The outer casing of the chimney, which was 175 feet high, was of concrete with an inner lining of brick.

In building chimneys a special mold is used for putting the concrete in place. The mold is circular in form, one part encircling the chimney on the outside and the other being parallel to it on the inside. A scaffolding is erected inside the chimney to support vertical beams which extend about 5 feet above the top of the mold when it is at its lowest position and from which the mold is hung. After being put in place the two sections of the mold are tightened by turnbuckles and the concrete is deposited between them. After the concrete is set the turnbuckles are loosened and the form raised about 5 feet by means of wheels turning on threads on the supporting rods, after which the mold is clamped again and another section of the chimney made.

In the case of a church in Brooklyn constructed of concrete, the Ransome system was used, this consisting of twisted steel bars imbedded in the concrete to give additional strength. The rods ran both vertically and horizontally, and the concrete was deposited in molds about movable wooden core pieces, making a hollow wall. Strips were nailed on the molds to produce the effect of joints, and the desired face was given to the stones by the form of the surface of the mold, the finish being produced by the use of tools after the concrete had hardened.

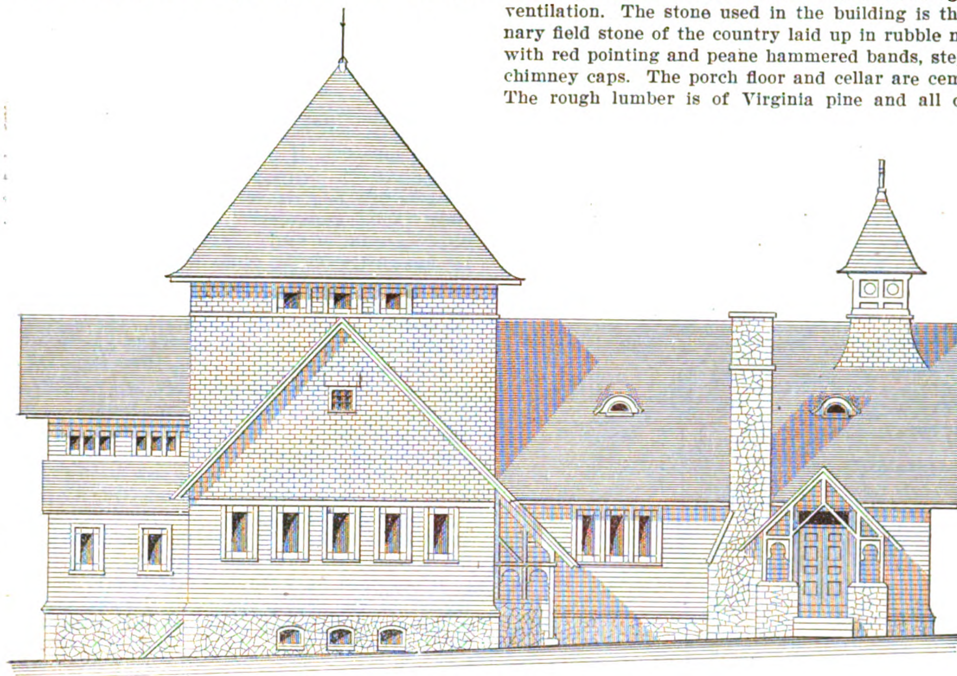
CHAPEL AT BLUE RIDGE SUMMIT, PA.

(WITH SUPPLEMENTAL PLATES)

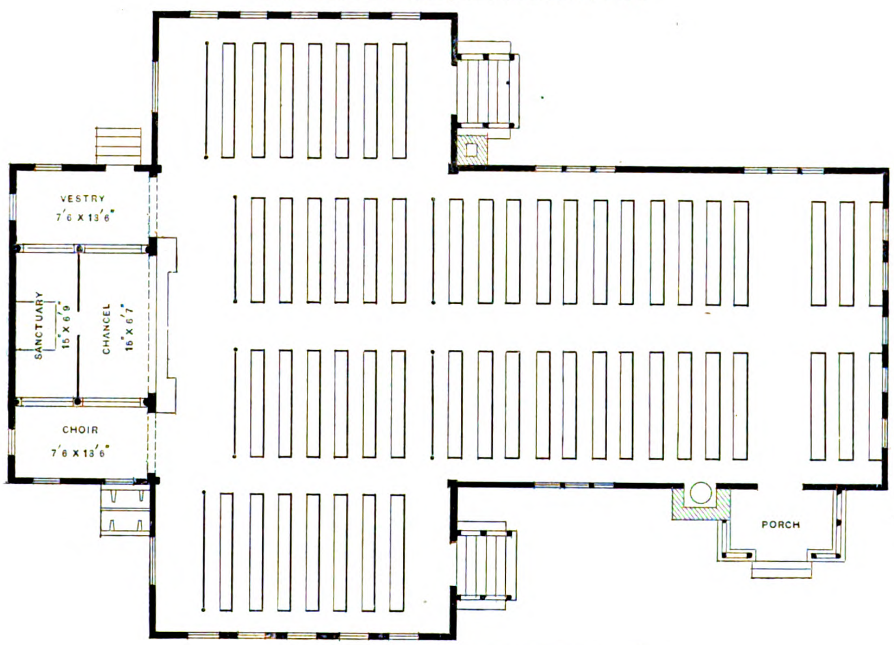
WE present in one of our supplemental plates this month an exterior view of the Chapel of the Transfiguration at Blue Ridge Summit, Pa., about 20 miles from the city of Gettysburg. On this and the following pages are shown the elevations, floor plan and some of the constructive details. The chapel was designed to meet the requirements of a mountain district, and its adaptability for the purpose may be judged from a study of the half-tone engraving, which was made from a photograph taken especially for our purpose.

Some eight years ago the nave portion and chancel were erected, but it was soon found that for the large summer congregation of the region the building was too small. It was, therefore, decided to enlarge it by moving back the chancel portion, building the transepts and constructing a square center tower for the sake of light and ventilation. The stone used in the building is the ordinary field stone of the country laid up in rubble manner with red pointing and peane hammered bands, steps and chimney caps. The porch floor and cellar are cemented. The rough lumber is of Virginia pine and all outside work No. 1 cypress with feather edge, narrow and unplaned weather boarding. The shingles on the walls and roofs are Bangor white cedar, and were soaked in boiled oil before being laid. The same dressing was also applied to the weather boarding and outside work. The windows, doors, &c., are of cypress, the window sash being pivoted. The roof timbers are dressed Georgia pine.

The interior walls and ceiling are dressed Virginia



Front Elevation.—Scale, 1-16 Inch to the Foot.

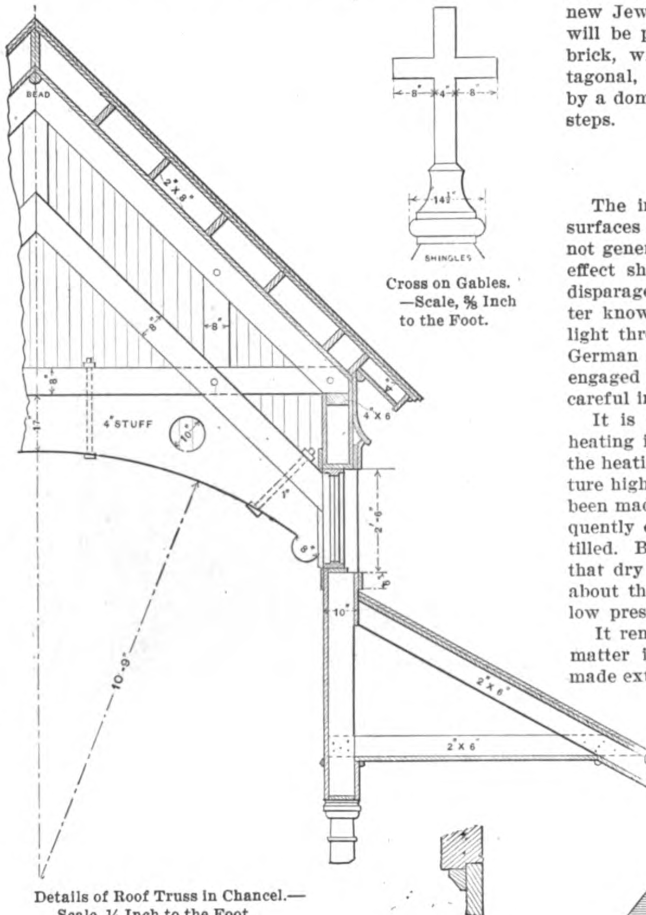


Floor Plan.—Scale, 1-16 Inch to the Foot.

Chapel at Blue Ridge Summit, Pa.—Ghequier & May Architects, Baltimore, Md.

pine, tongued, grooved and beaded. The pews are of Georgia heart lumber. The interior is finished in one coat filler, and one coat hard oil darkened for the timbers.

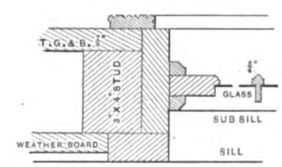
The architects of the entire building were Ghequier & May of 227 St. Paul street, Baltimore, Md., and the contract was executed by D. W. Hess of Waynesboro, Pa. The cost of the original nave and chancel portion approximated $2000, while a similar sum was expended in building the transepts and the center tower.



Details of Roof Truss in Chancel.—Scale, ¼ Inch to the Foot.

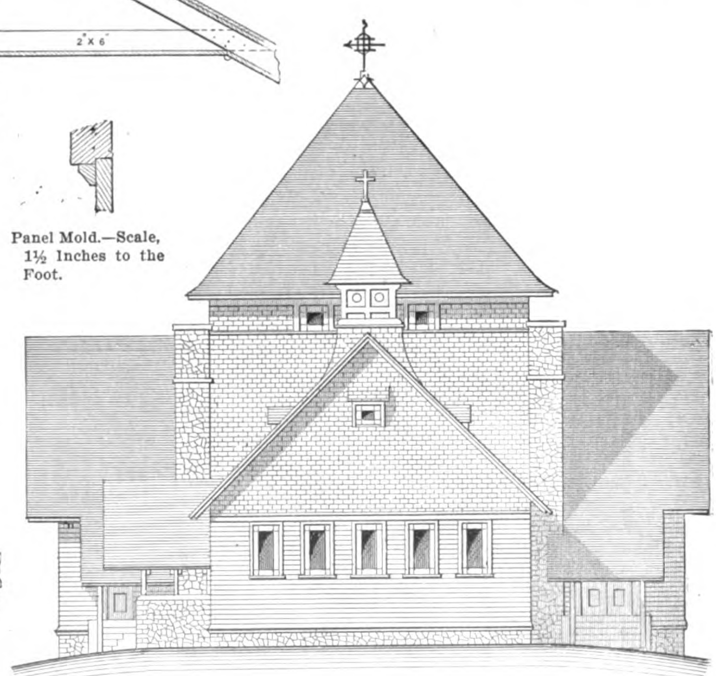
Cross on Gables.—Scale, ⅜ Inch to the Foot.

Panel Mold.—Scale, 1½ Inches to the Foot.



Horizontal Section through Window Frame.

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



End Elevation.—Scale, 1-16 Inch to the Foot.

Chapel at Blue Ridge Summit, Pa

DESPITE the war the building trade in South Africa is by no means at a standstill. The new City Hall at Capetown is steadily approaching completion. The contractors for the granite work required have recently made a shipment, consisting of a number of huge columns 16 feet 6 inches in length and 2 feet 3 inches in diameter. These are of red Scandinavian granite, and are magnificent specimens of turning. At Kimberley a new Jewish synagogue is in course of erection. This will be purely Byzantine in style, and will be built of brick, with cement dressing. The interior will be octagonal, the ark situated in the east being surmounted by a dome ceiling, and approached by a flight of marble steps.

Dust Causes Impure Air.

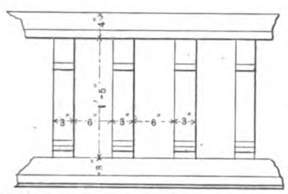
The influence of the dust deposited upon radiating surfaces on the purity of the air passing over them has not generally received the consideration which the final effect should secure for it. This has often led to the disparagement of some heating apparatus which a better knowledge of the cause would have avoided. The light thrown on the subject by the investigations of a German engineer should be of advantage to all who are engaged in heating with warm air. The results of his careful investigations are presented as follows:

It is well known that when a chamber system of heating is started in the fall a bad odor is noticeable in the heating rooms, whether the surfaces have a temperature higher than 212 degrees or not. Many guesses have been made as to the cause of this. The reason most frequently offered was that the air was burned or dry distilled. But this answer must be rejected, for the reason that dry distillation can only take place at temperatures about three times as high as those attained in modern low pressure steam or hot water heating.

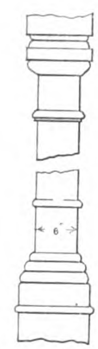
It remained for a German professor to look into the matter in the usually thorough German fashion. He made extensive investigations and tests of the dust gathered from the radiators in city residences and school rooms, and has evidently solved the problem. This investigation showed that the very fine carefully gathered dust is composed principally of horse manure, the presence of which is easily explained. This manure is ground into fine dust by the traffic and carried by the moving air and the shoes and clothes into the heating chambers and rooms, and naturally settles on the radiating surfaces.

It was further discovered that the dust taken from cold radiating surfaces had a large percentage of moisture, which is also easily explained. In view of the fact that this dust is composed largely of organic matter, and being highly hydroscopic, it is enabled to absorb large quantities of moisture. Last, but not least, the dust was found filled with micro-organisms. When these dust covered surfaces are slowly heated the moist manure, owing to the micro-organisms, will give off ammonia, which, on the one hand, gives to the air an unpleasant odor, and, on the other hand, has a bad effect on the mucous membranes of the people in the room. This would account for the belief that dry distillation of the air takes place, as the effect is quite the same. After a longer period of heating the moisture contained in the dust is withdrawn and the micro-organisms die. The evaporation of ammonia ceases, and with it the disagreeable effects noted above.

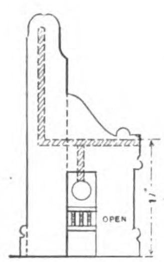
To avoid these altogether it is necessary to provide all heating surfaces with means for being properly cleaned and freed from dust before the beginning of any period of heating. It is further recommended to use only such radiation as is easily kept clean. Pin indirect or other extended surface radiation, and such sectional cast iron radiators as have the sections closely shoved together to save space, should be looked upon as unsanitary.



Details of Chancel Railing.—Scale, ½ Inch to the Foot.

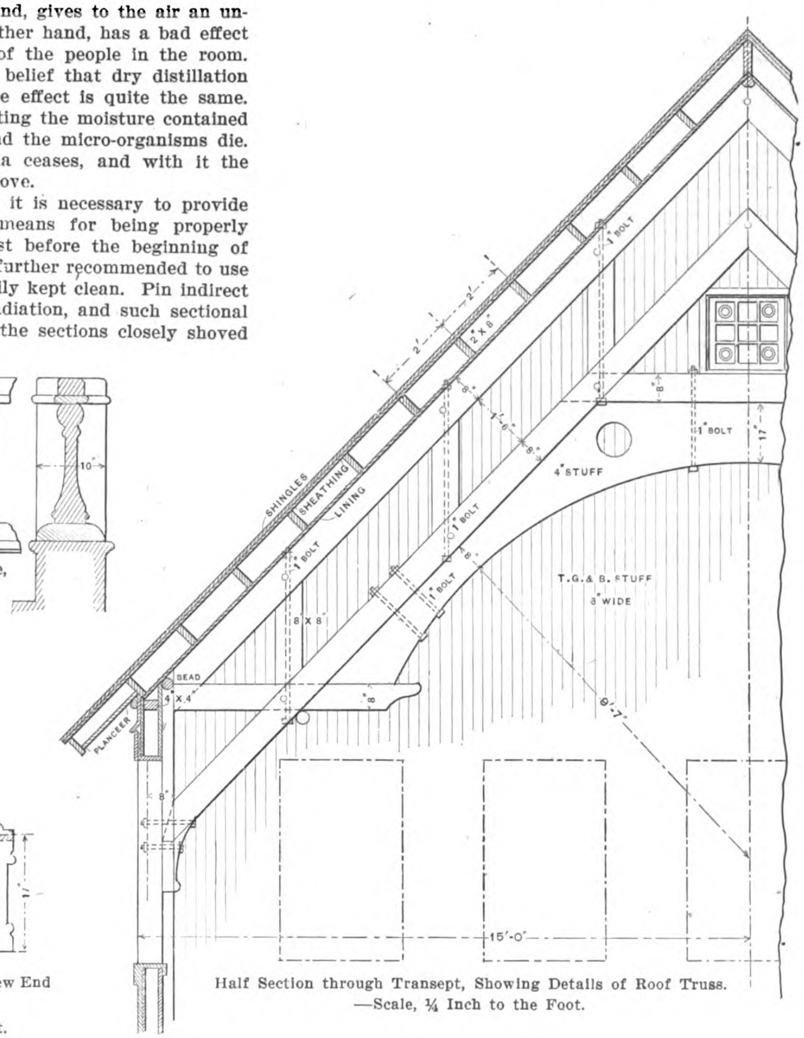


Detail of Chancel Column.



Elevation of Pew End

Scale, ½ Inch to the Foot.



Half Section through Transept, Showing Details of Roof Truss.—Scale, ¼ Inch to the Foot.

Chapel at Blue Ridge Summit, Pa.

Hot Water or Steam for Heating.

In discussing the relative advantages of a steam or hot water heating plant a writer in the *Rays of Light* presents the following:

One of the points not credited to the water system is the fact that the hot water can be carried lower than the water line of a steam plant, which in many cases is a valuable point, as the boiler or heater can be located in one of the rooms to be warmed, thus saving all the heat that the fuel produces. The question is sometimes asked, "Which is the better for heating apparatus, steam or hot water?" This question cannot be answered positively or in a word.

First, the matter of expenditure. The first cost of steam heating apparatus is somewhat less than that of hot water, owing to the fact that for hot water circulation larger pipes are required, especially for the returns; and also a larger amount of radiating surface is commonly, though not necessarily, used to compensate for the lower temperature at which hot water apparatus is usually operated. If the matter of first cost then is the most important factor, the decision must be in favor of steam.

On the other hand, the cost of fuel is an important consideration. This is in favor of hot water apparatus, especially where low temperatures are used. There are two reasons for this economy of fuel, the first being that in the fire box of a hot water boiler the products of combustion are in contact with the fire surface, which is at a temperature considerably lower than is the case when in contact with a similar surface of a steam boiler, say from 20 to 50 degrees less; from which it results that the products of combustion part with proportionally just so much more heat to the boiler, and are discharged into the chimney at a much lower temperature, with a corresponding less waste of heat. The second reason is that in consequence of the high specific heat of water, heat from the fire not immediately wanted can be stored up in the apparatus to be given out later as required, instead of being wasted in the chimney.

As to the danger of freezing, preference is to be given to a steam apparatus. It is undeniably true that if a hot water apparatus is neglected so that the fire is extinguished and any part of the apparatus is allowed to fall below 32 degrees F., such part of the system will be frozen and probably destroyed; and a similar result will happen if any radiator of such apparatus is entirely shut off and then exposed to extreme cold. This point militates against the use of a hot water apparatus in office buildings where part of the offices may be unoccupied, and so also in country houses, where indirect radiators which are thoughtlessly closed may be exposed all night to extremely cold weather; a hot water apparatus must be used with caution, while the steam system under similar conditions is less liable to freeze and break radiators.

If hot water be adopted it should not be forgotten that there is a justly raised objection to its use from the slow way in which radiators cool when shut off. The radiator is usually shut off when a room is too warm, and this is naturally just the time when it is desired to cool it quickest. Owing, however, to the high specific heat of water it takes an hour or two for it to drop to the temperature of the room, and heat thus retained gives annoyance or is wasted. If steam is used the radiators cool more quickly, for the steam in them is rapidly condensed and the only heat they hold is that of the iron, of which the specific heat is low compared with water; and all the radiating surface when shut off, therefore, ceases giving heat much more rapidly.

Hot water requires less skill and care in operation, as it dispenses with the gauge, gauge cocks, &c., and there is no water line in the boiler to be maintained or over pressure to be guarded against. In fact, the manipulation of a hot water boiler is almost exactly like that of a furnace. That is, if one wants more heat the fire is quickened, or if less heat is needed the draft is closed and the force of the fire checked. A hot water apparatus is usually left to the care of the ordinary house servant without apprehension of inconvenience or danger. It should be said, however, that a steam apparatus is just as easily controlled after the person in charge has been instructed and cautioned.

A Large Electric Power House.

Some idea of the magnitude of the new power house which is to furnish electricity for the elevated roads in New York City may be gained from the statement that the structure is 580 feet in length, 204 feet in width and required in its construction 6000 tons of iron and steel. It is located at Seventy-fifth street and the East River and embodies the most modern devices for producing an enormous current at a minimum cost. Its four chimney stacks rise 278 feet above the ground. The walls and floors of the main rooms are of white tile, thus adding materially to the impression of strength and cleanliness which ones get from an interior view of the building. The rooms for the engineers are on the second floor commanding a view of the dynamo room. For the public there is a reception room, from which a view of the machinery may be obtained. Elaborate conveniences, including shower baths, have been provided for the employees.

There are eight dynamos, which are expected to furnish a total of 100,000 horse-power, each dynamo being literally as big as a small house, the ring measuring 42 feet in diameter and weighing about 100 tons. The entire weight of each dynamo is estimated to be about 450 tons. The steam power required for the plant is generated by 64 boilers heated by 64 furnaces, fed automatically from coal bunkers at the top of the building holding 15,000 tons of coal.

Besides the power house at Seventy-fifth street there are seven substations in convenient parts of the city which serve to reduce the current, which is sent out at a pressure of 12,000 volts, which has to be reduced to 500 volts before reaching the elevated road motors.

WE understand that the directors of the South Carolina Interstate and West India Exposition to be held in Charleston, S. C., from December 1, 1901, to June 1, 1902, have invited Harde & Short of New York City to place on exhibition their plans and models of improved tenement houses, which were given a prize medal at the Pan-American Exposition recently held in Buffalo. These drawings, we understand, include the plans of the large model tenement house the architects are now erecting in Avenue A, which is said to be the largest to be constructed thus far under the new law, and the plans prepared by the architects for the recent Tenement House Commission, showing the type of tenement houses and apartment houses possible for various size lots ranging from a frontage of 25 feet upward.

Warehouse Floors.

Probably the best arrangement of floors for a non-fire proof building for general merchandise storage, says E. C. Stetson of Minneapolis in a paper read at the recent convention of warehousemen at Buffalo, is what has been called the highest type of mill construction, in which only postline girders are used, the floor planking reaching in a continuous line from girder to girder and by virtue of its own stiffness holding the load. The floor planks are somewhat thicker, usually 4 to 6 inches, are tongue and groove matched together and are of double length reaching over two sections of floor so as to avail of the cantilever effect of the bending tendency.

The writer has devised a system of trussing by inexpensive sheet metal the entire under side of such floors which has been highly approved by some authorities and which is designed to increase the floor stiffness sufficiently to avoid the need of extra thickness, while it also adds to the slow burning quality of the building.

The wood now largely preferred for its strength and evenness of grain is Washington fir, which can be had for posts in almost any size timbers. It has within a few years been determined that a large augur hole bored through the center length of each post and heavy timber will result in the seasoning cracks running to the center, leaving the outside solid, and of course adding to the sightliness and strength of the structure.

It is often dangerous to cover with oil paint stringers and other construction timbers, because of the tendency to dry rot when the surface is thus sealed, and it has been a common experience in some parts of the country for the building inspector to make the startling discovery that some main supporting stringers so painted consisted of an inch shell with the entire center of dry punk. This condition never results, even where timbers were somewhat green when erected, if they are left unpainted, but where a more finished appearance is desired a coating of any of the several cold water fire proof paints or of whitewash will form a good surface, and at the same time add in a probably valuable degree to the slow burning qualities of your building. In this connection it is worth mentioning that these coatings are now easily applied by any large painter, with the use of a spray machine and at an expense for labor of less than one-third what it would be if done in the old way by hand and brush.

Vaporizing Gas Stoves.

Some persons complain, says a British architectural journal, that gas fires cause an uncomfortable dryness of the atmosphere of a room. A series of experiments has been conducted which proves that the atmosphere of a room is not rendered more dry by the use of a gas fire provided with a flue than by the use of a coal fire, and the experimenter is of opinion that the alleged dryness is always due to a trace of the sulphur compounds in the products of combustion escaping into the room through a defective flue. Where the flue is perfect and a strong up draft is maintained no such feeling of dryness is experienced. To meet all requirements, however, most of the gas stove manufacturers now manufacture a stove fitted with a well to contain water, the water being slowly vaporized by the heat from the fire. Vaporizing fires appear to be rapidly growing in popularity, and are very serviceable for sick rooms where a moist, warm atmosphere is required. A shallow pan of water placed in front of an ordinary incandescent gas fire may, of course, be used instead of a specially constructed vaporizing gas stove, but is not so convenient.

CABINET WORK FOR THE CARPENTER.

By Paul D. Otter.

SHOULD any of the many readers of this journal walk over the floors of some of our large furniture stores in the Eastern or Western cities much of interest would attract their attention. A careful examination of certain patterns would leave no doubt in the mind as to their ability to produce work on similar lines, provided a few suggestions or guiding points were given. Assisted by the accompanying illustrations the simplicity of construction and unbroken character of outline, as exemplified in a few pieces to which attention will be drawn, become at once apparent.

A commendable feature of the better patterns of present day furniture is the emulating of the sturdy character and simplicity of treatment of the old cabinet makers, and be it said here that our early American craftsmen created much that we of the present time are forced to admire.

It is true we have misapplied our efforts through the medium of modern tools, but would not the model maker of a furniture plant of to-day be staggered should an apparition of his brother craftsman of 1700 appear and rudely snatch away the power driven rip saw, jointer, band saw and back knife lathe, and insist upon the modern man using the tools employed in those days of yore! Should such be true and our twentieth century man begin his task under the old way, in the light of a great joke, is it unreasonable to suppose that long before he converted his log into boards the thought would come before him, as he curiously handled and inspected the heavy jack plane, that his would be no easy task in dressing his stock; but he sets to with a will to experience what those "old fellows" must have had to do before they could mark a line. While he catches his breath and wipes the perspiration from his face, a bright, rational idea comes to his mind and he says, "When I get this stock smoothed up I'll go over my drawings and leave out some of my 'gingerbread' work and make my detail subservient to the construction, an object for which it is intended," and then it dawns upon him that this must have been the idea of the mechanic 200 years back, when he produced the furniture we admire so much to-day. He did it in a direct way and confined his energies to beautifying only such places and parts as needed it the most.

The literature and history of the times have been very much directed to old Colonial landmarks and customs. This tendency has consequently created good prices for the few patterns of furniture that come by chance into the hands of the dealers and has created a demand for copies. A number of factories are therefore kept busy manufacturing with great faithfulness reproductions of "old antiques."

The mechanic, not necessarily a cabinet maker, can do much in furnishing part of his home with portable or built in furniture, if he will but observe the chaste, simple lines of the earlier workman. During the era of flashy, overestimated furniture, some years since, there prevailed an idea among craftsmen other than furniture workers that it was a special art and privilege to perpetuate those styles from which we have since turned. So it was, and we are glad of it, for such frailties soon went to pieces and had their short day.

It will be noticed by the aid of the few patterns shown that very little intricacy is attached in laying out necessary draft from which to work. For the hight of seats or tables refer to any standard piece of furniture about the house, allowance being made, of course, where a seat is to be upholstered, to build the frame less the thickness of proposed upholstered cushion. The same applies as to casters on chairs, couches or tables.

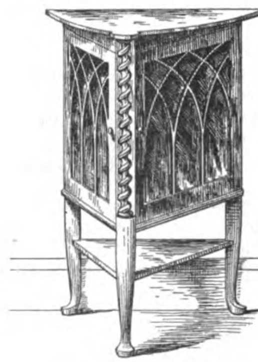


Fig. 2.—A "What Not."

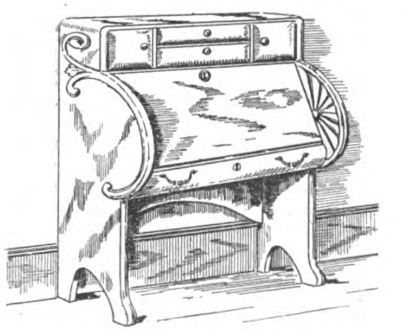


Fig. 1.—Home Writing Desk.

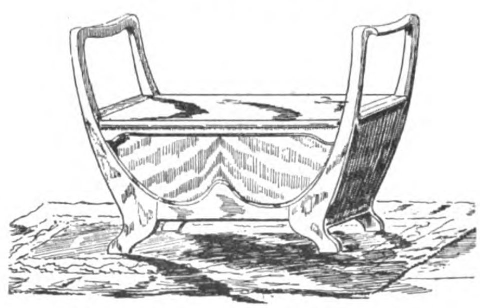


Fig. 3.—Hall Settle or Portable Window Seat.

Cabinet Work For the Carpenter.

Illustration, Fig. 1, showing the home writing desk is made on such simple lines that little explanation is needed. The carpenter, filling his much prized tool chest with easy moving drawers, is perfectly able to lay out the few drawers and compartments that are within a parlor writing stand. The slant front opens out and forms the writing table, being hung from inside of ends by a chain or metal device of the elbow order.

The "what not," Fig. 2, for fine china or frail bric-à-brac, is an article which adds much to the furnishing of a room, and a very useful resting piece for choice pieces of breakable curios. This is very plain in construction, being made on the plan of an equilateral triangle, one corner of which is made to receive a sufficiently wide pilaster, so that glass sides or doors may, one or both, be secured by a catch or lock, hinges being fitted to back stiles. As a bit of effective trimming a specially turned spiral column may readily be secured and doweled to front leg in front of pilaster, the top piece being shaped and molded to properly overhang this turning. The frames may either be filled with clear panes of glass or have leaded pattern, as shown, the execution of which was described in the December number of *Carpentry and Building* for 1900, under the head of

"Leaded Glass Work." This adds much to the Colonial suggestiveness.

The hall settle or portable window seat, as shown in Fig. 3, is almost a necessity, unless one is fortunately provided with plenty of closet room, for in this article, by raising the seat the box portion underneath makes a very convenient place to keep overshoes, a small riding saddle, or other articles wanted in a hurry and desirable to have readily accessible. In this piece it would be better to use Norway pine, or better still, Southern pine with pronounced red sap, than to use these woods in making the articles shown in Figs. 1 and 2, which, of course, would be more satisfactory, if possible, made in quartered oak, birch or mahogany, the three kinds of standard furniture woods.

There has been much experimenting of late in using other woods than the three mentioned, but any wood with a pretty grain or figure could be used which would be free from liability of indenting or checking, to which pine or bass is subject.

The prevailing taste is for the finishing material to be quite dark in imitation of old time stained and even weather beaten furniture, and a return to the wax finish or oil rubbed surfaces is very much to be welcomed.

The finishing for such pieces illustrated, after staining to the proper shade you desire, would be to give them three coats of orange shellac, the first two coats being rubbed down by No. 00 sandpaper, and the third coat of shellac rubbed down in pumice stone powder and oil; this will produce a dull gloss peculiar to old time furniture and one that will not show when suddenly struck or indented.

Much can be said upon this subject of creative art, which is awakening so much keen interest in the field of cabinet or case work abroad. Starting originally among a small band of artisans in the European centers the desire grew to give individual expression to their productions, and to check the disposition of concentration into large factories of various lines of handicraft, thus losing the identity of the workman and at the same time training the younger workmen to know only one small operation incident to the line of manufacture.

The results of these workers along individual lines have found expression in the *Art Nouveau*, or modern art. While it may not be at present used extensively by American manufacturers employing machinery for all operations, the spirit of the style is already giving a healthful tone to our designs, and checking a tiresome repetition of conventional styles and a sameness of treatment.

It is hoped that with what has been shown an interest may be awakened among many who feel their ability as constructionists and their inability as draftsmen to the point of drawing ornamental detail, that it is just as well to leave out the ornamental detail and produce their frames with a directness of construction and nicety of finish, with the introduction of low arched lines springing from posts to rails and the joints flushed over. When the work is carried to completion in this way the worker begins to feel he is dealing with a solid piece beautifully outlined, and not a collection of parts inharmoniously related.

Ventilate Newly Built Houses.

In discussing the question of sanitary houses a writer in a recent issue of the Journal of the American Medical Association presents some very interesting suggestions:

"Regarding the newly built houses, sanitarians, for the most part, teach that a period of four months in summer and six in winter ought to be allowed between the end of the building operations and the entrance of the inhabitants into a house. In this way will be avoided the accidents that arise from the premature occupation of an apartment.

"It is scarcely necessary to add that, as soon as the house has begun to be occupied, to avoid dampness it should be heated and ventilated; treated, in a word, by all the usual means to maintain a healthy condition of the apartment. If the dampness persists in spite of all these precautions, the proprietor is responsible for the defects in his building.

"Physicians are sometimes requested to estimate the relative dampness of an apartment or room. This is not always easy by simple inspection, as a room may be damp although saltpetre does not grow on its walls or mold in its corners. The following is an exact means of appreciation, and one that is within every one's scope: In the room in question a kilogramme of fresh lime should be placed after hermetically closing doors and windows. In 24 hours it should be weighed, and if the lime has absorbed more than 10 grains of water (that is, more than 1 per cent.), the room should be considered damp and classed as unhealthy.

"The question of dampness of dwellings is a frequent cause of dispute between landlord and tenant, naturally solved in the affirmative by the latter and in the negative by the former. The question can be settled in the future by the test of the hydration of lime, and which will give irrefutable proof or refutation of the validity of such complaint. The dampness of dwellings is a cause of illness. The death rate is greater in quarters where the apartments are damp than where they are dry.

Stops Ventilation.

"Ventilation is defective where the walls are impregnated with water; the porosity of the walls is done away with, and can only be re-established after the evaporation of the water has been completed and the heat required to effect this evaporation is furnished by the person living in the room. This is the cause of the vivid impression of cold which we experience in damp places, and it is a well-known fact that exposure to the action of the cold renders the organism more accessible to the attack of morbid germs. The rotting of walls, which appears particularly in places where the water used in building contained nitrates and chlorides, is caused by changes from dryness to dampness and *vice versa*. It gives rise to fragmentation of the mortar, and even of the building stones themselves. Finally frost can split a wall that is soaked in moisture.

"The dampness of dwellings is due to internal or external causes. There can be no doubt that a new building ought to be treated for a length of time by ventilation and heat, with a view to evaporate the really enormous amount of water incorporated with the building materials. According to Pettenkofer, a three-story house requiring 167,000 bricks would need some 825,000 litres of water to build. When this evaporation has been effected great care should be taken in insuring proper drainage for rain and other water."

An Important Strike Injunction.

A very sweeping strike decision has recently been rendered in Philadelphia which is of interest to all connected with the building trades. Judge McCarthy of the Common Pleas Court issued an injunction in which he denies the right of the Council of the Allied Building Trades or its agents to instigate strikes at buildings where contractors employ labor that is not affiliated with that organization. Judge McCarthy also denied the right of the defendants to order contractors to discharge members of labor organizations that are not affiliated with the Council of the Allied Building Trades. He ordered them to refrain from threats, expressed or implied, that employers would suffer loss by hiring the plaintiffs.

The case which resulted in the injunction was that of Erdman and others against the Council of the Allied Building Trades. Until April 22 last the plaintiff had been employed for many years by the local plumbing firm of Hoban & Doyle. Under threat of a strike, Wells & Wells, general contractors, of Chicago, had the plaintiffs removed from a large office building, then in course of erection. The plaintiffs were members of the Plumbers' League, an organization not affiliated with the Building Trades Council, and their places were taken by United Association plumbers who were members of the Building Trades Council.

CORRESPONDENCE.

IN presenting in our last issue the communication of "A. O. C.," Lake Charles, La., relative to his method of finding the back cut of jack rafters on octagon roofs, a slight typographical error occurred in the third line from the bottom, where it reads, "A bevel set at 8 will give the check cut," &c. It should have read, "A bevel set at 'L' will give the check cut," &c.

Design for a Farm House.

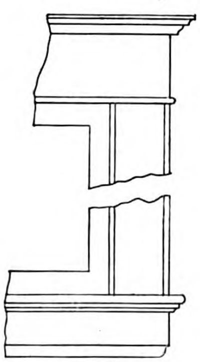
From W. S. WYLIE, *Washington, Iowa.*—I send a blue print copy of a set of house plans, accompanied by a photograph of the building, the house having been built about two years ago. The frame is of white pine, the outside walls being covered with 10-inch ship lap paper and sided. The floors are No. 2 fence flooring, except in the kitchen, which is yellow pine. The plaster is one heavy coat of cement finished with a white coat of lime and plaster of paris. The inside trim is of white pine, finished in oil. The casings, base, &c., are of stock patterns. The main stairs are finished with red oak newels, rail and balusters, with box molded string.

The plan here shown has been built from three times in about the same dimensions, and with some slight variations it has been used eight or nine times to my knowledge in this county. It has been used as a farm house in two instances.

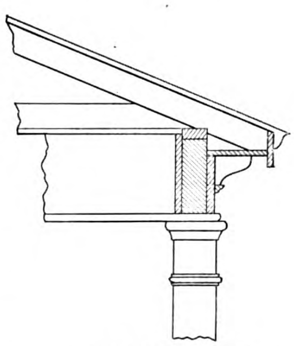
This plan may suit "D. L. P." of River, Ind., who in a recent number asks for the plan of an eight or ten room farm house. I think, however, it would be rather difficult to get that much room for the price which he names.

View of House Reproduced from Photograph.

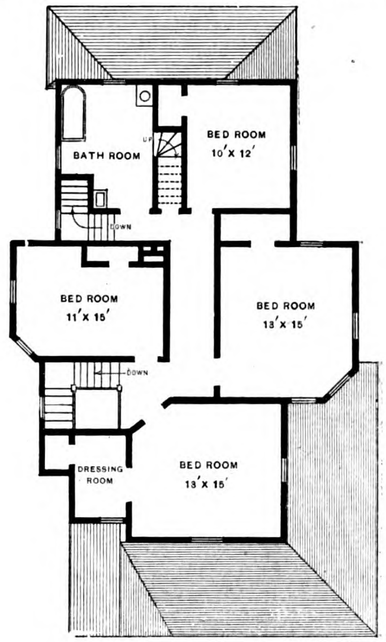
Front Elevation.—Scale, 1-16 Inch to the Foot.



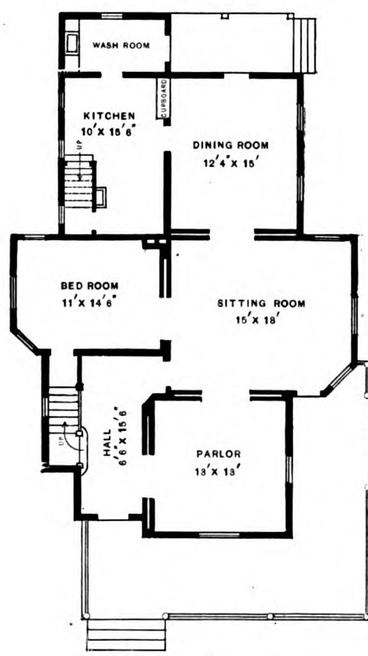
Detail of Finish on First Floor.—Scale, 1 Inch to the Foot.



Porch Cornice.—Scale, ½ Inch to the Foot.



Second Floor.



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

Design For a Farm House.—W. S. Wylie, Architect, Washington, Iowa.

Finding Back Cut of Hip Rafters When the Inclination is Other Than 45 Degrees.

From W. F. S., *Hermitage, Tenn.*—For some time past I have been an earnest reader of *Carpentry and Building*, but have thus far refrained from asking my brother chips for any information. I now wish to have them send to the editor for publication a method for finding the back cut of a hip or valley rafter when it departs from 45 degrees. I mean the top cut that would fit against the ridge or would miter the four hips together when they are at an inclination other than 45 degrees.

Form of Truss for 100-Foot Building.

From T. P. P., *Housatonic, Mass.*—Will some reader be kind enough to give me a little information regarding the form of truss to be employed in order to sustain a frame building which extends over a river. The structure is 100 feet long, 20 feet wide and 18 feet high, consisting of two stories. The first story is about 8 feet in the clear and the second story about 10 feet. The structure is supported in the middle, thus making two spans of 50 feet each. The timbers are to be 8 feet on centers, and the floor and roof planks to be 16 feet long and 3 inches thick. The sides are to be planked 2 inches thick, the boards running up and down and covered with clapboards. The floor plank are to be covered with maple ⅞ of an inch thick. The roof is about 3-inch pitch and the weight, besides the building, will be about 120,000 pounds.

Answer.—The problem of our correspondent was submitted to F. E. Kidder, the well known consulting architect, who furnishes the following in reply: A building such as that described by "T. P. P." is, in effect, a double deck bridge covered by a roof and enclosed at the ends. The best form of wooden truss for supporting such a building is unquestionably that shown in Fig. 1 of the accompanying illustrations, representing one-half of a side elevation of the building. For the construction of the floors, roof and walls described by the correspondent, the method of framing indicated seems best adapted for the purpose. Fig. 2 represents a half plan of the roof; Fig. 3 is a cross section through the building; Fig. 4 is a half plan of the lower floor clearly indicating the tie rods, while in Fig. 5 is a plan of the tie beam, made of five 2 x 10 inch plank the full thickness. All truss timbers are of Oregon fir or Southern yellow pine.

The trusses have been computed for a load on each floor of 60 pounds per square foot, exclusive of the weight of the floor itself, and for a total roof load of 30 pounds per square foot. A load of 60 pounds per square foot is equivalent to 230,000 pounds for both floors. This is nearly twice the load given by the correspondent, but it does not seem safe to design a building of this character for a load of less than 60 pounds per square foot, and for many purposes even this would be insufficient.

In order to support this floor load the floor beams should be either 10 x 12 or 8 x 14 inches, and of either Oregon fir or long leaf yellow pine. The most severe test on the structure will probably be produced by the wind, which always blows strong on a river. To prevent the building from being bent horizontally by the wind the lower floor should be trussed by diagonal rods, as indicated on the floor plan Fig. 4. These rods should pass through the tie beam of the trusses and be held in the middle by a strap or hook from the floor beams. A system of wooden braces should also be placed under the roof beams, as indicated on the roof plan, Fig. 2. Even with this bracing the upper portion might be blown down by "racking," and to prevent this there should be some way of bracing the walls either by extending the floor beams, so as to get braces on the outside, as shown in the cross section Fig 3 at A-A, or by placing braces on the inside, as indicated by the dotted lines opposite every other rod and in both stories.

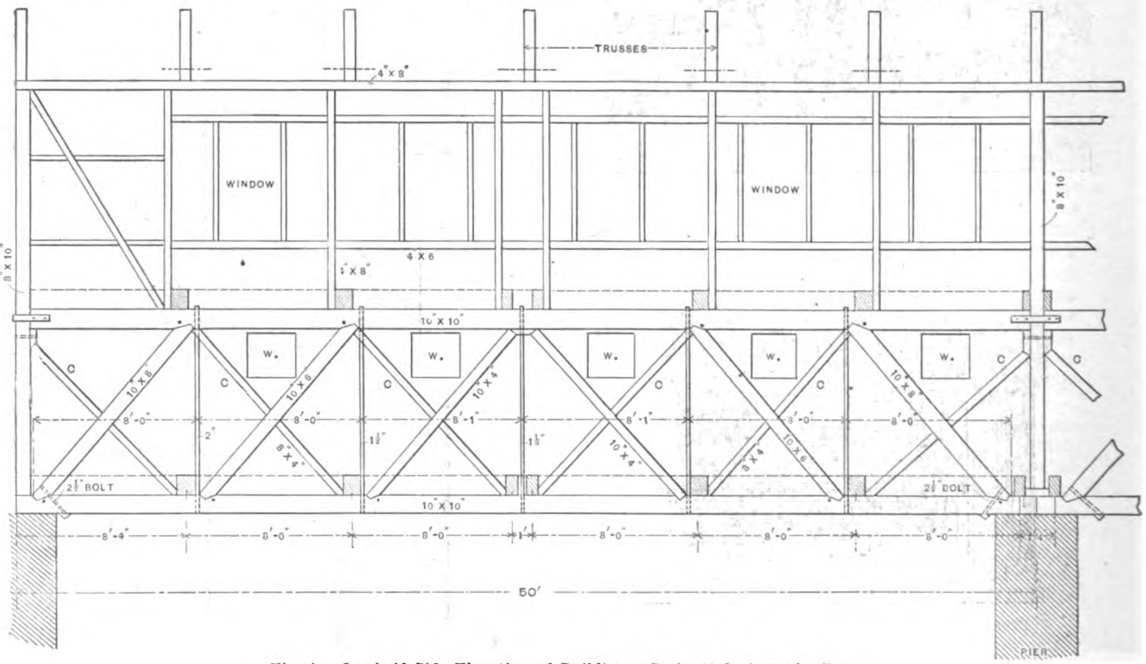


Fig. 1.—One-half Side Elevation of Building.—Scale, ⅛ Inch to the Foot.

Form of Truss For 100-Foot Building.

The ends of the building should have a girt at the level of the upper floor beams, and braces from each corner post toward the center. The second story posts should also be well spiked to the floor beams, the object in making the posts 8 inches wide being to give a better chance for the spiking. It also seems desirable to spike 2 x 6 braces to the side of the roof beams and to the posts below, in order to prevent the roof from being lifted off the plate.

With these precautions the building should be strong enough to stand a severe gale. There is one suggestion I wish to make in the way of a caution in regard to the trusses, and that is about putting any transverse load on the top chords. As the second floor is now framed the beams go over the ends of the braces so that the top chord only has to resist a compressive stress. If the second floor was framed by 2 x 12 inch joists placed 16 inches on centers, it would be necessary to increase the size of the chord to 10 x 12 inches. If the tie beams are built of plank they should be jointed as indicated in Fig. 5, and all of the bolts specified put in. At the same time the planks should be full 2 inches thick. The center plank should be jointed at the rods. The braces marked C in the side elevation, Fig. 1, should be cut against the main braces and not halved into them.

Should Hot Air Furnace Have a Water Pan?

From A. T., *Albany, Ore.*—I would like to submit to the readers of the paper a question in regard to hot air heating and the use of a water pan in connection with a furnace. I have recently installed a furnace in a house, but when it came to putting in the water pan which the manufacturer of the furnace supplied my trouble began. The water pan was too long to go in its proper place, and as the proprietor of the house insisted on the use of a pan, I made one of galvanized iron and put it on the rear end, setting it on the floor. After this had been done the agents of the furnace came along and condemned the use of water pans in furnaces, claiming that they caused more sickness than the furnace and pan were worth. We could not agree as to the merits of the case, and so I come to the readers of the paper for their views. The local plumber ran pipes into the furnace so as to get hot water for the bathroom and basin and be said that the job was a good one. Now I would like to find out whether they put a water pan in a furnace just for fun, or for the sake of health.

Finding Back Cut of Jack Rafters on Octagon Roofs.

From J. P. K., *Worcester, Mass.*—Although not having an opportunity to put to practical use some of the answers in the correspondence columns of *Carpentry and Building* in my present business, I still take as much interest and pleasure in reading them all as I did when working at my former trade.

In answer to "W. H. M.," Woodlawn, Ala., and others, I wish to testify to the value of the method given by "M. T." of Washington, D. C., in the September number and "C. S. J." of Mamaroneck, N. Y., given in the December number. I first used this system back in the eighties, and it came to me in the course of laying off some jack rafters. I had never seen it in print or saw any one use it before. As the gentlemen referred to above say, it is the most simple, as well as the most accurate rule known to get side levels for any kind of hip, valley or jack rafters, for a square, irregular, octagon or any other kind of a building where the connecting pieces stand perpendicular, or, in fact, otherwise, if they both stand at the same angle. For a regular hip roof it is not necessary to do any laying out if one has the lengths. Simply mark the down cut on the rafter with the 2-inch part of the square, marking on both edges (if rafter is 2 inches thick) square across on top edge and draw a line from this mark to long point. For an irregular roof, an octagon or any other kind, one must mark it out in plan just the same as if the roof was flat. Next get the down cut. Take measure from plans and proceed as described by the correspondents in the September and December numbers.

Right here I wish to emphasize to the readers of *Carpentry and Building*, especially those who have roof framing to do, the great importance of knowing how to figure square root, for with it one can figure the lengths of common, hip and valley rafters down to 1-100 inch. It is quite a difficult problem to learn, or it was for me after being out of school so long, but it can be mastered with a little patience and perseverance.

From W. H. M., *Woodlawn, Ala.*—I am much pleased with the answers to my inquiry relative to finding the back cut of jack rafters on octagon roofs, which are to be found on page 312 of the December issue of *Carpentry and Building*. I feel very thankful for the contributions of the two readers who have seen fit to respond with diagrams, both of which appear very simple and practical.

Drawings for an Arched Ceiling.

From J. J. R., *Democracy, Ohio.*—Will some able writer contribute to the columns of the Correspondence department a good plan for an arched ceiling, making the drawing and the descriptive particulars so clear that a novice can understand them?

Making a Cistern Filter.

From F. F., *Enterprise, Fla.*—Noticing the very interesting description of the method of making a cistern filter which appeared in the last issue, I am prompted to tell something about the filter I have built in my cistern and which works splendidly. I built on the bottom of the cistern a square chamber 24 inches each way and 18 inches high, using coarse, soft brick and mortar. I laid strips of 1½ x ¼ inch iron across the top to support the top of the chamber. The pump pipe was run into the chamber and cemented tight, so that the water had to filter through the bricks to reach it. The water that comes from the pump is very clear. It

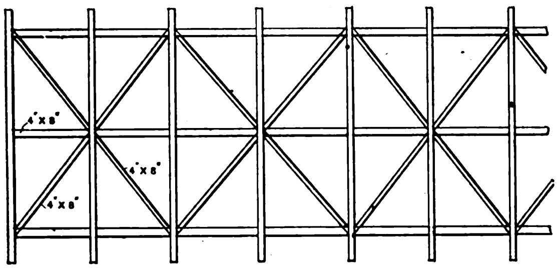


Fig. 2.—Half Plan of the Roof.

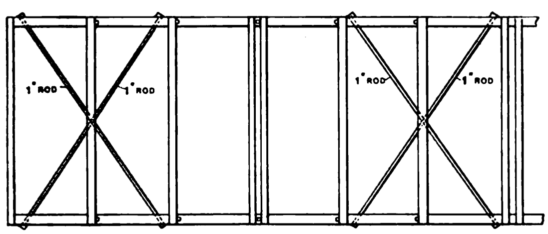


Fig. 4.—Half Plan of Lower Floor, Showing Truss Rods.

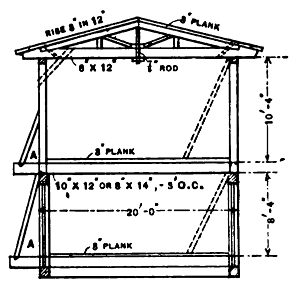


Fig. 3.—Cross Section of Building.

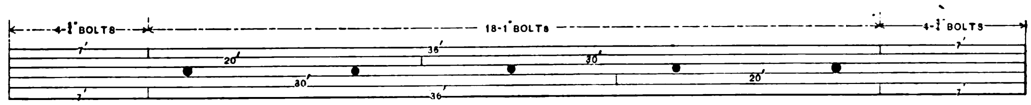


Fig. 5.—Plan of Tie Beam Made of Five 2 x 10 Inch Plank.

Form of Truss For 100-Foot Building.

is a simple matter to clean off the outside of this filter chamber occasionally, and should the bricks get very foul it would be a small job to make the chamber again of new bricks. This has not been necessary as yet with mine, but I have cleaned the cistern frequently on the principle that cleanliness is a virtue.

Laying Out the Face Mold for Stair Rail.

From C. B. H., *Warren, Pa.*—I wish to offer a few friendly criticisms "for the good of the cause" on the management of the stair rail problem submitted by "C. E. G." in the November number of *Carpentry and Building*, and as illustrated by Morris Williams in the December issue. I am quite sure Mr. Williams is too well posted on stair lines to think his illustrations will be accepted without some of their defects being observed and pointed out, and would no doubt be pleased to know they were read and understood by men in this line of building. I call attention to this matter so as to direct thought to some things into which beginners might do well to study. In the first place, the bevels, as shown in his sketch, Fig. 2, for laying out the wreath for curve out, are applied in opposite directions, when they both apply as shown at joint *a'*, or butt joint, and not as at "joint *w*." This is for the reason that the face mold slides on the butt joint.

Again, as shown in plan and elevation of the square well hole, Fig. 3, the center or tangent lines of rails are represented as being directly over the face line of the strings and platform risers—a new idea to me. The center line of rail should be ⅝ inch from the face of the strings and platform risers unless the balusters are less than 1½ inches in open string stairs. In housed or battlement front strings it should be over the center of the strings. Now whatever distance the tangent lines are from the face of the strings, the same relative distance must obtain along the platform risers and well hole; therefore the raking tangents reach beyond the riser lines; the one above, the other below. The distance, say ½ inch in each case, requires 1 inch to be deducted from 7¾ inches, leaving the rise or pitch of the well hole tangent 6¾ inches rise in 14 inches run, instead of 7¾ inches in 14 inches. The direction of the slide line is not given on the face mold, Fig. 4, and I fail to locate it from his explanations.

As being of interest in this connection I offer my method of treating the proposition of "C. E. G.," and shall be glad to have readers who are interested criticise it if so disposed. Fig. 1 represents the plan of stairs at the platform, giving the tangents, pitches of rail over same, the line of risers at platform, the center line of rail and the length of straight wood between the two quarter cylinders, as found on the pitch over these tangents. Fig. 2 shows the method of developing the wreath pieces; A B C being the tangents to the center line of rail, while A F is the pitch over the two tangents, as shown in Fig. 1, parallel with the risers. The pitch over the tangents along the line of the strings is indicated by B D. The distance B F is transferred to D E; then draw E H, H I and I J. Now I J is the level or normal line. Draw B K parallel to I J, and make K 7 the same length as B 6. Connect A 7 and apply the bevel at 7 to joint 2 of Fig. 1. Draw I 5 parallel to B D. Set off the distance C G equal to C 5 and connect G J. The bevel at G is applied to the upper end of the upper wreath and to the lower end of the lower wreath. Draw J N, as shown, at right angles to J B and connect N B. The line 3 4 is drawn to show the amount to be deducted from the risers in order to obtain the correct pitch from 4 to 5 of Fig. 1.

In order to lay out the face mold, proceed as follows: Referring to Fig. 3, draw B J, equal in length to N. B of Fig. 2. Take the length of the tangent B D of Fig. 2, and with one leg of the dividers at B of Fig. 3 strike the arc at C, and then with J as center and the same

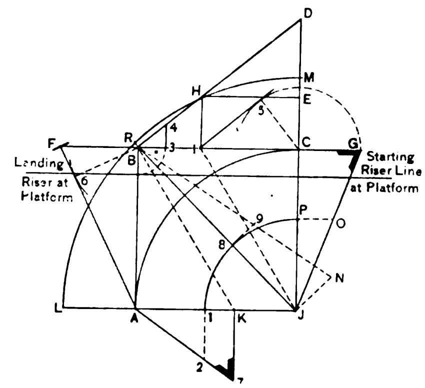


Fig. 2.—Method of Developing the Wreath Pieces.

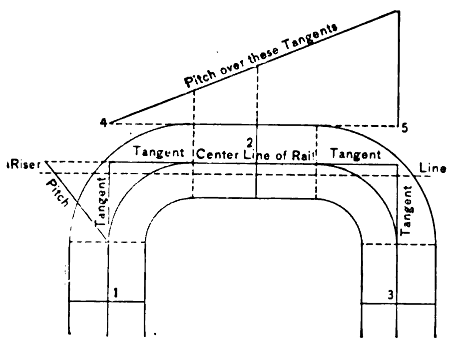


Fig. 1.—Plan of Stairs at Platform.

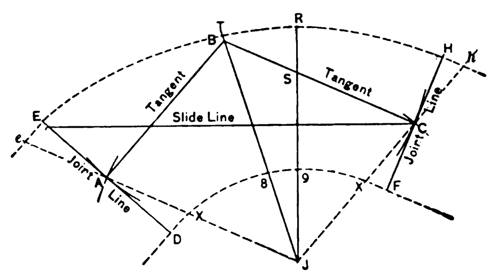


Fig. 3.—Laying out the Face Mold.

Laying Out the Face Mold for Stair Rail.

radius strike the arc at A. Now with the length of tangent, A F of Fig. 2, using B of Fig. 3 as center, cut the are at A, and with one leg of the dividers at J and the same radius cut the arc at C. Connect J A, A B, B C and J C. Make C S equal in length to D H of Fig. 2. Draw J R, the normal line, where the face mold is exactly the width of the rail. Draw H F and D E at right angles to the tangents. Make C F and C H equal in length to O G of Fig. 2, and A D and A E each equal to 2 A of Fig. 2. Make a mark at 9 and at R, setting off the distance equal to 9 R from N of Fig. 2 and 8 T equal to 8 R of Fig. 2. Draw the slide line at right angles to the normal J R. Bend a flexible strip through the points H R, T E and X 9, 8 X, marking therewith the shape of the face mold.

It will be observed that the lines H *h*, E *e*, F X and D X are all drawn at right angles to the joint lines. Add the necessary amount of straight wood to the respective ends and the mold is complete.

As to the developing of the wreath piece for the curve out, I would refer the correspondent to the issue of *Carpentry and Building* for last June, in which is fully explained the best system with which I am acquainted for the management of such cases. I could add nothing to it only to draw the line A H perpendicular to the string line, which was omitted in the diagrams as published.

Finding Bevels of Rafters in Roofs of Unequal Pitch.

From C. C. H., *Brookville, Pa.*—I have a few remarks to make relative to the question of finding bevels of rafters in roofs of unequal pitch. The correspondent, "C. N. E.," Decatur, Ind., says, "take the length of the bevel on the blade of the square and the length of the line A C on the tongue and mark by the blade." I would like to have him explain how he gets the line A C, as no scale is given in connection with his diagram, so it is guess work to know just what the line A C is.

Novel Method of Cutting a Twist Coping.

From D. FRAZER, *Philadelphia, Pa.*—Many methods of producing a twisted wooden rail have been used by members of the craft, the carpenter usually choosing the one which in his opinion is most suitable for the purpose, or, in other words, the one which he most clearly understands. It is probably for this reason that each mechanic in this branch of joinery claims his method of doing work the best, and does not put himself out to master any of the other systems or methods. It is the same way in the stone trade; some working from a plan, cutting the sides first, which is a very hard way for the stone cutter, then using falling molds to mark the lines by which to cut the top and bottom, while others employ a back mold and bevels.

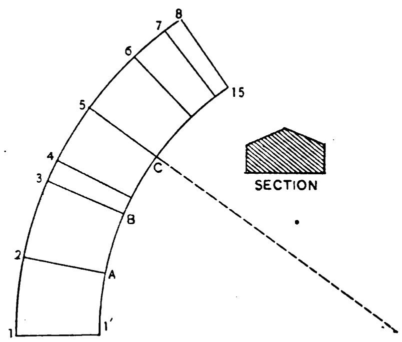


Fig. 1.—Plan and Section of Coping.

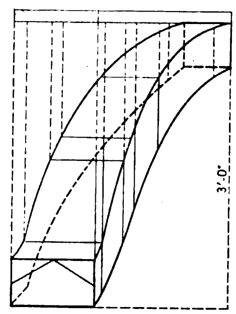


Fig. 2.—Perspective, Showing the drop.

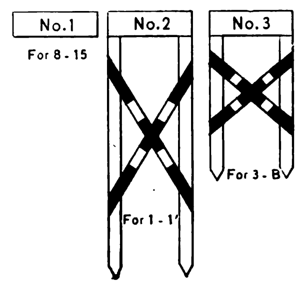


Fig. 4.—Views of the Brackets.

The method explained herewith was employed in getting out a granite coping, the drop being very great, and making altogether a rather difficult piece of work in obtaining the points to cut the top, so that it would be true to fit the wall and joint of the upper coping. A plan was furnished, as shown in Fig. 1, and an elevation as indicated in Fig. 2, showing the drop, 3 feet. The foreman set about finding the size of stone required by first drawing to a large scale the developed convex side from 1 to 8, as shown in Fig. 3; also the concave pattern. It will be noticed that I have only shown two points, one at O, at the bottom, and X, at the top. The patterns being drawn on one sheet, the size of the stone is reduced by drawing lines, as shown by 1-9-12-10-11 and 13, and the width of the plan. The block was put under the saws and sawn to the shape indicated between the dotted lines of Fig. 3, this giving a flat surface at the top and bottom, 1-13 and 10-12. This was roughed off to the shape indicated and then set so that 10-12 would be level. The plan pattern, the exact shape of Fig. 1, with radiating lines marked thereon, was then laid on the top, as shown by 10, 12, 14. The drop, 3 feet, was then measured down and a draft cut across as 1-1'. The drops of the several parts having been formed, as indicated by the figures in Fig. 3, brackets were made to correspond, as shown in Fig. 4; No. 1 being that for the top, as shown at 8-15. All the brackets leave this size of piece for the top, as shown at No. 1, No. 2 and No. 3, where the two drafts, 8-15 and 1-1', are cut even and out of all twist. The intermediate brackets used to get the different drops and drafts were cut across, as shown by the lines on the plan. As each bracket was put on a straight edge was applied, in order to make sure that the tops of each were in the same plane, as the more the plan is divided the truer the top is cut. If the two sides are roughed out very close the developed patterns can be applied, which will save lots of work in cutting drafts and points.

This method also has the advantage of enabling one to mark the plumb lines on the side so that the drafts can be cut to work the sides. The lines on the top, by which to cut the sides, can be drawn from the several points with part of the plan, or, what is better, plumb down from the plan pattern when it is set on top, as 10-12-14. Locate points 3 or 4 inches apart and connect them. When this is done, work the sides by holding the long blade of the square on the radiating lines and the other on the plumb lines. It is best to have sinking pins or gauges screwed on, as it will save time in measuring. The bottom is cut by drawing lines parallel to the top.

The wall to receive this coping was built up from hights taken off the developed falling mold, instead of building up the two ends, as is the ordinary practice with masons. In this case it fitted neatly without any trimming.

There is still another way to cut such work as that indicated in Fig. 3; the stone being roughed out as before. A flat surface is cut at 10-12 and the drop found, after which a draft is cut across, as 1-1'. Build up from this plaster, as shown, so that 10-12-14 will be in the same plane. Lay on the plan pattern and mark on the lines 1-1' and 8-15, and as much of the concave and convex curves as there may be room. This will serve as a gauge to set the pattern at the right place. We can then gauge down the different depths to cut the top, after which the stone can be finished as before explained.

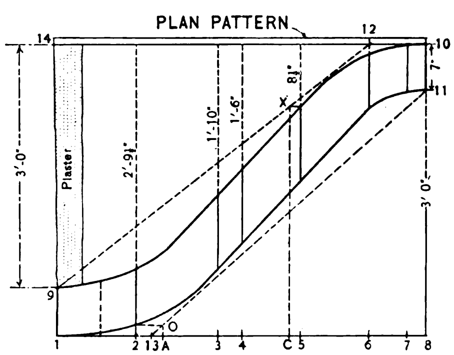


Fig. 3.—Diagram for Finding Size of Stone.

Novel Method of Cutting a Twist Coping.—Scale, ½ Inch to the Foot.

THE French have a fire proofing process which consists essentially of forcing the fire proofing compound into the wood, this being done by a direct high pressure connection to one end of a log, the other end of which is under atmospheric pressure only. The connection being made into the end, the fluid is forced into the wood cells and displaces the sap.

WHAT BUILDERS ARE DOING.

WHILE there is nothing resembling a "boom" in the building business in Austin, Texas, the city is making steady progress, and all branches of the building trades show a fair degree of activity. There are several large State jobs under way, and the contracts will be awarded about the first of the year. One of these, the Confederate Home Mess Hall, was let to Lambie & Fisher on November 1, the contract price being $10,000.

The local exchange is now in a flourishing condition, and the officers for the ensuing year are Francis Fisher, president; C. W. Moore, vice-president; C. B. Ledbetter, secretary.

Baltimore, Md.

The building trades are showing a fair degree of activity, although there are no very large building operations under way just at present. The Belvidere Hotel Company and the International Trust Company are preparing to erect buildings which will probably equal if not be superior to any of their class around the city. It is expected that the plans for the new Custom House building will be ready for the contractors before long.

The members of the Builders' Exchange met at its quarters, Charles and Lexington streets, Baltimore, Md., on the evening of December 3, the occasion being the quarterly meeting of the exchange. President John H. Short received the members from 7.30 until 8, when he invited them to a sumptuous luncheon in the main hall.

After the luncheon the president, in a few well chosen and graceful words, after welcoming his *confrérés*, urged that a close harmony be maintained and a concerted action in the direction of the affairs of the exchange, outlining the many good results to be obtained under such circumstances.

S. B. Sexton, Jr., followed in an address, in which he pointed out the value of the exchange to its members, and advocated its branching out in a larger sphere.

Joseph H. Hellen, first vice-president of the exchange, and a number of others made short speeches on the same line.

Messrs. Israel Griffith and Harry L. Black made addresses, in which they suggested that the Legislative Committee take steps toward urging a change in the City Charter governing the issuing of building permits. It was claimed that delays in issuing permits under the present law in some cases greatly retards work and sometimes results in a loss to the builder.

Others who addressed the meeting were Daniel A. Leonard for the stone men, A. H. Clark for the building supply trade, T. Buckler Ghequier for the architects, Theodore Mottu for the lumber trade, A. D. Klein for the Baltimore brick business and J. H. Dinwiddie of the Geo. A. Fuller Company for general contractors.

There was no toastmaster, and, in consequence, there were no set speeches, the informality pervading the whole affair rendering it far more agreeable and the speeches more genuine and spontaneous.

Buffalo, N. Y.

There has been a very fair amount of building in and about the city during the past season, and the cost of the improvements shows a gratifying gain, comparing one month with another. The permits issued for November of the present year covered building improvements estimated to cost $562,029, as against $241,065 the previous month, and $340,278 for September. When the comparison is made with November of last year the showing is not quite so satisfactory, owing to the fact that building operations in the closing months of last year were especially active, growing out of the preparations for the Pan-American Exposition. In November of last year the cost of the building improvements was $890,550, and for December, $575,298.

Taking the eleven months of the present year the cost of building improvements reached a total of $3,140,287, as compared with $3,514,028 for the corresponding period of 1900. The prospects for the immediate future are regarded as very encouraging.

South Buffalo, N. Y., is enjoying a miniature boom in the building line owing to the erection of the new plant of the Lackawanna Iron & Steel Company at Stony Point. It is estimated that 1000 new houses will be erected in that part of the city next spring.

Cleveland, Ohio.

The first dinner of its winter series was given by the Builders' Exchange on Tuesday, November 26. A large representation was present, and among the invited guests were Chief Wallace and Charles W. Lapp of the City Fire Department, C. H. Patton of the Ohio Inspection Bureau, H. J. Harks, Building Inspector, and Fred P. Thomas, president of the Cleveland Fire Insurance Exchange. The question which came up for discussion was "Better Fire Protection for Buildings." Various phases of the subject were fully discussed by those who had made it a study, and the occasion was in all respects most interesting and important.

After the talk had been concluded resolutions were adopted to the effect that in the opinion of the Builders' Exchange, "in no public or business building should elevators be built so as to adjoin stairways," and "that the Board of Directors of the exchange be requested to take up the question of protection against fire with the proper authorities, with a view to having an ordinance or law enacted regulating the placing of elevators in stairways of buildings in such a way as to provide against such accidents as that which involved the destruction of the N. O. Stone Block and others which have recently occurred in the city."

Erie, Pa.

During the past year there has been a considerable amount of building in the city, the number of houses averaging up to December 1 about 23 per month. The report of the Building Inspector for November made a very good showing, as compared with corresponding periods, there having been 52 permits issued for building improvements, aggregating a cost of over $48,000. The outlook for 1902 is very flattering, a number of enterprises being already in process of development. Several new shops will be erected, including those of the Williams Tool Company and the Odin Stove Works, to be located in the vicinity of Liberty and Twelfth streets. Architects have a number of plans on their boards covering residences, factory and business structures.

The Erie Builders' Exchange has recently added to its quarters two large rooms, which will be devoted to the display of all kinds of materials and devices entering into the construction and finish of modern buildings, whether intended for business or residence purposes. The advantages of an institution of this kind cannot fail to be readily apparent to manufacturers of and dealers in everything connected with building construction. It is hardly possible by means of pictorial representation to convey an adequate conception of the different materials, but by placing them on exhibition where they can be personally inspected by architects, contractors and builders, much more satisfactory results can be secured. In this way also architects can show their clients the newest and best structural material or devices used in building operations. The rooms are arranged for the display of articles to the best advantage, the floor space being occupied by platforms on which the exhibits are located. The platforms extend 2 feet from all sides of the rooms, and exhibitors are allowed to build 8 feet in hight and the entire width of the space rented by them.

All exhibits not attended by a representative of the manufacturer or dealer are cared for by the secretary of the exchange, who will properly look after the interests of the people concerned. Special care has been taken to have the exhibits so arranged as to render them attractive and interesting, and supplied with literature for distribution among visitors and those interested. The primary object of the establishment and continuance of this exhibition is the education of the public in building methods and materials, and therefore the rental charges for spaces are placed at a minimum.

Oakland, Cal.

Building in Oakland and in the other suburbs on the east side of San Francisco Bay shows hardly any signs of falling off, notwithstanding the rainy weather of November. The extension of street car service throughout the region has thrown open a large number of tracts for residence builders, while the erection of high class homes in some parts of Oakland and in Berkeley has been phenomenal throughout the year.

The labor situation is not all that could be wished, as internal troubles in the Building Trades Council threaten to put an end to the agreement between the mill owners and the labor union. If this should occur a strike in the building trades is one of the probabilities.

Omaha, Neb.

While Omaha has had no regular boom this year in the building line, there has been a steady growth with permanent improvements going on pretty much all the time. One of the most notable features has been the steady increase of new residence property, dwellings going up all over the city, ranging in cost from $1000 to $5000 each. These are not being built for speculation, but by persons for their own use. Some little attention has also been given to another class of houses, ranging in cost from $10,000 to $50,000, and quite a number of apartment houses have been built. The business section of the city has not been slighted, for quite a number of first-class improvements have been made in the way of business houses. With all the new residences, there are comparatively few vacant houses, showing that Omaha is certainly increasing in population.

Building contractors have no cause for complaint, except, perhaps, in one respect—that is, the competition. This has been so sharp that in many cases the margin of profit has almost been swept away. Some contractors appear to make no allowance for any misfortune that may overtake them, and consequently take chances which no other good business man would think of risking. From the outlook there appears to be quite a lot of new work ahead for the coming year, both in the business section and the residence portion.

The contractors and the labor unions are working harmoniously. Early in each year, say in January or February, the contractors and labor unions appoint committees and arbitrate all differences, adjust prices, hours of work, &c., and endeavor to settle all matters for the ensuing year on a fair business basis. The contract generally runs from March 1. This agreement has been found to work satisfactorily for both sides, and as a result there have been no strikes since the agreement went into force. Should anything come up not covered by the agreement the Arbitration Committee is called upon to handle the matter, and generally it is soon settled satisfactorily to all parties.

The carpenters, brick masons, stone cutters and plasterers work eight hours, with half a day off on Saturday. If work has to be done on Saturday afternoon, Sunday or any holiday, time and one-half is allowed.

The Omaha Builders' Club continues to prosper, both as regards its membership and usefulness. There are now some

75 members enrolled. The club removed from the Bee Building on November 1 to more central and commodious quarters in Paxton Block, occupying rooms 600 to 644. The club extends an invitation to members of the craft to visit its quarters whenever in the city.

Philadelphia, Pa.

On the afternoon of Tuesday, November 26, the Master Builders' Exchange held its regular quarterly meeting, with President William Conway in the chair. The president opened the meeting with a timely address, in the course of which he called attention to the fact that the organization, in this, the sixteenth year of its history, had many causes for thanksgiving, notably an unusually prosperous building season, and the flourishing condition of the exchange, on whose roll of membership 180 firms were represented. The chief originator and founder of the exchange, Treasurer Charles H. Reeves, then made a few remarks, speaking most impressively of the benefits arising from membership and attendance during 'change hour.

A rather lively and interesting discussion was precipitated by the presentation of a motion by ex-President Franklin M. Harris, that the officers secure the legal opinion of the attorney of the exchange on the status and rights of subcontractors, such as the plumber, the painter, the plasterer, &c., in case of destruction by fire of a building in the course of erection where the insurance is held by the general contractor. The result of the discussion was that the motion was carried.

A very pleasant feature of the meeting was a bountiful collation served just prior to the business session in the club rooms on the fourth floor of the exchange. There were present at this particular time a number of invited guests, including tenants and exhibitors in the building.

The Board of Directors held its regular meeting December 10, at which time were presented the names of those who had signified their willingness to become members of the National Association of Builders, and represent the Philadelphia Exchange therein. The question of preparation for the annual meeting of January 28, at which directors to be nominated December 28 will be voted for, was considered, and arrangements to fitly celebrate the close of the first year of the twentieth century were made.

Portland, Ore.

Building activity continues unabated, one of the notable features of the month being the fact that nearly all the permits issued are for two-story dwellings. The summer and autumn of this year will go on record as the greatest building epoch in the history of the city. While only a few large buildings have been constructed, there has been a goodly number of small brick ones, while the number of new dwelling houses erected was never before so large in the same length of time. Among the larger buildings now under construction are the Custom House on North Seventh street, the Y. M. C. A. Building on Fourth and Yamhill streets and the Merchants' Investment Building on the corner of Sixth and Stark streets.

San Francisco, Cal.

Building operations in the city show a substantial improvement, the number and value of building contracts filed making a steady increase from week to week. The operations for November were distinguished by the large number of fine office buildings and business blocks for which contracts were awarded. The rainy weather, however, and the recent advance in the price of lumber has had a tendency to check the erection of dwellings. One of the largest operations commenced in November was the M. H. de Young Building, a six-story structure, to cost $75,000.

John McCarthy, one of the best known contractors and builders in San Francisco, died there on November 17. He constructed the majority of the finest buildings in San Francisco, among them being the Mills Building, the Claus Spreckels Building, the Chronicle Building and the Spring Valley Water Works Building.

St. Paul, Minn.

At the annual meeting of the Builders' Exchange, held on Wednesday, December 4, the following officers were elected: President, J. W. L. Corning; vice-president, J. M. Carlson; second vice-president, J. H. Donahue; treasurer, William Rhodes; secretary, A. V. Williams; sergeant-at-arms, Robert Sigel.

Notes.

The Builders' Exchange of Seattle, Wash., have lately adopted a resolution requesting architects when opening bids to do so publicly in the presence of such bidders as desire to be present, the time of opening having been previously announced. They also ask that bids be posted in the office after the opening.

Contractors and Builders in Richmond, Va., continue very busy, and complain that workmen as well as certain kinds of material are rather scarce. Many private residences are being put up, some churches are being remodeled, and real estate men complain that they cannot supply the demand for rentable houses.

Martin's Ferry, Ohio, is experiencing a marked degree of building activity, and contractors have under way all the work they can handle until well into the winter. Most of the work is new dwellings, although several business houses are under way.

Building operations have recently been very active in Trenton, N. J., and the outlook is very encouraging. The indications are that workmen will be kept busy until next spring.

LAW IN THE BUILDING TRADES.

WHEN OWNER CANNOT RECOVER FOR COMPLETION OF WORK

A contract for the erection of a building provided that on default of the contractor the owner could terminate the contract and complete the building, the expense of same to be audited by the architects, whose certificate should be conclusive between the parties, and the contractor gave bond conditioned for his faithful performance of the contract. The contractor abandoned the work and the owner completed the building, but did not have expenses of same audited by the architects, who had been discharged as incompetent. It was held by the court that the owner could not recover for the expense, as same had not been audited by the architects, as it had not been shown that they were incompetent or dishonest, or to have refused to audit and certify.—Tully *vs.* Parsons (Cal.), 63 Pac. Rep., 833.

WHEN CONTRACTOR CANNOT RECOVER FOR EXTRA WORK.

Specifications required that the ground to be excavated as required by the site and drawings for all footings, piers, cellars, areas, subsoil, drains, &c., to the depth figured in the drawings, or to such depth as would provide absolute security against danger from frost or insecure foundations, to be done irrespective of depths shown in drawings and without extra charge. The contractor was to do the work "according to plans and specifications." It was held that the contractor could not recover for extra work required in digging for a secure foundation.—Ruecking *vs.* Mahon, 81 Mo. App. Ct. Rep., 422.

WHEN OWNERS ARE NOT LIABLE FOR EXTRAS.

Specifications for a building contract provided that no extra work should be allowed except on a written order from the architect, approved by the building committee, and that on any alterations or changes, the character and valuation of the work should be agreed upon in writing, signed by the owner and the architect and the contractor. The latter on verbal instructions from the architect, and without the knowledge of the building committee, continued the foundation walls 18 inches higher than specified. It was held that he could not recover for the extra work.—Gray *vs.* La Société Française (Cal.), 63 Pacific Rep., 848.

SLIGHT DEFECTS AND OMISSIONS WILL NOT PREVENT RECOVERY.

Where a building substantially complies with the specifications and contract, slight defects and omissions will not prevent a recovery of the contract price, less the expense necessary to put the building in the condition required by the terms of the contract.—Palmer *vs.* Meriden Britannia Company (Ill.), 58 N. E. Rep., 247.

WHEN DRAWINGS AND SPECIFICATIONS MUST BE TAKEN TOGETHER.

In a building contract the drawing of the cellar indicated a floor in same 6 inches thick, but did not indicate the materials of which it was to be constructed. The specifications provided that the floor should be water tight, and warranted to be such, and that the specifications and drawings must co-operate. The court held that the indication in the drawing of the proposed floor thickness was controlled by the provision of the specification, and the contractor was bound to make the cellar water tight, even if it was necessary to make it thicker than 6 inches. This contract provided that the architect should decide disputes respecting the plans and specifications, and the contractor submitted to the architect the plans of a subcontractor regarding the cellar and the architect said "better make it that way." The subcontractor constructed under supervision of the architect, but before the floor was completed water burst through and destroyed it. It was held that the contractor was not relieved from constructing such floor according to his contract.—Early *vs.* O'Brien, 64 N. Y. Supp. Rep., 949.

LIABILITY OF CONTRACTOR FOR MISTAKES.

Where a contractor in the erection of a building makes mistakes, which the owner is required to remedy by the building department of the city, the expense of same should be deducted from the agreed compensation of the contractor.—Beek *vs.* Catholic University, 67 N. Y. Supp. Rep., 567.

TURNING WOODEN RINGS FOR CURTAIN POLES.

By Fred. T. Hodgson.

There will always be a demand for wooden rings for curtain poles by people of artistic taste, for the reason that brass, bronze or other metal rings always look tawdry and out of place when attached to rich hangings, and at the same time they tarnish so readily that continual polishing, to the injury of the hangings, is necessary in order to preserve a respectable appearance. Wooden rings properly polished and made of the same kind of material as the pole always have an appropriate look about them, and are never in bad taste or out of harmony with their surroundings.

Wooden rings of the kind wanted are not often kept in stock by decorators and furnishers, and to obtain what is required application to a turner must be made or the rings may be constructed at home if the person desiring them has a lathe of his own. It is to this latter class that the following directions are submitted.

Let us suppose a couple of dozen or more of rings, to be made, say of mahogany, are required. Of course, any other wood may be used, but we take mahogany because it is a rich wood and easy to polish. We first cut out disks of the wood a little larger every way than the rings are intended to be. We then fasten to the iron face plate of the lathe a wooden plank, as represented at A of Fig. 1, which must be turned up true on face and edge. Several of these may be required, as hereafter shown. These planks or wooden face plates may be secured to the iron face plate or bolted thereon, as there are always a series of holes and slots left in the plate for this purpose. The mahogany disks are fastened to the wooden face plate in either of two ways. They may be screwed on, inserting the screws in the portion of wood inside the ring that is to be removed, or they may be glued on, as indicated in Fig. 1. If glued in place stiff paper must be placed between the ring block and the face plate. The reason for this is to permit the removal of the partly finished ring without splitting out the wood, as the paper will tear asunder quite easily if a chisel is inserted between the ring block and the wooden face plate. If the gluing process is resorted to it will be well to have several wooden face plates, so that a number of disks can be glued at one time, otherwise there will be a waste of time in waiting for the glue to set, for several hours will be required between the time of gluing and the time of turning. The wooden face plates should be properly centered, adjusted and marked for readjustment on the iron face plate indicated at B of Fig. 1, before the mahogany disks are glued on. At the same time care must be taken in gluing on the disks in order that they also be properly centered, so that there will be no wavy spots in the rings.

The second method of fastening on the disks is to screw them in place, as before stated and as shown at Fig. 2. The heads of the screws must be let in the wood some distance below the surface, so that a portion of the center of the ring can be removed without the turning tool coming in contact with the heads of the screws.

The first part of the turning is shown in Fig. 2, where a disk is represented screwed on the wooden plate, and the outside of the ring is turned to diameter, which is measured with a pair of calipers, and the inside cut out nearly through in the manner shown, the engravings representing the ring in section as well as the screws by which the piece is held in place. The next thing is to turn the semicircular section in one half of the ring, which is "trued up" with a little templet of tin, zinc or brass, as indicated in Fig. 3. The finished portion is then properly sandpapered, smoothed and polished with shellac or other appropriate polish; then the long point of the turning chisel is applied, severing the ring from the center disk, one hand being held around the ring to catch it as it leaves the wood. Of course, if the ring is glued on it will have to be severed from the wooden face plate by aid of a thin chisel. It is always better to turn all the rings to this form before touching the sides opposite. They are then chucked as shown in Fig. 4. A face plate is recessed to receive the finished part of the ring, to which it can be fitted by testing with chalk rubbed on the ring and tried in the recess. The ring is held in place with a paper joint, three or four narrow strips being placed across this recess and the ring glued and pressed in on them. The holding power of the paper strips is not very great, but it is sufficient if light cuts are taken and the glue is good. Sometimes rubber is made use of to hold the rings in this recess, and if properly managed, proves to be a better material for the purpose than paper. On releasing the finished ring from the recess with a chisel the paper will part through the middle without splitting the wood. The turning is simply a repetition of that previously done on the other side, the templet being used. After polishing and removal from the lathe the back of the ring will require a slight retouching with polish, when the eyes to receive the curtain hooks may be screwed in.

It will be seen that care must be taken in making the dimensions, for should the ring be made larger or smaller than the size intended, unless all are made alike, they will not fit into the recess in the wooden face plate, and as a consequence a face plate would be required for each ring. It is always a wise method to preserve the face plates, as they do not take up much room and they may be wanted again for a similar

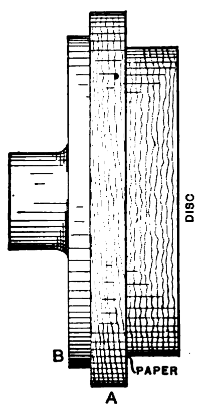


Fig. 1.—Face Plate with Disk Attached.

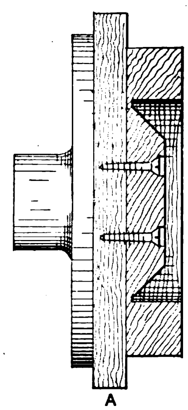


Fig. 2.—Ring Roughly Shaped.

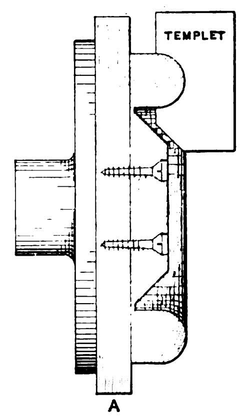


Fig. 3.—Showing Application of Templet.

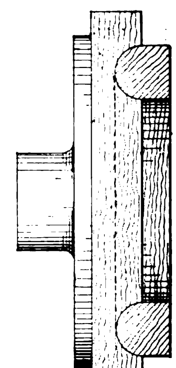


Fig. 4.—Ring Reversed in Chuck for Finishing.

Turning Wooden Rings for Curtain Poles purpose. These face plates may be made of soft woods, but are much better if constructed of good hard wood that will not warp or twist.

Opening of New York Trade School's Twenty-first Season.

The formal opening of the day classes of the twenty-first season of the New York Trade School took place December 11 in the auditorium of the school, at Sixty-seventh street and First avenue, New York. The hall was well filled by young men who are enrolled for instruction in the various trade classes for the 1901-1902 season. Superintendent H. V. Brill introduced President R. Fulton Cutting of the Board of Trustees, who extended a cordial greeting to the young men.

Remarks were also made by Edward Murphy and John Beattie, members of the School Committee.

The enrollment in the various classes this season has been fully up to the average. The day carpentry class starts with 24 members, the electrical class has 50 members; bricklaying, 15; house and sign painting, 15; plumbing class, 94, and the cornice class, 8 members. It was remarked that the young men who have entered the school this season appear to be of a higher type of intelligence than ever before, proving that the advantages offered by the institution are being more widely appreciated from year to year.

The meeting was closed with a few words of welcome to the new students by Superintendent Brill.

One of the most successful and interesting lines of work lately introduced in connection with the Trade School is the course of lectures for journeymen steam fitters and journeymen electrical workers, given each week by Arthur A. Hamerschlag, who reports that the attendance on these courses is considerably larger than ever before, and that the interest in them is constantly growing. Mr. Hamerschlag has inaugurated a very useful plan in connection with these lecture courses in preparing a printed synopsis of each lecture, which is distributed to the men and taken home by them.

American Exhibition in England.

United States Consul-General Osborne of London has sent to the State Department the prospectus of the American Exhibition, which is to be held at the Crystal Palace, Sydenham, from May to September, 1902. The Consul-General states that the exhibition is well backed, and has an influential American Advisory Committee. The Crystal Palace, in which the first international exposition was held 50 years ago, is a very large building, and is particularly well adapted to such a purpose. The buildings cover about 16 acres, are all perfectly lighted, heated and ventilated, and are surrounded by the most beautiful ornamental grounds in Europe, extending over 200 acres. Practically the whole of the interior of the palace will be devoted to the exhibition, which it is expected will prove of benefit, commercially and socially, to both the United States and Great Britain.

In connection with the exhibition it is proposed to establish, under the direction of a committee of representative Americans and British firms, a Commercial Bureau, so that all necessary information may be supplied to exhibitors in regard to the channels of trade and the placing of goods upon British and Continental markets. For the convenience of exhibitors arrangements will be made with a well-known firm for the supply of stands or cases for exhibits, either to order or to hire at moderate rates. Exhibitors, however, will be at liberty to make their own arrangements in this respect. The American Exhibition of 1902, which is the official title of the proposed undertaking, is designed according to the prospectus, to demonstrate the immense commercial development which has taken place in the United States during recent years, and it will be the largest and most important exhibition of American products, arts, industries and inventions yet seen in the United Kingdom. The various departments of exhibits, as classified, include in Class 1, machinery and all matters pertaining to the mechanical industry. Class 6 embraces hygiene, lighting, heating, ventilating and sanitary appliances.

The rules governing the exhibition, with form of application and plans of the Crystal Palace, have been filed for reference in the Bureau of Foreign Commerce at Washington, D. C., and plans and particulars of space, charges for which range from about $1 to $5 per square foot, according to position, will be forwarded on application to the Assistant Commissioner for Commercial Section, 20 Victoria street, London, S. W., or to the General Manager, Crystal Palace, London, S. E.

Mineral Wool for Insulating Purposes.

We have received from a well informed correspondent the following interesting comments relative to the use of mineral wool as an insulating material:

In the issue for November is an article entitled "Some Practical Hints on Insulation." The information therein contained is very valuable to people intending to erect buildings to be used for cold storage purposes and therefore needing the most perfect insulation. It is a fact conceded by all experts that still or dead air is the most perfect insulator known; also that dead air cannot be obtained in air spaces, but that these air spaces must be filled with some material to prevent the circulation of the air. Now what material is the best for this purpose? Naturally it should be one that holds the most air in confinement.

There are several materials that are brought to the attention of the public for this purpose, and they each have advocates among the best posted experts in the country. If the manufacturer of any one of these materials could get the unanimous indorsement of all these and his material recommended by them, all would be well for that product. But when these different experts do not agree how is the party using insulation to know what is the best material for him to purchase and use?

The materials most generally used for insulation are mineral wool, cork, shavings and cinders. All these materials are good for the purpose in the sense that they prevent the circulation of air, but then there are other matters to be taken into consideration—namely: Are they all fire proof? Will they absorb dampness? Are they vermin proof and will they always remain pure and wholesome, or in time become impregnated with impurities from various causes?

No one will claim that any or either of the above mentioned materials meets all these requirements, except mineral wool, and we defy any expert to prove to the public that this material is not in the first and most important point just as perfect an insulator as its competitors; that it does not possess the virtues of being fire proof and vermin proof; will not absorb dampness and will always remain pure and wholesome. It further has the advantage of being reasonable in price. To sum up, all these experts are fair enough to acknowledge all this for mineral wool, but make two objections to it. One is that it will settle in the wall if not properly put in. This is no fault of the material, but of the party using it. He would not think of building his air spaces of lumber full of knot holes for the air to circulate through. Poor construction must not be allowed in any part of such work. Let him see to it that the mineral wool is used in sufficient quantity and properly packed in the wall and this objection is done away with. We could add that this same objection exists regarding granulated cork, shavings and cinders. Their second objection is that it disentergrates, but all of the experts do not claim this. Our reply to this is that if slag wool is used there will be no disintegration. The wool is made from blast furnace slag, a residue obtained from the manufacture of pig iron, and consequently must be imperishable.

Our friends, the experts, delight in giving tables sustaining the materials they advocate, and we also can give tables supporting the efficiency of mineral wool.

Table showing the nonconducting properties of different materials at even thickness. (From Roper's "Engineer's Handy Book.")

Black slate	100
Sandstone	71-95
Fire brick	61-70
Asphaltum and soft chalk	45-56
Oak, pine, and wood and plaster	25-66
Sulphate of lime and sand	18-70
Sawdust and tan bark	17-20
Asbestos cemented	18-20
Fine asbestos in thread	13-15
Mineral wool	8-13
Ice	0

The following table of experiments made upon various materials for the purpose of determining their heat conducting power, was given in a paper read by J. J. Coleman before the Philadelphia Society of Glasgow:

Mineral wool	100
Hair felt	117
Cotton wool	122
Sheep's wool	136
Infusorial earth	136
Charcoal	140
Sawdust	163
Gas works' breeze (otherwise known as cinders)	230
Wood and air space	280

New Publications.

LINEAR DRAWING AND LETTERING FOR BEGINNERS. By J. C. L. Fish, Associate Professor of Civil Engineering in the Leland Stanford, Jr., University. Size, 7 x 10½ inches; 65 pages. Illustrated by four full page sheets and 50 figures. Bound in flexible cloth, with side title. Published by the author. Price, $1, postpaid.

BLANK BOOK FOR LETTERING, TO BE USED WITH LINEAR DRAWING AND LETTERING. By J. C. L. Fish. Size 7 x 10½ inches; oblong in shape; 30 sheets ruled on one side for lettering practice. Bound in paper covers. Published by the author. Price, 25 cents, postpaid.

This work, as the title indicates, is intended for those desirous of acquiring a knowledge of linear drawing and lettering, and is comprised in four chapters. The first of these relates to instruments and materials, the second deals with a course in linear drawing, the third is given up to lettering, while the fourth presents an introduction to drafting. The author states that the work embraced in chapters two and three constitutes a course of 50 working hours in linear drawing and lettering in Stanford University as it has been given during the past eight years, and as preparation for the drafting in the courses in descriptive geometry, elementary machine drawing, surveying and graphic statics.

Improper Chimney Construction.

Every heating contractor is aware that the chimneys constructed in many buildings are utterly unfit for the work expected of them. This is due in some instances to ignorance on the part of builders, but quite frequently to indifference as to the operation, where a saving in cost can be effected for the builder and also a saving in space. An experience with such a chimney recently came up in the business of the Æolipyle Company, 237 Water street, New York, through a change in the ownership of a property. When it became necessary to fire the steam heater the new owner found it was impossible to get up steam. In his search for a remedy he was advised to secure one of the Æolipyle combustion governors, and this led him to arrange for a representative of the manufacturers to visit the building and arrange for the connection of one of their devices. An examination showed a vertical sectional steam boiler having several square feet of grate surface connected by means of a 10-inch pipe with the chimney. The dull, lifeless appearance presented while there was fire in the boiler led to a further examination of the chimney, when it was discovered that the flue was 2½ x 16 inches in size, or utterly inadequate for the work it was expected to perform. A flue of such dimensions is of a shape calculated to offer most positive interference to the travel of air, gas and smoke through it. In this instance the flue backed up against another flue of the same size in an adjoining building owned by the same party.

On seeing the flue the chimney expert stated that it was useless to attach any apparatus to the heater with the object of securing its satisfactory operation. He recommended that the chimney be torn down from top to bottom and a chimney erected in its place with two flues side by side, having dimensions at least 9 x 9 inches, and preferably 8 x 12 inches in size. A new experience was then in store for him, for he was informed that this flue had been used the previous winter and that no difficulty had been experienced in getting up steam. In the presence of the owner the janitor testified that such were the facts.

Naturally, there is but one thing to do in such a case, and that is to leave it severely alone, which leads to the suggestion that possibly the janitor was afraid that if he admitted the flue was useless he would lose his position, by making it necessary for the owner to go to such a great expense as the construction of a new chimney would necessitate.

A USE has been found for another waste product by the utilization of the coke ashes of gas works for the manufacture of bricks. The ashes are reduced to a fine powder, mixed with 1-10 part of slaked lime, and after the addition of water, plugged until the mass forms a stiff paste. Then it is treated like ordinary clay, and formed into bricks by the use of suitable presses. The bricks are then stacked, protected from rain, and dried in the air, no artificial heat being used.

CONTENTS.

COLONIAL RESIDENCE ERECTED FOR MR. T. A. SPERRY, IN CRANFORD, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

CHAPEL OF THE TRANSFIGURATION, AT BLUE RIDGE SUMMIT, PA.

GHEQUIER & MAY, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1902.

(FOR ELEVATIONS, PLAN AND DETAILS, SEE PAGES 11-13.)

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

FEBRUARY, 1902.

The Charleston Exposition.

The opening in December of the South Carolina, Interstate and West Indian Exposition at Charleston, S. C., inaugurated what promises to be a useful and profitable undertaking for the promotion of Southern commerce and industry, particularly in its relation to the West Indian and South American trade. The prime idea of the promoters of the enterprise was the development of this trade, the location of the port of Charleston being peculiarly favorable to the promotion of an important export and import business with the 70 principal West Indian Islands and the east coast ports of South America. The fast growing importance of this field, especially since closer relations have been established with Porto Rico and Cuba, is becoming widely recognized by the business men of this country. The exports from the United States to the West Indies last year were greater than the exports to China, Japan and Asiatic Russia combined, and the quickening of this trade will naturally conduce to the profit not only of the South, but of the entire country. The exposition will also be serviceable in drawing attention to the marked progress that has been made of late in the South, and which is only the beginning of what promises to be a wonderful growth and development in that rich section of the country. No doubt, too, its lighter side will prove highly attractive to the pleasure seeker and tourist, who will be further attracted thither by the genial winter climate of Charleston and the picturesque features of Southern life provided at the fair.

The Outlook for Arbitration.

The approving attitude taken by organized labor in regard to the movement for arbitration of labor disputes initiated by the National Civic Federation at the recent convention in New York is a matter for congratulation, for it contributes one of the most hopeful factors to the industrial outlook of the country. One of the principal contentions for which organized labor has stood in recent years is the opportunity to bring its demands or grievances to the attention of the employers. This, as President Gompers of the American Federation of Labor points out in a communication to the official organ of that body, is a feature for which the new movement unqualifiedly declared and to which it stands committed. The conference of the Civic Federation and the establishment of its representative Arbitration Committee marked the successful issue of earnest and persistent efforts to bring about permanent arbitration of labor disputes, through the initiative of both the workers and the employers. That this movement will insure the entire elimination of strikes and lockouts from the industrial life of the country is not to be supposed, but that it will operate toward the better recognition by each side of the rights of the other cannot be doubted. The average workingman of to-day, and particularly the union worker, is of a sufficiently educated and intelligent type to recognize the truth that has been so generally lost sight of in the past—namely, that the interests of the employers and the employed are absolutely identical, and that the welfare of the one cannot be impaired without hurt to the other. Moreover, he has learned, by many sharp experiences, that strikes entail suffering and loss, even where they are, in their result, technically successful. There is no doubt that a strong feeling prevails among the workers in favor of the principle of arbitration as opposed to the crude and wasteful strike system, and that to labor as a whole, a method that will do away with the possibility of long periods of idleness and loss of income as the result of protracted labor disputes will be heartily welcome. At the same time union workers, as a class, are solidly against the system of compulsory arbitration, which some mistaken friends of labor are urging upon certain States for enactment into law. The contention is made that any system of arbitration should be one that is voluntarily accepted by both parties to the dispute without the intervention of the courts, and that this is the only kind of arbitration that is calculated to secure permanent success. In this connection it is interesting to note the somewhat radical, yet simple and comprehensive, scheme for averting strikes in the building trades now being developed by William H. Sayward, secretary of the National Association of Builders, and to which we refer at some length on another page of this issue.

The Fire Waste in 1901.

The years 1899 and 1900 were each marked by excessive fire losses in the United States, bringing disaster to many insurance companies, and these concerns were called upon in the year just closed to suffer still heavier losses. According to the careful compilation of the New York *Journal of Commerce* the aggregate fire losses of the United States and Canada for the calendar year 1901 amounted to the enormous total of $164,347,000, or a little more than $1,000,000 in excess of the loss of 1900. Under these circumstances it is not to be wondered at that an abnormal number of fire insurance companies are reported to have retired from business last year on account of the adverse conditions, among them being some of the older and more prominent institutions. The present outlook is said to indicate further withdrawals of insurance companies from the field during the first half of this year. The great increase in the fire waste of this country during the past three or four years is certainly alarming. Notwithstanding the improved facilities for the fighting of fire that have been introduced into our cities, the waste from this cause goes on increasing at a greater ratio than the increase of population. A comparison of the 1901 losses with those of the previous five years shows a marked increase in the damage caused by fire. For example, the average monthly loss in 1896 was $8,810,000; in 1897, $9,150,000; in 1898, $9,970,000; in 1899, $11,400,000; in 1900, $13,600,000 and in 1901, $13,700,000. The total for last year was, of course, greatly swollen by the conflagration at Jacksonville, Fla., which involved a loss of over $10,500,000, and other heavy losses were involved in the burning of the Board of Trade Building and many large stores at Montreal, Canada, and the destruction of a block of factory buildings in New York City. There were no less than 18 separate fires during 1901 in each of which losses of over $500,000 were incurred. Under these circumstances it is natural that the insurance companies should contemplate action in the direction of higher rates for insurance during the present year.

Splendid Gifts to Education.

The announcement of great gifts for charitable and educational purposes has become so common an occurrence in this fortunate country that something out of the ordinary in this line is now required to produce anything beyond a passing ripple of interest in the minds of the public at large. The report, published a few weeks ago, of the bestowal by Mrs. Stanford on the Leland Stanford, Jr., University of California of property valued at $30,000,000, coupled with the further announcement of the offer of Andrew Carnegie to furnish a sum of $10,000,000 for the establishment of an advanced educational institution at Washington, were sufficiently striking to attract intense interest and admiration. Mrs. Stanford's magnificent gift is probably the largest benefaction ever received at one time by any educational institution in the world. It is certainly the largest amount ever bestowed by a single individual. Moreover, this gift will appreciate in value as time goes on, as it consists largely of great tracts of land, much of which is still unimproved. Mr. Carnegie's gift is one of the greatest of a long series of princely benefactions that have flowed from his hand into educational channels in the United States and Great Britain. While official details of this project are not yet made public, it is understood that Mr. Carnegie contemplates the establishment in the national capital of an institution of higher learning, to which graduates of existing colleges and scientific men will be admitted for further study and research, the Government co-operating by giving the students free access to the valuable materials contained in the various departmental buildings and public institutions of the capital. Thus the proposed new college would not rival, but supplement, the existing seats of learning. There appears to be ample room for an institution of this character, and its conception gives another proof of the far seeing sagacity with which Mr. Carnegie is employing his wealth for the benefit of mankind.

Uniform Specifications for Painters.

At the eighteenth annual convention of the Association of Master House Painters and Decorators, to be held in Pittsburgh, Pa., on February 11, 12 and 13, one of the questions to be considered is that indicated by the above title. Its importance to the members of the trade is obvious, and the adoption of a uniform contract would doubtless go far toward obviating many of the annoyances growing out of misunderstandings between architect and painter in the execution of a contract. The last issue of *The Painters' Magazine* contains the following editorial comments on the subject:

No more important question has ever been brought before the National Association of Master House Painters and Decorators than that of devising a set of uniform specifications by means of which every different branch of painters' work may be accurately described, and which shall be satisfactory alike to painters and architects. For it is only by the preparation of specifications that will be mutually satisfactory that any real good can be accomplished. It would be the hight of folly to suppose that any architect would be willing to adopt a form of specification that depended in the slightest degree upon the honesty of the painter to whom the contract was awarded in order to obtain the quality of work intended. While undoubtedly it is true that many specifications are written that are so loosely worded that this very result obtains, it must be conceded that this is usually the case because the architect is ignorant of the correct way to specify the grade of work he desires, and not because he has any intention of writing a document that can be readily misconstrued. That is seen if the painters who criticise will but take the trouble to examine the descriptions of the work required of other mechanics in the same specifications that are so often faulty in their description of the painting work.

The sizes of moldings are accurately given, the quality of the lumber is indicated with exactness, the number of nails to be used to each joist or stud is particularly mentioned, the weight of the lead pipe for each particular fixture is fixed, and every lock, knob or hinge is called for by its catalogue number, so that there is no chance for the dishonest mechanic to escape from doing the work he has agreed to do, provided the superintendent is faithful to his duty. But when it comes to painting, the architect is too often attempting to describe work without knowing what is the proper method for obtaining desired results. This is not strange, for in many cases two or more painters asked to suggest the proper form of specifications for a particular piece of work would disagree radically as to the correct method to pursue.

It will therefore be seen that the committee to whom this important work of formulating a set of uniform specifications has been intrusted have no easy task before them, for they must approach the subject not from the point of view of the painter, but they must endeavor to put themselves in the place of the architect who is trying to obtain the best result for his client and who is desirous of framing a specification for painting that shall be strictly drawn, so that there can be no possible dispute as to its intent and meaning, and that will afford no loophole for the dishonest painter to crawl out of, and under which such a man, when looked after by a faithful, honest and competent superintendent, can be compelled to produce work of the exact quality intended by the specifications. There can be no hope that any set of uniform specifications that shall be formulated along any other lines than these would be considered by the American Institute of Architects, and unless it is approved by that body, it would be useless to hope for its general adoption by the profession.

Programme of Brick Makers' Convention.

As previously announced in these columns, the sixteenth annual convention of the National Brick Manufacturers' Association will be held in the city of Cleveland the second week in February. A splendid programme has been prepared and a local entertaining committee will look after the pleasure of members and guests of the association.

The headquarters of the convention will be at the Hollenden Hotel, where an exhibition of brick making machinery will be held, while a novel feature of the convention will be a side exhibit of brick, assembled from all parts of the country.

The plans contemplate the annual dinner on Wednesday evening, February 12, an excursion to various brick plants adjacent to the city on Thursday morning, with the compliments of the Cleveland Hydraulic Press Brick Company; a theater party for the delegates and their ladies on Thursday evening, followed by an informal Dutch lunch and smoker at the hotel, aside from the regular business sessions, which will be of benefit to all members of the trade.

D. H. Meloy.

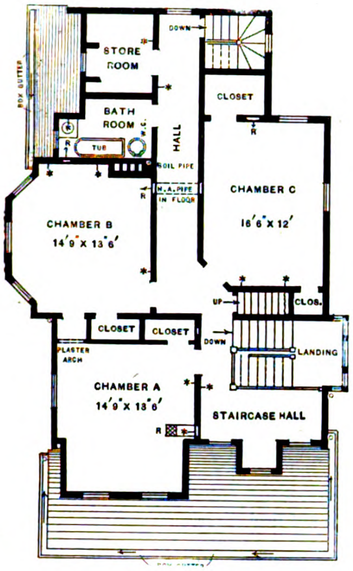
The many friends of D. H. Meloy, one of the pioneer architects of Waterbury, Conn., as well as one of its oldest citizens, will regret to learn of his sudden death early in January, while on a visit to his son in Bridgeport. Mr. Meloy was born in West Haven, January 22, 1826, receiving his early education in his native town. He studied architecture with S. M. Stone of New Haven and went to Waterbury in 1847, where he engaged in business as a contractor. In 1878 he devoted himself to the practice of architecture, in which profession he continued until several years ago, when he retired from active life.

He was the author of "Progressive Carpentry," with which our readers are more or less familiar.

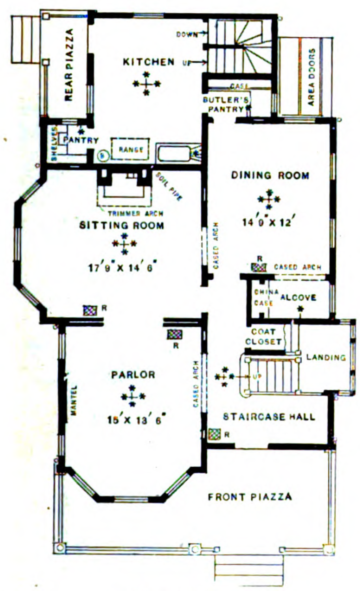
A HOUSE AT HARTFORD, CONN.

THE frame residence which forms the basis of one of our supplemental plates this month embodies in its treatment and arrangement many points of interest to our readers. Especially noticeable features are the broad piazza, extending across the front of the building, the projecting triple window which lights the platform of the main stairs, and the shingle effect on the gables and dormers. The exterior of the first story is covered with beveled clapboards painted a light colonial yellow. The second story, including dormers, is covered with shingles stained a light brown, while the entire roof is of a dark green color. The windows are glazed with polished French plate glass, except the window at the stair platform or landing, which has a neat design in colored cathedral glass.

From the architect's specifications we learn that the entire foundation is of selected dark red common brick laid up in red mortar, the effect being lightened by trimmings painted ivory white. The timbers of the house are first quality spruce, the bearing beams being 8 x 10 inches; the first, second and third floor timbers, 2 x 10 inches, placed 1 foot 4 inches on centers; the sills, 4 x 6 inches, halved and lapped joints spiked together; the girts, 1¼ x 6 inches, cut into the studding for the support of timbers; the plates, 4 x 4 inches, with lapped joints and spiked together; the valleys, hips and ridges, 2 x 10 inches; the main rafters, 2 x 8 inches, placed 2 feet on centers, and the other rafters 2 x 6 inches, also placed 2 feet on centers. The piazza bearing beams are 6 x 8 inches; the piazza floor beams, 2 x 8 inches, placed 1 foot 8 inches on centers; the balcony floor timbers, 2 x 6 inches, placed 1 foot 8 inches on centers; the piazza ceiling beams, 2 x 4 inches, placed 1 foot 8 inches on centers; the studding of the exterior walls, 2 x 4 inches, and that of the interior walls, 2 x 3 inches and 2 x 4 inches, all placed 1 foot 4 inches on centers.



Second Floor.



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

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

A House in Hartford, Conn.—F. R. Comstock, Architect, New York City.

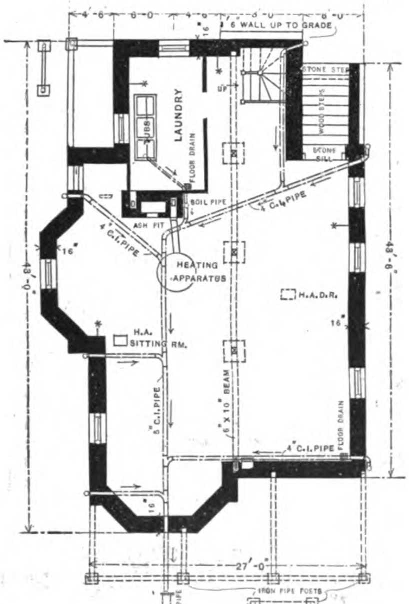
The staircase hall of first story and the entire walls are of oak. The parlor is finished in white enamel, the sitting room in white wood stained mahogany, while the dining room is in oak. The balance of the house is finished in Southern pine. The plumbing is of the open type and the fixtures modern in every respect.

The house here shown is pleasantly located on Main street, Hartford, Conn., and was erected for Thomas Beckwith in accordance with plans drawn by Architect F. R. Comstock of 20 East Forty-second street, New York City.

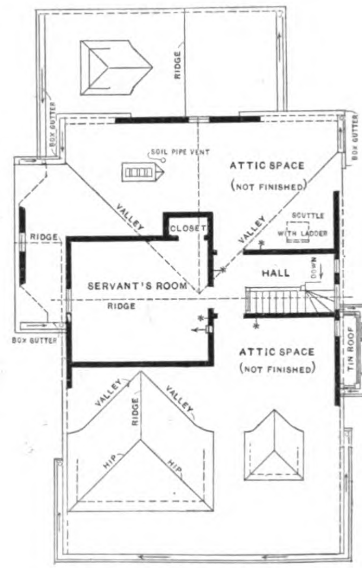
It would seem that the limit to the hight of the lofty business structures of down town New York has by no means yet been reached, if current reports are true. According to this report a promoter is trying to organize a realty company to build a 54-story office building on lower Broadway. It is said that plans for the building have already been drawn, and that from the street level to the top of the tower the hight will be more than 700 feet. The estimated cost of the building is said to be about $8,000,000.

Dust from Heating Apparatus.

It has been the custom of men engaged in other lines of heating to refer to the hot air furnace system of heating as being especially dirty. This, however, is a practice only followed by those in the trade who look out for their own interests alone, and is seldom used by men of broader judgment, who recognize that all indirect systems of heating are likely to be the means of distributing more or less dust through a building. In order to avoid the dust that is necessarily gathered in with the fresh air supply, when it is taken from near the ground, the air supply is often taken at some distance above the ground. Frequently the supply for hot air furnaces is introduced **through a duct which extends from 6 to 10 feet above the ground, covered by a hood and having an opening protected by means of wire screens against the entrance of birds, leaves and other foreign matter. In other instances, particularly in large cities, the fresh air supply for a heating system is taken from the roof level through** a flue that in appearance resembles in every way a chimney. This is quite a common custom when a fan system is used to force a large quantity of air through the system of warm air supply ducts. Failure to pay attention to the source of the air supply has brought some trouble to the custodians of the City Hall at Atlantic City, N. J., where a blower system is in use. Apparently there has been no complaint about the heating, but it is said that



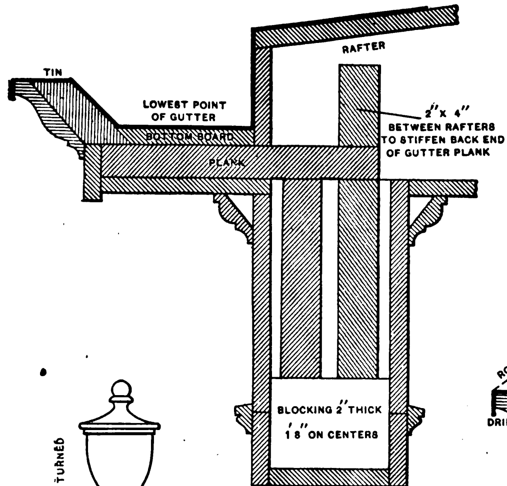
Foundation.



Attic and Roof Plans.

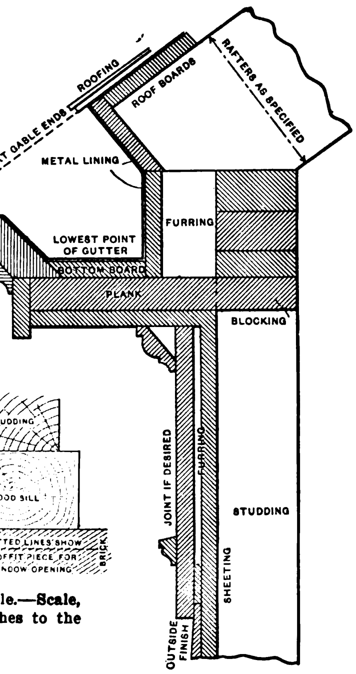
Side (Right) Elevation.

A House in Hartford, Conn —Plans.—Scale, 1-16 Inch to the Foot.—Elevation Scale, ⅛ Inch to the Foot

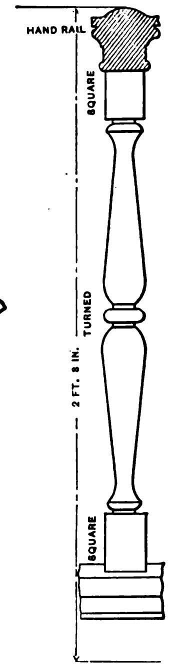


Detail of Piazza Cornice.—Scale, 1½ Inches to the Foot.

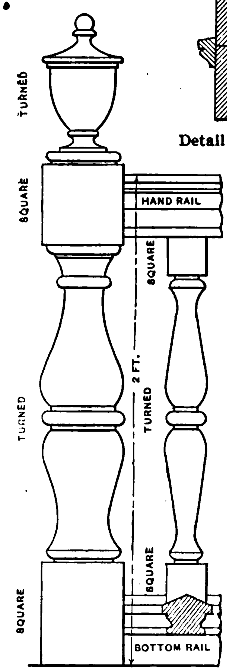
Detail of First-Floor Doors.—Scale, 3 Inches to the Foot.



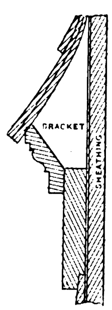
Main Cornice.—Scale, 1½ Inches to the Foot.



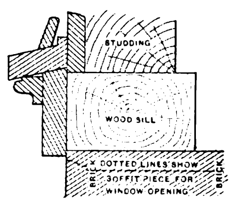
Detail of Piazza Baluster.—Scale, 1½ Inches to the Foot.



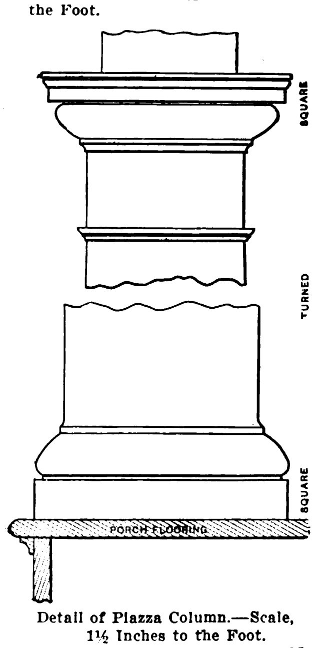
Details of Balustrade Over Triple Window Lighting Main Stair Platform.—Scale, 1½ Inches to the Foot.



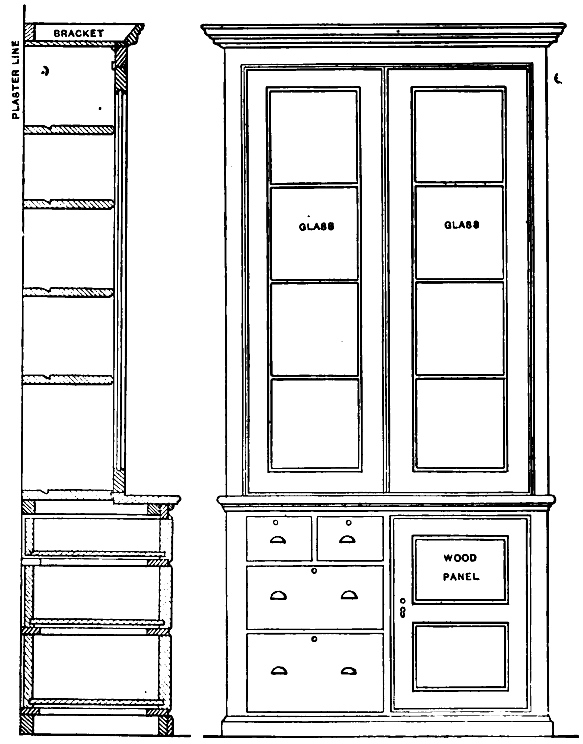
Detail of Belt Course.—Scale, 1½ Inches to the Foot.



Water Table.—Scale, 1½ Inches to the Foot.



Detail of Piazza Column.—Scale, 1½ Inches to the Foot.

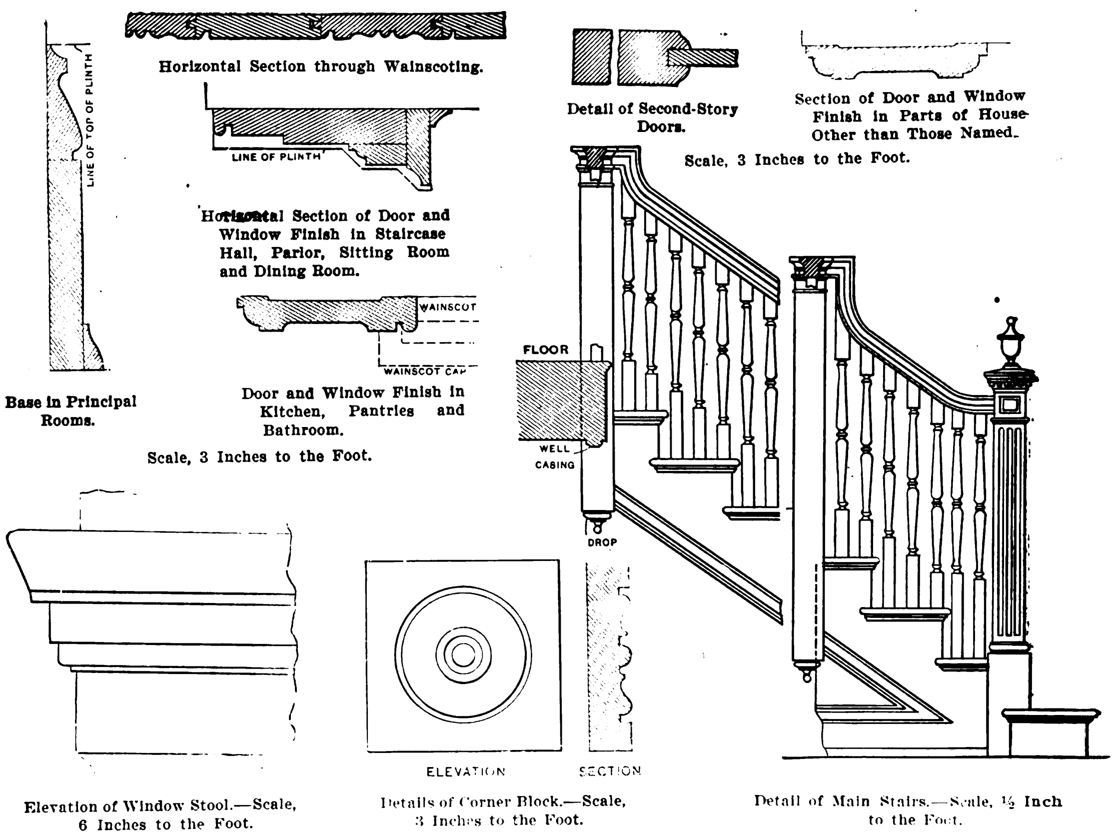


Details of Case in Butler's Pantry.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of House in Hartford, Conn.

the hot air flues carry such volumes of dust into the different apartments that in an incredibly short space of time names can be written in the dust that settles on the furniture. The fresh air for the heating plant is drawn in from the police court yard, and the complaint of the dust that comes in with it will doubtless lead to some method of avoiding the annoyance.

Those who live in the East, where hard coal is quite generally used, and where there is a natural moisture in the atmosphere, do not have the same cause for complaint that is felt in some other sections regarding the dust that follows the use of any indirect system of heating. In many instances, however, those who have moved into sections where the air is not so clean make demands upon the heating contractor for some method of getting rid of the dust nuisance. As a result, heating men have perfected elaborate systems for washing the air by sprays of water and passing it through screens of cheese cloth in order to arrest the dust. This can be done without difficulty where the attendant expense is not an objection. Those who use hot air furnaces, which bring into buildings large quantities of air, naturally look to furnacemen to furnish some device for checking the entrance of the dust which the fresh air naturally carries with it. In many cases the cold air supply ducts are equipped with frames to which cheese cloth is fastened, and the result is in every way satisfactory when the screens are sufficiently large not to hinder the air flow and the cloths are removed and cleansed with sufficient frequency. In some places it is found that in dry weather the cheese cloth requires changing not less than once in 48 hours, while in rainy weather the cloth may last for several days. When the cheese cloth screen is used in a cold air supply the heating is not infrequently hindered, owing to the fact that the meshes soon become filled with dust, which prevents the free entrance of air to the furnace. Where a screen is used, the frame work, instead of being just large enough to enter the supply duct at the smallest cross section, in the same way as the damper, should be inserted into the duct diagonally, one of its dimensions being the depth of the cold air supply, with the other as many times the width as can conveniently be inserted. This method gives a larger surface of cheese cloth, and affords a better opportunity for air to enter the duct, while it enables it to continue its usefulness for a long period of time before it is clogged with dust. If those who furnish such filtering screens desire to avoid trouble, they must impress those who require them with the fact that the screens require a great amount of care, and that attention must be given to them frequently and regularly; otherwise the efficiency of the heating apparatus will be impaired. There is ample room for profit to be made from the sale of air filtering devices in connection with indirect heating systems, provided they are arranged in a common sense way, and the owners are made to thoroughly understand that frequent attention is the price of clean, fresh air.



Miscellaneous Constructive Details of House in Hartford, Conn.

Cement Houses.

Hollow blocks of cement instead of bricks are coming into general use for building purposes in Denmark, the blocks being made 13 x 13 or 9 x 13, according to the character of the wall. A mixture of sand and slow setting cement is rammed into dry molds in the usual way. After about six weeks' hardening the blocks are strong enough for most building purposes. It is claimed that houses built with these blocks are fit for occupation immediately after completion, and that the inside of the wall requires neither cleaning nor preparation, but is ready for papering or painting at once.

COMPUTING SIZES OF TRUSS MEMBERS.—II.

By F. E. KIDDER, Consulting Architect.

RULES and tables for computing the sizes of the various members of a truss, to accord with the stresses, were given in the preceding issue, also an example of their application. As a further illustration of the application of the rules we will compute the size of the members of the truss shown in Fig. 7, and for which the stresses are given in Fig. 9 of the November issue of this journal.

Rods.

The stress in each of the two rods is 6930 pounds. Assuming that they will be of wrought iron, with threads cut from the body of the rod, we find from Table 1, published in the issue for January of this year, that a 1-inch rod is not quite strong enough, and that we must use 1⅛-inch rods.

Principal Struts.

The stress in the lower portion of the principal struts or rafters is 25,770 pounds. We will assume that the timber is to be of white pine. The length between joints 1 and 2 is a little less than 10 feet. From Table II of the January issue we find that to resist a compression of 25,770 pounds, with a length of 10 feet, will require either a 6 x 10 or 8 x 8 inch strut. Which of these sizes we will use we can determine better after we have found the required size for the top chord and tie beam. The stress in the cop chord is 14,970 pounds and the length is practically 10 feet. From Table II we see that a 6 x 6 inch strut has a safe resistance for this length of 17,352 pounds, so that it will do for the top chord. The two braces, 2 7 and 5 8, each have a compressive stress of 4400 pounds and are about 9 feet long. From Table II we see that this will require a 3 x 6 inch timber. The tie beam in this truss has no transverse strain to speak of. The tensile stress is 17,900 pounds. From Rule 1, January issue, we find the net sectional area by dividing the stress by 1400—for white pine—which gives 12.8 square inches, or a little more than 2 x 6 inches. As the tie beam will probably be built up of planks we must double the net area to allow for splicing, and it will also be necessary to still further increase the section to allow for cutting at the joints and for the bolts and rods, so that we will make the size of the tie beam 6 x 6 inches, the same as the top chord. In order to make good connections at the joints the various timbers should all be of the same width, hence we will make the principal struts 6 x 10 inches. The braces B B would have no stress except under wind pressure. What the stress would be in that case can be determined by a special diagram, but as it would not be very large we will be perfectly safe in making them 4 x 6 inches.

Example III.

We will next compute the size of the members for the truss shown in Fig. 10, which is here reproduced from the November issue and for which the loads and stresses are given in Fig. 11.

Rods.

The stress in the rod 2 3 is 13,492 pounds; in rod 4 5 5804 pounds, and in the center rod 1968 pounds. These will require for wrought iron 1⅜, 1 and ⅝ inch rods respectively. The ⅝-inch rod had better be increased to ¾-inch for appearance sake.

Of the wooden members we will first compute the size of the top chord, which acts both as a beam and as a strut. The load on one of the center spans is 5704 pounds. Assuming that the wood will be white pine and taking 10 inches as the trial depth, we find the breadth to resist the cross strain by Rule 2, published in the January issue. The length or span is about 7¾ feet. Multiplying this by the load we have 44,206. This is to be divided by twice the square of the depth multiplied by 60, or 12,000. Performing the division we have 3.7 inches as the breadth, or it will require a beam 3.7 x 10 inches to resist the cross strain. The compression in the center spans of the top chord is 43,260 pounds.

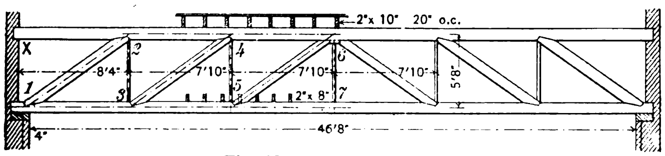


Fig. 10.—Horizontal Truss.

From Table II we see that the strength of an 8 x 10 inch beam 8 feet long is about 1000 pounds in excess of this. Therefore to resist the compression will require an 8 x 10 inch beam and to resist the cross strain nearly a 4 x 10 inch, so that our beam must be 12 x 10 inches. As the beam will be stronger, however, if we make the depth 12 inches and the width 10 inches we will use a 10 x 12 inch for the top chord. This might be reduced between the wall and the end joints to 6 x 12 inches. It is not necessary to increase the size of the compression members on account of bolt holes or splices, provided that they come at the joints.

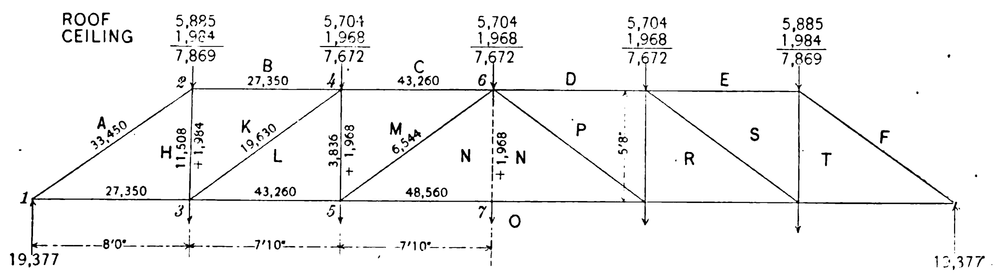


Fig. 11.—Truss Diagram with Joint Loads Indicated and Illustrating Example III.

Computing Sizes of Truss Members.—Diagrams Reproduced from the November Issue of Last Year.

We will next compute the size for the tie beam, which also has a transverse load. The load on one of the center spans of the tie beam is 1968 pounds. Assuming the depth as 10 inches and computing the thickness in the same manner as for the chord, we obtain 1¼ inches for the necessary thickness of a 10-inch beam to resist the transverse strain. The tension in the center panels is 48,560 pounds.

Dividing by 1400 we have 35 square inches as the net sectional area required to resist the tensile stress. This is equal to 3½ x 10, which is the least sectional area that will answer at joints 5 or 7. Between the joints the thickness must be increased by 1¼ inches to allow for the transverse strain, so that a beam 4¾ x 10 inches is the least that will answer for a solid tie beam—that is, formed of a single stick of timber. As it would be impracticable to obtain such a timber in most localities it will be necessary to build the beam of 2 x 10 inch planks, bolted together every 2 feet with ¾-inch bolts. On account of the joints due to the splicing of the planks it will be necessary to double the size of the beam or to make it 10 x 10 inches, and even then it will be necessary to lay out the beam in such a way that the net sectional area at any point will be at least 35 square inches and so that no two joints in the planks will come nearer than 8 feet of each other. This matter of building up tie beams will be considered in a future paper.

We have now settled on 10 x 12 inches as the size for the top chord and 10 x 10 inches for the tie beam. Brace 1 2 must, therefore, be 10 inches wide. The stress in this brace is 33,450 pounds, and the length of the brace is about 9 feet. From Table II we find a 6 x 10 timber is hardly strong enough, and that we must use an 8 x 10, which should be placed flatways. The stress in the brace 3 4 is 19,630 pounds, for which we will have to use a 10 x 6 or a 10 x 5. For brace 5 6 the stress is 6544 pounds, for which a 3 x 6 would answer, but as the beams are 10 inches wide it would be better to use a 3 x 8.

This gives all of the dimensions of the truss, as both sides of the truss should be alike. With these examples the reader should be able to compute the size of the members in any truss after the stresses have been determined, as the process is the same, no matter what the shape of the truss may be.

PLAN TO AVERT BUILDING STRIKES.

FOR the last three or four months William H. Sayward, secretary of the National Association of Builders, has been at work in New York City investigating the labor problem as it appears in the building trades of the metropolis. The object of this effort is to secure the co-operation of employers and workmen in the trades named looking toward the establishment of a permanent court of settlement and appeal, in which all of the building trades shall have representation through both employers and workmen, and make annual agreements covering all the rules and conditions which shall prevail in each trade for the year ensuing.

The plan as proposed comprehends such a composition of the court as will give the community its proper consideration, following out the theory that the labor problem is composed of three factors—the employer, the workman and the community—and that no one of these factors or no two have a right to settle conditions conclusively without the co-operation of the others.

Mr. Sayward has thus far been engaged principally in investigation, interviewing a great many employers in all of the building trades individually, making selection of the most influential to determine whether they feel assured that the time is ripe for making a movement of the radical character contemplated, which will be in effect a recognition of the value of co-operation of employers with labor organizations looking to the settlement of all affairs of mutual concern. He has also obtained many interviews with representative workmen and officers of various unions in the building trades to determine whether, on their part, the mass of workmen would be in favor of the establishment of such a court which would place the whole of these relations of employer and workman in a fair way for settlement upon a thoroughly business basis.

He has, thus far, received great encouragement from employers and workmen, they having heartily approved the plan as ideal in character and as being upon a very dignified and businesslike plane. There are many difficulties to overcome owing to the complicated conditions existing in the metropolis which have largely arisen from failure to comprehend the true relations of employer and workman and the value of application of organized effort. There are, however, no difficulties that cannot be overcome by persistent and earnest endeavor along the lines indicated.

Having secured the approval of employers and workmen individually to a sufficient extent to determine the reasonableness of further action, steps are now being taken to obtain the adhesion of the various bodies of employers and workmen. Thus far, too, Mr. Sayward has received the hearty indorsement of such organizations as have been so addressed. He is holding meetings in the city every week and reaching as many organizations as possible, principally, up to the present time, those of employers. All of the organizations of workmen are being addressed through their proper officers, and their adhesion will be sought during the coming months.

The plan briefly outlined is the establishment of a court of settlement and appeal which shall have as its permanent members three persons entirely outside the constituency of the building trades, and to be selected as follows: One by the workmen of all the trades acting collectively, one by the employers of all the trades acting collectively through committees appointed for the purpose, and these two to select a third, also outside the constituency. These three persons are to be preferably men of legal training and judicial character and of such high standing in the community as to lend dignity to the tribunal; they to practically furnish the balance of the court and preserve the community's interest in the conduct of the court's function. These three permanent members of the court form the nucleus. The full court is to be composed by the selection of three workmen and three employers who joined with the three permanent members will make a court of nine. These workmen and employers are to be selected from each trade and to act consecutively in sitting in the interest of that trade in making annual agreements. The three permanent members thus sitting with six representatives of each trade in succession will be able to preserve the decisions from conflict and complication one with another and will from their character lend dignity and significance to the decisions of the court, while at the same time bringing the whole determination of affairs for the building trades upon an infinitely higher plane than they have previously been.

All decisions of the court will be open to the public, and will be conclusive and binding upon all parties. During each year the court will be available for reference in case either employers or workmen in any branch fail to live up to the agreement as announced, the whole to be determined by the court and no strike or lockout of any name or nature be permitted under any circumstances.

Any new features or ideas looking to a change, modification or extension of the rules for any trade during the interim between times of annual agreements are not to be permitted because of abandonment of work but are to be referred to the court for consideration and digestion during the balance of the year, and are to come up for actual consideration at the time of the next yearly agreement.

From the statements above presented it will be seen that this is a radical, yet, at the same time, comprehensive plan, and simple in its principle. It is based entirely upon the idea that it is possible to settle the affairs of mutual concern to employers and workmen, in the building trades at all events, upon lines that are just, fair and businesslike.

Law in the Building Trades.

PER DIEM DAMAGES DO NOT APPLY TO ABANDONMENT.

Provision in a contract to furnish stone for a building, that if the contractor fails to fully perform it by the time stipulated he shall pay, as liquidated damages, $50 for every day he shall be in default, does not apply to a case of utter abandonment of the contract by him.—Gallagher *vs.* Baird, N. Y., 66 N. Y. Supp. Rep., 759.

WHEN CERTIFICATE OF ARCHITECT IS NOT NECESSARY.

Under a building contract providing that final payment should be made when the building was "completed and accepted by the architect," a certificate of the architect of his approval of the work was not necessary to enable the contractor to maintain an action for the balance due him, as the matter of approval was one of fact.—Devlan *vs.* Wells (N. J.), 47 Atl. Rep., 467.

CONSTRUCTION OF A FIRE PROOF VAULT.

By JOSEPH E. LEWIS.

AN important part of the office equipment of a manufacturing plant is a fire proof vault. It need not necessarily be burglar proof, for the records which it will contain, while of great value to the company, yet possess no cash value and offer small temptation to theft; but fire proof beyond question it must be. Here should be preserved everything of a documentary nature pertaining to the business, including all drawings and shop records. Should the whole plant be destroyed by fire the data thus preserved would serve as a basis for insurance adjustments as well as a means of continuing the business along the old lines in new quarters.

Two essential qualities of a fire proof vault may be named. First, it must be absolutely proof against fire; and, second, it must be dry. The second is scarcely less important than the first, for papers readily collect moisture, which will in time render them illegible.

The writer, having recently designed and constructed a vault which has proved very satisfactory to the owners, has thought it not out of place to describe some features of the design as being of possible interest to readers of the paper. The plan, Fig. 1, shows the location of the vault outside of the main building, it being constructed so as to be as much isolated as possible. The advantages of this location consist in remoteness from inflammable material and in the ready access of air and light.

The foundation walls are of masonry, extending nearly 4 feet below the level of the ground and composed of granite laid in Portland cement. They are several inches wider than the brick walls which they support. The inclosed space was excavated to a depth of about 2 feet below the floor level and filled in with broken rock. Upon this rip-rap the cement floor, 4 inches thick, was laid. This construction is shown in Fig. 2, which is a vertical transverse section. The bed of broken rock was designed not only to give a massive floor, but chiefly to allow moisture to settle away, so that the floor and lower part of the vault might be dry, and it has fully served its purpose.

A ground plan of the walls, which are composed of a good quality of red brick laid in mortar, is shown in Fig. 1. The outer and inner walls are separated by a 3-inch air space, and are tied together at frequent intervals. The total thickness of the two exterior walls is 15 inches each, while that of the walls adjacent to the office and shop is 24 inches, the air space extending all the way around.

This air space deserves special mention, as it serves two purposes. In the first place 3 inches of air are worth vastly more than 3 inches of masonry for fire proofing. Air is about the best nonconductor of heat, and is probably more used for that purpose than any other material. The majority of pipe coverings are good insulators, principally because they are full of air cells, and it is from the same source that terra cotta and other fire proofing materials largely derive their value.

But the air space serves a second and no less important purpose in providing a means of ventilation. It is entirely sealed at top, bottom and sides with the exception of five pipes piercing the outer wall at A, and five more piercing the inner wall at B, all as shown in Fig 2. Those at A are pitched slightly so as to drain outward, and those at B are provided with corks, so that they may be closed at will. These pipes are spaced evenly along the sides of the wall at the elevations indicated. A complete circulation of air is thus provided to dry out the space between the walls; and fresh air is also thus admitted to the vault itself. It should be observed that this arrangement for ventilation does not in the least detract from the fire proof qualities of the vault.

Ample light is provided by five wire glass windows at the elevation indicated by C on the outer wall, Fig. 2. These windows are 3 inches wide and 15 inches high. The wire glass, ¼ inch thick, was set in cement. The glass was obtained from the Pittsburgh Plate Glass Company, and seems to have been cast in a mold with a strong piece of wire netting running through it. It may be shattered into fragments by heat or otherwise, but the wire prevents the pieces from falling, so that the shattered pane remains in place. It has been found to be practically fire proof under the most severe tests.

The wooden roof of the office was extended to include the vault, but under this a fire proof roof was carefully constructed to seal up the vault and the air spaces at the top. The arrangement is shown in Fig. 2. For this pur-

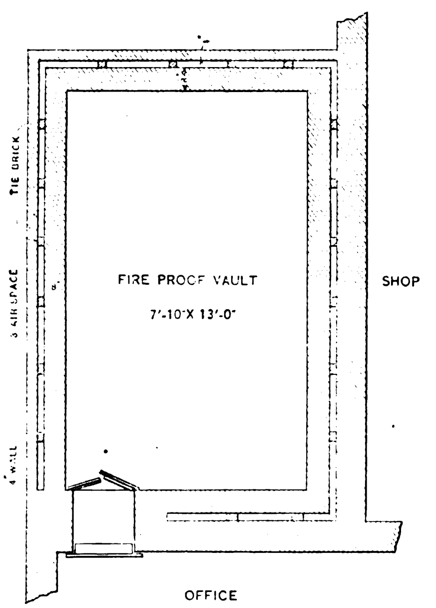


Fig. 1.—Foundation Plan.—Scale, 3-16 Inch to the Foot.

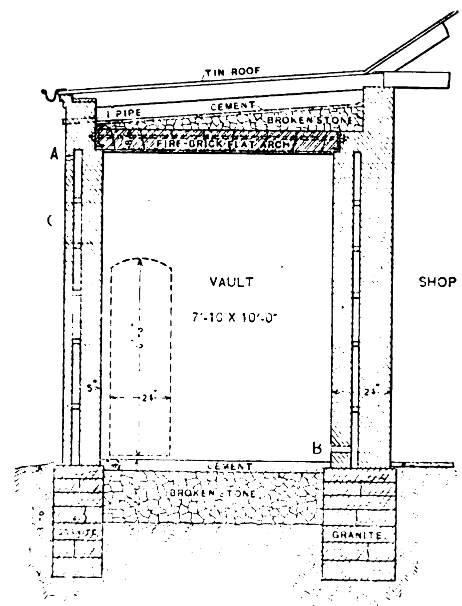


Fig. 2.—Vertical Transverse Section.—Scale, 3-16 Inch to the Foot.

Construction of a Fire Proof Vault.

pose we used fire brick flat arches, known as the Excelsior end construction flat arch, and made by Henry Maurer & Son of New York City. It was necessary to use considerable care in placing the arches in position. After the walls had been brought to the proper hight all around, and the air space bricked over, a false roof of planking was laid so as to produce a flat surface upon which to lay the arches. This staging should preferably be 1 inch higher in the middle than at the sides. At all events it should not be allowed to sag. Two 8-inch channels hold the ends of the arches, as shown, and these are tied together with five ¾-inch rods. One-inch rods would have been better. The arch bricks were laid in Portland cement, and the nuts on the tie rods screwed up tight before the cement had time to set.

It was deemed advisable to make the fire proof roof so that it would drain in case of leakage through the outer roof. It was accordingly filled in with broken stone and bricks, as shown in Fig. 2, producing a pitch of about 9 inches. A nice coating of cement was applied, and the surface carefully sloped toward the two lower corners, where the brick wall is pierced through to the outside by two 1-inch pipes, to carry off any water that might find its way to the inner roof.

The doors of the vault are an important feature, and were made by the East Berlin branch of the American Bridge Company. The passage way is 2 feet wide, 2 feet long and 6 feet 6 inches high. The floor of the passage is of ¼-inch boiler iron, cemented in place and elevated about 2 inches above floor levels in the office and vault to provide a sill for the bottom flange of the doors to shut against. A brick arch is used at the top. The outer door is made of corrugated iron, and is known as a filled box door. That is to say, it is made hollow, and the space filled with asbestos or other insulating material. Hinges and hinge bricks as well as a double latch fastening come with the doors. The hinge bricks are of cast iron, and designed to be built into the wall of the passage. The inner doors are a pair of corrugated iron shutters, and are provided with latch and catch bolts at top and bottom. The passage is thus closed at both ends, providing a large air space which makes the entrance entirely fire proof. To provide for locking the outer door a piece of 1½ x ⅝ inch iron was securely built into the edge of the brick wall, so that the end projects through a slot in the flange of the door. A ½-inch hole was bored in the end of this tongue to receive a padlock.

The ceiling of the vault was plastered, and then the interior was allowed to dry out for four or five weeks, at the end of which time three coats of white paint were applied, the last coat being an enamel to produce a smooth hard finish.

Shelves for books and files were furnished by Merritt & Co. of Philadelphia. They are made of expanded metal supported upon angle iron racks. Besides this, there is a large case for drawings and a small safe.

RAPID SKYSCRAPER CONSTRUCTION.

(WITH SUPPLEMENTAL PLATE.)

ATTENTION has at intervals been called to some of the methods employed in the erection of towering office buildings to be found in the larger cities of the country, all calculated to facilitate the progress of the work and render its completion as rapid as possible. What we illustrate by means of the half-tone picture forming one of our supplemental plates this month may not be altogether new to those readers dwelling in the larger cities and who are accustomed to the more or less Aladdin like effects in building operations at the present day, but to those living away from the large cities it cannot fail to awaken interest. Years no longer intervene between the demolishing of an old structure and the occupancy of its more imposing successor. Only a few weeks are now necessary for the establishment of a new landmark and the introduction of a new feature in the sky line. The design of the structure and the method followed in its erection both contribute to advance the date of its rent receiving career.

This order of architecture has been aptly described as a steel frame with a masonry casing. The speed at which the metal work can be assembled is only controlled by the delivery of the steel and the hoisting appliances. It is evident that many gangs of men can be worked simultaneously without being crowded so as to interfere with each other. This insures the utmost expedition in the erection of the frame and the completion of the floors but a step behind.

The same may be said to be true of the masonry, which is carried forward in entirely distinct and separate units. One of the best examples recently coming to our notice as illustrating the extent to which this subdivision may be carried is shown in the engraving, made from a photograph taken while the work was in progress. This building is on the southeast corner of Broadway and Maiden lane, New York, and was designed by Clinton & Russell, architects, of 32 Nassau street. It will be noticed that the masonry is carried forward at the same time at three distinct levels. The picture shows the first two stories finished, then come two stories of the frame; then four stories of masonry, and above this three of steel. The third group of masonry, it will be noticed, has just been started at the twelfth floor, above which the skeleton frame is still progressing.

A VERY interesting document has just been issued by the United States Department of Agriculture, relative to tree planting on rural school grounds. The matter was prepared by William L. Hall, Assistant Superintendent of Tree Planting of the Bureau of Forestry, and comprises what is known as "Farmers' Bulletin No. 134." The text deals with the present condition and needs of rural school grounds and indicates methods for their improvement. It also suggests important lines of study for the teacher and school in connection with trees and forests. The information and advice apply to country church yards and to school yards in many towns and villages.

Molds for Casting Plaster Ornaments.

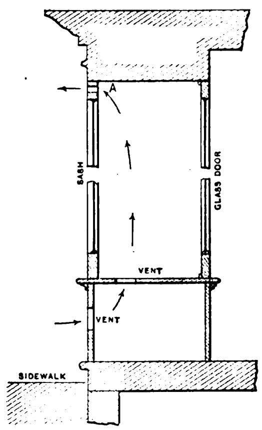
In describing a method of making molds for casting plaster ornaments a writer in one of our exchanges states that "the latest and most favored molds for plaster casts are a combination of glue and glycerine, the mass being prepared as follows: In a suitable kettle place 5 pounds of good glue with 5 pounds of soft or rain water, and allow it to stand for 24 hours. Now pour off the superfluous water and place the kettle into the water bath—that is, into a larger kettle, that contains boiling water or into a regular apparatus designed for melting glue. When the glue so treated has become liquid, add to the above quantity 3 pounds crude glycerine and 25 grams salicylic acid and stir the mass well, so as to obtain an intimate mixture. This done, the liquid must be filtered through fine cheese cloth into a clean vessel and when the foam has disappeared, the mass may be made into molds, but the procedure must be necessarily slow in order to prevent foaming and thereby avoid defects.

The mold can be taken off only when it has cooled thoroughly and become hard to the touch. In taking off the mold, it is cut into suitable sections with a sharp knife, which are, when casting, set together again and held with cords or wire. As soon as these molds have become cold, they must be coated with talcum first and then be given two or three coats of copal varnish, slightly thinned with turps. This treatment makes the mold water repellant, as well as proof against the possible damage that might result from the casting of the plaster—respectively, the heating up of the same during the hardening of the cast.

CORRESPONDENCE.

Preventing Show Windows from Sweating.

From F. T. D., *San Francisco, Cal.*—In answer to the inquiry about sweating show windows which appeared in the December issue of the paper, I would like to offer a plan which has been tried and found a success. The sketch which I send represents a vertical section

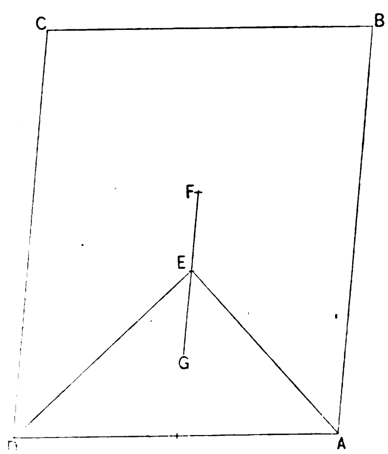


Preventing Show Windows from Sweating

through the show window indicating the method of ventilation. In order to accomplish the purpose an 8 x 10 inch iron ventilator was inserted under the show window facing the street and a ventilator of the same size was placed in the floor of the show window. The arrows indicate the direction of the currents, the fresh air entering at the bottom and the hot air escaping at the top through holes made in the sash. These holes, indicated by the letter A, were 1 inch in diameter and were placed every 6 inches across the top of the window. The ventilators might be made with closing shutters, so as to regulate the draft. The store in question is occupied by a dealer in Japanese fancy goods and the window has four gas lights.

Finding Back Cut of Hip Rafters When the Inclination is Other than 45 Degrees.

From L. T. B., *Hamburg, Iowa.*—In reply to the inquiry of "W. F. S.," Hermitage, Tenn., which appeared



Finding Back Cut of Hip Rafters When the Inclination is Other than 45 Degrees.

in the January issue of the paper, I submit my method of obtaining the cut desired. Referring to the accompanying diagram, let A B C D represent the plan of a building, the angles of which are not right angles; E F the ridge and A E and D E the seats of two hips. Place the blade of the square against the line E F, and slide the square down toward G until 12 on the tongue comes to the line A E. The figures on the blade at E will then be less than 12. Now take 12 on the tongue and the figures at E, plus the gain of the hip per foot, and mark by the blade. This will give the back cut, which will fit the ridge or the opposite hip.

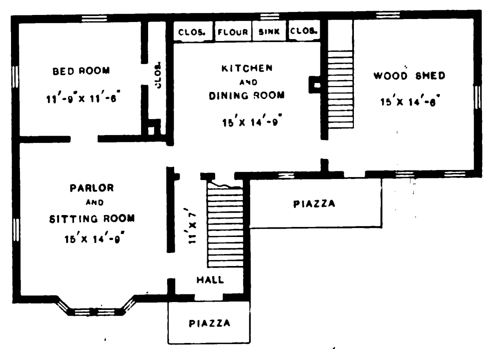
Now reverse the square and bring it down toward G until 12 on the tongue strikes the line D E, and the result is a greater number than 12 on the blade at E. Take the number at E, plus the gain of the hip on the blade, and 12 on the tongue; mark by the blade. The result is the cut for the ridge or opposite hip. By marking the opposite side of A E with the cut of D E and the opposite side of D E with the cut of A E, we have the cuts which will fit against the first pair of common rafters, or if the sides of the building are equal these cuts will fit the other pair of hips.

Putting Truss in Barn Roof.

From S. M., *Magnolia, Del.*—Will some reader of the paper kindly tell me the best way to put a truss in a barn roof, the building being 80 x 100 feet in size?

Criticism of Floor Plan Invited.

From W. C. E., *Athens, Maine.*—I send a sketch of a floor plan of a story and a half house which I should



Criticism of Floor Plan Invited.

like to have the readers of the paper criticise. Does any one see where improvements can be made and are there any features which are objectionable? I would like very much to have some one draw an elevation and at the same time give a plan for the second floor, together with estimate and amount of material required to construct an attractive, substantial home.

Design Wanted for Odd Fellows' Hall.

From SUBSCRIBER, *Maybury, W. Va.*—Will some reader of the paper be kind enough to furnish information regarding the best arrangement for an Odd Fellows' hall? The structure is to be of frame, 25 x 40 feet, and two stories in hight, with a reception room on the first floor and a hall on the second floor. There are to be two small rooms on each floor for entrance. Any suggestion which the readers may see fit to give in regard to this matter will be greatly appreciated.

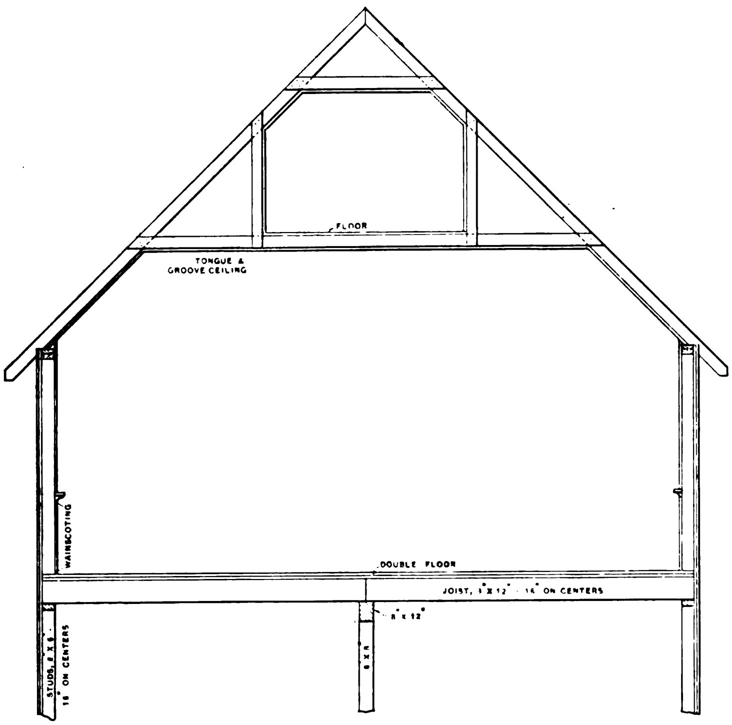
Perspective of Two-Gable House Wanted.

From D. E. P., *River, Ind.*—I am an interested reader of your excellent paper, especially of the Correspondence department, and I can hardly wait after one number is received until the next one comes to hand. In looking over the pages of the January issue, I am much impressed with the house submitted by W. S. Wylie of Washington, Iowa, giving a half-tone view of the building. I would like very much to have this correspondent or some of the other contributors furnish for publication a simple outline in perspective of a house with two gables. What I want especially is just the outline and the angles of drawing them to scale, as I am a beginner and find that part of drawing difficult to produce. I am at a loss to know just the angle at which to place the floor plan in order to lay out the elevation.

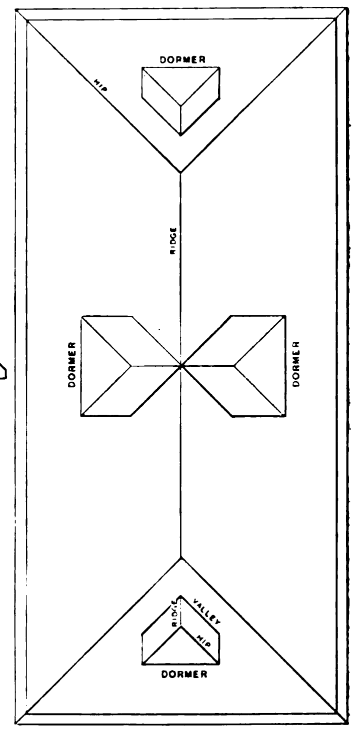
A Question in Roof Construction.

From Green Hand, *Baltimore, Md.*—I would like to have the advice of older "chips" in the trade regarding the construction indicated by the sketches inclosed. They relate to a public building, 32 x 70 feet in size, and two stories in hight. The structure is of frame and has a hip roof of half pitch and one dormer window on each side. The features I would like to preserve are as follows:

1, A clear, unobstructed ceiling on the second floor, and 2, a storeroom in the attic about 10 feet wide and the length of the building between the hips.



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



Roof Plan.—Scale, 1-16 Inch to the Foot.

A Question in Roof Construction, Submitted by "Green Hand," Baltimore, Md.

As stated above, the building is 70 feet long, and the hips come in about 16 feet from each end, making 32 feet, thus leaving about 38 feet of straight roof. I especially desire to call the attention of my brother chips to that portion of the building embraced by the straight rafters. The latter are to be placed 2 feet on centers, and the roof is to be shingled. Now I want to know if a building 32 feet wide can be roofed in this manner?

It will be noticed from an inspection of the drawings that each part of the rafter construction has to carry a portion of the ceiling, while the lower tie carries the floor and ceiling.

I would also like to ask what is the proper size of rafters and other timbers; also, what is the position of the braces? We do not, as a rule, have very severe winds or snow storms, and, of course, this point must be taken into consideration.

Laying Out a Face Mold for a Stair Rail.

From Morris Williams, *Scranton, Pa.*—I do not doubt the good intentions of "C. B. H.," Warren, Pa., in the January issue, where he makes a few "friendly criticisms" for the "good of the cause" on my management of a stair rail problem submitted by "C. E. G.," Frederick, Md., in the November issue. Often "criticisms" lead to useless disputations and when so resulting do more harm than good.

In my management of the problem I considered it necessary to carefully adhere to the plan drawing submitted by "C. E. G.," and my prime motive was to demonstrate how to lay out a face mold and obtain the bevels for a wreath, first, to stand directly above a stretchout stringer; secondly, face molds and bevels for wreaths that would stand directly above the center of rail continued around a square well hole.

My critic states that my Fig. 3 in the December issue illustrates a representation of tangent lines directly above the stringers. This is incorrect. In Fig. 3 there is no line representing the stringer and the tangent lines there shown are directly above their respective plans, where they correctly belong.

Every handrailer knows that if the face of stringer projects outside the center of rail in such a problem as the one under consideration the same projection obtains for the crown of well hole, and that this calls for a change in the location of the risers adjoining the landing.

But this is a consideration outside the problem as submitted by "C. E. G." in the November issue, and, furthermore, it is a factor that may be eliminated altogether, inasmuch as the face of the stringer is determined by the baluster, its size and position.

Assuming the balustrades to be placed outside the stringer, the face of stringer would in that case be inside the center line of rail, causing a reversion of management of raking tangents to the one exemplified in "C. B. H.'s" diagram. Assuming, again, the balustrades to be so fixed as to call for the face of stringer to coincide with the center of rail, the method as illustrated in my Fig. 3 of the December issue would have to be adhered to.

Neither "C. B. H.," myself nor any one else has the right to fix the face of the stringer while not aware of the arrangement of balustrades. I have made it a rule in helping those that call for help to faithfully follow the conditions as made known in the query. On comparing the plan in the November issue and my **Fig. 3** in the December issue it will be seen that my management was strictly true to the conditions.

In the near future I will present drawings to illus-

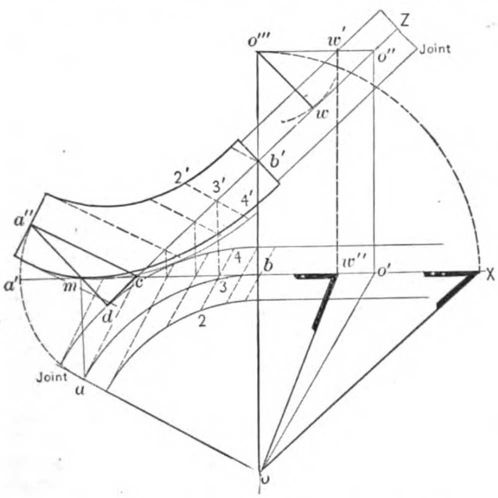
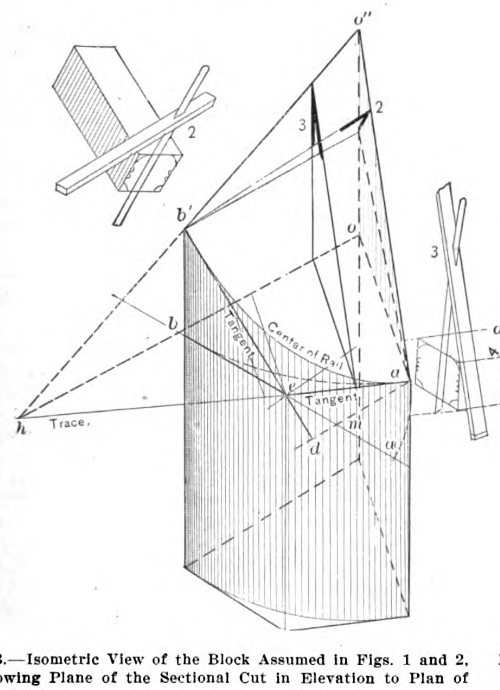


Fig. 1.—Simple Method of Laying Out Face Mold for a Wreath Over a Stretchout Stringer.

How to obtain the correct bevel is the question that determines the twist in the wreath piece. The application in actual construction will be an easy affair. One needs only to hold the wreath in its position to know how to apply the bevels. It is well to know that in all cases where the tangents of the plan are at right angles the bevels are invariably to be applied reversely, and that this is not the case where the plan tangents assume either acute or obtuse angles.

Before entering more fully on the subject of bevels I will demonstrate, as in Fig. 1, the most simple method that can be conceived to lay out the face mold for a wreath over a stretchout stringer. Probably this is the most important wreath piece in modern handrailing.

Let *o* be the center wherefrom the curve of the plan is described; *a c* and *c b* the tangents to the plan center of the rail. Draw *a m* square to *b c*. From *c* draw the pitch over the straight steps, as at *c b′ w o″*. The pitch line *c b′* represents the inclination of the tangent *c b* of the plan. The tangent of *c a* of the plan is level. Now, parallel with the level tangent *c a*, draw the dotted lines, as shown, across the plan of the rail. From where these lines intersect the tangent *c b* erect perpendicular lines to intersect with the pitch line of tangent *c b′*. Through



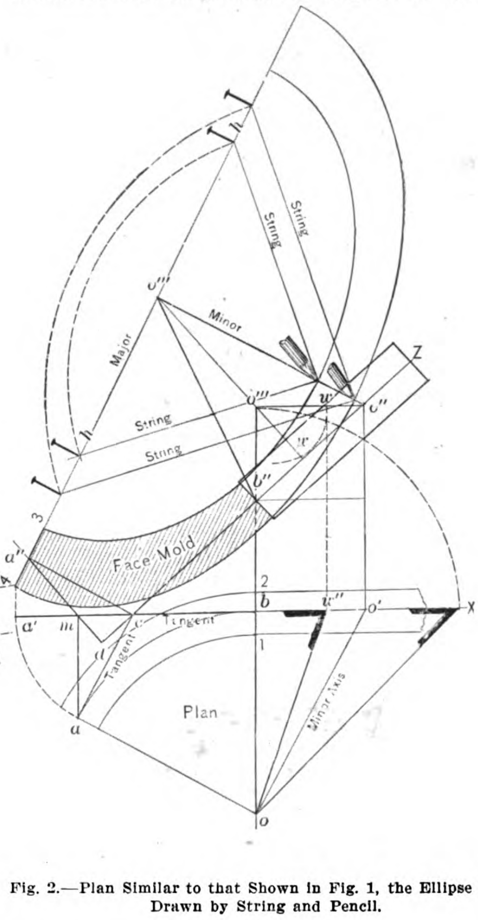


Fig. 3.—Isometric View of the Block Assumed in Figs. 1 and 2, Showing Plane of the Sectional Cut in Elevation to Plan of the Block.

Fig. 2.—Plan Similar to that Shown in Fig. 1, the Ellipse Being Drawn by String and Pencil.

Laying Out Face Mold for Stair Rail

trate this special feature to the satisfaction of all concerned, but in the meantime let not the least doubt be entertained as to the correctness of my management of the query. Criticisms generally create doubts and seldom do anything else.

I shall leave "C. B. H." here and proceed to further discuss the question of face mold for a stair rail. In my Fig. 2 of the December issue the upper bevel was shown applied to the outside of the wreath piece instead of to the inside. Probably too much hurry is to account for it, but as it is only a "view" it is not very serious. The bevel itself carries all the importance.

the corner *m* draw the line *d m a″* square to the pitch line of the tangent *c b′*. Now revolve the level tangent *c a* of the plan to *a″*; connect *a* and *c* and draw the dotted lines from the pitch line *c b′* parallel to *a c*, as shown. Make the dotted line 2′ 3′ 4′ equal to 2 3 4 of the plan, and all the other dotted lines equal to their correlative lines in the plan.

The curve of the face mold may now be described through the points thus found. The joint at *a″* is made square to *a″ c* and the joint at *z* square to *c b′*. The portion from *b′* to *z* will be straight and is known as the shank.

The face mold is now complete and it may be laid out on a piece of board in less time than it takes me to explain its construction.

For this wreath there are two bevels required. and here again the method shown is simplicity itself. From the center o draw the line $o\ o'$ parallel to the level tangent $a\ c$. Upon o' erect the line $o'\ o''$, cutting the pitch line of straight rail in o''. From o'' draw $o''\ w'\ o'''$. Draw $o'''\ w$ square to the pitch line of straight rail. Now revolve the point o''' to X, as shown by the dotted arc; connect $x\ o$, and the bevel will be at x. It is to be applied at joint a of the wreath. Again revolve point w on pitch line to w', as shown, and drop a perpendicular line to w''; connect w'' and o. The bevel is shown at w'' for the upper joint.

This method of obtaining bevels is applicable to every condition, the principle being to draw a line from the center of the plan parallel to the level line or "ordinate" and follow it up to the pitch. The hight from o to o'' will be the altitude of the triangle that constitutes the bevel. The base of the triangle will be the line $o\ b$ of the plan.

In Fig. 2 is represented a plan similar to Fig. 1, and let it be required to draw the face mold by means of trammel, strings or any other method available for describing an ellipse. It will be seen that this figure contains all the lines of Fig. 1 except the ordinates. The same reference letters are used in both figures.

To lay out the face mold by the method exhibited in Fig. 2, it is required to find the outlines of the section made through the assumed block of the form laid out in the plan, as at $o\ a\ c\ b$. The tangents $a\ c$ and $c\ b$ forming an obtuse angle, the block is designated as an obtuse angle block. The pitch line $c\ b'$ represents the inclination of the sectional cut above the plan tangent $c\ b$. The point c is shown to be in the base and the point b' the hight of $b\ b'$ above the base, and as the tangent $a\ c$ is level, the point a also will be in the base. We have thus found the elevation of the three points $a\ c\ b$.

The elevation of point o may be found, as was explained in Fig. 1, by drawing a parallel line to the level tangent $a\ c$ from o to o' and erecting a line, $o'\ o''$, cutting the pitch line in o''. The perpendicular line $o'\ o''$ represents the hight of point o in the section. Now from o'' on pitch line of straight rail draw the line $o''\ o'''$ parallel to $c\ a''$, making it equal in length to the line $o\ o'$ in the plan marked minor axis; connect o''' and a''. Draw a line from o''' to b'', thus completing the outlines of the section—namely, $a''\ o'''\ o''\ b''$.

To lay out the face mold on this section is exceedingly simple once the process is intelligently understood. It will be seen that the line $o''\ o'''$ of the section is the semiminor axis of the ellipse and that the line $o'''\ a''$ is the semimajor axis. Now from point o''' and at a distance equal to o 1 2—that is, the radius of the inside and outside curves of the plan—mark points on the minor axis represented in the figure at where the pencils are fixed.

To find the points on the major axis at which to fix the pins, and which are designated *foci* of the ellipse, take the length o''' 3 on the major for a radius and the point where the pencil on the inside curve on the minor is placed for center and describe an arc, cutting the major axis in h and h. Place the pins in these points, as shown; fix the string to each pin and stretch it out, as shown, to the pencil on the minor axis, and sweep the curve for the inside of the face mold. The curve for the outside is described in the same way. The shaded position of the curve will be the face mold.

We have drawn the remainder of the ellipse to show that the face mold is but a portion of an ellipse in this case, and, furthermore, it is such always when the curve on the plan is described from a center.

In Fig. 3 is represented what I consider an invaluable diagram to those seeking knowledge of the "why" and "wherefore" of the constructive lines made use of in handrail construction. It is an isometric view of the block assumed in Figs. 1 and 2, clearly showing the plane of the sectional cut in relation to the plan of the block. Points a and c are shown to be level, the line between representing the level tangent $a\ c$. The point b is shown to be raised equal to $b\ b'$ and the point o is shown raised equal to $o\ o''$. All these points connected exhibit the inclination of the plane of the section. The side $a\ o''$ of this sectional plane is shown to be somewhat higher than its opposite side, $c\ b'$—that is, the plane inclines in the direction from the side $a\ b'$ of the block to its opposite side, $a\ o''$.

The angle of the inclination in this direction determines the bevel that is to be applied to the wreath at point b'. The bevel is represented in the figure at 2 and is also shown applied to the inside of the wreath piece. The other bevel, marked 3, represents the angle of inclination of the plane from the side $a\ c$ of the block to the opposite side, $b'\ o''$, and is to be applied at the end a'' of the wreath piece, as shown.

Before concluding I wish to state that a thorough understanding of these diagrams will enable any one to lay out face mold and find the bevels for any plan of a stretchout stringer. My endeavor has been to explain the nature of the lines more than to champion some specific method.

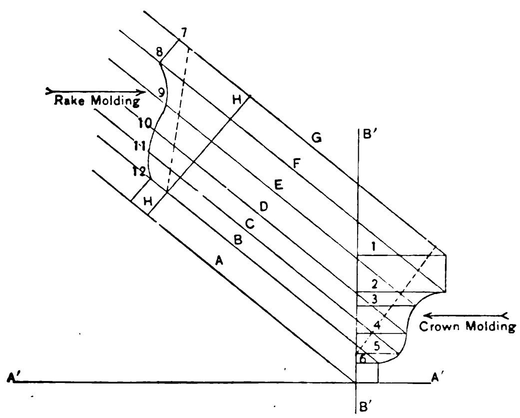


Fig. 1.—Method of Obtaining Profile of Rake Molding.

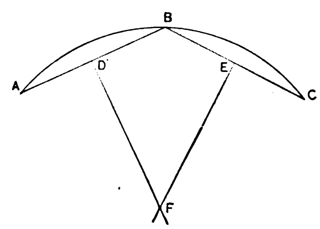


Fig. 2.—Finding Radius for Striking Circle through Three Points.

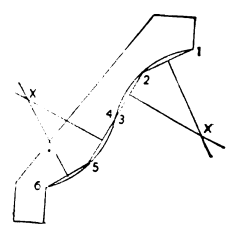


Fig. 3.—Method Applied to a Rake Molding.

Mitering Rake and Level Moldings

Mitering Rake and Level Moldings.

From W. A. E., *West Waterford, Maine.*—I have recently noticed more or less discussion regarding the method of finding the proper shape of a rake molding to intersect a given crown molding, and as a contribution to the subject I will try and explain what I consider a simple and easy way of doing the work, hoping it may be of some little help to a few of the many young readers of the paper. First, take a square edged wide board, or the edge of the bench, or even a piece of sheathing paper, and lay out the level line A' A' on the plan, Fig. 1; next lay off the plumb line B' B', after which take the crown molding, or whatever we are to use for one, and place it in the angle formed by the intersection of the lines just mentioned. Place the fillet so as to fit fair against the line B′ B′. Now mark around the molding and set off the lines A, B, C, D, &c., with the same pitch as the roof forms with the line A′ A′, which in this case is 10 inches to the foot. We will now square across the pitch line, making the line H H. Taking the points 7, 8, 9, 10, &c., the same distance from H H as 1, 2, 3, 4, &c., are from B′ B′, will give the points through which to draw the rake molding, and at the same time give the proper width of it.

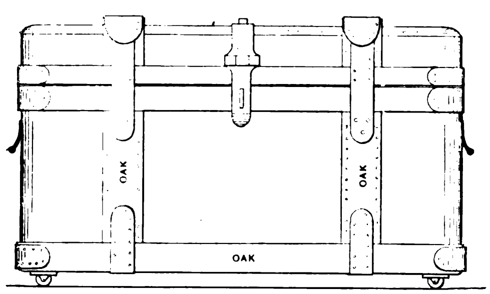
In connection with Fig. 2, I will explain how to find the radius for striking a circle through any three points. Take, for example, the three points, A, B, C, through which we wish to draw a circle. First draw a straight line from A to B and from B to C; then square from the center of the line A B as at D, draw a line through the point F; next from the center of B C, as at E, draw the line E F, and at the intersection of D F and E F will be the point or center on which to set the dividers in order to strike a circle through the three points named. This same plan may be used in connection with arches and any circular work.

Fig. 3 shows how this method may be applied to a rake molding, taking the points 1, 2, 3 the same as 8, 9, 10 in Fig. 1, and 4, 5, 6 of Fig. 3 the same as 10, 11, 12 of Fig. 1. I think the readers will have no trouble in finding the shape of any rake if this plan is carefully executed.

Design for a Tool Chest.

From H. J. M., *Decatur, Ill.*—I have seen from time to time requests of different "chips" asking for designs of tool chests, but the answers would invariably be something nice and pretty; just the thing to tickle the fingers of the bad baggageman. I used to make those pretty things, and have them smashed into bric-a-brac the first or second trip out, but after several trials I adopted the design shown herewith, which has been four years on the road, and while it is pretty badly scratched, it is as sound as when new.

The body is of ⅞-inch water elm, which will tear sideways before it will split, and is very light when dry. The ledges are of oak, ⅝ inch thick, and the straps are No. 20 galvanized iron cut to suit. The dimensions are 28 inches long, 18 inches wide and 20 inches deep inside,

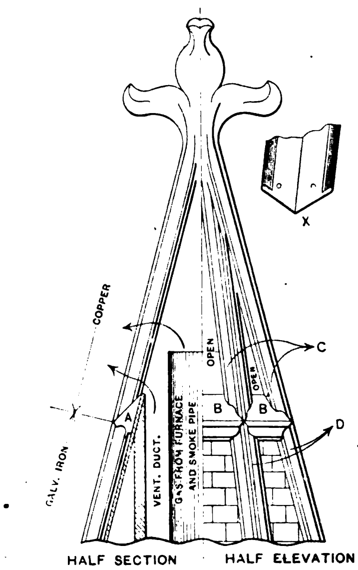


Design for a Tool Chest.

spaced into three horizontal trays which are divided to suit the tools. The top is covered with 12-ounce duck brought down over the edges and fastened with hoop iron ⅞-inch wide, well nailed with 3-penny wire nails. After all the nails are clinched the inside may be finished to suit the fancy of the owner. The hinges are two 8-inch strap, put on with ¼-inch bolts extending through both ledge and body. The hasp is put on the same way. The bottom ledge projects downward ⅞ inch and a ¼-inch R. is put in. The bottom edge of the ledge is rounded off, which gives a good grip by which two men can take up the chest. I used common folding handles on the chest, and gave the whole outside three coats of burnt umber well sandpapered. It will be observed that all corners are rounded well, and that is one of the reasons why it has such an attractive appearance.

Constructing a Copper Spire.

From W. L., *Troy, N. Y.*—Will you please give us your opinion as to the advisability of constructing the apex of a spire by continuing the ribs which form the hip moldings and ornamenting with a finial, the work to be executed in heavy copper, but leaving out between the copper ribs what is really the roofing, so as to permit a smoke pipe to be run up through the center of the tower, thus allowing the hot gases from the furnace to escape



Constructing a Copper Spire.

between the copper ribs? Is copper the proper material for use in such a case?

I would also like to know whether sheet lead is best for valleys on slate roofs.

Answer.—In the accompanying illustration we give a reproduction of our correspondent's sketch, showing a half section and half elevation of the spire in question. A smoke pipe runs through the center of the tower, the heat from which is supposed to create a draft for the escape of the foul air in the vent duct. The mold A in the half section and B B in the half elevation indicates the deck mold above the roofing, and above the deck mold the ridging D is to continue to the apex of the spire, with a finial over the same, and leave the openings C above the deck mold for the escape of the gas, smoke and foul air.

The plan is a good one, and if the lower hip ridges are to be made of galvanized iron we would suggest that the deck mold A be made of tinned copper to avoid any electrical action between the galvanized iron and copper, making the upper ridging and finial of 20-ounce cold rolled copper, which is not likely to be destroyed by the smoke or gas. It would be well to line the inside of the duct with galvanized iron to avoid any danger of fire from sparks, unless the spire is of fire proof construction.

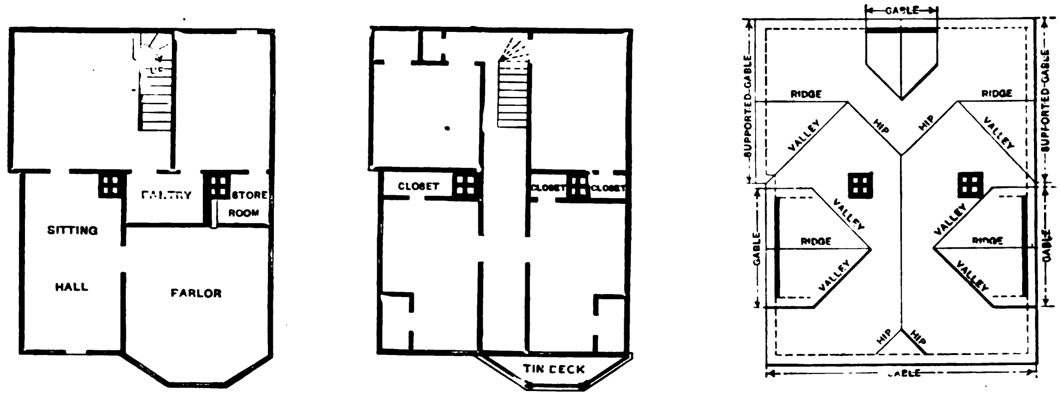
While sheet lead makes a good valley lining, we would suggest the use of soft copper—14 or 16 ounce weight—laid in 8 feet lengths without any nailing into the valley, the sheet to be fastened by means of copper cleats. This allows for the expansion and contraction of the metal. A sketch is shown at X of a valley with the water locks O and O on each side, which allows any leakage to follow and drain out at the bottom.

Frost on Windows.

From R. C., *Toronto.*—I used to have a good deal of trouble with frost on my show windows, and last winter I bored some ⅝-inch holes under the window just below the floor, then a few holes through the floor as close to the window as possible, and another row of them near the ceiling, above the glass. My window is separated from the store by a glass partition. I find that since boring the holes I am never troubled with frost, for the cold air enters through the holes at the bottom of the window, driving the warm air out of the upper holes and making the temperature nearly as low as that outside, thus preventing the condensation of moisture on the glass.

Suggestions for Remodeling a Small House.

From W. H. M., *Woodlawn, Ala.*—I send herewith plans in reply to "J. D. R." of Parry Sound, Ont., who made inquiry in the December issue, page 312, for floor and roof plans, embodying a modification of those presented in connection with his letter. His inquiry calls for the addition of parlor, hall and pantry, and the plans which I submit allow all these being added, with but little change in the old portion of the building. The flues are, I think, conveniently arranged so that a heater may be placed in any one, or all the rooms if desired, or the flues may be converted into chimneys if such is his wish, with but slight changes. The plans here shown permit of a number of closets, which are convenient adjuncts of all sleeping rooms. I would say, in this connection, that the main hall on the first floor is of such a size that it may be used as a sitting room if occasion requires, and a heater may be placed in it and connected with the flue. The roof plan shows the various hips, valleys, ridges and gables.



First Floor. Second Floor. Roof Plan.

Scale, 1-16 Inch to the Foot.

Suggestions for Remodeling a Small House.

Heating a Greenhouse.

From H. N. S., *Halifax, N. S.*—I am called upon to heat a small greenhouse, 18 feet long, 12 feet wide, with a pitched roof that is 10 feet high in the center, falling each way to 4-foot walls on the sides. I desire to use a lot of 1-inch and ¾-inch pipe that I have on hand for heating it by means of a hot water system. I desire to connect the pipes with headers connected with the flow main from the heater, and I should like to know what sized water heater I would require? How much should I run for the work to maintain a temperature of 60 degrees when the thermometer is 12 degrees below zero, the building being so situated that it has no protection on any side? Is it necessary to carry back the same number of pipes as is carried from the heater, area for area? Could I lead off with 1-inch pipes and return with ¾-inch, having the same number of each? Or, would it be better to use all of one size? I propose to place the heater under the building so connected with the chimney that there will be no detriment to the plants from sulphur or gas, and expect with that I will get a good percentage of heat from the fire, though I do not calculate it will aid much in heating the greenhouse proper.

Answer.—In hot water heating it is necessary to have the return pipes of the same capacity as the supply pipes. The size of the boiler will depend on the amount of radiation needed for heating the greenhouse, which is governed by the glass exposure rather than by the cubic contents. We assume that the glass roof of the greenhouse will expose 288 square feet of surface, and that the ends of the greenhouse are also of glass, which would add 120 square feet of glass surface, making a total of 408 square feet of glass surface. If 1 square foot of surface is provided in the heating coil for every 2½ feet of glass surface exposed, it is probable that there will be no difficulty in raising the temperature of the greenhouse to 60 degrees, even with the mercury at 10 degrees below. By dividing the amount of glass surface by 2½ it will be found that about 165 square feet of heating surface will be necessary in the coils, and a heater rated to carry this amount of surface should be provided. Some benefit would be derived, both in economy of fuel and less care in firing, if a heater of 200 square feet capacity is provided, as it will also have to heat the surface exposed in the mains, and the fire can be regulated more readily to do the work. Both 1 and ¾ inch pipe are looked upon as rather small for use in heating greenhouses with hot water. However, if it is desirable to use this pipe return bend coils should be made so as to allow for the expansion and contraction of the pipe connected with the different headers. It would be better to use all 1-inch pipe in one coil, and all ¾-inch pipe in the other coil.

It may aid our correspondent in making these coils to know that 3 lineal feet of 1-inch pipe are required to expose 1 square foot of surface, and that 3.63 lineal feet of ¾-inch pipe expose 1 square foot of surface. If the coil on the more exposed side of the house is made to expose 100 square feet of surface and is made of 1-inch pipe, it would require 300 lineal feet. If the other 65 square feet of surface needed was made of ¾-inch pipe, it would require about 236 lineal feet of pipe. It is probable that the heating coils cannot be made more than 16 feet long, and by dividing the 300 feet of 1-inch pipe by 16 it will be seen that 20 lines of 1-inch pipe will be necessary in the heating coil, and by dividing the 236 lineal feet of ¾-inch pipe by 16 it will be seen that 15 lines of pipe will be necessary. If this is done a 1½-inch flow pipe should be carried from the boiler to the coil made of the 1-inch pipe exposing 100 square feet of surface, while a 1¼-inch pipe may be used in the coil made of ¾-inch pipe. If the flow mains are carried from the heater and connected with the flow headers on the return bend coils and the coils given a downward pitch to the return bends at the far end and a downward pitch carried back to the return header, where return pipes of the same size as the flow pipes are carried back to the heater, there should be no difficulty in the circulation.

A small pipe should be carried to the expansion tank from each flow main at the point where it connects with the flow header. This will serve the double purpose of allowing the air to escape from the heating coil and also to provide for expansion. A smaller pipe should be carried from the 1¼-inch pipe connected with the ¾-inch flow header. If one of the smaller cast iron water heaters that are on the market is used for this work it should have a grate at least 15 inches in diameter, and if the construction provides for the indirect passage of the products of combustion through the heater to the smoke outlet a decided advantage will be had in both efficiency and economy.

WHAT BUILDERS ARE DOING.

THE members of the Builders' Exchange in Baltimore, Md., are very much interested in the award of the contract for some of the work in connection with the new custom house to be erected in that city. It appears that when the bids for the iron, brick, fire proofing and granite work were opened in Washington it was found that a Baltimore firm of contractors had put in the lowest bid for Maryland granite, although it was not the lowest general bid submitted. In order to co-operate with the local Congressmen in urging upon Secretary Gage the desirability of awarding the contract to the Baltimore bidders on the ground of the superior quality of Maryland granite over that for which the lowest bid was made, its adaptability for chiseling and its freedom from discoloration, the president of the Builders' Exchange called the directors together in special meeting, when resolutions were passed favoring the adoption of Maryland granite for the proposed custom house.

As a result of the meeting a large delegation went to Washington on January 13, and with Congressman G. A. Pearre of Cumberland called on the architects who drew the plans and specifications. They then went to the Treasury Department, where they were cordially received by Second Assistant Secretary Taylor, who listened with great interest to what the delegation had to say, but frankly stated that if he were not bound by certain laws and regulations passed by Congress which usually govern in the matter of bids he would unhesitatingly favor awarding the bid to the user of local granite. He stated, however, that the whole matter would be carefully considered before a decision was reached. The delegation returned to Baltimore late in the afternoon feeling much encouraged and hopeful of the result of their visit.

Chicago, Ill.

As might naturally be supposed, the record for the complete year immediately following the period of the long strike in the building trades in the city of Chicago would prove notable in the magnitude of the operations. While the figures for 1901 do not by any means break the record, still, as compared with 1900 the increase is most marked; in fact, the value of the building improvements exceeds that of any year since 1895.

According to the records of the Building Bureau, permits were issued during the 12 months of 1901 for 6053 buildings, having a frontage of 1171 feet and involving an estimated expenditure of $34,962,075; these figures compare with 3554 permits for buildings having a frontage of 1056 feet and costing $19,100,052 in the 12 months for 1900. The greatest activity occurred in the months of May, June and July, when over 2000 structures were erected.

Cincinnati, Ohio.

The records of the Department of Inspection of Buildings show that for the year just brought to a close building operations were conducted upon a much larger scale than for some time past. During 1901 permits were issued for 2619 building improvements, involving an estimated outlay of $3,505,-450, as against 2350 permits for improvements, aggregating $2,145,035, for the 12 months of 1900. Comparing the figures of last year with 1899, the increase is somewhat less, although the percentage of gain is considerable. In that year 2918 permits were issued for improvements costing $2,650,879.

Columbus, Ohio.

The Builders' and Traders' Exchange held "open house" on January 6, when occurred the annual election of officers, and the occasion was one marked by much enthusiasm and good fellowship. The rooms were open from two o'clock in the afternoon until midnight, and the election was held from three until eight o'clock. Many prominent citizens not members of the exchange called during the day; also several delegations from out of town, including 15 members of the Newark Exchange.

The member of the local body who was prominent during the day and the recipient of many congratulations was J. B. Coulter, the organizer of the exchange seventeen years ago, and one of the charter members upon its reorganization in 1892. He was a director for six years, from 1895 to 1901, and after a great effort on the part of the members to have him continue in the directory, he declined the responsibility and retired from office, although yet an active member, at the age of 75 years. The retiring Board of Directors elected Mr. Coulter an honorary member, with all the privileges and courtesies of an active member, without the payment of dues. Mr. Coulter was also presented with a large picture of himself, the canvas measuring about 22 x 36 inches. It will adorn the walls of the room in which the election was held.

The result of the election showed the following officers to have been chosen for the ensuing year:

President, R. A. Edgar.
First vice-president, F. E. Reeves.
Second vice-president, William E. Knox.

Directors: E. T. Bingham, I. T. Coe, A. S. W. Huffman, A. M. Magrew, M. P. Street, Henry Richards, W. O. Taylor, J. G. Drayer, J. J. Marvin and Louis Fink.

The reports of the treasurer and secretary were read, showing an improved financial condition and an increase in membership, larger than any year in the history of the exchange.

The officers and directors were installed at a meeting of the exchange held on Wednesday evening, January 8, and on Thursday evening, January 9, the directors re-elected Richard J. Gardner secretary and E. L. Harris treasurer.

Detroit, Mich.

For several years past Detroit has been showing a steady growth in the way of building improvements, and the record for 1901 stands considerably ahead of that of the year previous. For the period first named there were, according to Permit Clerk C. W. Brand, 2764 permits issued for buildings estimated to cost $5,977,400, as against 1964 permits for buildings costing $4,142,400 in the 12 months of 1900. In the year previous to that the number of permits issued was somewhat larger, but the capital invested showed a slight falling off, the records showing 2054 permits for buildings costing $4,002,680.

If the prosperity which the Builders and Traders' Exchange enjoyed last year continues, the members will consider in the near future the proposition of moving to somewhat larger and more convenient quarters. At the annual meeting, held on January 9, several new members were admitted, making the total number 72. The new officers are:

President, Richard Helson.
Vice-President, Albert Albrecht.
Secretary, P. A. Tucker.
Treasurer, J. D. Candler.
Assistant secretary, L. K. Mahon.

Each of these officers is an ex-officio director and they, with E. M. Harrigan, R. W. Gardner, Michael Finn, John A. Mercier and Herman Mayer, will constitute the Board of Directors.

Kansas City, Mo.

According to the annual report of Superintendent of Buildings McTernan, Kansas City has undergone a substantial building growth of considerable proportions during 1901, the value of the buildings erected in the city during that time exceeding that of any corresponding period in its history. According to the figures of the inspector, permits were issued for something like 4500 operations, involving an estimated expenditure of over $6,178,000; these, comparing with 3527 permits, involving an outlay of $4,272,000, in the 12 months of 1900. Going back to 1899, it is found that there were 3735 permits issued for improvements valued at $4,060,800.

A large amount of the building done during the past year was by real estate speculators, and the houses erected and sold were for the most part either combination frame and brick or wholly of brick. It is stated that the houses have met with ready sale, and in almost every case the investor has made a good profit on his expenditure. In discussing the outlook for the ensuing year, Superintendent McTernan expresses the belief that 1902 will be another record breaker.

Los Angeles, Cal.

The building record for Los Angeles, Cal., during the year 1901 was greater than that of any previous year, and nearly double that of last year. The value of the buildings put up during 1901, as shown by the figures of the Building Superintendent, was $4,376,917, the record for December being $518,764. The outlook for the coming year is excellent. A number of plans are now on foot for the construction of many new buildings, both small and large.

The builders in Los Angeles are now seriously inconvenienced by a shortage of lath, and it is claimed that work on over 500 houses has been stopped on this account. Only one of the lumber yards in the city has lath to sell. On account of the shortage dealers are now shipping lath from Arizona and elsewhere by rail.

Lowell, Mass.

The building business for the year just brought to a close has been much above the average, although probably a much larger volume would have resulted had it not been for the labor troubles. Competition has been close, yet in most cases the balance is on the right side of the ledger. No failures have occurred among the contractor members of the exchange, and the grade of work done has been fully up to the average. Architects as well as owners have been giving more attention to the matter of estimates and the "shoddy man" is not in favor.

At recent meetings of the Builders' Exchange the labor situation, present and prospective, was discussed at considerable length. The feeling in the trade seems to lean toward payment "by the hour," and that contractors work whatever men they desire, eight, nine or ten hours, according to circumstances, and pay whatever individual contractors consider a man to be worth.

The general feeling regarding the coming season is that there will be a great deal of activity, more especially if harmony in labor circles prevails. There is some talk of moving the State Prison from Charleston to Tewkesbury, which is a short distance from Lowell, involving the expenditure of from $6,000,000 to $7,000,000. This would doubtless prove of benefit to the building industries of Lowell, and the feeling prevails that it is only a question of a very short time when the work will be done.

The Builders' Exchange is in a flourishing condition and the membership is fully maintained. During the winter a number of interesting meetings have been held in which business and social good fellowship have been combined.

Memphis, Tenn.

The report of the Building Department of the city shows the year just closed to have been a record breaker as regards the amount of capital invested in building improvements. Previously the banner year was 1900, when $1,887,942 were invested in new buildings and alterations, but for the year just closed the figures stand at $2,866,135. The amount represented by the permits of the past year shows an increase of more than 400 per cent., as compared with 1896, and an increase of more than 200 per cent. as compared with 1898.

Milwaukee, Wis.

The outlook for building operations in and about the city of Milwaukee the coming season is regarded as very bright. There is considerable new work contemplated and every prospect of all branches of the building trades being actively engaged. During the year just brought to a close there were erected 201 dwelling houses, 327 cottages, 219 flat buildings, 78 stores, 82 factories and warehouses and 12 churches.

According to the report of Inspector of Buildings Michael Dunn, there were 1484 permits issued for building improvements, estimated to cost $5,024,695, as compared with 1170 permits for improvements, costing $3,114,158, for the 12 months of 1900. The figures for the latter year are somewhat below the record for 1899, when 1408 permits were issued for improvements, costing $3,931,466. From the above it will be seen that 1901 is far ahead of any of the immediately previous years.

Minneapolis, Minn.

At the recent election of the Master Builders' Association the following officers were chosen for 1902:

President, H. N. Leighton.
Vice-President, Angus McLeod.
Secretary, F. H. Fall.
Director for three years, August Cedarstrand.

It is interesting to note in this connection the popularity of Mr. Leighton, this being the third time he has been chosen by the members of the association to preside over their deliberations.

Montreal, Can.

There was a large gathering at the annual meeting of the Builders' Exchange, which occurred in December, at which time officers and directors for the ensuing year were chosen. The annual report was presented, together with the financial statement of the treasurer, showing a prosperous condition of affairs. The future of the building interests in Montreal was discussed and was regarded as very hopeful, but a feeling of regret was expressed that some of the leading institutions should have placed contracts for important buildings in the hands of outside contractors.

The election of directors for the ensuing year resulted in the selection of J. H. Hutchinson, James Paton, N. T. Gagnon, John Quinlan, J. Wighton, E. S. Mattice and H. R. Hossey. A vote of thanks was tendered the retiring board and also to the secretary-treasurer for past services.

At a subsequent meeting of the newly elected board, they organized by selecting J. H. Hutchinson for president, J. Paton vice-president and George J. Sheppard secretary and treasurer.

Peoria, Ill.

Reports from Peoria indicate that the season of 1901 was the most prosperous in the history of the local builders and contractors. Figures taken from the books of the Building Inspector show an increased number of buildings and an increased amount of capital invested as compared with the 12 months of 1900. There were 361 new buildings erected, which was an increase of 83 over the previous year, and the amount invested was $900,787, being an increase of about $160,000 over the previous year. The total amount expended for new buildings and repairs was $1,044,786, as against $827,912 during 1900.

Among the more important buildings erected during the past year were the Corning Distillery, the new building for the Iowa Elevator, the shops for the Chicago, Rock Island & Pacific Railroad, the roundhouse for the Chicago & Northwestern Railroad, the McAleenan boiler plant, the Harrison School and the factory for the Hart Weigher Company. There were no important store buildings erected, although a number are contemplated for the ensuing year. The above figures do not include any of the suburban districts, where a large amount of building was done.

Pittsburgh, Pa.

It is probably safe to say that the year 1901 will go on record as that of the greatest activity in the building line which the city has ever experienced. The improvements have been conducted upon an extensive scale, both in the city proper and in the suburban districts, and the close of the year finds many enterprises still in progress. Just now it is natural to expect a lull in building operations, although architects are busy making preparations for the opening of the coming season, when a number of plans previously projected will be carried to execution.

The record for the month of December shows 151 permits to have been issued for structures estimated to cost, in the aggregate, $515,319, which is an increase over December, 1900, of nearly $29,000. The record for November last year was the smallest for any month, owing in a large measure to the shortage of materials and the unsettled weather. According to the figures of Superintendent J. A. A. Brown, the number of permits issued from February 1, the beginning of the fiscal year, up to January 1, 1902, was 2948, for improvements estimated to cost $16,998,277. Taking the previous fiscal year, being that from February, 1900, to February, 1901, there were 2378 permits issued for building improvements estimated to cost $10,394,201. These figures, compare with 2090 permits for building improvements, estimated to cost $7,292,257, in the previous fiscal year. From these figures it is seen that for the 11 months of the present fiscal year the gain is very heavy, even when compared with the full 12 months of the previous year.

Philadelphia, Pa.

According to the Bureau of Building Inspection, the year 1901 will go down to history as a record breaker as regards the number of permits issued for building operations and the estimated cost of the improvements, the figures exceeding those of any single year in the history of the department. Heretofore 1897 has held the record, but these figures were exceeded in 1901 by about $4,000,000, while they show a gain over the record of 1900 of about $9,000,000.

The number of permits issued during the 12 months ending December 31, 1901, was 8697, covering 12,824 operations and involving an estimated expenditure of $29,495,335, these comparing with 8439 permits, covering 11,506 operations, estimated to cost $20,778,970, in the 12 months of 1900. In the year which heretofore had held the record, being that for 1897, there were 8312 permits issued, covering 14,937 operations, estimated to cost $25,915,770.

At a special meeting of the Master Builders' Exchange held on December 24, nominations were made for seven members of the Board of Directors, whose terms of office had expired. The election is to occur at the time of the annual meeting, on January 28 of the present year.

On the afternoon of December 31 the members of the exchange and their friends celebrated the close of the year with a vaudeville entertainment at their rooms on Seventh street. This has been the practice of the exchange for several years past, and special pains were taken by the Entertainment Committee to make the one marking the close of the first year of the twentieth century a particularly notable event. The programme was a most enjoyable one and embraced ten numbers by well known variety stars. The Entertainment Committee consisted of W. S. P. Shields, chairman; A. B. Barber, Frank R. Whiteside, John R. Huhn, Charles P. Hart, William J. Collins, John R. Wiggins, Frank H. Reeves and J. Lindsay Little.

Providence, R. I.

Building operations in the city were more than ordinarily active during the year just brought to a close. The total amount of capital invested in new buildings aggregated something like $5,000,000, which is about 12½ per cent. increase over the corresponding 12 months. According to the Building Bureau, there were 1302 permits issued, which was an increase of 200 over the figures for 1900 and of 38 over those of 1899. The number of dwelling houses erected in the city during the past year was 461, with the greatest activity in the Sixth ward. Taking the figures for the past three years, it is found that more than 2100 new buildings have been erected in Providence, while the development of suburban trolley lines has been such as to stimulate activity in the way of new buildings in all directions about the city.

San Francisco, Cal.

The year 1902 opens with a fine prospect for the building trade, for during the last few weeks of the year just closed builders in the city saw matters take a decided change for the better. During December some of the best contracts for the year were let, and on all sides there is evidence of work for 1902. In all the business sections of the city old buildings are being torn down and preparations are being made for replacing the old structures with modern business blocks.

The Building Trade Council of the city has submitted to the employers a request for higher wages on and after March 1. The changes in the wage schedule which are asked are as follows: Sheet metal workers, from $3.50 to $4 per day; glaziers, from $3.25 to $3.50 per day; glaziers' helpers, from $2.25 to $2.50 per day; cutters, from $3.75 to $4; roofers, from $2.50 to $3 per day; sign painters, from $3.50 to $4 per day; sign painters' helpers, from $2.50 to $3 per day, and pictorial painters, from $4 to $5.50 per day. The millwrights wanted a reduction of one hour per day in time. It is not generally believed that a strike will result.

Worcester, Mass.

The annual meeting of the Builders' Exchange of Worcester was held Wednesday evening, January 8, the principal business being the presentation of the report of the secretary and treasurer, and the election of officers for the ensuing year. Incidentally it may be mentioned that a committee was appointed to arrange for an annual banquet, the date of which has not yet been definitely determined. The report of the treasurer showed the exchange to be in a prosperous condition.

The officers elected for the ensuing year were as follows:

President, James I. Elliott.
Vice-President, W. E. Griffen.
Treasurer, George W. Carr (re-elected).
Trustees: E. J. Cross, O. S. Kendall, B. F. Marsh, A. P. Robbins, E. W. Wheeler, Elwood Adams.

The office of secretary is filled by appointment and he is chosen at the first meeting of the Board of Directors, which in this instance was on the evening of Friday, January 10, when H. W. Sweetser was again selected to discharge the duties of the office.

The exchange has issued a diary for the year which in style and general makeup is a duplicate of that of last year.

Youngstown, Ohio.

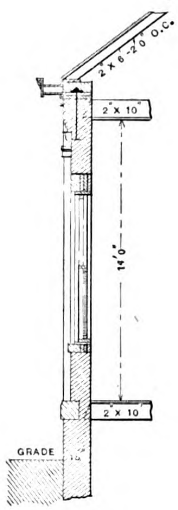
The members of the Builders' Exchange held their annual meeting on the evening of Tuesday, January 7, and at the same time occurred the annual reunion and banquet, which has been a feature of the organization for several years past. The spread, as it was called, occurred in the parlors of the First Baptist Church, and there were present about 100 members and their friends. The diners did not linger long enough at the table to indulge in any great amount of oratory, as they were due in a body at the Park Theatre to witness the play.

A ONE-ROOM BRICK SCHOOL HOUSE.

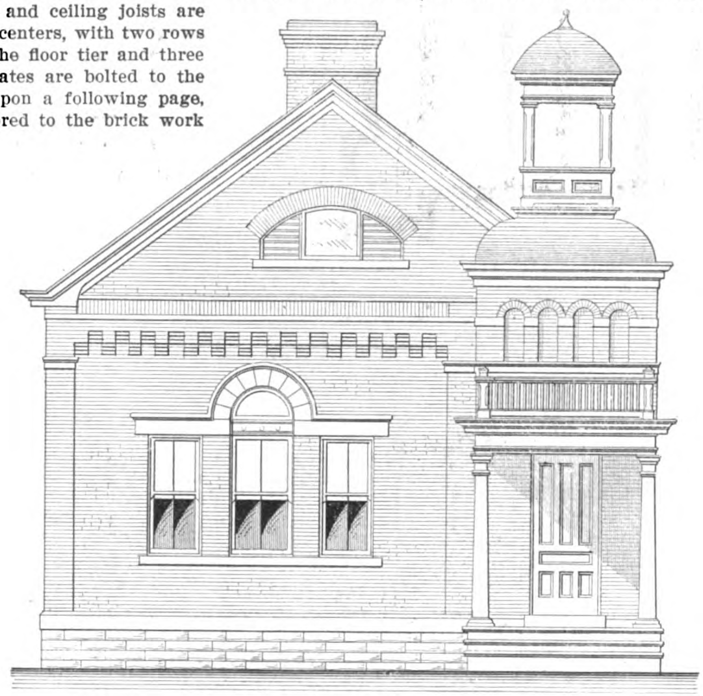
WE take pleasure in laying before our readers illustrations of a one-room brick schoolhouse erected in Fairfield Township, Ohio, in accordance with plans drawn by George Barkman, architect, of Hamilton, that State. An inspection of the drawings shows the building to be one story high and having a class room 26 x 32½ feet in size, well lighted on two sides.

The foundation walls are of local quarry limestone laid in mortar, while all outside walls above grade are "rock work" in even courses and pointed with Portland cement blackened. The water table, window sills, as well as window and front door caps, are of cut sandstone, and there is a stone for the date of erection in the front gable. The walls of the building are of brick 12 inches thick and bonded by making every seventh course a heading course. The brick pilasters are 17 inches wide and project 4 inches. The floor and ceiling joists are 2 x 10 inches spaced 16 inches on centers, with two rows of 1 x 3 inch cross bridging in the floor tier and three in the ceiling tier. The wall plates are bolted to the walls, as shown in the details upon a following page, while the ceiling joists are anchored to the brick work by means of wrought iron strap anchors secured to every fifth joist. The rafters are 2 x 6 inches, placed 2 feet on centers, and are covered with sheathing boards, on which in turn are placed 16-inch red cedar shingles laid 5 inches to the weather. The floors are double, the lower one being of rough boards laid with close joints and well nailed to every joist, while the upper floor is of yellow pine strips not over 4 inches wide and secret nailed. Between the upper and lower floor is placed a layer of Sackett's No. 1 building paper. The porch is floored with 1⅛ x 3 inch white pine, laid with paint between joints. The floor in the belfry is of pine covered with tin and has 2 x 3 foot trap door hung on butts. There is also a trap door in the ceiling of the vestibule, of the same size.

All inside finish and jamb casings are of yellow pine in plain Eastlake style, treated with one coat of Wheeler's filler and two coats of Berry Bros.' hard oil finish, each coat being well rubbed down, the last one with pumice stone and water to a dull finish. The class room and vestibule are wainscoted 2 feet 9 inches high with narrow beaded yellow pine flooring, having a 1⅜-inch cap with scotia underneath and a quarter round at the bottom. The wardrobes are wainscoted 6 feet high. All outside wood work is painted three coats of pure linseed oil and Phœnix white lead. All inside finish has one coat of Wheeler's filler and two coats of Berry Bros. hard oil finish. There are two Tuttle & Bailey slat registers placed 9 inches above the floor and connected with the vent flues. The building is fitted with outside blinds. The architect states that the cost was $2000 complete, with the exception of blackboards and seats.



Section.



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

A One-Room Brick School House.—George Barkman, Architect, Hamilton, Ohio.

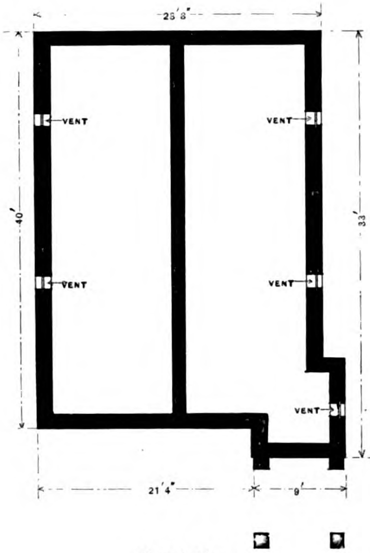
Each City Block is a Town.

Those who are familiar with the way in which New York City is laid out are impressed with the fact that the city block is the unit. With the exception of certain localities, in each block may be found the elements of a town. The avenue frontages serve to make the main streets where the business of the little town is done, and along the side streets and above the stores are the residences of the people. A study of an individual block in the city shows that practically every want of mankind may be satisfied in its limits. If communication with the world were suddenly shut off the inhabitants of each city block would not have to go beyond the confines of their little settlement to find the means of filling every want.

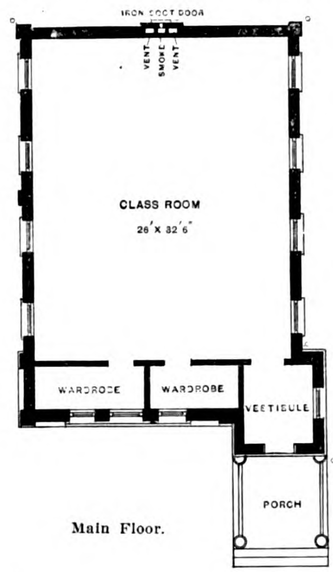
Each block has its butcher shop, its bakery, its grocer, generally two or three saloons, a drug store, or perhaps two; two or three green grocers and fruit merchants, several small dealers in coal and ice, a barber shop, several doctors and an undertaker's shop. It is a strange thing that the depot for coffins is often between a butcher shop and a drug store.

School Heating Systems.

Evidently there is need for some better method of acquainting those who have charge of operating the heating systems in school buildings with the proper method of managing them. From various parts of the country reports come that school buildings had to be closed owing to the failure to secure a comfortable temperature in them. In many instances investigation finds the failure to be due to want of knowledge on the part of the janitor, or, in his absence, of the teachers in the school building, of how to manipulate the different valves and dampers to secure an increase in the temperature in the building when the outside temperature falls. It will very readily be seen that to the uninitiated the low pressure steam system, hot water system, or even the later day furnace systems present complications which, if not thoroughly understood, make it impossible to operate them so as to warm a building comfortably. In many needed to check the fire or increase it. This example is one worthy of being widely followed, particularly by those who install heating systems in school buildings. It may be safely assumed that a school building is never closed on account of low temperature as soon as it should be. Thus more or less risk to the health of all who occupy the building is incurred before the teacher adopts as a final measure the closing of the school, to escape expos-

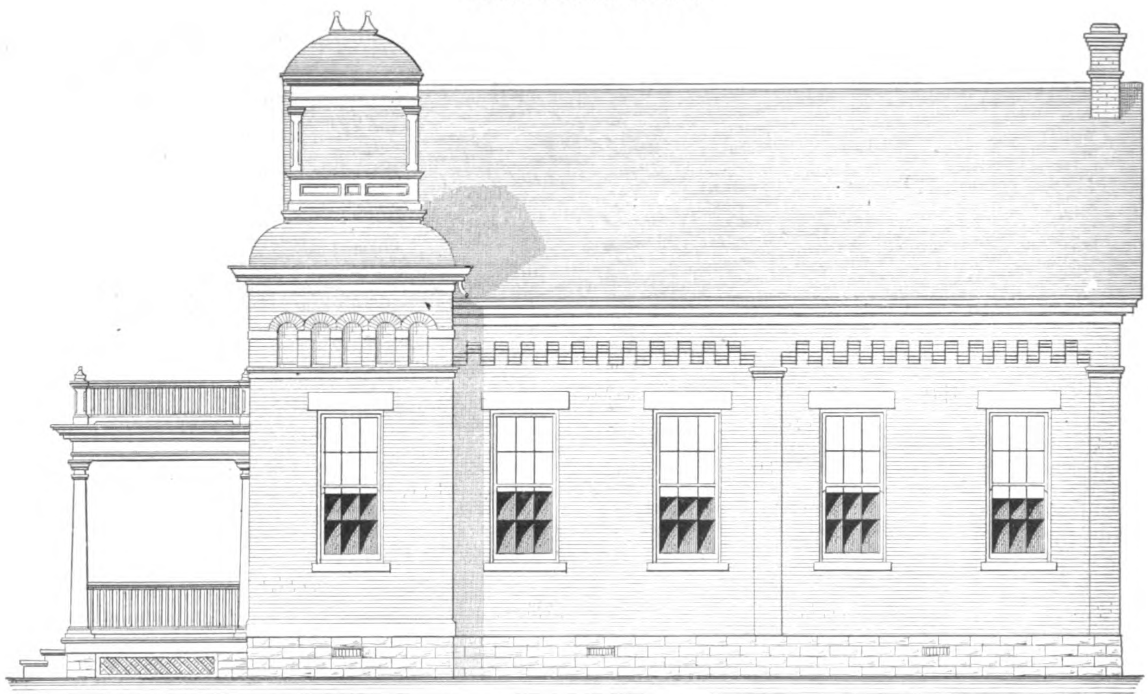


Foundation.



Main Floor.

Scale, 1-16 Inch to the Foot.



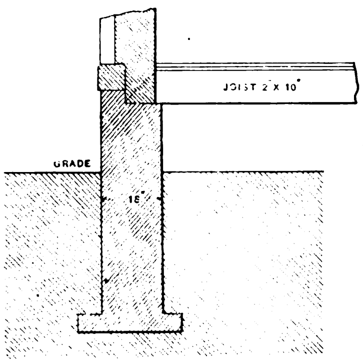
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

A One-Room Brick School House

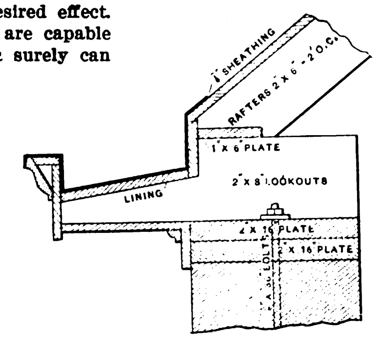
instances this forces the closing of the school. Sometimes it is found that those who have some idea of how to fire up burn the fire entirely out by opening the dampers and giving full draft, without taking up the labor of replenishing the fire with fuel, this menial task being left to the janitor.

Some leading contractors furnish explicit directions of such a nature that any intelligent person by carefully reading them can attend to such simple details as are ure to a temperature that is too low for health. While it may be the duty of a school board to see that the janitor gives intelligent service, the fact that so many schools in widely separated sections are closed on account of inability to heat the buildings shows that something further is necessary than can be expected from the school board or the janitor.

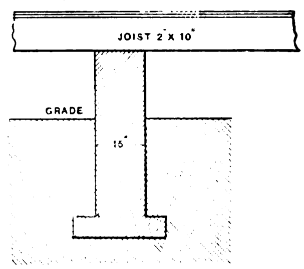
This requirement can best be satisfied by the heating contractor, and it becomes incumbent on all who heat school buildings, churches or other buildings that are only periodically used, and in which the heating system is left to the janitor or sexton, to supply charts and directions such as will enable any intelligent person who discovers that attention to the heating system is needed to give such attention as will produce the desired effect. This is not a great labor, and those who are capable of designing and installing a heating plant surely can furnish typewritten directions for its operation, and such drawings of the different details as may be necessary to make the directions readily understood.



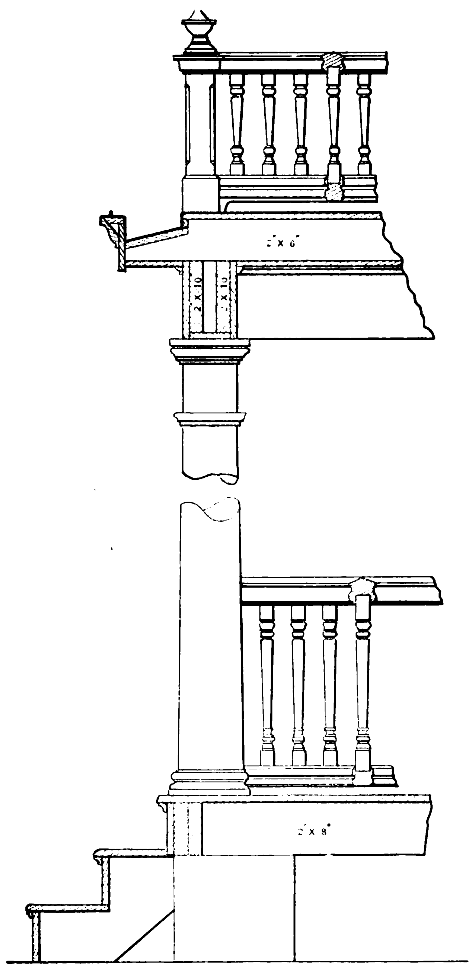
Section through Outside Wall.—Scale, ¼ Inch to the Foot.



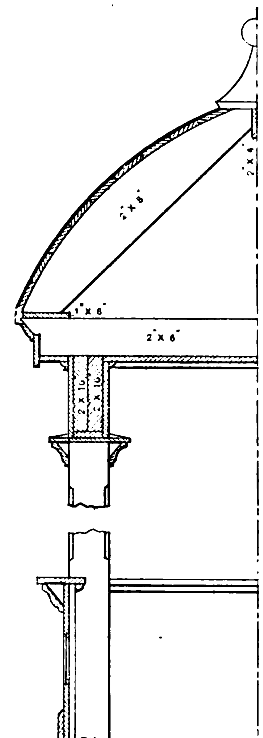
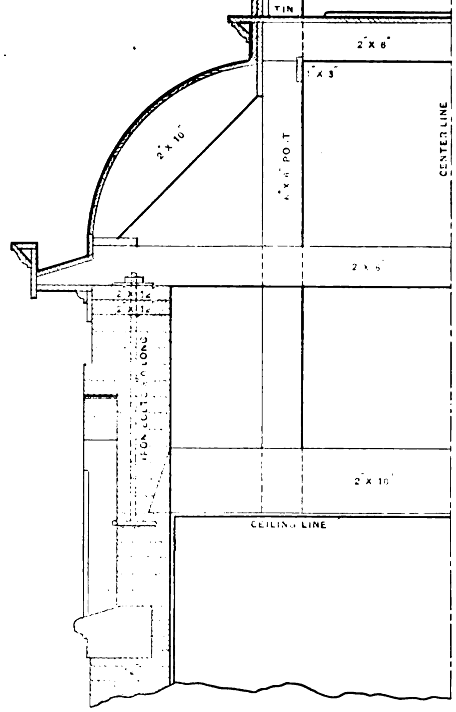
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Section through Partition Wall of Foundation.—Scale, ¼ Inch to the Foot.



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

Half Vertical Section through Tower.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of One-Room Brick School House.

AN agreement has recently been made between committees representing the Iron League of America and the Chicago Architectural Iron Workers' Union which provides that the workmen shall receive a minimum wage of 42½ cents an hour, and that none but union men shall be employed by members of the league. The union agrees to permit its members to work on buildings by the side of the nonunion men in case union men cannot be secured. The Iron League is composed of the architectural foundrymen and contractors who erect structural work.

Roofing and Cornice Work.

Sheet metal has taken a prominent part in the construction of buildings in the last quarter of a century, and the indications all point to its still greater use in the future, owing to its adaptability to the requirements of modern construction work. Advices from many quarters demonstrate a revival of the popularity of tin plates for roofing, due to the improved quality of plates that have been produced by the American manufacturers. It is notable that black and galvanized sheet iron in various forms has proved popular for covering many classes of business buildings and some residences. In the better class of buildings erected by the Government and by private enterprise copper is still held in high esteem for roofing purposes. Now that the price of sheet copper seems likely to reach a figure that will bring it within the reach of a greater number of consumers a revival in the use of this metal for construction work may be expected. Sheet metal lends itself admirably to the production of imitation tiles, and owing to the pleasing architectural effect of these metal tiles those who manufacture them have found a rapidly increasing demand for their product.

For wharf sheds, factory buildings and warehouses sheet metal siding has come into extensive use, and there is no indication of a reduction in the tonnage that will be required for these purposes. The facility with which imitations of stone and brick can be reproduced in sheet metal has led to an increasing demand for this style of siding. The weight of foundations of massive buildings has been very materially reduced through the use of sheet metal for window heads and ornamental cornices and for general ornamental purposes. Whereas in the past the tinsmith was also the roofer and constructed such sheet metal finish to buildings as was needed, the popularity of sheet metal for the purposes above referred to is now sufficient to support large separate shops employing respectively tinsmiths, roofers and cornice makers. It has also brought about the establishment of numerous large works for the construction of special machinery for preparing the materials for use. As a further indication of the trend in this field some of the finest buildings that are to be erected during the ensuing year will be provided with sheet metal roofs, gutters and conductors, and be embellished by sheet metal cornices and other architectural ornamentations. Sheet metal skylights have also almost entirely displaced all other kinds and their use is extending to new fields, which gives promise that the skylight maker is to share in the work that the new year is bringing to all lines of trade. The use of sheet metal, moreover, has not been confined to the exterior of buildings, but the handsome panel work that has been produced in sheet metal adapts it for ceilings and side walls of buildings of all classes. Not only is a fine artistic effect secured by the original design, but through the assistance of the painter a color effect is also obtained that adds greatly to the demand for this kind of finish for rooms, corridors and halls. Another important quality is that this finish is both fire and water proof, a feature that is not lost sight of in the present effort to erect safe buildings. Its safety and beauty combine to promise a large increase in the use of interior sheet metal work. The workmen will continue to profit by the activity in this branch, where already the demand for those who have a thorough knowledge of every detail in the production of their work is unsatisfied. This should prove an incentive for further effort to master every branch of the trade from the blue print to the finished work in place on the building.

UNITED STATES CONSUL LANGER of Solingen, Germany, reports in regard to the trade school recently organized in that city that it is obligatory for tradesmen, whether apprentices, assistants or factory laborers, to attend from four to six hours weekly until they reach the age of 17 years. The employer must pay into the city treasury the amount necessary for materials (which comes to about 72 cents annually) used by each person in his employ who is under obligation to attend the school. He is at liberty, however, to deduct such amount from the employees' wages. The Solingen trade school is supported jointly by the city and State.

Imitating Quartered Oak.

Many of our readers doubtless have occasion to execute work which in some part involves the use of imitation woods, and more or less staining is necessary in order to have everything harmonize. A frequent call is to imitate quartered oak, and for the benefit of those who may be interested we present the following suggestions taken from a recent issue of the *Painters' Magazine:*

It should always be borne in mind in imitating quartered oak, or any other wood, that it is the natural we wish to imitate, and not some one's idea of what it should be. Therefore it is necessary to first study the various changes of grain and have the general character of the grains of the particular wood impressed on the mind before beginning to work.

In graining to imitate quartered oak, wipe out the champs or veins with a rag, and soften the combed portions between the champs by drawing a rag folded three or four times toward the edges of the work previously wiped out with the rag. The edges of the champs may first be sharpened up by drawing the second joint of the forefinger against them. A fine comb is then lightly waved over the spaces of open work and the whole panel or mantel blended lightly crosswise with the flat brush. Or the work may be combed as described and permitted to dry before taking out the champs. In that case, when the work is dry, mix a weak solution of sal soda and add to it some dry umber, to show where you touch the work; put the solution on the champs with a fitch tool, let it stand a few minutes to soften the color, and wipe it off with a soft rag. It will be found that the graining color is taken off to the ground work, giving the same effect as if it had been wiped out while the color was wet, but the work looks cleaner. When done in this way the work should be overgrained. The champs may also be put on in dark colors over the combed work and left so, as some veins of oak appear dark in certain lights. These dark veins may be imitated by combing the work the same as if one was going to use the rag to wipe out. Do not blend, but put in the veins with a small fitch tool or fresco liner dipped into some color from the bottom of your pot, not too dark, and immediately blend one way, lifting the edge of the color. After some practice it will be found that a very good imitation of dark champs or veins is the result.

Methods of Designating Floors.

Across the border to the north of us, as well as in other parts of the world, more or less confusion exists regarding the order in which the different floors of a building should be named, and in commenting upon the fact a writer in the *Canadian Architect and Builder* states that "some of the leading Canadian architects have decided to fall in line with American practice and the ideas of the majority of their clients by numbering the different floors one, two, three, &c., beginning with the ground floor as No. 1. The practice in Canada and in England has been to name as the first floor the one first above the ground floor. It is claimed, however, that probably 75 per cent. of architects' clients regard the ground floor as being the first floor. The result is frequent misunderstandings between architects and clients, requiring frequent explanations, and leading to delays where matters have to be arranged by correspondence. It is thought by some that the difficulty would be overcome by adopting the American instead of the English method. Where there are basements the floor would be designated as the "basement floor," and the floor above as the "first floor," counting from the front of the building. Local architects are by no means unanimous in opinion regarding the advisability of changing the method which has been in vogue until the present."

CONSTRUCTION OF BRICK ARCHES.

THE manipulation of brick in the construction of arches forms one of the most interesting phases of the bricklayers' work, and practice differs in so many respects in various parts of the land as to render contributions to the literature of the subject of more than ordinary moment. This variation in construction as well as in the technical terms employed frequently results in much annoyance.

With a view to throwing light upon the matter an English writer describes the method of building brick arches which obtains in his section of the world and which we present below, together with a number of illustrations clearly showing how the work should be done.

Referring to Fig. 1 we have C C, which represent voussoirs; A B and A' B', radial lines or joints, and E E, skewbacks. The distance from W to X is the "span," and from Y to Z the rise. The top brick or stone, F, in an arch is called the "keybrick" or "keystone."

An arch is named according to the curve it assumes and the manner in which it is constructed. The principle of the curves in common use is shown in the engraving. Fig. 2 is a segmental arch, struck from a point situated below the springing line, the curve being the segment of struck in the following manner: Divide the span A D into three equal parts by the points E F. From A, with radius A F, describe an arc, and from E, F and D describe similar arcs, which intersect at I J. Now bisect the span A D and raise A perpendicular to I. Draw a line through I F and J E, and produce these lines. With compasses, from F, with radius F D, describe arc to J, and from E, with the same radius, describe a similar arc to N H. Then from I, with radius I J, describe arc J I, and from J, same radius, the curve H I, when the interior curve of the arch will be completed, the remainder of the arch being set out in the usual manner.

Fig. 11 represents the arch called the Ogee or Moorish. It is struck from four centers, as indicated by dotted lines in the figure. The crown of this arch is usually finished off with a stone or terra cotta bow. Fig. 12 shows an inverted arch, and consists of a segmental arch built upside down. Its use is principally to distribute the weight carried by walls and piers over the adjacent ground.

The various arches above described may be constructed either rough, gauged or axed, and will be so called in addition to the name derived from the curve.

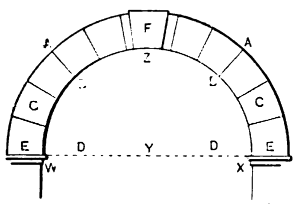


Fig. 1.—Showing Parts of Which an Aich is Composed.

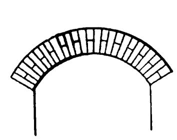


Fig. 2.—A Segmental Arch.

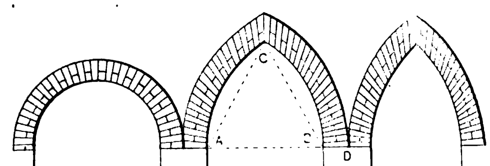


Fig. 3.—A Semicircular Arch. Fig. 4.—A Two-Center Arch. Fig. 5.—A Lancet Arch.

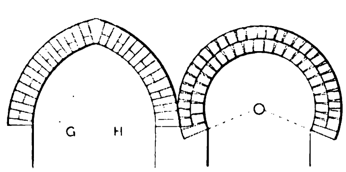


Fig. 6.—Another form of Two-Center Arch. Fig. 7.—A Horseshoe Arch.

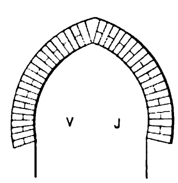


Fig. 8.—Pointed Horseshoe Arch.

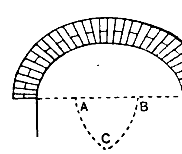


Fig. 9.—An Elliptical Arch.

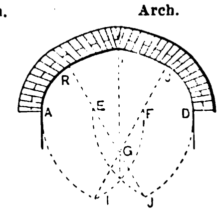


Fig. 10.—An Elliptical Gothic Arch.

Construction of Brick Arches.

a circle, whence the name. Fig. 3 is a semicircular arch, the curve being half a circle. Fig. 4 is a two-center arch, called an equilateral, the equilateral triangle being shown by dotted lines. The curves are struck from each side of the span, A and B respectively, and intersect at the crown C. Fig. 5 is a lancet arch, which is struck from two centers as before, but the striking points D E are outside the span, so that the rise is greater than the span. Fig. 6 is a two-center arch, struck from points, G H, inside the span, on the springing line. It is generally called an obtuse angled arch.

The arches shown in Figs. 4, 5 and 6 are often termed, in common with all two-center arches, "Gothic" or "Pointed," but the terms, although correct so far as they go, do not distinguish one from the other. It will be understood that the pointed arches shown in Figs. 5 and 6 may be struck from any two centers; outside the span in the one case, and inside in the other. Fig. 7 represents a horseshoe arch struck from a point situated above the springing line. It is the strongest form of arch we have, and is often employed for tunneling and other heavy work. Fig. 8 is a Gothic horseshoe, pointed horseshoe, or Moorish, and is similar to the last, but is struck from two centers, I and J. Fig. 9 is an elliptical arch, which is formed on a semiellipse, and should be turned by a trammel, but in the absence of that instrument it may be struck approximately correct from the three points A, B and C, or other similar points, depending upon the relative length of span and hight of rise.

The elliptical Gothic arch, as shown in Fig. 10, is

Thus we have a segmental rough arch or a segmental gauged arch, and so with the rest of them. A rough arch is one in which the bricks are laid without being cut. They are usually arranged all headers in separate rings. Fig. 13 shows a rough segmental arch, which will form an example of rough arches in general. To draw such an arch set out the curves to a proper radius, then divide up into 4-inch rings, concentric with the outer curves; take a distance of 2 inches on the compasses and set it around the inside curve of each ring. The width of the bricks in the arch being 2 inches, it will be seen that if the lines representing the joints are radiating to the center from which the curve was struck the bricks show a greater width than 2 inches at their extremities. To adjust the difference draw the small circle Z, with the striking point at center, and diameter equal to the width of a brick. If now the lines of the bricks are drawn to form tangents to the small circle, as indicated by dotted lines in Fig. 13, the bricks will be of the proper shape, while the mortar joints will be of the requisite wedge shape. It is now considered a stronger method to start and finish all rough arches with a stretcher on the two backs, which gives a firm base to spring from.

To strengthen the arch it is often the custom in heavy engineering and other work requiring great strength to build a few brick stretchers to connect the rings together, as shown in Fig. 14. These through connections will be built in numbers depending upon the span of the arch, and the space between such connections will be filled in with concentric rings in the ordinary manner.

Gauged arches, of which an example is shown at Fig. 15, are those in which the bricks are cut or gauged to the required wedge shape to produce a thin, straight joint, and are curved more or less on top and bottom to follow the curve of the arch. The bricks are not laid in rings, but are arranged headers and stretchers, so as to produce a solid, strong mass. As a general rule, the joints in all these arches should be at right angles to tangents of the curve, which in the case of arcs of circles will cause the joints to radiate to the center from which the curve was struck. The rule, however, cannot always be followed. Take the case of an equilateral gauged arch and difficulties present themselves, so that the arch is sometimes seen set out as in Fig. 16, and sometimes as in Figs. 17 and 18. The first would be the method according to rule—viz., to radiate the joints to the center. This arrangement leaves a very ugly and weak bonding at the head of the arch. For this reason effect of producing an equal number of bricks in the arch excluding the key, so that it may be finished the same on both sides.

The flat arch, Fig. 19, is very popular in some places, chiefly because it looks well, is easily constructed and gives a flat head for window or door. The process of setting out is similar to those in other gauged arches, the joints being set out along the extrados from the key brick. The skewbacks, C D, are shown at angles of 150 degrees with the soffit of the arch, and therefore radiating to the center A at the intersection formed by describing arcs from each side, E and F, with radii equal to the span. The angle of these skewbacks, however, will vary with the span of the arch.

Axed arches are those in which the bricks are roughly cut or axed to the wedge shape, so as to form an arch of a description something between a gauged one and a rough one. The bricks are laid in single rings, the ob-

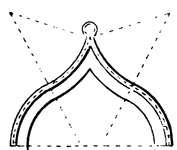


Fig. 11.—An Ogee or Moorish Arch.

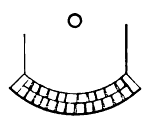


Fig. 12.—An Inverted Arch.

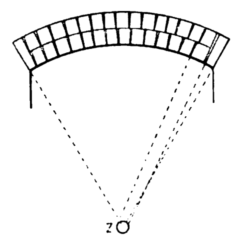


Fig. 13.—A Rough Segmental Arch.

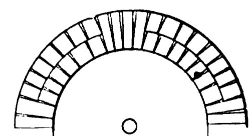


Fig. 14.—An Arch for Heavy Work.

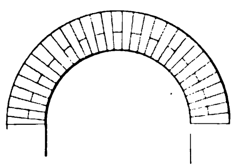


Fig. 15.—A Gauged Arch.

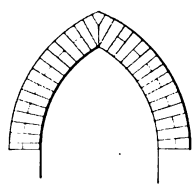
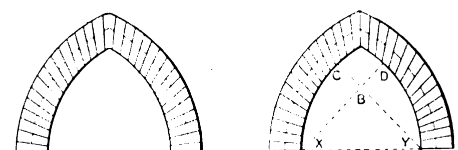


Fig. 16.—An Equilateral Gauged Arch.



Figs. 17 and 18.—Showing How the Arches Are Sometimes Set Out.

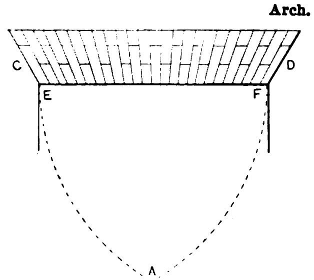


Fig. 19.—A Flat Arch.

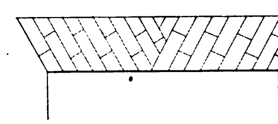


Fig. 20.—A " French " or " Dutch " Arch.

Construction of Brick Arches

many bricklayers prefer to radiate their joints to the center of the springing line, as shown in Fig. 17, and though this method is not in accordance with the rule it gets rid of the difficulty to a certain extent, and is therefore often employed. At the same time its appearance is not perfectly satisfactory, and the arrangement shown in Fig. 18 is, therefore, sometimes employed, which gets rid of the awkward head. Two lines (dotted) are set out at an angle of 50 degrees with the springing line on each side of the arch. These are produced to cut through the curve at C and D. The joints of the arch from X to C are radiated to Y, those from D to Y to X, and those in the upper portion of the arch to the intersection of the two inner lines at B, whereby the bricks at the crown are eased off. In pointed or two-center arches, other than the equilateral, the same method may be followed, the angle of the dotted lines being greater or less, as the circumstances of the case may require.

In setting out gauged arches care must be taken to draw first a middle or key brick at the crown of the arch, the object being to provide a brick to resist the increased strain at that point, and, secondly, to have the ject of cutting them being to form thinner mortar joints, and so a stronger arch.

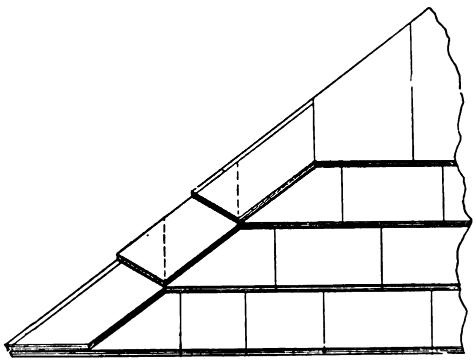
One very bad form of arch is known as the " French " or " Dutch " arch, shown in Fig. 20. It is very often used in positions in which it is hidden. It is very unworkmanlike to use this as a substitute for a correct arch. Practically, it has not one of the qualities of the arch proper, and as its strength depends wholly on the adhesion of the mortar, it will be seen how weak and feeble it must necessarily be.

A GOOD PROPORTION for the mixing of concrete materials for foundation work is given by an exchange as follows: To one barrel of cement—4 cubic feet—add 16 cubic feet of crushed stone, 9 cubic feet of sand and from 15 to 20 gallons of water, the whole making about 29 cubic feet. A batch of the above proportions makes, when tamped into place, 18 feet of concrete. The amount of material in a cubic yard—27 cubic feet—of concrete is: Cement, 5.8 cubic feet; sand, 11.6 cubic feet, and 22.2 cubic feet of crushed rock.

"Boston" Hip Construction.

In the description of the Colonial residence at Cranford, N. J., presented in our issue for last month, reference was made to the fact that the hips were run up "Boston style." One of the readers of the paper desires to know what is meant by this form of construction and whether it is generally employed or is peculiar to the Eastern part of the country.

As being of interest to this correspondent as well perhaps as to many others we present herewith a view



"Boston" Hip Construction

of a portion of a hip roof showing the general arrangement of the shingles. The lower course is laid in the usual way and then the hip shingle is put on, with the upper portion cut away at the angle indicated by the dotted line. This allows the second course of shingles to form a close joint with the hip shingle, as shown. The operation is repeated for the different courses, care being taken to alternate the laps on the hip, all as indicated in the engraving. Messrs. Oakley & Son, the architects of the house in question, state that they would not think of building a hip or barrack roof, as it is better known in some sections, without the "Boston" hip, as it is a sure preventive of leaks as well as curling.

Electroplated Doors.

A method of producing a wooden door which is thoroughly inclosed in metal without visible seams, thus giving it the appearance of a solid door, has been developed by an inventor in Bridgeport, Conn. This is accomplished by a process of electroplating the wooden doors with copper, brass or other metals, thus especially adapting them for use as entrance doors to flats or other large and expensive buildings where massive and elaborate effects are sought. Such doors are considered a valuable adjunct in preventing the rapid progress of fire, and metal protected doors are frequently used in theaters.

There is no necessity of burning off the varnish in order to revarnish, as is necessary with the old methods of covering or protecting. The finished wooden doors are first filled with a wood filler as, for instance, a mixture of linseed oil and resinous gum, which is designed to waterproof and protect the wood thoroughly and prevent warping. The doors are placed in a tank filled with the heated filler, which is kept hot by steam. After the filler has thoroughly penetrated the wood they are lifted out and permitted to drain off, after which they are laid on a table for further applications. The door is then rubbed smooth and coated with a varnish, as shellac, and is then dried. This operation is continued until the desired surface is obtained. The edges of the door are trimmed with sheet metal strips corresponding to the width of the door, being attached to the four edges by means of nails, screws or cement. The material used for the strips is preferably copper, bronze or brass. The face of the strip on the edge of the door is covered with a metallic insulating varnish, after which the entire door is coated with a metal substance, such as thin metallic leaf, metallic brass powder or common varnishing wash, with plumbago. When the coatings applied have become dry the door is rinsed and is ready to receive the electric deposit. The door is supported in a vertical position in the plating bath. One wire goes to the anode, and the second wire is preferably attached to the metal strip on one edge of the door; the current is then turned on, and the electrolytic action takes place until the surface is covered to any desired thickness.

The advantage obtained by covering the edges of the door with a sheet metal strip is that its high conducting power makes a complete circuit around the door, and the width of the strip insures an even and unbroken surface between the two sides.

New Publications.

CONTRACT AND ESTIMATE RECORD BOOK FOR PLUMBERS. By B. H. Jessup. Pocket edition, 200 pages, arranged for 50 estimates. Size, 3½ x 8 inches (oblong.) Flexible cloth. David Williams Company, publishers, 232-238 William street, New York. Price, 50 cents.

Estimate books, now largely in use by plumbers, are designed to reduce the labor involved in preparing estimates on jobs and to obviate the risk of omitting items in figuring, which often results in loss to the plumber. This is an improved edition of an estimate book in size suitable to be carried in the pocket. It contains 50 complete forms for estimates, with a space at the head of each form for entering the date and the name of the person to whom the estimate is furnished. In preparing estimates, the plumber usually finds it necessary to go over a long list of items of materials. Figuring these items for memory or from memoranda is believed to be an unhandy and unreliable method, and this book, therefore, meets a well defined want in providing a means of keeping track of the cost of work and affording a systematic record. The form of estimate employed embraces a list of all material used in any ordinary house with each item in its proper classification. Parallel columns give space for entering the cost of each item, which will enable the estimator to easily add the total.

The author has also prepared a large sized Plumbers' Estimate Book for office use, and a Steam and Hot Water Heating Estimate Book, information of which can be obtained from the publishers.

ELECTRIC GAS LIGHTING. By H. S. Norrie. 100 pages. Size, 5 x 6½ inches. 57 cuts. Published by Spon & Chamberlain. Price, 50 cents.

This book is issued with a view of conveying instruction as to the installation of electric gas lighting apparatus, including the jump spark and multiple system, for use in houses, churches, theaters, halls, schools, stores or any large buildings. It also contains directions for the care and selection of suitable batteries and in regard to wiring and repairs. The aim of the author is to enable any one possessing ordinary mechanical ability to construct much of the apparatus used for the purpose of lighting gas by electricity, or at least to successfully erect it and keep it in operation. The headings of the chapters convey a sufficient idea of the field aimed to be covered by the book. These are: "Multiple Gas Lighting Connections and Wiring;" "Primary Coils and Safety Devices;" "Lighting of Large Buildings," and "How to Select Batteries for Gas Lighting." The text is amply illustrated by engravings, and the book is gotten up in a very attractive style.

Mirrors in Front Doors.

Recently, in passing through possibly the prettiest village in the Cotswolds, says a writer in the London *Graphic*, I saw an excellent idea that might with advantage be introduced in London and elsewhere. Within the knocker on the front door—which, in this instance, was about on a level with the face of the visitor—was placed a small convex mirror. Supposing the visitor is paying a call of either congratulation or condolence, how advantageous must it be to put the right expression on his countenance—either festive or doleful—before he knocks at the door.

Protection from Lightning.

In discussing the question of protection from lightning, Killingworth Hedges compares European and American practice, and refers to his rearrangement of the system used at St. Paul's Cathedral, where the conductors, erected as recently as 1872, were found to be totally inefficient, both as regards the conductivity of the joints and the resistance of the earth connections. In the plan recommended, both for this installation and for the more recent one at Westminster Abbey, the number of ordinary conductors from air to earth had been greatly increased, and, besides these, horizontal cables had been run on the ridges of the roofs and in other prominent positions, so as to encircle the building, being interconnected to the vertical conductors wherever they crossed one another.

The horizontal cables were furnished at intervals with aigrettes, or spikes, invisible from the ground level, which were designed to give many points of discharge. At the same time they, in conjunction with the cables, would receive any side flash which might occur should any portion of the building receive direct stroke of lightning. The unreliability of soldered joints for conductors, whether of cable or tape, had led Mr. Hedges to design a special joint box. A special form of tubular earth has also been designed, which takes up little space, and has the advantage that if a suitable moist ground is not obtainable the desired low electrical resistance can be attained by leading a tube in connection with the rain water pipes, so that a portion of the rainfall is diverted to the tubular earth.

The author alluded to the immense amount of damage to property annually occurring which might be prevented if efficient conductors were installed. He mentioned that instead of every church having its lightning conductor, not 10 per cent. were so provided; and in the case of other public buildings the percentage was not much larger, the reason in the case of the former class of buildings being that a vicar wishing to safeguard his church had usually to pay the cost out of his own pocket.

Architects as a rule treated the question of lightning conductors in a very brief manner, and in their specifications seldom said anything as to the way in which they were to be run, or the necessity for good joints and good earth connections.

An Electric Radiator.

The increasing use of electricity for domestic purposes renders interesting some account of a new electric radiator which has been brought out in London, England, and referred to by the *Architect* as follows: The device consists of a movable form, something like an asbestos fireplace. It contains four large electric heat lamps in a polished copper reflector. The heat is generated by current from an electric supply main. All that is necessary to fix them ready for use is to connect the flexible wires attached to each radiator to an electric plug which forms part of every installation. For high or low voltage they are equally adapted, heat lamps of the requisite capacity being supplied, and work satisfactorily on alternating or continuous current. The standard size of these radiators consists of four heat lamps, sufficient to warm the air of a room 12 feet square, with a consumption of 1 unit per hour, but they can be regulated to one-half by means of the switches attached. For larger rooms or halls two or more radiators can be used, or radiators can be supplied of a design containing six or more lamps, although the first method is preferable, as the heat can be taken to the point where most wanted, a special feature being their portability. But the most important is that they provide pure warm air, no oxygen being consumed by them, nor are any noxious fumes given off. Their appearance is certainly bright and cheerful, and there are no ashes or dirt to be removed after their use.

Interior Decoration in Metals.

"One of the most notable tendencies in interior decoration just now," said an architect, "is to introduce the metals, especially copper, to take the place of wood and plaster. Closet 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 be extended 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 grilles in 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 101 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."

CONTENTS.

RAPID SKY-SCRAPER CONSTRUCTION.

BUILDING AT BROADWAY AND MAIDEN LANE, NEW YORK CITY.

CLINTON & RUSSELL, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, FEBRUARY, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

MARCH, 1902.

Local Building Operations in 1901.

A close observer of what has been going on in the metropolis the past year, in the way of new building construction, could not fail to have been impressed with the number and extent of the operations which have been in progress in all parts of the city. It is probable, however, that the magnitude of the figures contained in the report of the Superintendent of the Department of Buildings covering 1901, and made public February 3, were not regarded without feelings more or less akin to surprise. During the year just closed the volume of operations very closely approximated the record, showing, in the boroughs of Manhattan and the Bronx, an increase over 1900 of practically 100 per cent. This tremendous gain has been due, in a measure, to the constantly increasing demand for business offices, private dwellings and apartment houses, as well as to the possibilities created by the proposed transit improvements in various parts of the city. Along the line of the subway, especially above Fifty-ninth street, building operations have been conducted upon an enlarging scale, embracing, for the most part, family hotels and high-class apartment houses. The figures contained in the report of the Department of Buildings for the year ending December 31 last, and embracing the five boroughs constituting the Greater New York, show applications to have been filed for new buildings and alterations aggregating 15,964 and estimated to cost $150,262,887, as against 15,504 involving an outlay of $88,462,174 in the year previous, and 21,571 costing $167,618,664 in the year 1899. Of the total estimated cost of new buildings, $50,846,500 were for flat houses costing more than $15,000 each, and $5,812,150 for tenement houses costing less than $15,000 each, these figures comparing with $29,337,000 and $5,084,800 respectively, for the same class of buildings in 1900. There was expended for dwelling houses $13,055,650; for hotels and boarding houses, $20,551,350; for office buildings, $11,237,755; for store buildings, $8,355,750; for manufacturers and work shops, $6,130,393; for school houses, $2,277,300; for municipal buildings, $3,453,950, and for frame dwellings, tenements, &c., as distinguished from those above mentioned, which presumably refer to brick and stone construction, $10,908,681. New buildings in progress of construction December 31, 1901, aggregated 7143, and the alterations in progress at that date were 2267. The number commenced during the year was 7169, and the number completed 6325, as against 6548 and 6552 respectively in the year previous.

Building Classification in Manhattan and the Bronx.

As might naturally be supposed, the bulk of the operations during the year under review were conducted in the boroughs of Manhattan and the Bronx, the figures making some notable contrasts when compared with those of the year before. The most remarkable gains are to be found in connection with flat houses, office buildings and hotels, at the same time the aggregate increase over the 12 months of 1900, as indicated above, was something like 100 per cent. According to the figures of the Building Department, permits were issued last year in these boroughs for 1167 flats, estimated to cost $50,892,500, as against 704 permits for buildings costing $29,715,000 in the 12 months of the year previous, this increase being probably due, in large measure, to the passage of the tenement house law last spring. There were also issued permits for 46 hotels and boarding houses costing $20,421,000, as compared with 13 permits involving an outlay of only $2,168,000 in 1900; for 41 office buildings estimated to cost $11,095,200, as against 23 costing $2,532,175 the previous year, and for 124 store buildings to cost $7,822,900, against 92 permits for similar structures in the previous year, estimated to cost $5,771,390. In the item of school houses a slight falling off occurred last year, as compared with 1900, the figures being $1,023,900, against $2,303,000. In the matter of dwelling houses, permits were taken out for 298 structures estimated to cost $9,050,750, while, during the 12 months of 1900, the figures were 316 and $6,496,950 respectively. This does not take into account dwellings and tenements of frame construction, of which 700 were projected, involving an estimated expenditure of $2,135,280, compared with 708 in the year previous, costing $1,850,500. The total estimated cost of the new buildings in the boroughs of Manhattan and the Bronx for which applications were filed last year, is given as $112,176,640; with Brooklyn second, recording operations amounting in cost to $18,198,617; and the boroughs of Queens and Richmond last, with $5,676,440. The alterations in the various boroughs call for an aggregate expenditure of $14,020,960. Taking into consideration the operations now under way and the improvements contemplated for the ensuing year, 1902 should prove one of the most active in the building line which the city has witnessed in its entire history.

A Handsome Commercial Building.

The structure which will occupy the site fronting on Sixth avenue, from Thirty-third to Thirty-fourth streets, will, when completed, probably be one of the handsomest commercial buildings in New York City. While only seven stories in hight, it will have a frontage of 210 feet, with a depth of 150 feet in Thirty-third street and 85 feet in Thirty-fourth street. It will be of skeleton frame, fire proof construction, and the design will be executed in the style of the French Renaissance. The material will be limestone, with ornamental iron trimmings. There will be two large entrances, which will have green marble columns bearing ornamental lamps, the entrance feature running two stories in hight. The structure will have a copper cornice and balustrade, on top of which will be a number of ornamental globes of opalescent glass 3½ feet in diameter, these being lighted at night. In the subbasement will be the mechanical plant, boilers, engines, dynamos, switchboards and elevator appliances, together with an elaborate heating and ventilating apparatus. The basement proper will contain the shipping room, cloak rooms, resting rooms and luncheon rooms for employees, while a portion will be devoted to a public restaurant, with a separate entrance on Thirty-fourth street. The building will be devoted entirely to the clothing business, and six of the floors will be devoted to retailing, while the top one will contain the main offices, receiving rooms, examining rooms and offices of the business management. The structure is being erected for Saks & Co., in accordance with plans drawn by Buchman & Fox of New York City. The estimated cost of the building is three-quarters of a million dollars, and the work is being done by the George W. Fuller Company. It is expected to have the store ready for business by the middle of September of the present year.

Making Progress with the Plan to Avert Strikes in the Building Trades.

In our issue last month we referred at some length to the work which is being done by William H. Sayward, secretary of the National Association of Builders, looking to the establishment of a permanent Court of Settlement and Appeal in connection with the building trades. We have pleasure in recording the fact that Mr. Sayward is meeting with consistent encouragement in his efforts to permanently harmonize the interests of employers and workmen in these trades in New York City, although up to the present time his labors have been limited to the presentation of his plan to organizations of employers and to securing their approval. Nearly all the organizations in the metropolis have been addressed on the subject and approval has resulted in every instance.

As soon as the plan has been presented to the remaining employers' organizations, it is Mr. Sayward's intention to pursue the same course with relation to the workmen. He will present the plans to the unions as rapidly as possible, until the whole field is covered and both employers and workmen have become thoroughly familiar with the scheme, its proposed details and the method of operation. No attempt will be made to put the plan into actual operation until the entire field has been thoroughly canvassed and sufficient support has been pledged to secure the success of the undertaking.

A large number of union workmen have been interviwed in an unofficial capacity by Mr. Sayward, and all have expressed themselves to him as heartily in favor of the plan and willing to do all in their power to aid its establishment.

Proportions and Cost of Concrete Walls.

There appeared in our issue for December of last year a description of the new car shops in course of erection at Elizabethport, N. J., by the Central Railroad of New Jersey. The most noticeable feature in the construction of these buildings was the liberal use of concrete, with but one exception all the walls being of that material. From an article in a recent issue of the *Railroad Gazette* on the same plant we take the following items in regard to the proportions of the concrete and the cost per cubic yard:

The concrete used in this work was in some cases made with an aggregate of engine cinders, in general with the proportion of 1 part of cement, 3 of Edison sand and 6 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 all sizes of gravel and sand to the smallest. When this was employed it was mixed with cement only, the amount of cement used being determined by experiment. In all cases the concrete was mixed very wet, so that no ramming was required. After being deposited it was puddled with a light wooden rammer to secure an even distribution. No attention was paid to the weather, concrete being mixed and deposited in any weather in which the men could work.

When the temperature dropped below 25 degrees all water used was brought nearly to the boiling point and salted, using 1 pound of salt for 18 gallons of water. When the work stopped at night it was covered with canvas between the forms and sprinkled with salt. The forms for the work below ground were of rough hemlock; above ground, of yellow pine painted with soft soap, which gave a smooth surface. No provision was made for expansion and contraction from temperature changes with cinder concrete. This is good practice, but in gravel concrete a joint should be made about once in 150 feet. Some of the concrete was mixed by hand, some of it in mixing machines. Wherever 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. Where the machines were used the cost for mixing was reduced, but the cost for handling and depositing was so much increased as to overbalance it. In general, it may be said for building work that no machine mixer is economical that cannot be transported as easily as a wheelbarrow.

New York State Association of Builders.

The New York State Association of Builders will hold its annual gathering on February 20 in the Builders' Exchange rooms, Arcanum Club Building, Devereaux street, Utica, N. Y. An interesting session is expected, and arrangements are made for a large representation from the various cities. The Utica builders will entertain the delegates as their guests at a banquet, to be served in the evening of the date named, while the business session will be held in the afternoon.

The present officers of the State Association are: President, F. P. Stillman of Rochester, N. Y.; vice-president, Charles Geiger of Buffalo, and secretary and treasurer, James M. Carter of Buffalo, who is also secretary of the Builders' Association Exchange of that city.

Finishing Hard Wood.

A writer in a recent issue of the *Painters' Magazine* expresses the following views regarding the finishing of hard wood:

If it is open grained wood I should first fill it with paste filler, then I would give it a coat of shellac, and after that I would bring it up with a first-class varnish.

It would be all right to finish it all in shellac if it could be kept from moisture, but wherever a drop of water touches a shellac finish it will turn white. And just as like as not the mistress will set the servants to wiping up the hard wood finish with a damp cloth. Now a good varnish will stand it, but shellac won't. But the best way to clean furniture and hard wood work is to use crude oil—only a very little of it—and then wipe it off thoroughly with cotton waste or cheesecloth. The latter is preferable because it has no lint to catch on the wood work, although if you rub it dry enough with cotton waste you can rub off any lint that may be left. The crude oil acts as a varnish renewer as well as a cleaner. But if it is not thoroughly wiped off with plenty of elbow grease it will catch the dirt and look pretty bad. Crude oil is a good thing provided you don't use too much of it, and then, again, provided you don't leave it on.

A Thoroughly Modern Church.

In the suburbs of Chicago there is a Methodist Church which is unique in many respects. Among its interesting features is a steel fire proof vault for the storing of church records and the communion service, an up to date hotel kitchen, banquet hall and dressing rooms for participants in entertainments, a nursery for babies who must be brought to church by poor mothers, and a large parlor for the women with rocking and easy chairs. For the boys and young men there is a fine gymnasium. The building is of Gothic architecture and is of stone, with a steel frame work.

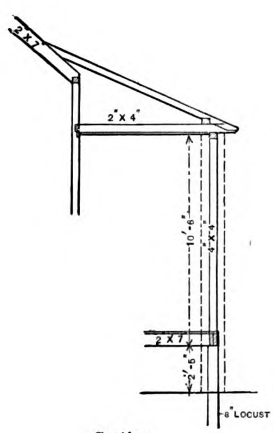
AN architect in Indianapolis, Ind., was instructed to make plans for a $100,000 court house at Rensselaer, and for the completed plans he was to be paid 3 per cent. commission and for superintending 2 per cent. The County Commissioners afterward ordered the plans changed so that the court house cost almost $150,000, but they refused to pay the architect on this basis, holding that he was entitled only to a commission on $100,000. The Supreme Court has held that he is entitled to a commission on the full cost of the completed building.

PARSONAGE AT QUEENS, NEW YORK.

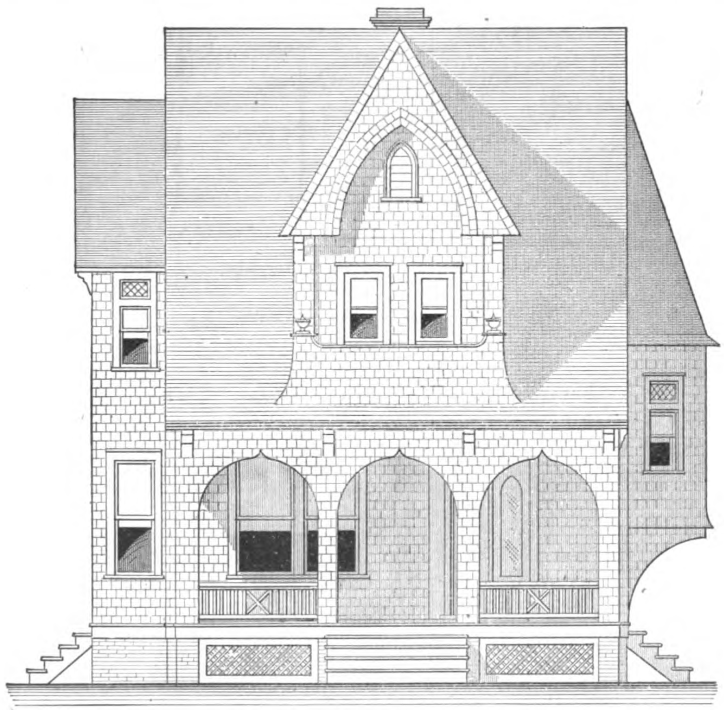
WE have taken for the subject of our half-tone supplemental plate this month a two-story frame dwelling arranged to meet the requirements of the parsonage for St. Joseph's Church, at Queens, Long Island, N. Y. The small picture which occupies the upper right-hand portion of the half-tone engraving shows the church in the foreground with the parsonage beyond. The elevations, floor plans and details presented upon this and the pages which follow give an idea of the internal arrangement of the parsonage and the general method of construction. Noticeable features of the exterior are the treatment of the gables, the side entrance to the cellar, the projecting window which lights the stair landing, and the effects produced by the liberal use of shingles.

An examination of the plans shows upon the first floor a reception room, parlor, dining room, study and kitchen, with butler's pantry fitted with the usual conveniences. The arrangement of the rooms is such as to give direct communication between the front door and the kitchen, without the necessity of passing through any of the principal rooms. The position of the study at the rear of the house isolates it in a measure, while access to it is from the dining room within and from out of doors by means of a side entrance. On the second floor the principal room is the south chamber occupying the space over the dining room. There are two sleeping rooms at the front of the house and in the rear a servant's room, bathroom and linen closet. The main stairs rise from near the center of the house, thus reducing hall space on the second floor to a minimum. The stairway is lighted by means of the projecting window indicated on the second-floor plan and shown on the right elevation.

According to the specifications of the architects the foundations are laid in Rosendale cement and lime mortar, the cellar bottom being covered with 2 inches of concrete and finished with a good coat of Portland cement mortar. The building is of frame construction, the girders being 6 x 8 inch yellow pine; the first-floor joist, 2 x 10 inches; the second-floor joist, 2 x 8 inches, and the third-floor joist, 2 x 6 inches; all of spruce. The sills are 3 x 6 inches; the posts, 4 x 6 inches; the ledger boards, 1¼ x 5 inches; the window and door studs, 2 x 4 inches, doubled. and the rafters, 2 x 7 inches. The entire frame is covered with hemlock sheathing boards, over which is placed building paper. The front and side walls, as well as the gables, are covered with 6 x 18 inch cypress shingles laid 5½ inches to the weather. The shingles on the side walls were two-thirds dipped in H. W. Johns' shingle stain, dark red in color. The roofs are covered with 6 x 20 inch cedar shingles laid 6 inches to the weather. The outside trim is of pine 1¼ inches thick. The piazza floor is of 1¼ x 3 inch strips of white pine, tongued and grooved. The piazza and soffit of cornices are ceiled flat with ½ x 3 inch North Carolina pine and finished with Pratt & Lambert's spar varnish.



Section.



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

Parsonage at Queens, Long Island, N. Y.—Tuthill & Higgins Architects, Jamaica, N. Y

The floors of the house are ⅞ x 3 inch North Carolina pine. The trim of the reception room, parlor, dining room and study is of white pine, while that of the remainder of the house is white wood, natural finish. The trim has three coats of H. W. Johns' best white paint. The kitchen and butler's pantry are wainscoted 3½ feet high with ½ x 2½ inch strips of white wood. The hardware of the house is of Patterson Brothers' Arcadum design, and the knobs on the interior doors are of bird's-eye maple.

The kitchen has a brick set Lakewood single oven range with water back attached to a 30-gallon galvanized iron boiler. It also has an 18 x 30 inch iron sink, and in the butler's pantry is an oval copper basin with goose neck faucets. The bathroom is fitted with a steel clad roll rim tub and oval basin with white marble slab and back and a No. 39 Prompto closet made by the J. L. Mott Iron Works. The bathroom has a wainscoting of enameled tile. The laundry in the basement has two-part Alberene stone tubs, adjoining which is a No. 3 washout water closet.

The house is lighted by electricity and heated by a

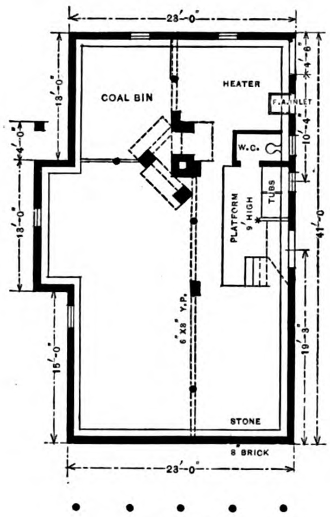
Special Niagara hot air furnace made by the Boynton Furnace Company, 207 Water street, New York City.

The parsonage was designed and erected under the supervision of Tuthill & Higgins, architects, of Jamaica, N. Y.

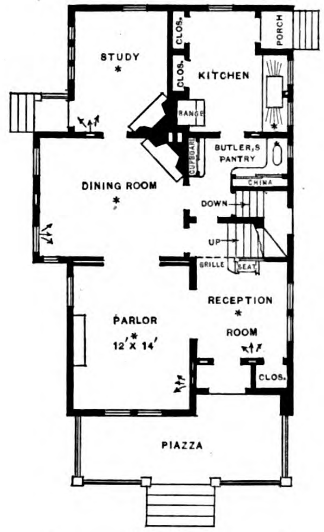
Material Used in Large Buildings.

It is probable that very few of our readers have any idea of the vast amount of materials required in the construction of one of the modern office buildings, so many of which are to be found at the present day in the larger cities of the country. The sources of supply of these materials are, one might say, all parts of the world, and the personal private history of each kind, were such history possible of relation, would make most interesting reading. The Chicago *Tribune* is just about completing a new 12-story structure for itself, having a frontage of 144 feet on Dearborn and 120 feet on Madison street, and as affording an idea of the extent of the materials required in its construction it presents the following statistics:

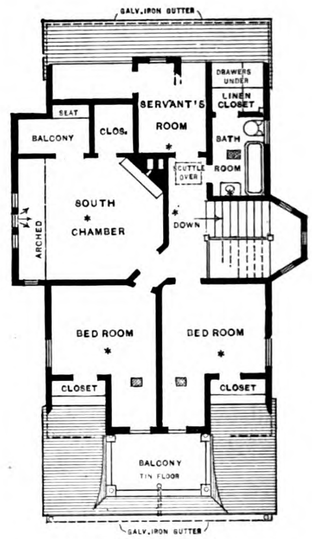
Eight million seven hundred and ninety-one thousand five hundred and eighty pounds of steel were needed to form the supports and frame work of the new structure. Four million bricks and 34,000 cubic feet of stone have been built up around it. Fifty-eight thousand lineal feet of great piping have been found necessary to supply water, gas, &c., for the big building. Twelve thousand seven hundred and fifty square feet of roofing were needed to protect the future tenants from the weather, and 1700 doors will provide means of ingress and exit to the various suites and offices. Eight hundred windows will furnish means of light and air, and 60,000 square feet of plate glass will be fitted into these outside window frames. Seventy-five thousand square yards of plaster will provide the interior finish for the



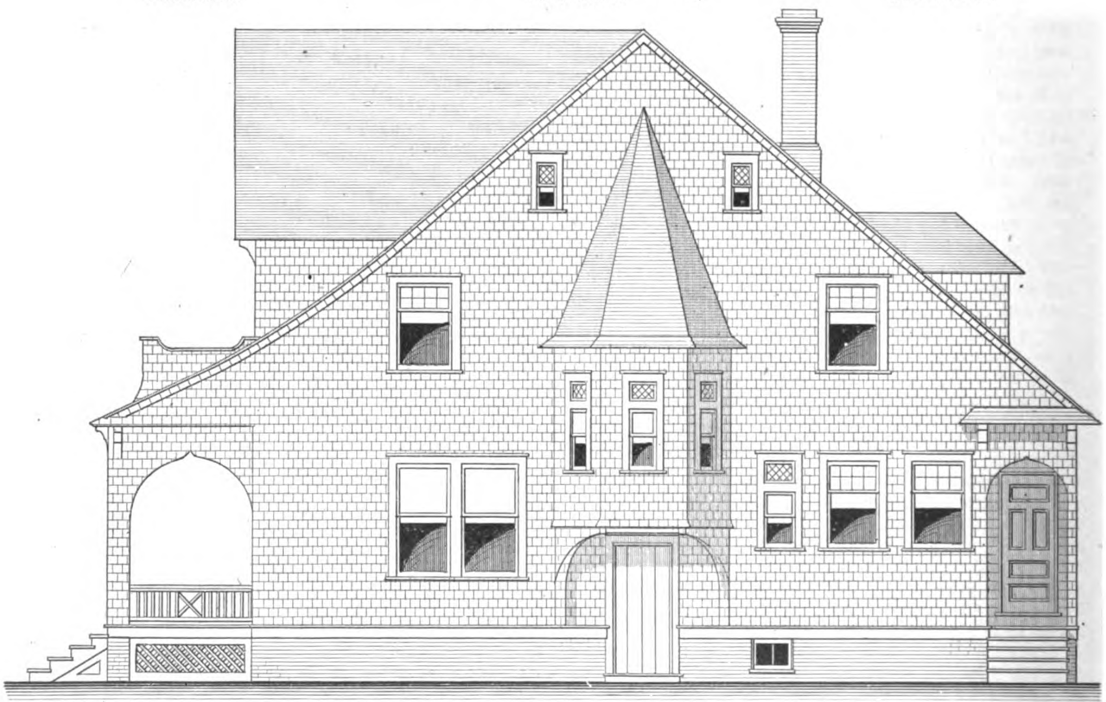
Foundation.



First Floor.



Second Floor.



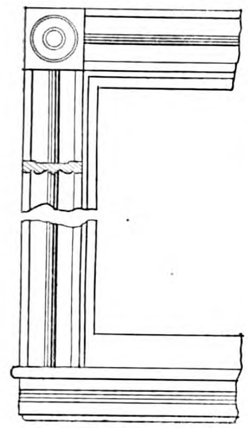
Side (Right) Elevation.

Parsonage at Queens, Long Island, N. Y.—Floor Plans—Scale, 1-16 Inch to the Foot—Elevation.—Scale, 1/8 Inch to the Foot.

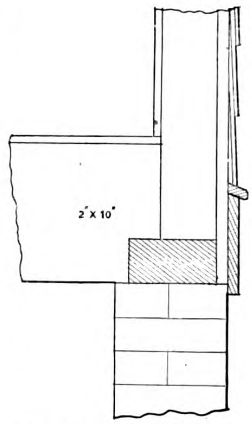
walls, 3000 square feet of rubber matting will rest upon the floors, and there will be 300,000 square feet of maple flooring. Of paint, varnish, hard finished lumber, door knobs, window fastenings, elevator and plumbing apparatus, and similar "finishings" used in this one big building the number and amount can scarcely be estimated. And there are large numbers of extra and additional supplies necessary for the completion of the

built and substantial as the new *Tribune* structure, there are about 25 of similar size and proportions. Multiply the figures given and obtained direct from the official builders of the *Tribune* edifice by 25 and the total is enough to cause even a seasoned contractor to lose his breath.

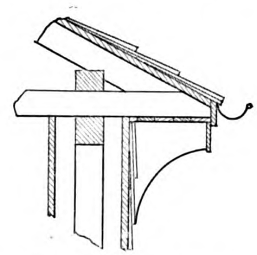
To begin with, 1,500,000 square feet of plate glass,



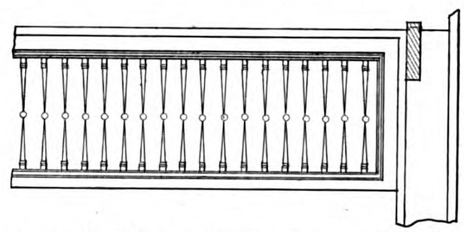
Details of Inside Trim.—Scale, 1 Inch to the Foot.



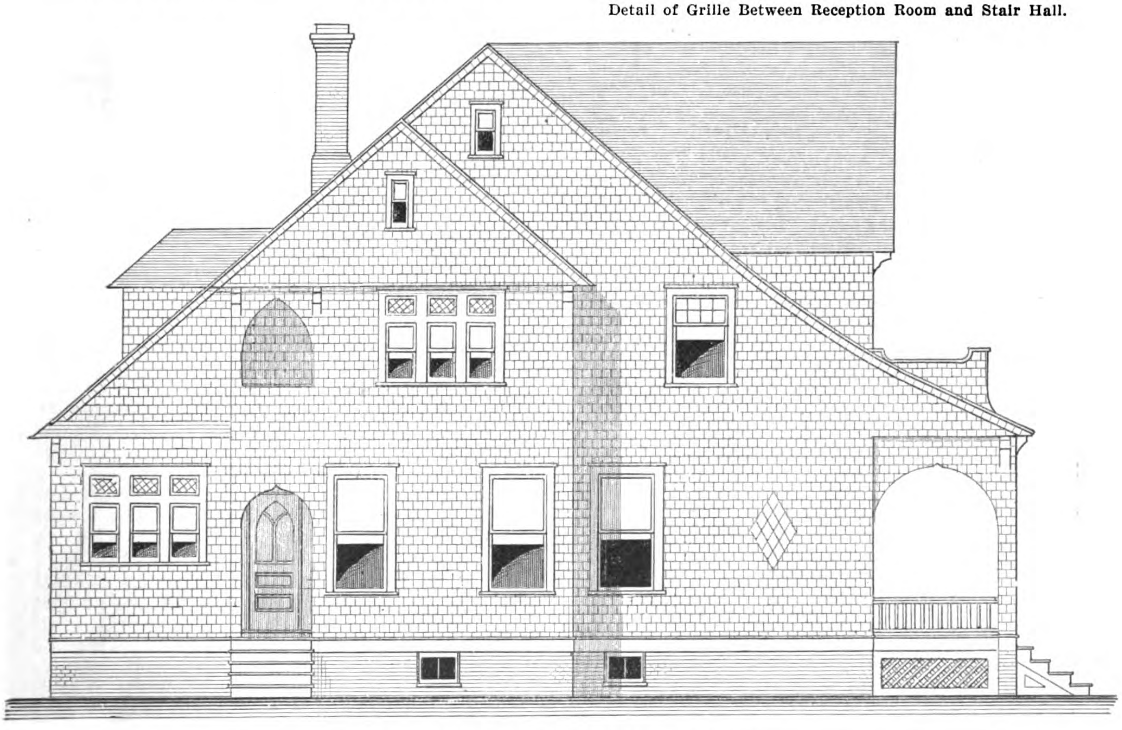
Detail of Water Table.—Scale, 1 Inch to the Foot.



Detail Piazza Cornice.—Scale, ⅝ Inch to the Foot.



Detail of Grille Between Reception Room and Stair Hall.



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

Parsonage at Queens, Long Island, N. Y.—Elevations and Miscellaneous Details.

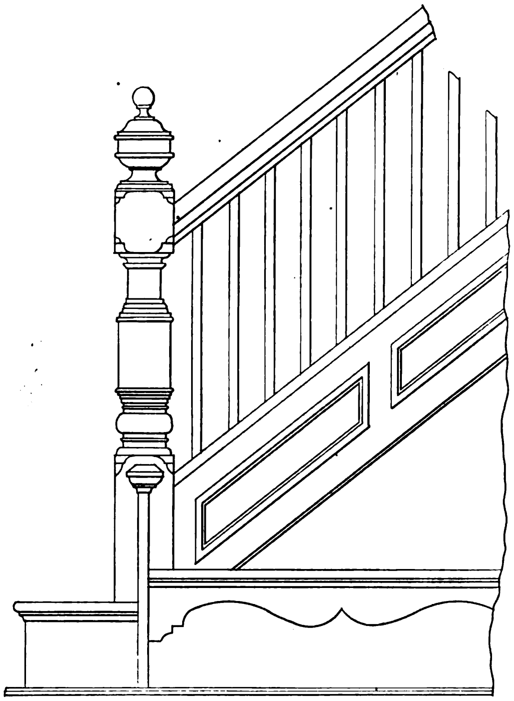
work which it would be extremely difficult to list or catalogue at all.

Of soil and earth 51,209 cubic yards were excavated in order to make room for the foundations of the big building. Fifteen hundred tons of coal have been consumed during the necessary building operations, and the services of a large double force of men, working days, nights, Sundays and holidays for ten months, will scarcely suffice to finish the great structure at the contracted time.

While there are few buildings in Chicago as finely

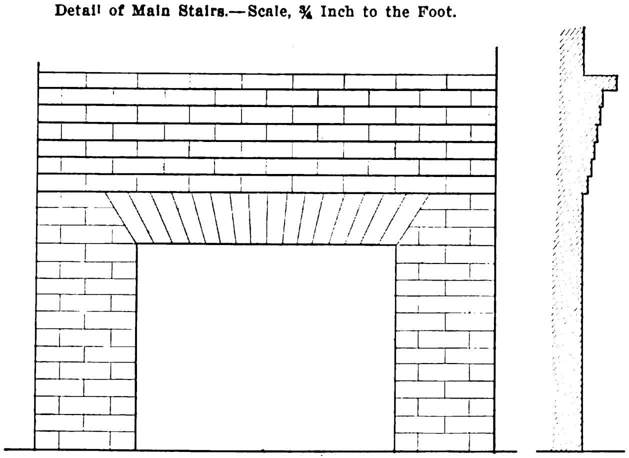
then 219,789,500 pounds of steel, 850,000 cubic feet of stone, 100,000,000 bricks, 1,450,000 feet of piping, 318,750 square feet of roofing, with 75,000 square feet of rubber matting and 7,500,000 of maple flooring for the floors beneath, and 1,875,000 square yards of plaster for the finishing of the walls; 42,500 doors and 20,000 windows have been used in the erection of these 25 large buildings; the soil excavated to make room for their foundations mounts up to 1,280,225 cubic yards, and 37,500 tons of coal provided the motive power which made their erection possible. The time consumed in this erection, with a colossal force of workmen continually employed, was a trifle over 20 years.

These figures relate only to the 25 largest and finest buildings of Chicago. Of buildings not quite so large, but still large enough to be important and imposing, there are nearly 300 within the city limits. With the above figures as a basis the time and materials needed for the construction of a twentieth century Tower of Babel would be nothing in comparison to the astounding total before which the imagination shivers.

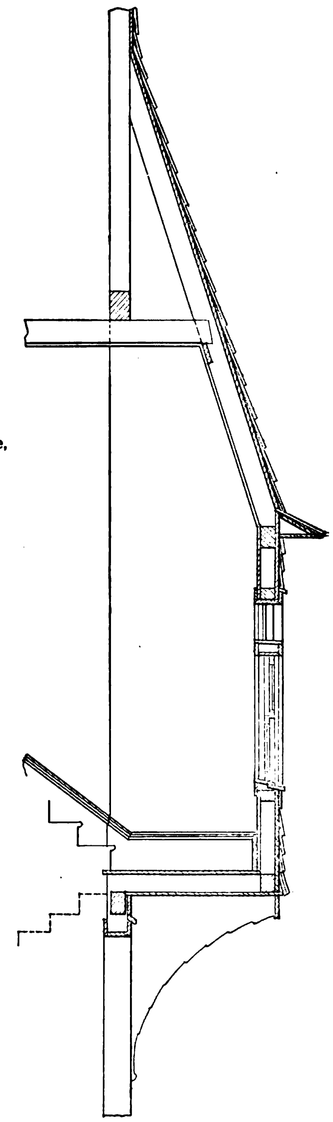


Detail of Main Stairs.—Scale, ¾ Inch to the Foot.

Section of Base.—Scale, 3 Inches to the Foot.



Elevation and Profile of Fire Place.



Section through Bay Window at Stair Landing.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of Parsonage at Queens, Long Island, N. Y.

To Cool the Air at the St. Louis Fair.

It is proposed to try an interesting experiment in the way of cooling the air at the international exposition to be held next year in St. Louis. The idea is to reduce the high temperature of the grounds during the summer months by drawing downward cool currents from an altitude of 800 to 1000 feet above the ground and distributing over the fair grounds air from 10 to 15 degrees cooler than the surface temperature. The plan, according to a published description, comprehends the construction of an aerial tower or stand pipe of the aforesaid hight, with lower termination about 50 feet above the ground, where large fans or blowers are attached that will draw a current downward at the rate of 20 or 30 miles an hour, equivalent to a pumping capacity of 500,000 cubic feet of air per minute. This volume of air will cover an acre 10 feet deep—in an hour 60 acres and in six hours 360 acres. It is expected that calefaction through the action of the sun's rays will be counterbalanced and neutralized by the constancy of the current during the daytime. After sundown the temperature, it is claimed, can be held below 80 degrees F. The fans are to be started at 4 a. m., when the air is coolest. By 10 o'clock the buildings and grounds would be filled with fresh air and so maintained during the day.

WHAT is claimed to be the largest pane of glass in the world was turned out recently at the Kokomo Plate Glass Factory, Kokomo, Ind. It was 150½ x 221⅓ inches, and weighed 1450 pounds finished. In the rough it weighed 2900 pounds, taking 20 men to carry it. It was successfully finished and crated and is said to be flawless.

STEEL FRAMES IN BUILDINGS.

WE have the following interesting communication from William Copeland Furber in regard to the discussion which appeared in the January issue relative to the durability of the steel frames which are the skeletons of most of the modern office buildings at the present day, this being based upon a lecture delivered by Mr. Furber before the School of Architecture in the University of Pennsylvania:

My attention has been called to an editorial in your issue of January of the present year, and if I may encroach upon your space I should like to discuss still further some of the points in the lecture you refer to. The discussion of the rusting of iron in buildings is hardly a theoretical one. The rusting of iron is a familiar and commonplace fact, and one with which everybody is more or less acquainted. The housekeeper who scours her tin covered cooking utensils and the locomotive engineer who covers with tallow the bright parts of the shell work of his engine in wet weather, both know that iron corrodes quickly in the presence of moisture. The builders of ships know that unless the hull plates of the vessel are either "pickled" or "sand blasted," to relieve them of the mill scale and other foreign substances in electric opposition to the metal, galvanic action will take place under the paint on the exterior of the hull and form a "rust cone" around the electric negative material and push the paint off; they also know that the common practice of covering the inside of the plates with Portland cement or some bitumen compound prevents corrosion of the metal work from the bilge water and dampness of the interior of the hull. So that it is therefore evident that the prevention of rust by the use of "sand blast" and Portland cement is not a novelty, but a well tried process of known value, and in view of its extensive use in marine structures it is somewhat surprising that it is so little known on land structures. Structures which cost hundreds of thousands, and frequently several millions, should not be left to certain destruction when the means of insuring their integrity is close at hand.

The grillage beams of the foundations are usually taken care of by the Portland cement filling and casing, but the exterior columns and girders are simply inclosed in the stone, brick or terra cotta walls. That this is not sufficient to exclude moisture is well known to every designer of buildings, and the knowledge is acted upon when he insists upon "furring" all external walls to prevent the dampness being carried through to the plaster.

Now it requires no extended argument to show that if stone and brick walls transmit enough water to affect the plastering the paint on the structural work must also be affected. The water passing through the mortar dissolves out the soluble salts and becomes alkaline, which destroys the oil in the paint, and then the pigment has no protective value. In the course of time the soluble parts of the mortar being washed away, the water, already charged with carbonic and sulphuric vapors, meeting with no neutralizing agent, reaches the unprotected iron and the work of corrosion begins.

The discussion of the shams and pretenses of the architectural treatment of *some* of the modern skeleton buildings is too long to briefly refer to, but this superficial treatment must continue as long as their designers' lamps are empty—like the lamps of foolish virgins—of the oil of truth—which alone can illuminate their pathway.

The "slow burning construction" myth is still believed in, but the superior test of fire proof construction is, What will happen if the Fire Department is late or does not arrive, and how much will it cost for repairs after the fire? Subjected to this test the slow burning construction idea dissolves in its own smoke.

Yet another word. A fire proof building, using the term in a reasonable sense, is commercially impossible. Although the test of many buildings that masquerade under that term would seem to belie the statement, the trouble with the present system is that the vital points are not sufficiently protected—the lower flanges of the floor beams and girders are but thinly covered and the columns are frequently inadequately protected. Criticism should be directed against the methods and not against the system.

QUALITY OF STONE USED FOR CONCRETE.

THE use of concrete is increasing so rapidly at the present day as to render a consideration of the quality of stone best adapted for the purpose of more than passing interest. In discussing the influence upon the strength of concrete of different varieties of stone the *Quarry* says:

It appears from experiments which have been carried out in the testing shops of the Royal Technical High School in Stockholm that all kinds of broken stone are by no means of equal value for making concrete. These experiments did not include the examination of the different results obtained from crushed stone and from shingle, which is very largely used for concrete in the neighborhood of shingle beaches, but rather of the different results obtainable from various kinds of crushed stone which might reasonably have been supposed likely to be of uniform value for this purpose. All the stone upon which experiments were made was crushed in an ordinary stone breaker to a uniform gauge, and a number of 10-inch cubes, made of cement, sand and broken stone, in the proportion of 1, 3, 5, were molded and rammed, with the addition of 5½ per cent. of water. Both the sand and broken stone were carefully washed and dried before mixing. The ramming was done by 44 blows of a monkey, weighing 130 pounds, with a fall of 3.28 feet, this being about one-quarter of the work put on standard test pieces of cement. The blocks were kept for a fortnight covered with soaked mats in a damp cellar, and afterward in a dry, cool room until the completion of a month from the time of mixing. The mean results of five separate tests of blocks made from five kinds of stone gave the following figures:

Kind of stone.	Weight of concrete per cubic yard. Tons.	Crushing strength per square inch. Tons.	Relative crushing strength.
Hornblendic granite	1.79	1.125	100
Diorite (greenstone)	1.79	0.965	86
Hornblendic granite, from Rindo redoubt	1.74	0.958	85
Pegmatite, from Edholmen	1.72	0.894	79
Pegmatite, from Ytterby	1.70	0.685	61

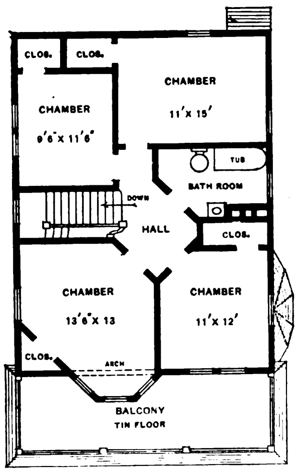
Individually the five specimens of greenstone concrete showed the greatest variation both in weight and crushing strength. The strongest was more than half as strong again as the weakest, although the weight per cubic yard did not differ by more than 4.4 per cent. This important result points to the great necessity of ramming in order to secure the greatest possible density. The relative strengths given by the different kinds of stone in the above table also show great differences. Between the two kinds of hornblendic granite, for example, there is a difference of 15 per cent., the only difference observable in the stone being that the weaker specimen was of coarser grain. The pegmatites, which gave the poorest results, were also coarser in grain than the other varieties.

The structure of the stone employed for concrete appears, therefore, to play a most important part in determining its strength, and coarseness of grain is not a desirable quality. To this fact we call the attention of all engineers and concrete manufacturers, for it is obvious that not all kinds of crushed stone are capable of giving the best results. Efforts will doubtless be made to utilize many kinds of quarry waste, but it behooves all who contemplate embarking in this industry to look carefully to the quality of their stone if they wish to compete with the best products of established reputation.

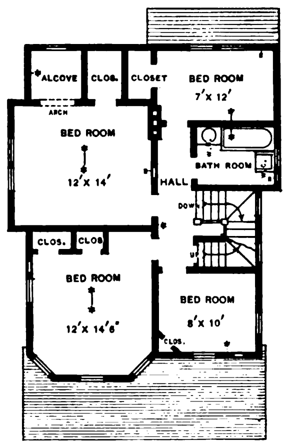
COMPETITION IN FLOOR PLANS.

WE announced in our December issue that one of the features of the paper for the current year would be a competition in floor plans for an eight-room, two-story, detached dwelling, such as would be suitable for erection in a suburban or country town on a plot of ground having a frontage not exceeding 33 1-3 feet. The rooms were to be arranged on two floors, in a way to utilize the available space to the best possible advantage, and were not to include any which might be provided in the attic or basement. As intimated in the announcement, the term "rooms" was intended to cover living apartments rather than bathrooms, closets or halls, although it was distinctly stated that where the a motto, device or *non de plume* by which it could be identified. The same designation was also to be placed upon a sealed envelope containing the real name and address of the competitor, and both drawings and sealed envelope were to be forwarded in a flat package to this office before a specified date.

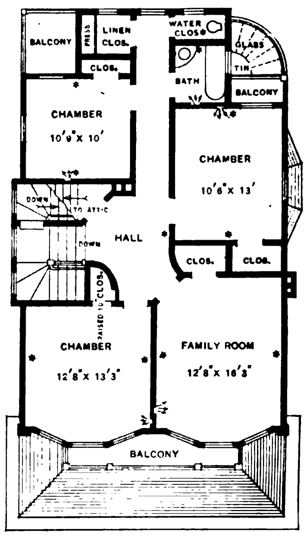
It was also stated that in reaching a decision in the



No. 88.—Second Floor.



No. 18.—Second Floor.



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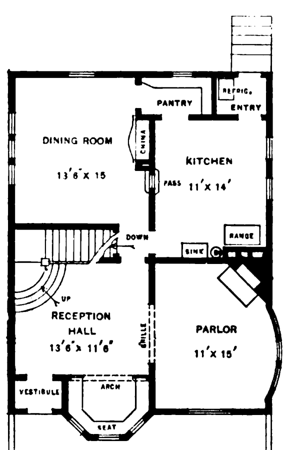

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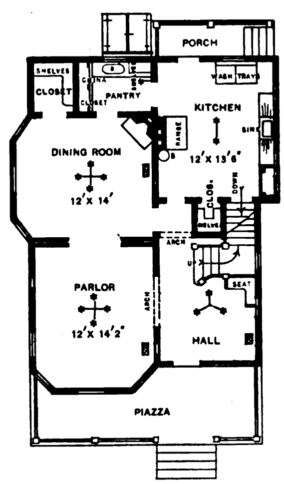

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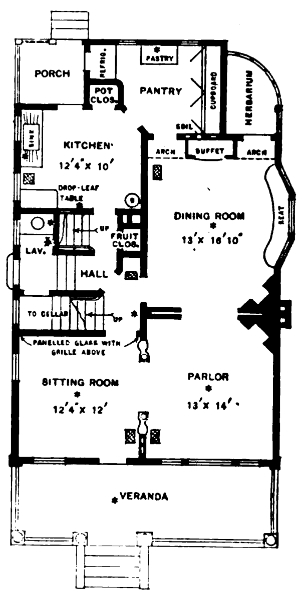


No. 64.—First Floor.

Competition in Floor Plans for an Eight-Room House.

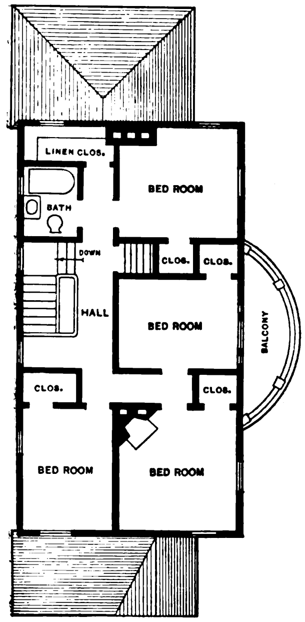
front hall, for example, was enlarged or expanded so as to be serviceable as a reception or sitting room it was to be counted as a room and not as a hall. This applied to the second floor as well, where the hall is very often so arranged, as regards size and appointments, as to be utilized for a sitting or sewing room. Such closets, cupboards and halls as were necessary for the occupants of the house were to be provided in connection with the eight rooms.

The conditions of the contest called for first and second floor plans, with the drawings to a uniform scale of ¼ inch to the foot, and each sheet to bear upon its face contest, the plans were to be subitted to a committee of experts appointed for the purpose, and from the entire number ten or more sets were to be selected, consisting of those regarded by the committee as best meeting both the letter and the spirit of the competition, and, at the same time, most suitable for execution upon a lot of the size specified. The number chosen was then to be engraved and published in these columns, so that every reader might have an opportunity of expressing his preference as to which was entitled to receive the first prize. It was duly announced that the award of the prizes would be in accordance with the votes of the readers—

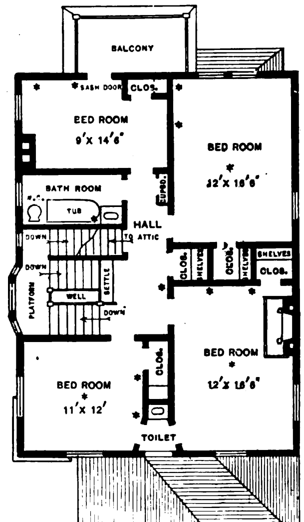
that is, the set of plans receiving the largest number of votes would be entitled to the first prize, the set receiving the next largest number of votes would be given the second prize, and the set receiving the third largest number of votes would secure the third prize.

With these requirements in mind, the committee to whom was intrusted the labor of selection carefully examined something like 150 sets of plans which were submitted in the contest, after which 12 were selected for publication, and we have pleasure in presenting them herewith for the consideration of our readers. In making the announcement in our December issue we stated, as clearly and specifically as possible, the conditions to govern the competition, yet in very many instances contestants failed to comply therewith, and the committee had no alternative but to regard all such as out of the contest and therefore not entitled to consideration. In some cases competitors placed their names and addresses directly upon the drawings, thus showing the committee at a glance by whom they had been submitted; in several instances nine rooms were provided upon the floor plans, when the conditions expressly stipulated there should be only eight; other contestants destroyed their chance for a prize by making their plans too wide to render them "suitable" for a lot having a frontage of 33 1-3 feet. In this latter class were a number of plans showing an excellent arrangement of rooms which we hope to lay before our readers in the near future as a study in house planning.

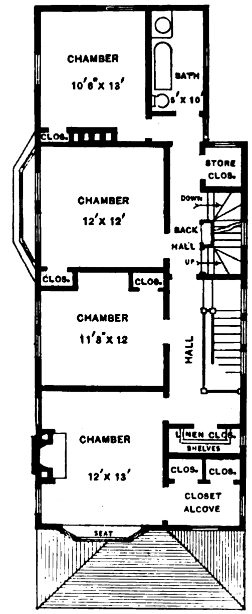
In the opinion of the committee a plan 30 feet wide



No. 5.—Second Floor.



No. 25.—Second Floor.



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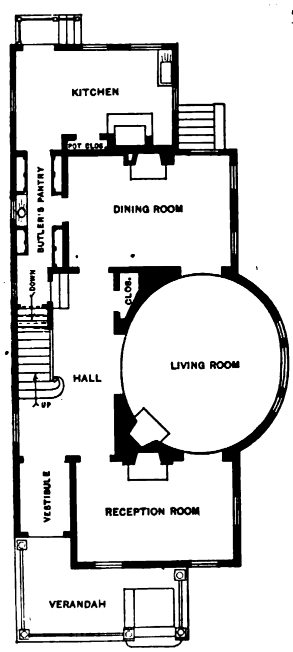

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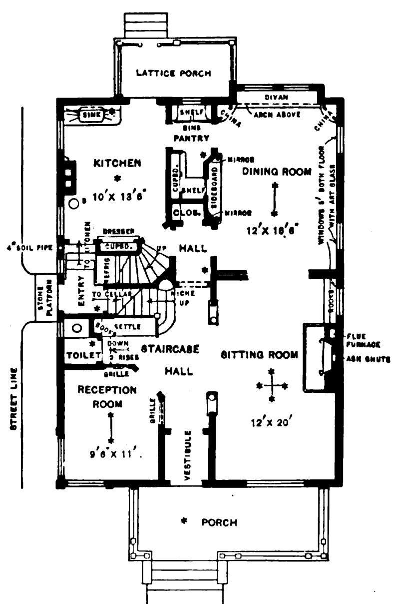

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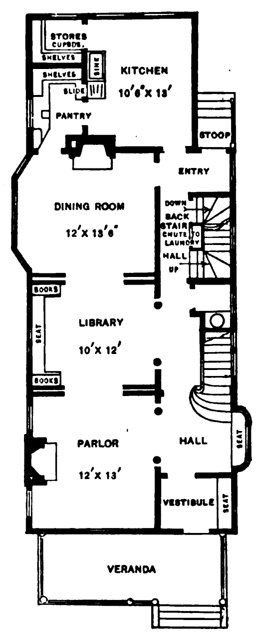


No. 56.—First Floor.

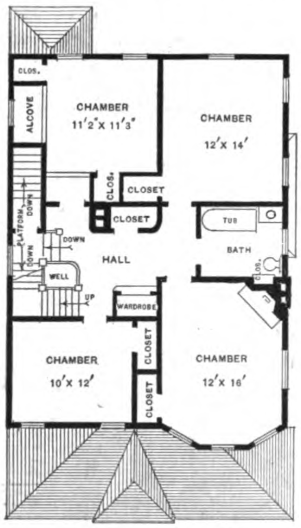
Competition in Floor Plans for an Eight-Room House.

would not permit of sufficient room at the side of the house to serve as a proper passage by which to reach the rear distance, as, allowing for projection of cornice, the house would be 1 foot within the building line on one side and 2 1-3 feet on the other. There were several instances of plans submitted calling for buildings 30, 31, 32 and even 33 feet in width, without allowing for projection of cornice, and one competitor submitted a first-floor plan with front veranda measuring 40 feet from out to out. How the occupants of this house were to reach the rear entrance from the outside without trespassing upon adjoining property the author did not indicate.

The efforts submitted showed a great variety of arrangement of rooms, many of which we fear could hardly be commended by reason of convenience, economy or hygiene. For example, one plan showed a water closet opening directly out of the pantry, another designer made it necessary to pass through the "serving room," out of which it opened, to reach the water closet on the main floor, and there seemed to be a tendency on the part of many to place bathrooms directly over the dining room and parlor, while in one instance it was directly over the vestibule and front hall—positions which, unless the floors were thoroughly deadened, would be apt to cause frequent embarrassment. All these points the committee duly considered in reaching a decision, and the 12 sets of plans here shown are representative of the best efforts submitted under the terms of the contest.

In another part of this issue, on page XVII, we present a ballot designed for voting in this competition. It will be observed that each set of plans here published is numbered, which, by the way, has no other significance than an indication of the order in which the drawings were received at this office. Each and every reader of the paper is cordially invited to fill out a blank ballot with his full name and address, and indicate by number the set of plans which, in his estimation, is entitled to the first prize.

This ballot, in order to be counted in the decision, must reach this office not later than March 25, and no vote will be counted unless it be upon the published ballot. We shall be glad to have our readers carefully study all the plans as presented, and, after making up their minds which set is entitled to the first prize, cut out the ballot and mail to the address given on the blank.



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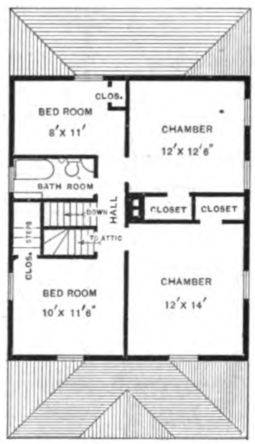

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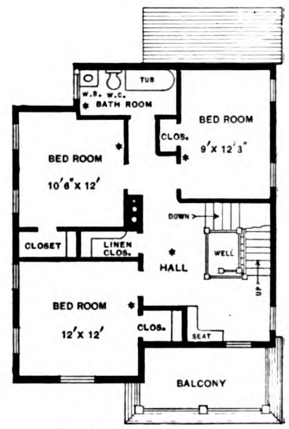

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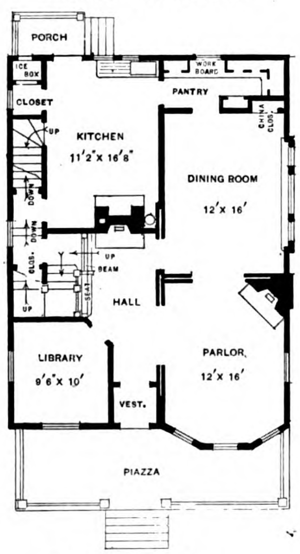

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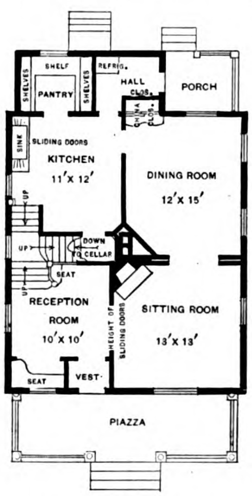

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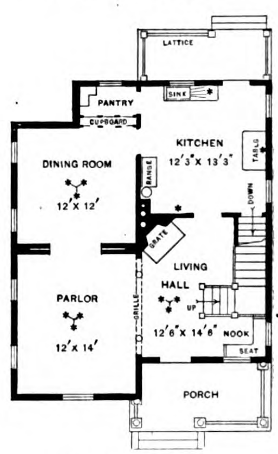
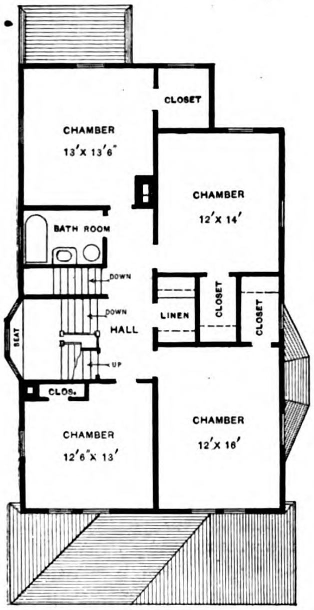


No. 45.—First Floor.

Competition in Floor Plans for an Eight-Room House.

Central Heating Plant at Owatonna, Minn.

A central heating plant is in successful operation at Owatonna, Minn., in connection with the works of the Owatonna Electric Light & Heating Company, using exhaust steam from engines and flue gases to heat water, supplemented by live steam when necessary. Two 15 horse-power pumps force the water through 4 and 6 inch pipes and ½-inch house services, laid in wooden casing filled with mineral wool. When the temperature of the air is 40 degrees the water is forced through the pipes at a temperature of 140 degrees under 10 pounds pressure; when the temperature drops to 20 degrees below zero the water is heated to 200 degrees and forced through the pipes at 40 pounds pressure. At a low temperature it is estimated that a 100 horse-power boiler will furnish heat for 15,000 square feet of radiating surface, but in moderate weather it will supply 25,000 square feet. The loss of heat in the water in the circuit is 20 to 25 degrees. Two miles of mains were added during the past season, this more than doubling the length since the plant was established a little more than a year ago. The amount of radiating surface in use has quadrupled.



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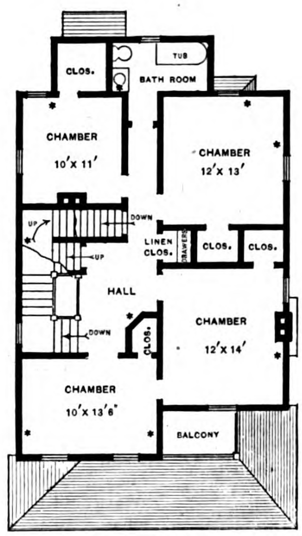

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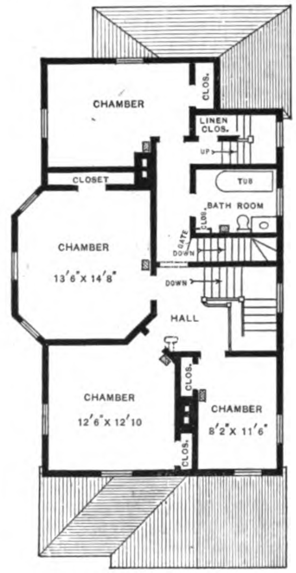

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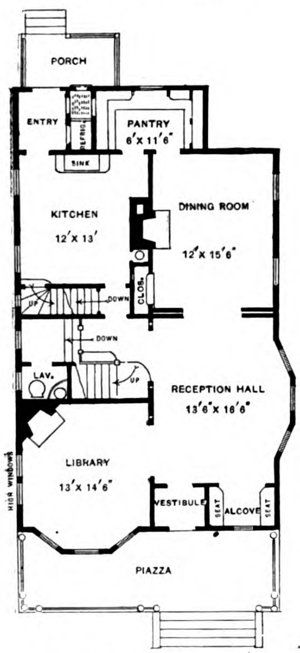

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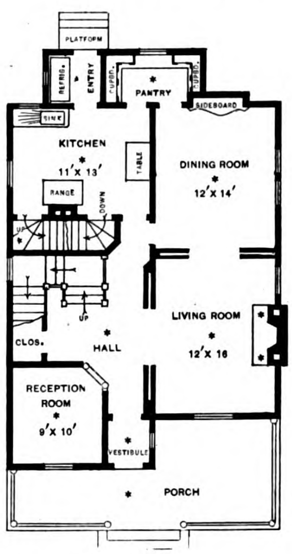

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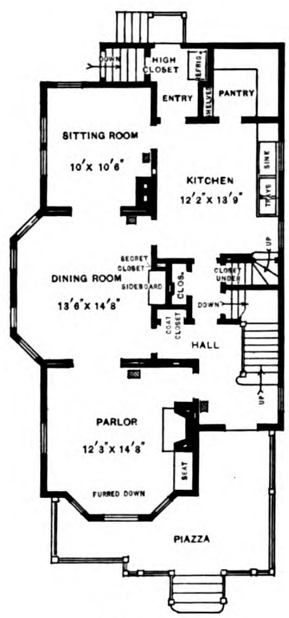


No. 74.—First Floor.

Competition in Floor Plans for an Eight-Room House.

Color in A chitecture

According to the laws of harmony as accepted and recognized by all modern races, and even by the most ancient Egyptians and Hebrews whose records have survived, the greatest harmony is produced in nature and also in art by the proper proportions of blue, red and yellow; blue predominating and yellow used sparingly. It is self evident, says a writer, that the clouds and sky have an almost infinite variety of beautiful hues, tints and shades of blue and gray. The gray is largely composed of blue. The mass of the sky and clouds are to the visible earth's surface as a hemisphere is to a circle, or as 11 is to 7. The sky blues are of various hues, from the most exquisite ultramarine at the zenith to the most delicate cerulean nearer the horizon, and each hue has various tints and shades, enhanced and multiplied by the sunlight and clouds.

To attempt to use blue of one or two feeble hues, and utterly without variety of tint or shade, on the building, is to place it in contrast with nature's richness and infinite variety, consequently it soon looks cold and dead. But the greatest objection to blue in the building is on the side of harmony. There is a superabundance of blue in nature's average, as is proven by the conceded greater beauty of the sunrise or sunset tints, when the complementary red and yellow are added in great variety, perfection and purity of hues. Green, which robes a great part of the terrestrial circle, has also a large portion of blue. That nature has an excess of green is evidenced by her greater beauty when autumn with her inscrutably subtle chemistry adds the complementary colors, red and yellow, also our happiness and never failing appreciation of nature's flowers, which the Creator, with His pencils of sunbeam, paints with the complementary red and yellow, both with primary and mixed power. Each species having many varieties, but all in harmony with their surroundings, that make it the admiration and despair of colorists.

The greens of nature are of the same great variety and beauty as the blues, and are enhanced by rain, dews and sunbeams, giving reflected light and color, refracted light and color, and varying shades, shadows and forms; while a green building is dull, monotonous, faded and usually positively harsh. Having demonstrated that nature has in her average repose more than sufficient quantity of beautiful blues and greens, why should the architect or painter use these colors? True, when the temperature is 100 in the shade, then cool grays are lovely, but when March gales are raging the building repeats the most dismal coldness. The color and forms of architecture designed for the Grand Cañon of Colorado must, it seems to me, be different from those bordering Lincoln Park. There are a great many beautiful and durable building stones whose colors are blue or gray, and some lovely green ones. All of these natural stones have a great variety of natural shades and tints, which give life and character to a building. But such cold colored materials should be used with great caution and should be carefully studied as to harmony by analogy rather than contrast with the other materials which enter union with them, that the greater harmony may result. In my experience with over 200 designs in water color perspectives and in a critical examination of over 2000 colored designs, besides the observations of thousands of executed buildings, having many different kinds of surroundings, the modest, warm colors having a major portion of red or yellow, and a varying portion of both red and yellow, have never failed to please me more than cold colors. In some of the architects' designs under my brush where they or their client had imposed cold, dismal, gloomy colors, one could not help noticing how much better the pictures looked in the middle stages before the cold colors were put over the building. One of the most flagrant sins of color is to make a combination of bright red brick with very light blue stone. This, though perpetrated by many very scholarly architects, is so grating on my sense of color harmony as to be absolutely uncultured. I cannot comprehend how they could ever have repeated the crudity and discord so many times. True, black and red are much more discordant, but there is no excuse for any discord. Those architects who have studied their designs in color soon discard the combination as being too much like prison stripes.

The late John W. Root, who did more for architectural painting than could be told in many volumes, never failed to carefully study his designs both in beauty of form and perspective water coloring, where he could also see the harmony of color effect, and hence you will hardly ever find one of his buildings digressing the laws of harmony, which is an added complement to their more important forms.

THE West Side Branch of the Young Men's Christian Association of the City of New York celebrated its fifth anniversary at the Association Building, 316-320 West Fifty-seventh street, on the evening of Monday, January 20. Starting with 243 members on December 31, 1896, the association has grown in the past five years until it now has 2127 members. Its attractions are a well equipped gymnasium, a large swimming pool, 37 evening educational classes, a library of 45,000 volumes, an attractive course of entertainments free to members, and a boys' department numbering nearly 300, with separate gymnasiums and class rooms.

English Masonry in the Eleventh Century.

Without any definite knowledge on the subject most Americans believe that the art of the stone cutter and the mason was in evidence in Great Britain from the very earliest days. So many of the ruins of the island seem to be crowned with hoar antiquity that we do not stop to consider the date when they were actually constructed. It will doubtless evoke surprise on the part of many to read in the *Architect and Contract Reporter* of the comparatively late date at which stone construction became general. The paper says:

It is impossible to read St. Bernard's "Life of Archibishop Malachy" without seeing that the Irish people in the twelfth century were not acquainted with the art of cutting and carving stone, and that their buildings were then usually of wood. Ireland was, no doubt, behind England at that period in all the arts of civilization, but is not likely to have been more than a century behind, and the state of Ireland in the first half of the twelfth century is probably a fair picture of that of England in the beginning of the eleventh. If churches were the only buildings erected of stone it would have been hardly possible to keep up a supply of skilled masons unless the number of churches then building had been very much greater than there is any reason to believe it was. These simple arts require a good deal of practice, and constant practice, for men to become skilled in them and to remain so. If all demand for them were to cease for two or three generations from the general habit of building in wood, these arts would perish, and would have to be learned afresh when a fresh demand for them arose; and this process would require two or three more generations before really skilled masons were produced. A skilled mason, whether a cutting mason or a setting mason, has at all periods when masonry was used at all been able to earn double the wages of a common laborer, which proves that it has always been an art to be learned, like other arts, by practice. With the exception of churches, the earliest stone buildings we have in this country (after the Romans) are the Norman keeps and castles, none of which are earlier than the eleventh century, and it was a century after the keeps were built in stone before the outer walls of inclosures or any of the dwelling houses, even in the castles, were built of stone. Earth works and wooden palisades continued to be the usual fortifications down to the thirteenth century. The use of cut stone came in very gradually, and timber buildings continued to be by far the most common. Some wooden churches still remain in different parts of the country where stone is scarce, as in Essex, Hampshire and Cheshire. These are now the exceptions, but in the tenth century, when the whole country was covered with forest, stone churches were the exception.

Consolidation of Mortar.

A note in a recent issue of the proceedings of the American Society of Civil Engineers by George W. Rafter gives the results of some experiments on the consolidation of mortar. For dry mortar mixed in proportions of 1 of cement to 1, 2, 3 and 4 of sand, with 15.5 to 17.4 pounds of water per cubic foot of mortar, the average consolidation under ramming for nine experiments was 5.4 per cent., the results usually varying from 4.1 to 6.9, with one result as low as 0.9 and one as high as 10.9 per cent. For three experiments with plastic mortar, using 16.7 to 19 pounds of water per cubic foot, the average consolidation was 4 per cent. The average of all the results was 5.1 per cent. The result of 10.9 per cent. is attributed to insufficient mixing of the mortar.

HOW TO MAKE AN ELLIPTICAL CHUCK.

BY FRED. T. HODGSON.

A GREAT many years ago a small firm wished me to make for them 5000 handles for screw drivers, and several thousand smaller one for brad awls, &c. These handles were to be made of "dogwood," or what is sometimes called "American boxwood," the firm having the stuff in supply. The handles were to be of oval or elliptical shape on the big or hand end, and circular on the tool end, each one to have a heavy ferrule fitted on the small end, something similar to the handle shown in Fig. 1, which was one among a number of forms made for the firm mentioned.

This undertaking was new to me, and I hustled around and made many inquiries among old turners to discover the manner in which the work was done. I had about a dozen samples of what was required, which had been imported from Sheffield, and they were fine specimens of work. My inquiries were fruitless, for nearly every old turner I met had a scheme of his own, which he had never tried, for doing the work, but I accepted none of them. Finally I found in an old magazine, the *Practical Mechanic*, I think, a full description of the oval chuck I eventually made and used for the purpose, to the complete satisfaction of the firm and myself, and which I will endeavor to describe to the readers of *Carpentry and Building*. Fortunately I have a set of the drawings in a crude form by me, which will aid in my description, and better enable the readers to understand the mechanism of the instrument.

The origin of this chuck is somewhat in doubt, but it is attributed to the celebrated William Murdock, the Scotch assistant of the noted engineer, James Watt, to whom we are indebted for the perfection of the steam engine. It happened one day that Murdock called on Mathew Boutton, the partner of James Watt, seeking employment, and during the interview, not knowing what to do with his hands, Murdock employed them in fingering his hat. Boutton being struck by the singular appearance of this article, inquired how he became possessed of it. Murdock answered, "Oh, I just turned it in a bit lathey o' my own making." The hat was like our fashionable tiles in the shape of the hats of the period, and was oval inside and out. Boutton at once came to the conclusion that a man who could turn out such a hat as that of wood was worth engaging, so Murdock was employed and received the magnificent sum of £1 ($5) a week. Among many other things he built in iron, brass and wood oval chucks similar to the one I am about to show.

This chuck consists of a slide, S, in Fig. 2, carrying two rubbers or guides, as shown on the back of the chuck, and marked R' in Fig. 3. These rubbers or guides are fastened to two studs attached to the back of the slide, which work in two slots in the back plate of the chuck, which is screwed on the nose of the mandrel. The slide is moved between the two guides G G of Fig. 2 by means of the rubber clasping the ring R of Figs. 3 and 4, which is screwed on the face of the lathe head eccentric with the mandrel, as in Figs. 3 and 4. When the mandrel is made to revolve the side carrying the work is moved nearer to the chisel every half revolution, and consequently the chisel cuts more off the two sides of the work which are opposite to the ends of the slide, thus producing an oval or ellipse.

The diagrams, which are one-third size, together with what has been said before on elliptical chucks, may be sufficient to enable those who have followed me closely to make one of these instruments, but for the benefit of those who do not care to dig deeper into the mysteries of the turner's art than ordinary circular and elliptical turning I will endeavor to show how this tool may be made by any one skilled in the use of tools, and while the whole thing can be made of wood, maple or Spanish mahogany, I will devote the article more especially to the making of it in metal. The ordinary carpenter will find no difficulty in making his own patterns for the work, when he can get at any foundry large or small castings made from them without trouble.

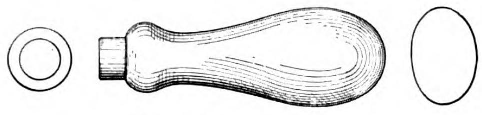


Fig. 1.—Brad Awl Handle.

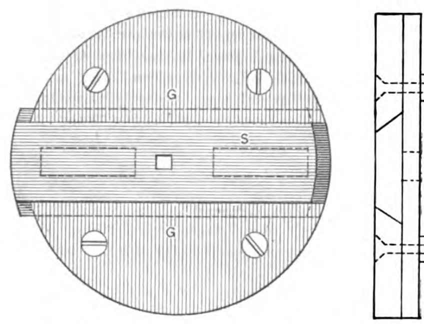


Fig. 2.—Front and Side Views of Oval Chuck.

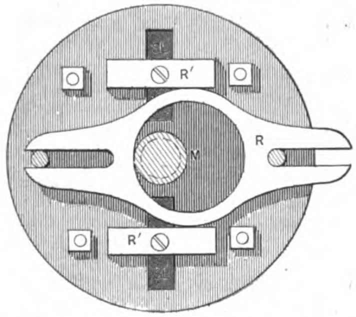


Fig. 3.—Rear View of Elliptical Chuck.

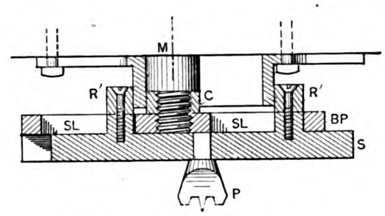


Fig. 4.—Section through Chuck.

How to Make an Elliptical Chuck.

The best wood for making the pattern is undoubtedly mahogany or bay wood, but nice white pine answers well enough where only a few castings are to be made. Let us make a beginning with the ring shown in Figs. 5, 6 and 7. Cut a piece of wood 6⅛ x 2⅝ x ¼ inch to the shape shown in Fig. 5, which is 6 x 2½ x 3-16 inch when finished. Then get a piece 2¾ inches square and 1 inch thick, and turn it into a ring 2½ inches in diameter outside, ¾ inch wide and ¼ inch thick, making it rather thicker on one edge than the other, so as to draw easily from the sand, and glue it to the first piece, then cut out the center of the first piece and also the grooves at each end.

Next take two pieces 5¾ inches square and ⅝ inch thick and turn them into two disks 5½ inches in diameter, one of them to be ½ inch thick and the other ⅝ inch thick. In the latter cut the two slots S L of Fig. 3, making them ¾ inch from the center and 1½ inches long and ½ inch wide; also cut a parallel piece out of the center of the ½ inch thick disk 1½ inches wide on one side and 2 inches wide on the other, so as to form a dovetail slide, as in Figs. 2, 8 and 9, and glue on the wide side of it two studs, ½ inch cube, 1¼ inches from the center, as in Figs. 8 and 9.

For the chuck, as described, the lathe head will require to be 5 inches wide across the face; if it is not of this width it will be well to make a small pattern, as shown in Fig. 10, and get two castings made from it and screw them on each side of the lathe head.

Now varnish all the patterns and take them to the foundry and get castings from them. Having obtained these, commence work on the ring, as all the other parts have to be fitted to it. File up the flat portion, edges and grooves, and then clamp it on the face plate of the lathe, and turn the circular part inside and outside and on the edge. Get two set screws about 1 inch long and 5-16 inch in diameter. Draw a line across the face of the lathe head, parallel with the bed, and through the center of the mandrel, and drill and tap two holes to fit the set screws, one on each side of the mandrel, 2⅛ inches from the center. Next, turn a small collar, C, ⅝ inch long, and the same size as the shoulder of the mandrel, as at M in Fig. 4; bore and tap to fit the mandrel. Also tap the plate with the slots in it, then screw on first the collar, then the plate, and turn both sides true. First turn one side, then take off, turn round and screw on the mandrel with the turned side toward the collar, and turn up the other side smooth and true. Then file up the broad side of the slide perfectly true, and file both edges parallel to each other. Face up one side of each of the two guides and file the edges to the same bevel as the edges of the slide, so that they will fit together. The slide must be ground with fine emery and oil when the chuck is fitted together, so as to be made to fit perfectly, for on this depends in a great measure the quality of the work done. Then file up the two studs on the back of the slide, taking care to have them exactly in the center; then file the slots in the back plate so that the studs will just work easily in them. The slots must also be exactly in the center.

Bore and countersink two holes in each guide, as in Fig. 2; bore corresponding holes in the back plate, and then bolt the guides firmly to the back plate, after which screw it onto the mandrel and turn the face of the guides, making them a little thinner than the slide will be finished so that any work that may be screwed on the slide will move freely over the guides. Put the slide in its place and face it up in the lathe; also turn the edges of the chuck. When this is done screw the rubbers R′ R′, Figs. 3 and 4, which are simply pieces of ½ inch square iron 2 inches long, on the studs in the back of the side, so that the ring will just fit between. Next fit a spur center, P, in the slide, as shown in Figs. 4, 8 and 9, and countersink the hole at the back so as to take a stout screw, to be used in fastening short work on the chuck. Now put on the ring in its place and screw the chuck on the mandrel and it will be complete.

The chuck as now described is suited for a lathe having a mandrel 1 inch in diameter, mandrel nose ¾ inch diameter and ¾ inch long and projecting 1½ inches from the face of the lathe head, but the dimensions may be easily altered to suit any lathe. I may add here that the elliptical and eccentric chucks may be combined by fastening the latter on the slide of the former, when very beautiful work may be produced, such as the intersection of ellipses or elliptical inlaying, and many other things that will suggest themselves to the operator.

It will be noticed in the foregoing that reference is not made to all the letters which appear in the diagrams, because the letters used are the initial letters of the parts of which the chuck consists and indicate these parts in each diagram in which they are shown; thus S, wherever it occurs, is the slide; G indicates the guides, R the ring, R′ the rubber, SL the slot, BP the back plate, C the collar and M the mandrel.

If the reader of this article owns a lathe that will work iron he may make a chuck of the kind described at a cost of about $2.50, independent of his own labor. If he gets all the parts made at some machine shop, but makes the pattern himself, the cost will run up to $12 or $15, but when possible I would advise the reader to do the entire work himself, then he will have a better understanding of the instrument and be more able to apply its use to many purposes other than simply turning ovals.

It may be asked "How could you turn your handles for screw drivers and brad awls on a chuck of this kind?" Well, in turning these handles both head and tail blocks of the lathe were pressed into service. The thick and oval end of the handle was chucked into the head block on the sliding bar, while the thin end of the handle was centered onto the tail block center, which was stationary. The process was simple and effective.

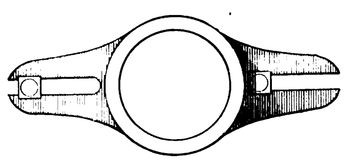


Fig. 5.—Front View of Ring.

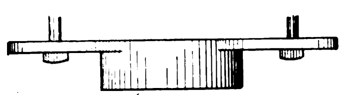


Fig. 6.—Side View of Ring.

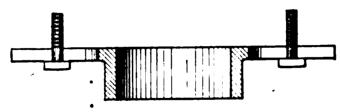


Fig. 7.—Section of Ring.

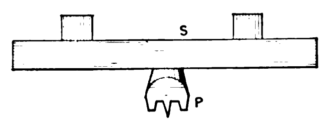


Fig. 8.—Side View of Slide.

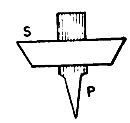


Fig. 9.—End View of Slide.

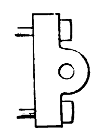


Fig. 10.—Casting to Widen Lathe Head.

How to Make an Elliptical Chuck

Oregon's Exhibit at the Charleston Exhibition.

Those of our readers who find an opportunity of visiting the South Carolina Interstate and West Indian Exposition now being held at Charleston, S. C., will doubtless be interested in the forestry exhibit made by the State of Oregon. It is to be found in the annex to the Palace of Agriculture, and is in a way a truly educational one. One stick of fir, which was cut 7 feet from the butt, squares 34 inches and measures 74 feet in length; another block from a tree is 27 feet in circumference, and another 9 feet in diameter. In addition to these, there are samples of boards, measuring 4 to 5 feet in width, 4 inches thick, and from 30 to 40 feet in length; also ship planks 4 to 5 inches thick and 74 feet in length. Arranged on a long table in the center of the entire exhibit are polished woods of pine, spruce, fir, cedar, juniper, yew, laurel and oak, both white and black. These are also shown in their rough state. Other features are cabinet lumber, including polished maple, ash, alder, myrtle, laurel, dog wood, cotton wood, cherry and a number of other woods, all of which grow in vast quantities in the State.

It is said that during the year 1901 the saw mills of Oregon cut 988,565,000 feet of lumber, valued at nearly $9,000,000. At the State exhibit are many large photographs of forests, and the statement is made that some trees of great dimensions do not have a limb for a distance of from 60 to 100 feet from the ground.

CORRESPONDENCE.

Constructing a Wooden Wind Mill.

From C. H. B., *Bolton Notch, Conn.*—Will some of the readers of the paper give me an idea how to build a wooden wind mill of about 2 horse-power capacity ?

Finding Dimensions of Girder by Bending Moments.

From H. C. L., *Moorestown, N. J.*—I should like to see in *Carpentry and Building* an answer by F. E. Kidder explaining how to find the dimensions of a plate cantilever girder of any length by bending moments.

Answer.—In reply to the above Mr. Kidder says:

To explain in detail the method of designing a cantilever plate girder would require more space than the editor might consider expedient, but I will endeavor to indicate the method in a general way.

The bending moments in a plate girder are computed by the same formulæ as for a simple beam fixed at one end. For a beam fixed at one end and loaded at the other, the bending moment over the point of support is the product of the load by the distance from the center of the load to the support, or $M = WL$. For a distributed load, W, $M = \frac{WL.}{2}$

In either case the bending moment is greatest at the support and decreases to nothing at the outer end. Fig. 1 shows the graphical representation for the bending moments in the two cases; the curve for the distributed load being that of the parabola with apex at A.

Fig. 2 represents the shearing stress in the web of the girder for distributed load and load applied at the end. As the bending moment decreases from the point of support to the end it is customary to taper the web of a plate cantilever girder as in Fig. 3, although in the case of a very short cantilever, heavily loaded at the outer end, it might be necessary to keep the depth uniform on account of the shearing stress. With any method of loading the web should be stiffened by vertical angles placed over the support, as shown in Fig. 3. The area of the flanges at any point should be equal to

$$\frac{\text{Bending moment at that point in foot pounds}}{\text{Hight of web at that point in feet} \times F.}$$

F being 13,000 pounds for the top flange and 12,000 for the bottom flange. The area for upper flange should be the net area after the rivet holes are deducted. The sectional area of the web plate at any point should equal

$$\frac{\text{Shear at that point in pounds,}}{7,000}$$

but in no case should the thickness of the web be less than 5-16 inch or less than one-eighteenth of the depth.

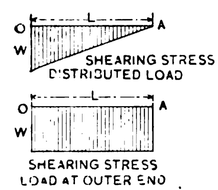


Fig. 2.—Diagrams Showing Shearing Stress.

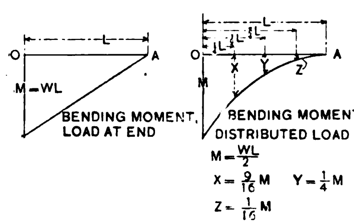


Fig. 1.—Graphical Representation for the Bending Moments in the Two Cases.

EXAMPLE.

Assume that the cantilever shown by Fig. 3 has a length, L, of 10 feet and a hight of 2 feet, and supports a uniformly distributed load of 32,000 pounds. Determine size of flanges and thickness of web.

ANSWER.

Bending moment at support $= \frac{32,000 \times 10}{2} = 160,000$ lbs.

Net area of top flange $= \frac{160,000}{2 \times 13,000} = 6.16$ sq. in.

Area of bottom flange $= \frac{160,000}{2 \times 12,000} = 6.67$ sq. in.

For both flanges we will use two 3½ x 3½ x ⅜ inch angles, having a gross sectional area of 4.96 square inches, and an 8 x ¼ inch cover plate, giving us a gross area of 6.96 square inches and a net area in the top flange of about 6.3 square inches.

The web area at support must equal $\frac{32,000}{7,000} = 4.58$ square inches. As the web is 24 inches high, a thickness of ¼ inch would give a sectional area of 6 inches. Hence we must be governed by the rule given above and make the thickness 5-16 inch.

At the center of the projection the bending moment will be 40,000 pounds and the hight of web 15 inches. This will require a net area in the upper flange of $\frac{40,000}{1\frac{1}{4} \times 13,000}$, or 2.5 square inches. Hence at this point the angles alone will give sufficient area and the cover plate can stop about 4 feet from the support. The angles should be continued the full length of the girder.

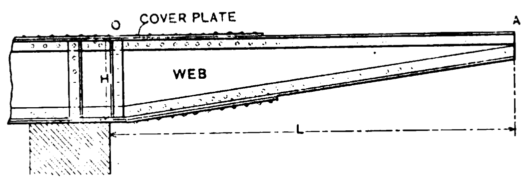


Fig. 3.—Side Elevation of Cantilever Girder.

Finding Dimensions of Girder by Bending Moments.

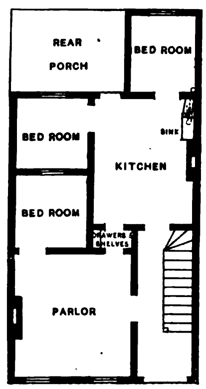
The shear at the center will be ½ W, or 16,000 pounds, which will require a sectional area of $\frac{16,000}{7,000}$, or 2.3 square inches. The actual area is 15 x 5-16 inch, or more than sufficient. The rivets should be ¾ inch in diameter and 3 inches on centers for the first 2 feet from the support, then 4 inches on centers to within 2 or 3 feet of the end, where they may be 6 inches on centers. For a thorough description of the method of detailing riveted girders the correspondent is referred to Chapter XX of the "Architects' and Builders' Pocket Book" or to Birkmire's "Compound Riveted Girders," both of which can doubtless be furnished by the publishers of *Carpentry and Building*.

Handling and Setting Plate Glass.

From R. S., *Louisiana, Mo.*—I would suggest that those readers of the paper who have had experience in the matter describe their methods of handling and setting large sizes of plate glass. Carpenters and builders do nearly all the plate glass setting outside the big cities, and I think that a discussion of the subject would prove of more than ordinary interest. I have done a great deal of this work myself, and it seems to me that the methods in vogue are rather primitive. I have never seen an exhaustive article on the subject, and there is opportunity for the presentation of numberless suggestions. Glass under 84 x 84 inches involves no trouble in the setting, but above that size obstacles are plentiful. I have methods of my own for putting in the glass, but I have no doubt some of the readers of the paper have better ones. If not, when others speak I will give my plan.

Suggestions Wanted for Remodeling a Workingman's House.

From JOURNEYMAN BRICKLAYER, *Albany, N. Y.*—In renewing my subscription to *Carpentry and Building* for



Plan Accompanying Letter of "Journeyman Bricklayer."

1902, I inclose herewith a rough sketch of the plan of my house as it is at present. I want to enlarge it so as to have a parlor, dining room, kitchen, three bedrooms and bathroom complete, with a pantry for the kitchen and a clothes closet in at least two of the bedrooms. I also want laundry tubs in the kitchen. I do not want to disturb the present building any more than I can help, but to make the improvements in an addition. I would like to have a flight of back stairs under the same roof, if it is possible. Will some of the architectural friends of the paper assist me to a solution of the problem presented? I have been a reader of *Carpentry and Building* for a number of years, and have learned quite a little in my own line of business, which is bricklaying and plastering, and I think every mechanic ought to subscribe to the paper.

Frost on Windows.

From W. I. S., *Lynn, Mass.*—In the last issue I noticed how "R. C." keeps frost from forming on his show window. The method he employs is all right and works well, but his theory that the cold air enters at the bottom of the window, fills the inclosed window space and crowds out the warm air through the holes at the top of the window is not in accordance with my experience. In real cold weather there is always a current of air circulating behind a window. The warmer air in the room or window space, as it may be, naturally is near the ceiling. When this strikes the window it is immediately chilled and drops rapidly, keeping very close to the glass until it gets to the floor. The force of this descending current of air can frequently be felt with the hand, and can be most easily and plainly observed by blowing a little smoke from a cigar near the window. The smoke will be drawn in by the strong downward current, as soon as it gets near the window, and will fall to the floor. I do not believe that boring holes at the top and bottom of a window will prevent the action of this strong air current, but that this current would suck cold air through the top holes and let some cold air escape out of the lower holes. The accompanying illustration shows my theory as to the movement of the air.

From J. U. & SON, *Louisville, Ky.*—We noticed in the February issue the letter about keeping frost from windows. The idea put forth by "R. C." regarding the way the air circulates in a closed in show window is right. We have used two windows made as he describes and they have never frosted, although we have given the system a five years' trial. During the winter our weather was 7 degrees below zero, and our windows were just as clear as in summer. Our show windows have holes

Frost on Windows.—Sketch Illustrating Theory of "W. I. S." of Lynn, Mass.

in the top and bottom, and a feather placed in the window near the glass is carried by the ascending current of air to the top of the window.

Criticism Desired of Bridge Truss.

From J. M. B., *Monroeton, Pa.*—I inclose rough sketches of a bridge truss recently erected near here, and I would like to have the opinion, regarding its strength or weakness, of Mr. Kidder, or some other of the architectural engineers who have contributed to the columns of the paper. Personally, I think it is a weak truss. The bottom chord is green hemlock, made of 2 x 10 inch plank, not sized. The rest of the timber is white pine seasoned, except the floor plank, which are 2-inch oak. It will be noticed that the joint at P in Fig. 1 is cut vertical, or plumb. The rods are of iron 1 inch in diameter without the ends being upset. There are two trusses, one each side of the bridge, 16 feet between centers. At B and W are ⅞ x 4 inch cast washers. At C C in Fig. 2 are 2 x 6 inch braces spiked on. The bridge is on the main road, and is intended to replace one swept away by the flood of December, 1901.

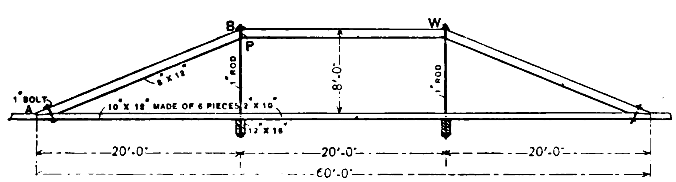


Fig. 1.—Elevation of Bridge Truss.

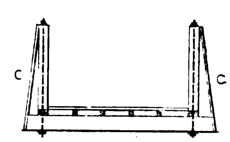


Fig. 2.—Cross Section.

Criticism Desired of Bridge Truss.

Figuring Fire Losses Upon Buildings.

From R. S., *Louisiana, Mo.*—I have a suggestion relating to figuring fire losses upon buildings which I think is deserving of mention in the columns of the paper. My experience has taught me that builders are always called upon to figure the fire losses, although it is done sometimes by the assured and sometimes by the insurance company. This work, in my opinion, is as much a part of the building trade as any other form of estimating, and yet it is somewhat out of the usual field of operations. Articles upon the adjustment of fire losses would, I believe, interest all readers, and should call forth expressions of opinion from both builders and insurance adjusters. I have had rather a wide experience in this field, and may say something if any interesting points are overlooked.

Note.—This is a phase of the building business which has been discussed but little in our columns, and the letter of our correspondent opens the way for much valuable comment on the subject. Let the discussion be full and free.

Turning Wooden Curtain Rings.

From TURNER, *Poughkeepsie, N. Y.*—I beg leave to offer those of the readers interested in turning my method of procedure in making curtain rings, which I believe is fully as practical as the one described by Mr. Hodgson in the January number. Let the turner, amateur or otherwise, take a block of wood large enough to make eight or ten rings, say 3 x 3 x 6 inches in length, with the grain running crossways—that is, to say at right angles to the length. If so heavy material is not available, let him build it up by gluing stuff of almost any thickness together, as indicated in Fig. 4 of the sketches. Now let this blank be fastened on the face plate with a central screw, as shown by A in Fig. 1. This form of face plate is one of the most valuable attachments of the turning lathe, and one which no turner should be without. The screw should be of good size. The length to enter the blank can be regulated to suit the work in hand by means of a wooden disk of suitable thickness, as shown at B. Bore a hole in the blank C to admit a screw not large enough to lessen its holding quality, but just so as to prevent splitting. Now proceed to turn off as many three-quarter round rings as the blank will make. This leaves only one corner to be rounded in the second operation. In Fig. 1 D shows a ring detached from the blank, E marking the unfinished corner.

The next step is to fasten a soft wood block, with the grain running lengthways, on the screw and form the hollow chuck shown in Fig. 2, tapering the recess slightly toward the center. This will hold the rings nicely. Make them a full round and polish inside. A slight tap with a hammer on the end of the chuck will dislodge the ring again.

It is now ready for the final polish. Remove the chuck from the screw plate and fasten on another block of wood. Round it up, as shown in Fig. 3, tapering slightly toward the end, and glue a little strip of soft cloth around it to prevent scratching the polished inner surface. When finished, it should fit the ring at some point on the cloth. A nice, even polish can now be applied to the outer surface of the ring. By this method one is not obliged to be so extremely particular as to size, and any one who has tried to make a lot of rings fit a chuck of such a shape as that advocated by Mr. Hodgson will realize this advantage. Again there is no gluing to be done in order to hold the work in the machine, nor any fuss in getting an even polish without a ridge in the center.

These criticisms, or suggestions, are not made in an antagonistic spirit, as I have perused the many articles of Mr. Hodgson with great interest, pleasure and profit, and I am now waiting for him to tell us how to make one of those intricate and expensive chucks in a cheap manner.

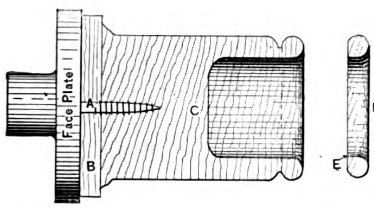


Fig. 1.—Sectional View, Showing Face Plate, with Central Screw A, Disk B, Blank for Rings C, and One Ring, D, Three-quarter Round, Severed from Block.

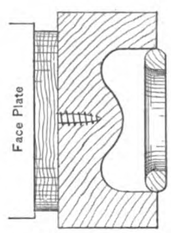


Fig. 2.—Second Operation, Showing Chuck and Ring in Position.

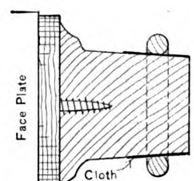


Fig. 3.—Ring on Polishing Block.

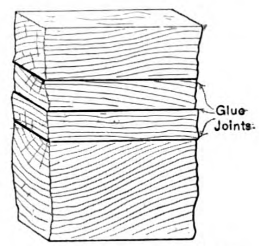


Fig. 4.—Built up Block for Rings.

Turning Wooden Curtain Rings.

Further Comments on Laying Out Face Mold for Stair Rail.

From MORRIS WILLIAMS, *Scranton, Pa.*—In this article I propose to explain the solution of the problem submitted by "C. E. G.," Frederick, Md., in the November issue of *Carpentry and Building*. I have already explained the stretchout, and will therefore in this article take up the treatment of the well hole exclusively. In my treatment of this portion in the December issue I assumed the well hole to be square and the landing risers to be in line with the crown tangents.

The treatment based on such assumptions was perfectly correct, and probably the most simple method known of laying out a face mold and finding bevels to twist the wreaths, notwithstanding the "friendly criticisms" by "C. B. H.," Warren, Pa., in the January issue.

I have always in my endeavors to help beginners thought it necessary to use all the essential lines for the purpose, and to place each line exactly where it belongs, so that the relation of the projected lines to the base lines may be seen at a glance.

To do this it is necessary to project the elevation of each line and point from the plan; and again from the elevation to the section of the oblique plane wherever the wreaths are assumed to rest.

If our numerous so-called authors of new systems had adopted similar methods of treatment the science of handrailing to-day would be universally understood by the class of men that claim to be and call themselves stair builders. Instead, not 1 per cent. of these men know much about the fundamental geometrical principles of the science. Such a state as this has resulted in the almost entire exclusion of geometrical staircases from building construction.

In these days we seldom find anything having a resemblance to a curve except occasionally a little stretchout at the starting, while the remainder consists invariably of landings and newels. This would not be the case if architects and stair builders knew their business as they ought. The one is unable to plan a geometrical stairway, and the other is unable to construct it. When it is attempted by "guess" it always results in a miserable botch, disgusting to all concerned, leaving no alternative but to design and construct the next one with newels and platforms.

One need only to look about to find tangible evidence in spoiled staircases constructed under such disadvantages, and until the method of teaching the science is greatly simplified there is no likelihood that geometrical staircases will ever again resume the justly exalted place they held in the days of our fathers. Although in their days the theory was not so advanced as it is in our times, the conditions were different. Then the architect was a scholar, often a graduate collegian, while now we meet fellows usurping the title with qualifications barely sufficient to make a decent plan and elevational drawing.

I suggested to one of this class not long ago that he design a geometrical stairway for one of his buildings. "What do you mean?" he said, "I never heard of them," and of course I had to give it up.

Again, the stair builder in those days had to know his lines. The "guess" method had not matured. As far back as the days of Peter Nicholson, the originator of the science, when the method was to fit a wreath around a cylinder, the job when done would be a perfectly scientific construction, and, as such, satisfactory to all concerned.

The stair builder in those days was a stair builder absolutely. Not every Jack and Harry would be allowed to encroach on their territory. Occasionally some of the best joiners might have the gracious privilege of attending to the glue pot and getting out the wedges, &c., and oh, how grateful, proud and elated they would be. But when the lines were to be drawn, the face molds to be laid and the bevels to be found, the old stair builder would be always by himself. He had a secret to keep, a dignity to be guarded and he meant to do both.

The combined efforts of such qualified architects and stair builders naturally resulted in the construction of some of the grandest stairways that the most fastidiously artistic taste could possibly demand. But alas, our fathers are dead and their art is gradually fading away toward the realm of the lost arts. To-day we have platforms and newels in all sections of the country, and to all appearances they have come to stay. The question arises, What is to be done? There is only one answer, simplify the method of teaching the science of geometrical handrailing. Commence with the first principles, as in all other sciences. Teach the student all those problems in solid geometry that pertain to oblique planes, their traces, angles and inclinations, &c. A knowledge resting on such a stable foundation will enable its possessor to surmount all difficulties. Then, and not before, will the platform stairways be put aside to make room for geometrical stairways, which in every respect are in my estimation far superior. As long as wreaths will be made by guess and rule of thumb, no change will ever take place, inasmuch as the production of such unscientific methods will inevitably be imperfect, and as such bring universal condemnation.

I will now proceed to explain a few diagrams that are based on the principles mentioned. Let Fig. 1 represent a well hole, the distance between centers of rail being 14 inches, this being one of the conditions laid down by "C. E. G.," in the November issue. At each corner is placed a small quadrant of 3 inches radius. The landing risers are placed at a distance from the center of the crown tangents equal to the projection of the face of stringer outside the center of rail, a condition suggested in the January issue by "C. B. H." of Warren, Pa. Adjoining the two quadrants along the crown of the well hole is a short piece of straight rail. This completes the plan of the well hole. To lay out the face mold, it is required to find the elevation of all the lines and points found in the plan.

Let us asume X Y to be the ground line—that is, the line that intersects the plan and elevation. All points and lines below this line will be in the plan, and all points and lines above it will be in the elevation. The first process will be to revolve all the points to the line X Y. Take *a* on X Y as center, and with radius *a d* revolve the point *d*, as shown by the dotted arc, to *d'* on X Y. The point *d'* on X Y will be the elevation of point *d* of the plan, and it is also the point that represents the face of the second riser from the landing. Again take *a* for center with *a'* for radius and revolve 1 to 1' on X Y, as shown. Upon 1' erect the line 1' 1", making it equal in length to the hight of a riser. The point 1" will therefore be the elevation of point 1 of the plan, and it will also represent the face of the first riser from the landing.

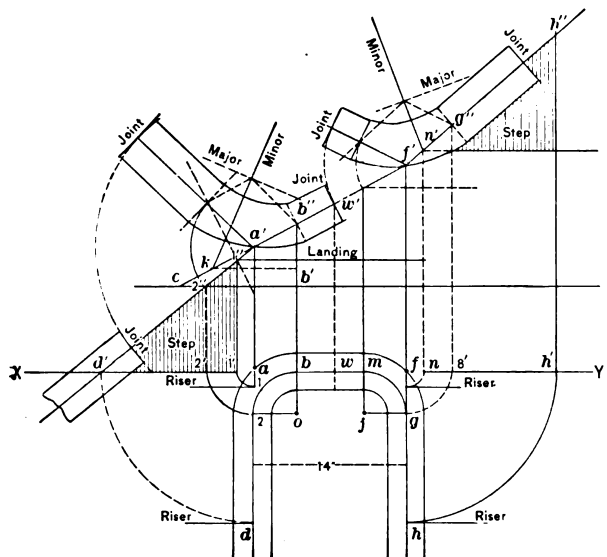


Fig. 1.—Plan and Elevation of Well Hole of 14 Inches Diameter, Showing 3-Inch Radius Quadrant in Each Corner.

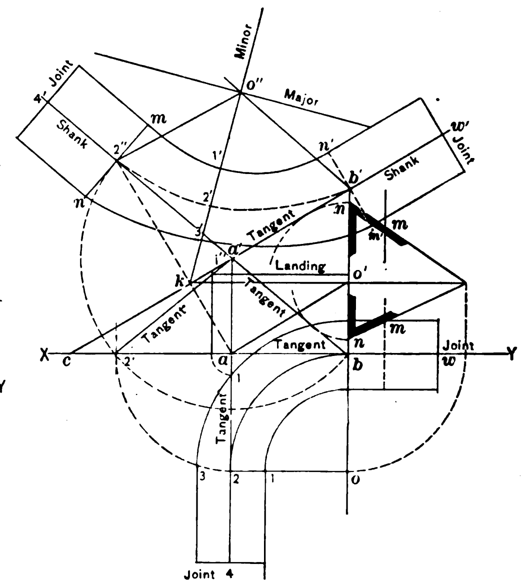


Fig. 2.—The Laying Out of the Face Mold.

Further Comments on Laying Out Face Mold for Stair Rail.

Now draw a line from 1" to *d'*, which will be the elevation of the line 1 *d* of the plan; it is also a line representing the inclination of the straight rail of the bottom flight. By extending it above and below the points 1" and *d'* respectively, and prolonging the line *d a* of the plan to meet it in *a'*, the point *a'* will be the elevation of point *a* of the plan. Upon point *b* in X Y erect the line *b b"* indefinitely. Revolve all the points in the other quadrant to X Y, and upon each point erect a perpendicular line, as shown at *m f n h'*. Make *n n'* equal the hight of two risers and *h' h"* equal three risers; connect *h"* with *n'* and prolong the line to *f'*.

Now connect *f'* with *a'* and prolong to *c*. We have thus obtained the elevation of all the points and lines of the plan, *h" f'* being the elevation of *h' f*, and it is also the inclination of the upper flight; *f' a'* is the elevation of *f a*, and is also the inclination over the crown of well hole; *a' d'* is the elevation of *a d*, and also the inclination of the bottom flight.

We are now ready to lay out the face molds, of which both are shown in the figure, but as this portion of handrailing is so important we will lay out the face mold to a larger scale, as in Fig. 2. It will be noticed that the plan and elevation in this figure are those of the first quadrant in Fig. 1, the reference letters in the two figures being alike. As the face mold is a development of the quadrant it will not be necessary to include the step adjoining the quadrant in this figure, as was done in Fig. 1, therefore our ground line, or X Y in Fig. 2, will be the line shown at *c* 2′ *b*′ in Fig. 1.

To lay out the face mold proceed as follows: From *a* on X Y in Fig. 2 and square to the pitch line *c a*′ *b*′ *w*′ draw the dotted line *a* 2″. From *a*′ on the pitch line as center, and with the bottom tangent *a*′ 2′ as radius, turn over to 2″ and connect 2″ with *a*′, which will be the bottom tangent revolved into the section, or, in other words, into the face mold. To complete the section draw a line from *b*′ to *o*″ parallel to *a*′ 2″, and a line from *o*″ to 2″ parallel to *a*′ *b*′, which completes the section. Make *b*′ *o*′ equal to *a a*′, and draw a level line from *o*′ to *k*; connect *k o*″, which will be the minor axis. The major axis will

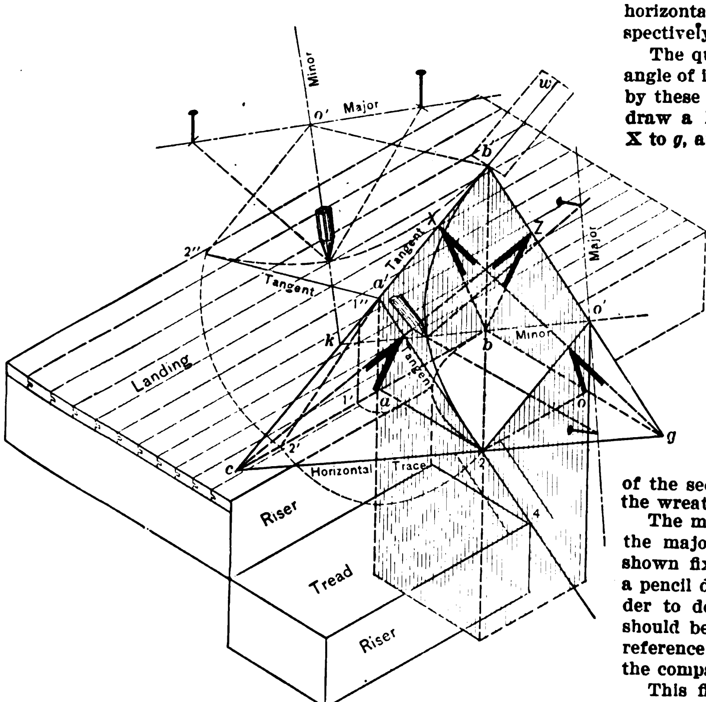


Fig. 3.—View of the Landing and Step Adjoining; Also Plan of Center Line of Bottom Quadrant, its Development, as Well as that of the Tangents and Inclination of the Plane of the Wreath.

Further Comments on Laying Out Face Mold for Stair Rail.

be a line drawn through *o*″ at right angles to the minor axis. Make *o*″ 1′ 2′ 3′ on the minor equal to *o* 1 2 3 of the plan. The points 1′ and 2′ will be contained in the curves of the face mold, and the distance from 1′ to 2′ will be its width at the minor axis.

It will be required now to find its width at the two ends 2″ and *b*′. From the point 2″ draw 2″ *m* and 2″ *n*, each equal in length to *n m*, taken from the bottom bevel shown in the figure. The distance *m n* determines the width at this end. From *b*′ draw *b*′ *m*′ and *b*′ *n*′, at a distance equal to *n m*, taken from the upper bevel in the figure. This again determines the width at this end.

To describe the inside and outside curves take a flexible lath and bend it to touch the points *m* 1′ *n*′ for the inside curve, and to touch the points *n* 3′ *m*′ for the outside curve. Complete the mold by drawing the shanks parallel to 2″ 4′ and *b*′ *w*′ respectively. The length of the shank *b*′ *w*′ equals *b w* of the plan and the length of 2″ 4′ equals 2 4 of the plan.

To find the bevels make *o*′ *s* equal to *o b*, the radius of the center line of rail on plan. Revolve the bottom raking tangent *a*′ 2′ to *b*, as shown by the dotted arc 2′ *b*. Place one leg of the dividers in *o*′, and extend to both tangents, turning over to *n* and *n*, as shown; connect *n s* and *n s*, and the bevels will be found at *n* and *n*. The one taken from the upper tangent is the one to be applied to the upper end of the face mold, and the one taken from the bottom tangent is the one to be applied to the lower end of the mold.

I wish to emphasize here that the method explained in these figures when thoroughly understood will surmount all difficulties in handrailing.

To further aid the understanding of them I have prepared a perspective view in Fig. 3, which illustrates all the lines clearly. In this view all the lines are folded to their right position, and all the points in the elevation placed directly above their respective plans.

The section *o*′ *b*′ *a*′ 2 is shown cut right through the square block, the plan of which is *o b a* 2, showing clearly the inclinations of the tangents, as found in Figs. 1 and 2.

The large triangle *b*′ *c g* represents the inclination of the plane or sectional cut, its lower line, *c* 2 *g*, being its horizontal trace, and the two other lines, *b*′ *c* and *b*′ *g*, respectively, represent the vertical traces.

The question of bevels resolves itself into finding the angle of inclination of the inclined plane that is indicated by these traces. To determine the angle to the side *c b*′ draw a line square to the side *c b* of the block from X to *g*, and again a line from X to *b*, this last line being drawn square to the pitch of the line *c b*. The angle at X will be the angle of inclination of the plane in the direction of *c b*, and therefore the bevel that is to be applied to the end *b* of the face mold.

To find the angle of inclination in the direction of the side *b g* draw the line Z *c* square to the side *b g* of the block, and the line Z *b* square to the pitch of the same line. The angle at Z indicates the angle of the plane in the direction of *b g*, and therefore the bevel that is to be applied to the end 2 of the face mold.

The minor and major axes are shown in this figure in their true relation to the plane of the section, or, in other words, the inclined plane of the wreath.

The minor is shown at *o*′ *k* crossing the section, and the major at right angles to it through *o*′. Pins are shown fixed in the foci with the string attached and a pencil describing the center line of the wreath. In order to derive the greatest benefit from this figure it should be carefully compared with Figs. 1 and 2. The reference letters being the same will greatly facilitate the comparison.

This figure I maintain is the most instructive ever published, as it graphically exhibits all that the tangent system can possibly teach of the science of handrailing.

Give the Young Men a Chance.

From C. W. B., *Reading, Pa.*—If the editor will grant me a little space, I will endeavor, even though somewhat late in the day, to give my friend, "A. L. W.," of New Hampshire a little clearer idea of what I meant in my communication published in January, 1900, and commented upon by him in the following issue. Although it is some time since the matter appeared, I must say I was somewhat put out by his rather harsh comments upon what I had to say regarding the opportunities afforded to young mechanics for learning how to read and handle drawings and to get ahead in the world. I certainly intended no offense, but only to give the facts as I saw them around me. I know full well there are such men right here as "A. L. W." speaks of, who learn the trade in a few months, and then want to run everything their own way. I, however, am not referring to such individuals. Those to which my comments applied are young mechanics, bright, intelligent and willing, and who appreciate the smallest thing explained to them. Around here a young mechanic must help himself, or be left altogether behind. It is perfectly proper to learn to help yourself, but we need a little advice once in a while, and I may say that all I have learned of journeyman house carpentry I have acquired by watching others and asking a few questions now and then of those who I thought knew more than I did. I have progressed so far that I can work with any journeyman. The bosses around here do not take the time to show the young man anything, and the foremen—that is, the most of them—are too selfish to tell or show the young mechanic, for they say, if you ask them at the noon hour or any other time about anything, "Learn it yourself." I do not believe in running after a foreman all the time and asking him about this and that, as he gets tired of that sort of thing, I know. It appears around here to be necessary to bribe a foreman with things he is in the habit of using in different ways, in order to secure his confidence and learn anything from him. This, however, is something I cannot do, and will rather trust to luck, and keep my mouth shut and my eyes open, reading and reflecting, as "A. L. W." says, which is a wise suggestion. Every spare hour I have is put in with different text books pertaining to my profession, of which *Carpentry and Building* is one of the best that any young mechanic can read.

"C. B. H." Replies to Morris Williams, Regarding the Stair Rail Question.

From C. B. H., *Warren, Pa.*—In the February issue of *Carpentry and Building* "C. E. G." of Frederick, Md., presented a plan of a stair rail over a square well hole or cylinder, and requested Mr. Williams, or myself, to deal with the problem. Mr. Williams gave his method in the December number, and mine appeared in the January issue, I, at the same time, presenting a few comments on his illustrations. To this he replied in the February issue. Now I desire to lay down this proposition: The expedient thing to do is the proper thing, and the proper thing to do is the right thing in all cases of hand railing. Mr. Williams intimates as incorrect my statement in regard to his illustration, Fig. 3, showing center line of rail and as occupying a position directly over the face line of the string. Now let us see. In his article he says: "Assuming again the balustrades (balusters) to be so fixed as to call for the face of stringer to coincide with the center of rail, the method as illustrated in my Fig. 3 of the December issue would have to be adhered to." Further comment on the inaccuracy of my statement is, I think, unnecessary.

Let the readers of the paper closely examine the plan submitted by "C. E. G." in the November issue, and observe the radius of the rail at the well hole, which is close to 4 inches for the center line, and then compare with the one in the January issue, and decide who has the more closely adhered to the question. If no one has the right to assume the relation of string and rail, why does Mr. Williams place it where he says it must be?

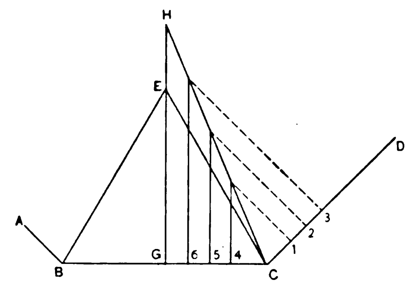
The illustration in the January issue shows my way of dealing with the problem, let the string occupy whatever place desired by the builder. I refer here to the manner of obtaining the correct pitch of rail over crown of cylinder. Mr. Williams ignores my reference to the slide line on the face mold, owing perhaps to "too much hurry," but more probably because a wreath with a sharp, slightly obtuse angle is not a wreath, as it does not embrace the proper combinations—namely, to entwine, to encircle, to twist—and is therefore worthless. Miter a straight rail on the same angles, and for all practical purposes one would be just about as good as the other. Instead of being "a thing of beauty and a joy forever," it would be abhorred.

Mr. Williams also says: "It is well to know that in all cases where the tangents are at right angles the bevels are applied reversely" (which is true if both tangents are pitched), "and that this is not the case where the plan tangents assume either acute or obtuse angles." This staggering proposition leads me to think that what I do not know about stair lines would make a very cumbersome volume. I would like very much to see an object lesson given in the case of a wreath around less than a quarter circle (obtuse angles) and both tangents equally pitched in which the bevels are not reversed; also one embracing more than a quarter circle (acute angles) with one tangent pitched and a level tangent in which the bevels are not reversed.

I sincerely trust these discussions will not prove idle or useless disputations; and that they will not "create doubts," but rather remove some already existing. I also hope that the student seeking knowledge may be benefited, not misled by inexpedient methods or misleading views, for in such cases they are serious; otherwise incorrect instructions given to pupils may be regarded just as proper as correct ones. The experienced stair builder is not supposed to be particularly benefited by such articles as these, and they are therefore intended solely for the use of others.

Finding Back Cut of Jack Rafters on Octagon Roofs.

From R. E. D., *Marion, Ill.*—I wish to call the attention of "A. O. C.," Lake Charles, La., to what appears to be a mistake in locating jack rafters in his diagram on page 312 of the December issue, accompanying his reply to "W. H. M." of Woodlawn, Ala. Referring to his article, he says: "Connect H C and we have the hip in position to find the lengths and bevels of the jacks, as 1,



Finding Back Cut of Jack Rafters on Octagon Roofs.

2, 3," which is correct, except they should be placed on the other side of the hip, as indicated in the sketch sent herewith and designated by the figures 4, 5, 6. The dotted lines 1, 2, 3, indicate the way the jacks are shown in the diagram of "A. O. C." in the December issue. It will be seen from an inspection of my diagram that to place the jacks as shown by the dotted lines will make them too short.

From T. D. G., *Council Bluffs, Iowa.*—Having been a subscriber to *Carpentry and Building* for 20 years, I may be getting childish, but I am displeased, because neither "J. P. K." of Worcester, Mass., nor "W. H. M." of Woodlawn, Ala., included me in acknowledging the replies to the letters on the octagon roof problem in the October number I would not care so much if the other fellows had made a correct solution, but "A. O. C." of Charles City, La., is either mistaken, or the engraver did not do him justice, which I think is probably the case. Nevertheless, the correction in the January number does very little good. On page 312 of the December issue the jacks should be spaced between C and G on the other side of the hip and extend to C and H.

By the way, I have been thinking of having an "old subscribers'" reunion in our house next August—my birthday. We will try and make it pleasant for all. Watermelons and a few kegs (of nails) will be on tap. All are cordially invited.

Note.—Possibly this correspondent was one of those who were present at the famous "Oyster Supper," held at the time when the "Wood Butcher" letters were attracting so much attention early in the eighties; if so, he can doubtless give the readers some very interesting reminiscences.

Relative Strength of Solid and Built Up Beams.

From J. L. S., *Goldfield, Iowa.*—Will some of the practical readers of the paper tell me which is the stronger, a solid piece of timber 4 inches square by 10 feet long or a built up beam of the same dimensions made of four different pieces of material ? I claim that the solid beam is the stronger, while a carpenter here claims the built up construction to be the stronger. Who is right ?

Note.—Without any desire to anticipate the expressions of opinion, which we trust our practical readers will feel free to give concerning the point raised, we would state that a built up beam is usually much stronger than a solid beam of the same dimensions.

MAKING CENTERS FOR CIRCULAR OPENINGS IN CIRCULAR WALLS.

THE subject of constructing semicircular openings in circular walls, or circle on circle, as it is often called, has attracted no little attention in the past, and is one with which the average carpenter and builder has ofttimes experienced no little difficulty. Openings of this kind do not occur with the same frequency that they do in straight walls, and this may in some measure account for the trouble which the carpenter is compelled to face when called upon to construct a center upon which to turn such an arch. In one of the London papers George Ellis tells how the work may be done in a scientific and expeditious manner, and states that while there are other methods of obtaining similar results, he knows of none that will give so accurate a shape with so little expenditure of time and material. Although discussed from an English point of view, there may be features of interest to American readers.

Referring to Fig. 1 of the accompanying illustrations, let A B C D represent the plan of a segmental opening in a circular wall, while E F G represent its elevation. The first step is to cut two ribs of 1-inch stuff to the curves shown on the plan. These must be cut to a width equal to the thickness of the arch, less the thickness of the uprights *a a*, or "laggings," as the English writer terms them. These are usually of ⅝-inch stuff. Next cut off as many as may be required of the vertical laggings about 1 inch longer than the boards are shown in the elevation, the author assuming that the plan and elevation of the arch has been set out on something full size. The laggings are then nailed lightly to the ribs with a space between, the top rib being placed half way between the bottom and crown, as indicated in Fig. 2. Now screw a piece of stuff, as H of Fig. 1, square across the middle of the bottom rib, nearly flush with the convex face, and of such length that a straight edge resting upon it will just clear the points C and D. It should be notched out about ½ inch to bring its center above the springing line, after which prepare a light rod, similar to that shown at A of Fig. 1, and 3 inches wide at one end, tapering off to 1 inch at the other. Make the wide end perfectly square with the straight edge, and cut a V notch down its end for the pencil to rest in. Set off on this rod the radius of the arch less the thickness of the laggings J. Mount it upon the piece H with a brad awl as a center, and sweep it around the lagging, keeping the pencil upright in the groove. This should be done on both sides, as shown in Fig. 1, after which the pieces may be knocked off the ribs and cut off to the line. This being done, they may be permanently fixed and the horizontal lags J nailed across their ends, after which the rod is again swept around to a greater radius and any inequalities taken off with the jack plane.

In narrow openings, or where the plan sweep is very flat, as in Fig. 3, the curving of the ribs may be dispensed with and the center built up in the ordinary way, as shown in Fig. 4. The lags, being made rather thicker than usual, are nailed on as shown, flush inside and overhanging outside, sufficient to get the face line of the wall drawn upon them for the guidance of the bricklayer. To do this stand the "center" upon the plan just as it is drawn in Fig. 3, and with a large square held perpendicular to the base and its edge to the line R L, draw a series of marks on the edges of the lags. After this has been done bend a thin strip around the circumference, keeping its edge to the marks just made and the pencil in the line of the wall.

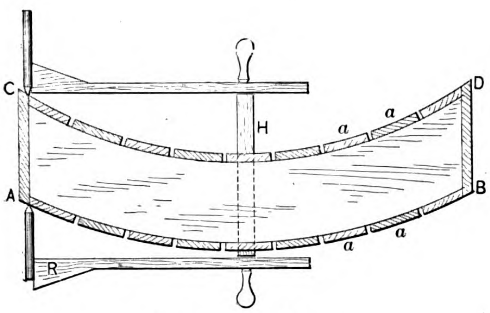


Fig. 1.—Plan of Center.

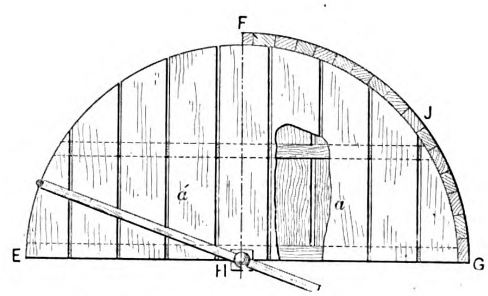


Fig. 2.—Elevation of Center.

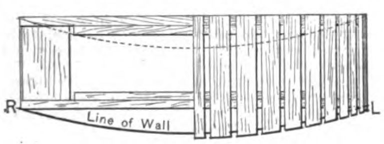


Fig. 3.—Plan of Straight Rib Center.

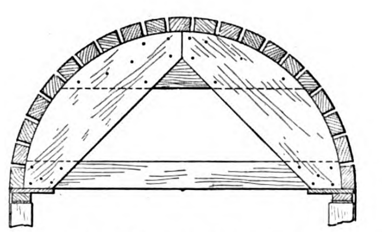


Fig. 4.—Elevation of Center Shown in Previous Figure.

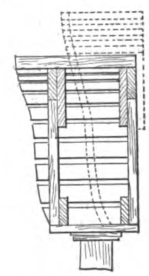


Fig. 5. — Vertical Cross Section of Straight Rib Center.

Making Centers for Circular Openings in Circular Walls.

In some instances the setback has to be turned concentric with the reveal, and in such cases it is usual to build a saddle center on the main one, as shown by the dotted lines in Fig. 5. In order to do this scribe two pieces of 1-inch stuff to set solid on the back of the center; then set the pieces to the depth of the setback and scribe around the soffit. Cut a rib for the back to the same curve and nail it on at the required hight. Before fixing the front rib run a parallel line around the main "center" equal to the thickness of the reveal, and nail a thin slip to it, shaping it, if necessary, with the spoke shave. When lagging the top, keep the ends of the lags plumb over this slip.

To find the center of any arch when the rise and span are given, draw a straight line equal in length to the span, and at its center set up a line square with it, making it equal to the rise. At these three points—namely, the rise and each end of the springing—drive nails, after which place a straight edge against either two and at its center, measured between the nails, apply a large square and draw an indefinite line. Repeat the process on the other side, and the intersection of the two lines drawn will be the center required.

If the curve is very flat the center may be so remote as to be practically inaccessible. In such case nail three thin strips together in the form of a triangle, the two sides resting tight against the nails, while the base or third piece crosses at the springing and acts as a brace to them. One of the side pieces should be twice as long as the distance from the crown to the springing. If this triangle is moved around against the nails, the pencil being held at the apex, a true curve will be traced from the crown to one springing, and if then turned over and the process repeated the other half may be drawn.

WHAT BUILDERS ARE DOING.

WE understand that it is the hope and purpose of the Ohio State Association of Builders' Exchanges to make itself instrumental in forming exchanges in the various cities throughout the State, where they do not now exist, and as a result of its endeavors to carry out this object a movement is under way to form an exchange at Akron, Ohio. A meeting of 50 of the representative men of the city engaged in the building industry, either as contractors or dealers in materials, was recently held in the dining-room of Buchtel Hotel, where, after a banquet, short addresses were made by delegates of the State Association from Cleveland, Columbus, Toledo and Youngstown, setting forth the benefits to be derived from a local exchange and also from a State association. Remarks were made by several of the Akron men, in which they expressed their belief that the time had come when Akron should ally itself with the onward movement. An expression of opinion on the question of a Builders' Exchange in that city showed the feeling to be unanimous in favor of the step, and a committee was appointed to make the necessary arrangements to call a meeting at an early date to perfect an organization.

Bedford, Mass.

For some time past meetings have been held by the master builders of the city for the purpose of discussing the labor situation and considering the matter of an eight-hour day. After thoroughly reviewing the situation a course of action was decided upon, and January 29 a communication was sent to the representatives of the bricklayers and masons to the effect that the master builders had decided to grant an eight-hour day after June 30. The request of the bricklayers and masons was that the eight-hour day should go into effect April 1, but the builders maintain that in order to avoid trouble which may arise in the carrying out of contracts now in force the postponement of the eight-hour day until July 1 will be more just to them than to grant the shorter day on April 1. We understand that a committee to confer with the master builders with a view to securing a change of the date will soon be appointed by the Bricklayers' and Masons' Union.

Buffalo, N. Y.

Building operations in and around Buffalo are showing a considerable degree of activity, and indications point to a good volume of business the ensuing year. Those who expected a reaction along building lines after the Pan-American Exposition had closed seem likely to be doomed to disappointment, as building conditions are livelier in Buffalo to-day than they have been at any corresponding period in a number of years. Among the enterprises under way, or in prospect, may be mentioned a structure, to cost about $300,000, for the Young Men's Christian Association; a building to cost a like amount for which the Fidelity Bank has awarded the contract; ten or twelve new factories of considerable size in different portions of the city; while several handsome residences are being put up, as well as a big apartment house costing about $350,000. Considerable additional work is now on the boards of the architects, and, all things considered, 1902 is expected to be a good building year in Buffalo. It is stated that one large factory in the outskirts of the city recently placed with the Buffalo Brick Association an order for 5,000,000 brick to be consumed this season.

On Monday evening, January 27, the annual meeting and installation of officers of the Builders' Association Exchange was held. The reports of the various officers showed the exchange to be in a splendid condition and that 14 new members had been added to the roll the past year, while there had been no resignations. The treasurer's report showed a balance of about $4000 to the credit of various funds.

The following were duly installed as officers of the exchange for the ensuing year:

President, B. I. Crooker.
Vice-president, George W. Maltby.
Treasurer, C. B. Jameson.
Secretary, James M. Carter.
Trustees—Peter Ginther and John W. Henrich.
Arbitration Committee—Henry Achaefer, E. M. Hager and John Feist.

After the business session the members present were invited by the officers elect to a banquet served in the exchange rooms. A feature of the evening was the presentation to the retiring president, Charles Geiger, by the members of the association, of a handsome leather Turkish chair.

Chicago, Ill.

For some time past the question of limiting the hight of buildings in Chicago has been agitated and not long ago the City Council passed an amendment to the building ordinances which prohibited the erection of a building higher than 130 feet. A few weeks since, however, they practically reversed their previous action and removed the limitations as regards hight for fire proof structures. This action, it is thought, will pave the way for a veritable "boom" in the city, and for the expenditure of something over $20,000,000 within the next 18 months for new buildings in the center of the South Side business district, plans for which, we understand, have already been prepared. Among the extensive improvements projected in the city are those of the First National Bank, which contemplates the expenditure of something like $5,000,000 in the erection of the largest sky-scraper Chicago has ever seen. The new building will be erected at the corner of Monroe and Dearborn streets and will cover a ground area of 190 x 232 feet, or more than twice the area of Chicago's great Masonic Temple. In hight the new building will be 16 stories, and the cost of the structure itself is placed at about $4,000,000, the other million having been expended in purchasing the necessary site. In order to make way for these extensive improvements the Montauk Building, the first of Chicago's sky scrapers, will be torn down, as well as several other structures.

Erie, Pa.

The first social function of the Erie Builders' Exchange was held on the evening of January 14, in their rooms in the Penn Building, there being 65 members present. Early in the evening a nominating committee was selected, the duty of which was to present the names of 25 members to be voted on at the election, February 11, from which a board of 15 directors was to be chosen by ballot. The toastmaster of the evening was George B. McIntire, who discharged the duties of his office in a most entertaining and satisfactory manner. An excellent spread had been provided by the Entertainment Committee and the occasion was a thoroughly enjoyable one in every way.

The first annual meeting of the exchange was held February 11, when the reports of the various officers were presented, showing the condition of the organization. Although the exchange has been in operation for only nine months, it has developed a remarkable growth and has served an excellent purpose. The polls were open from 11 in the morning until 8 in the evening, and the result showed the election of the following Board of Directors: Joseph Frank, Joseph Kirschner, Fred. Zesinger, Henry Himberger, Charles Schaper, Ora Gunnison, Joseph Dudenhoefer, R. T. Shank, A. S. Pinney, Lyman Felheim, E. D. Carroll, Geo. B. McIntire, James N. Thayer, U. D. Sweigard and Fred. Goodill.

The Board of Directors met on February 17 for the purpose of choosing officers for the ensuing year, but the results of the election were not received in time for use in this issue.

President E. W. Constable highly complimented W. B. Schafer, who has discharged the onerous duties of assistant secretary with entire satisfaction. He has conducted all branches of the office with success and will doubtless be chosen to fill the position for the ensuing year. Mr. Constable presented a review of the work of the exchange, showing that it had made steady and substantial progress and that the total membership on February 1 was 106.

During the year 1901 there were 720 permits issued by the city for building improvements estimated to cost $771,155. Of the total number, 268 permits were for dwelling houses, and, as a rule, the buildings erected during the year were of a higher and more modern grade than in previous years. In fact, 1901 witnessed the largest volume of building operations since the building department was established in 1890.

Honolulu, H. I.

At the annual election of the Master Builders' Association of Hawaii, held in Honolulu on January 7, the following officers were elected: President, T. F. Osborn; vice-president, W. T. Paty; secretary, Jas. F. Langton; treasurer, W. P. Barry; auditor, Julius Asch.

The Master Builders' Association of Hawaii are now making arrangements to establish a builders' exchange at Honolulu.

Los Angeles, Cal.

For the month of January, 1902, no cessation in building is to be noted. The figures for the month show permits to the value of $500,000. These include nearly 300 different buildings, the majority being dwellings, but a number of high class business blocks are also ready to start. Architects and builders report that the future is full of promise, especially in the matter of home building.

Milwaukee, Wis.

The Builders and Traders' Exchange held their annual election on Wednesday, February 5, the polls being open from 2 to 6 p.m. The voting resulted in the following selection of officers for the ensuing year:

President, L. Hoffman.
First vice-president, F. R. Dengel.
Second vice-president, L. Evers.
Treasurer, John Langenberger.
Secretary, E. Hesse.

DIRECTORS FOR THREE YEARS:

Joe Myer,	Geo. Schmidt,
Geo. Posson,	J. J. Quinn.

The members of the exchange have decided to take quarters in the Builders' Club Building and will occupy the first floor. The basement of the structure will be occupied as a *café*, the entire first floor by the Builders and Traders' Exchange, the second floor by the Builders' Club, and the third floor will be divided up into offices, with a room for architects. The structure is nearing completion, and it is the expectation of the members of the exchange to occupy their new quarters by the middle of March.

Minneapolis, Minn.

The members of the Master Builders' Association enjoyed their first annual banquet in January at the Hotel Nicollet. In addition to a large representation of the members, there were present many of their friends, including local architects, dealers in building materials, sash, door and blind men, and others. President Leighton acted as master of ceremonies, and after calling the members to order made a short address, in which he outlined the object of the association and expressed the hope that those present would in years to come look back with pleasure to the first banquet of the association.

Among the speakers of the evening were Architect H. W. Jones, who dwelt on the mutual interests between owner and builder; W. A. Elliott, who represented the general contractors; W. Nelson, the stone contractors; Angus McLeod, the carpenters; Asa Payne, the lumbermen; W. B. Smith, the sash and door men; L. S. Gillette responded to the toast of "Contractors in general," and ex-Mayor W. H. Eustis spoke for the master builders. The addresses were listened to with marked attention, and the occasion was one to be remembered by all who participated.

New York City.

At the annual meeting of the Building Trades Association, held at their rooms in the Townsend Building, Broadway and Twenty-fifth street, on the second Monday in February, the following officials were re-elected for the ensuing year:

President, Francis M. Weeks.
First vice-president, Warren A. Conover.
Second vice-president, Charles L. Eidlitz.
Secretary and treasurer, William K. Fertig.

MANAGERS FOR THREE YEARS:

Stephen M. Wright, Leonard K. Prince,
Ronald Taylor, Alphonso E. Pelham,
Frank Kessing.

Manager for two years: Francis H. Howland.

Oklahoma City, Oklahoma.

A charter was issued in January to the Builders' Exchange of Oklahoma City, Okla., with the following officers and trustees: President, L. F. Lee; vice-president, A. O. Campbell; secretary, Thomas O'Keefe; treasurer, W. D. Eastland; trustees, Robert Dunfield, T. F. Dowell and C. M. Parker, all of Oklahoma City.

Omaha, Neb.

The Omaha Builders' Club have recently occupied their new quarters in Paxton Block, this change being of great advantage to the members on account of its more central location and readiness of access. As a result of the move there has been a largely increased daily attendance. The club has met with wonderful success from the start, and to-day the roll shows 60 active members, who are strictly contractors, and 16 dealers in materials. The recent election resulted in the choice of the following officers and directors for 1902:

President, A. A. Newman.
Vice-president, Harry Johnson.
Treasurer, J. E. Merriam.
Secretary, W. S. Wedge.

DIRECTORS:

M. D. L. Scott,	Jno. H. Jones,
Robt. W. McHale,	Gus. A. Johnson,
J. J. Hanighen,	Frank Waller,
Robt. B. Anderson,	Robt. Sanderson,
Gus. F. Epeneter,	Benj. Melquist.

The outlook for building operations this season is regarded as quite promising, both as to residence property and business blocks, and all the architects are looking forward to an active spring trade. The statistics of the building department show that during 1901 permits were issued for improvements involving an estimated expenditure of $1,627,294, as compared with $1,043,645 in 1900 and $1,009,744 in 1899. The record for December of last year was far ahead of that of any other month, the cost of building improvements being more than double those of June, which ranked second.

Philadelphia, Pa.

The report of the Bureau of Building Inspection for the month of January does not make a very flattering showing when compared with the previous month, or with January of last year. According to the official figures, there were 320 permits issued in January of the present year, covering 367 operations, estimated to cost $894,665, as against 452 permits for 656 operations, costing $1,763,880, for January, 1901. It is fair to state, however, that the figures for January of the present year do not include elevator work, the account of which is now kept separate from the general records of the building department. Including these figures, the total for January shows 462 permits, covering 515 operations, the cost of which is estimated at $968,665. The figures for December last show 520 permits to have been issued, covering 611 operations, costing $2,808,520.

The annual meeting of the Master Builders' Exchange occurred at their rooms in Seventh street on Tuesday, January 28. President Conway occupied the chair, while the members listened to the reading of the reports of the various officers and committees. The liabilities have been reduced to a considerable extent during the past year, and the surplus has now reached the comfortable sum of $30,915.

The result of the election showed the following members to have been chosen to constitute the Board of Directors for a term of three years:

Class 1—James J. Ryan.
Class 4—Joseph E. Brown.
Class 5—John J. Byrne.
Class 6—W. S. Shields.
Class 9—John D. Carlile and F. F. Black.
Class 11—W. J. Collins.

The Board of Directors held a meeting on the second Tuesday in February, being the 11th, and organized by choosing the following officers for 1902:

President, Wm. S. P. Shields.
First vice-president, James J. Ryan.
Second vice-president, J. Lindsay Little.
Third vice-president, Thos. F. Armstrong.
Treasurer, Chas. H. Reeves.
Secretary, Wm. Harkness.
Trustee of Endowment Fund, John S. Stevens.

In the evening Mr. Shields entertained the Board of Directors and the retiring president, William Conway, at dinner at the Manufacturers' Club. Mr. Shields has been a member of the exchange since 1892 and has been prominent in its councils. He has been a member of its legislative and entertainment committees and of the Board of Directors for several years, and has always taken an active part in all measures for the benefit of the exchange and the building trades in general.

The members of the Master Builders' Exchange have been invited by the Supervising Architect of the Treasury Department to furnish estimates on the construction of a new United States post office and court house in Indianapolis, Ind. The appropriation for the building is $1,250,000, and the bids are due March 17.

William H. Allen will soon commence operations on 125 two-story houses and stores and dwellings, and 16 three-story houses, on the block bounded by Twenty-ninth, Thirtieth, Oxford and Jefferson streets. The operation will involve an expenditure of $225,000, and the houses for the most part will have a frontage of from 15 to 16 feet.

An extensive building operation will be carried out the coming season in Glenside, where W. T. B. Roberts, the well-known contractor, will erect 50 houses from designs by various architects. This will make one of the largest suburban improvements that has been attempted in the suburbs of the city at one time. The houses will be of part stone and frame, shingle, stucco and brick construction, with the interiors finished in various kinds of hard wood and equipped with modern plumbing.

Portland, Maine.

The annual meeting of the Builders' Exchange of Portland, Maine, was held on the evening of January 15 in the Riverton Park Casino, where a banquet was served, after which the business meeting occurred. The deliberation was presided over by President J. H. O'Neil. There were several additions made to the membership, and the wage question was considered at some length. It seems to be the general opinion that there should be no change in the rate of wages for the ensuing year.

The result of the election showed the following officers to have been selected for the ensuing year: President, Frank A. Rumery; vice-president, Thomas Hollivan; secretary, Eugene C. Smith, and treasurer, Sylvanus Bourne.

Portland, Ore.

During the first two weeks of January 49 building permits were issued, with an aggregate value of $136,350. This is a record breaking amount for this season of the year, and builders consider it to foretell an immense activity in building as the season opens. Almost all of the houses are for residence purposes. Two lots of flats have been undertaken since the first of the year, which will cost upward of $10,000 each. A five-story structure is to be put up at the corner of Third and Morrison streets by the Faling estate. The new building will have a frontage of 75 feet on Third street and 100 feet on Morrison street.

Rochester, N. Y.

The report of Fire Marshal Walter, recently issued, shows that during the year 1901 more capital was invested in building operations than for any similar period in the history of the city. The record shows 349 buildings to have been erected at a cost of $1,868,591, and 244 buildings to have been remodeled at a most of $336,778, making a total of $2,205,364 for the year. The character of the buildings erected and remodeled embraced 35 brick, 1 stone, 40 frame, 13 brick and frame, and 3 fire proof. There were 380 buildings intended for dwelling purposes, 3 for educational purposes, 5 churches, 2 hospitals, 50 industrial establishments, and 297 miscellaneous. The largest number of new buildings, mostly dwellings, was erected in the Twelfth Ward, while the value of new buildings erected during the year was greatest in the Sixth Ward.

San Francisco, Cal.

The first month of the year has been marked by a greater building activity in the city than any corresponding month in its history. The record for January showed 170 structures in the hands of the builders, representing a cash value of nearly $1,250,000. Of this number 120 buildings are new, the remaining 50 undergoing important alterations which will enlarge and modernize them. Between 30 and 40 of the new buildings now under way are from 4 to 12 stories in hight. Many of them have massive steel frames and external walls of dressed stone, Roman brick and tiles. The nearest approach to this present activity in the past was in January, 1891, when 101 buildings were in the hands of the contractors. These had a total valuation of about half those of the last January. Numerous construction projects are now taking shape which promise that the year 1902 will far exceed all of its predecessors in both quantity and quality of new buildings.

It is currently reported that the Fuller Construction Company of Chicago are preparing to enter the field in this city.

Savannah, Ga.

The Material Men's Association has recently been formed for the purpose of protecting the interests of the dealers in building materials, and among the membership are a number of the leading lumber men. The Board of Directors consists of William B. Stillwell of Savannah, F. J. College of Atlanta, M. A. Smith of Augusta, J. Lee Ensign of Worth, T. U. Butts of Columbus, J. N. Nell of Macon, A. Degan of Augusta, and H. H. McClure.

The Board of Directors recently organized by electing the following officers for the ensuing year: President, W. B. Stillwell; vice-president, M. A. Smith; treasurer, F. J. College; secretary and general counsel, W. L. Gignilliat.

Scranton, Pa.

The tenth annual meeting and banquet of the Builders' Exchange occurred on the evening of January 15. The election of officers was held at the Board of Trade Assembly Rooms and the banquet at the Elks Lodge Rooms. There was a large representation of the exchange in attendance, and among the guests at the banquet were officers of the neighboring exchanges as well as several of the city officials.

The old officers were re-elected for the ensuing year as follows:

President, E. S. Williams.
First Vice-President, E. W. Smith.
Second vice-president, H. R. Sykes.
Secretary, B. F. Laudig.
Treasurer, George W. Finn.

At the banquet the master of ceremonies was J. W. Howarth, and among those who made speeches were the following: President E. S. Williams, President A. J. Burlingame, Vice-President H. S. Jones and Secretary Edward Eyerman of the Wilkes-Barre Builders' Exchange; President T. H. Snell of the Pittston Builders' Exchange; Treasurer Fred. May of the Hazleton Builders' Exchange; Architects J. H. Feeney and E. L. Walter, Building Inspector F. L. Brown, John Colligan, J. A. Powell, P. F. Howley, Luther Keller, Frank J. Johnson, John F. Scragg, A. L. Francois, City Solicitor George M. Watson, City Engineer Joseph P. Phillips and Conrad Schroeder.

In the course of their talk some of the speakers touched upon the long existing fight between the carpenters and employers, but the tenor of the remarks evidenced a desire that there should be such co-operation between employer and employed as to insure perfect harmony in future operations in and about the city of Scranton.

St. Louis, Mo.

At the annual meeting of the Builders' Exchange, held in January, the following officers and directors were elected for the ensuing year:

President, Henry Fairback.
First vice-president, Joseph P. Kelly.
Second vice-president, Thomas P. McKelleget.
Secretary, Joseph E. Doyle.
Treasurer, John A. Lynch.

DIRECTORS:

Henry Schmidt,	John M. Doyle,
John H. Daues,	James Ryan,
Thomas P. McKelleget,	Joseph P. Kelly.
Lawrence Kennah,	Henry Fairback.

The newly elected officers of the Master Builders' Association were recently installed, the ceremony taking place in the rooms of the association in the Odd Fellows' Building. The installation followed a dinner at which practically all the members of the association were present. The new officers are:

President, A. W. Black.
First vice-president, M. W. Muir.
Second vice-president, R. A. Lewis.
Secretary, C. D. Morley.
Treasurer, John Low.
The trustees are Nicholas Pilligreen and George Ittner.

Toronto, Ont.

The annual meeting of the Builders' Exchange was held at their rooms in Yonge Street Arcade on January 20, a large representation being present and the directors' report which was presented being of a most satisfactory character. The officers elected for the ensuing year are:

President, Jas. B. Thomson.
First vice-president, Joseph Russell.
Second vice-president, Richard G. Kirby.
Treasurer, David Williams.

DIRECTORS:

Thos. Christie,	John R. Lyon,
John M. Gander,	Wm. Smallwood,
Jas. Crang.	

Representative on Board of Industrial Exhibition, Thos. Christie.

Representative on Technical School Board, John M. Gander.

Auditors, Geo. Clay and Frederick Holmes.

Washington, Pa.

An application has recently been filed for a charter for what is to be known as the Washington Builders' Exchange, the object of which is to "encourage and protect the building interests in Washington County; inculcate just and equitable principles; establish and maintain uniformity in commercial usages; avoid and adjust, so far as practicable, the controversies and misunderstandings which are apt to arise between individuals engaged in the trade when they have no recognized rule to guide them; and to acquire, preserve and disseminate valuable business information." The number of directors is fixed at 12, the following having been chosen for the first year: Brit Hart, John A. Kerns, William Vankirk, E. G. Dudley, S. R. Crites, J. A. Milliken, I. J. Dickson, Enoch Mounts, Thomas L. Dagg, H. B. Rossell, C. M. Slater, Joseph Forrest, Sr.

Wilkes-Barre, Pa.

The Master Builders' Exchange recently filed papers of incorporation and held a meeting on the evening of January 23, when a large number of builders, contractors and representatives of the building and allied trades were present and great enthusiasm prevailed. The exchange has been formed for the encouragement and protection of the building interests, and the leading members of the trade have associated themselves with the movement. The principal business was the election of officers for the ensuing year, the result being as follows: President, Wilson J. Smith; first vice-president, Richard Turner; second vice-president, H. S. Jones; third vice-president, Ferdinand Lange; secretary, I. M. Leach, Jr.; treasurer, J. E. Patterson.

Board of Directors—Charles Erath, representing the plumbers; Anthony Yeager, the painters; L. J. Coil, the builders; Conrad Lee, the millmen; Fred. Allen, the plasterers; O. D. Jones, the roofers; T. F. Ryman, the lumbermen, and Arthur Lewis, the electricians.

Youngstown, Ohio.

At the annual meeting of the Builders' Exchange in January the balloting for trustees showed the following had been elected to constitute the Board of Directors for the ensuing year: Henry Niedemeier, G. F. Hess, A. G. Young, H. P. Heedy, T. B. Van Alstine, J. B. Chambers, Thos. Lightbody, A. D. Fiehler, W. W. Drake, W. L. Jacobs and J. S. Dalzell.

At a meeting of the directors they organized by electing the following officers for the ensuing year: President, Henry Neidermeier; vice-president, George F. Hess; treasurer, Arthur Young; secretary, T. B. Van Alstine. Harry Calvin, who has been the active secretary of the exchange since its organization, was reappointed.

LAW IN THE BUILDING TRADES.

CALIFORNIA LAW REGARDING FILING CONTRACTS.

The law of California provides that a building contract which is not recorded in the office of the County Recorder shall be wholly void. Therefore where an original contractor repaired a building under an unrecorded contract he cannot recover the reasonable value of his services and materials in repairing the building without showing a substantial compliance with the statute.—Laidlaw *vs.* Marye, 65 Pac. Rep., 391.

WHAT IS SUFFICIENT CONSIDERATION TO RETAIN MONEYS FOR MATERIALS.

When one agreed to furnish materials to a contractor provided that the owner would retain sufficient of the money due such contractor on the contract to protect the material man, the court held that the furnishing of the materials was a sufficient consideration to sustain the promise and render the owner liable.—Roussell *vs.* Mathews, 70 N. Y. S., 886.

WINDOWS IN PARTY WALL.

Where one of the owners of adjoining property makes no objection to the other cutting windows in the party wall, but merely states that she will hold him liable for any damage that may be occasioned by the falling of bricks, she is estopped to object to the windows until such time as she may desire to use the part of the wall where the windows are located. Neither of the owners is entitled to open windows in their party wall over the objection of the other.—Dunscomb *vs.* Randolph, 64 S. W., 21.

WHEN DEFECTIVE WORK CANNOT BE DEDUCTED.

In the absence of fraud the owners are not entitled to credit for defective work, where the architect received the building and turned it over to the owners and the latter accepted it.—Whitehead *vs* Brothers' Lodge, 62 S. W. Rep., 873.

WHEN BUILDING IS DESTROYED BEFORE WORK IS COMPLETED.

One who undertakes to make repairs on a house, and furnishes the material, the amount to be paid for labor and material to be ascertained at the completion of the work, cannot recover from the owner where the building is destroyed by fire without the fault of the owner before it is completed.—Murphy *vs.* Forget (19 C. S. Reports, 135), Canada.

The Commercial Element in the Trade School.

The value of the commercial element in the trade school, says George I. Alden, in the *Southern Workman*, is shown in three respects. First, it furnishes the best standard with which to test the work of the student. The commercial standard is best because it is the one to which the student must conform in the practice of his trade, and the efficiency of the trade school in this particular line will be judged by the ability of its graduates to meet readily and quickly the commercial requirements of the trade which they have been taught.

But the commercial element in a trade school is valuable also because it secures the best development of the pupil. The idea that a trade can be better acquired or the pupil better trained by working on useless pieces or designs than by practice on real work demanding commercial standards will not be likely to revive until medical students are excluded from hospitals where people are sent to be treated and allowed to take their practice in the laboratory and deal with skeletons, manikins and dead bodies, rather than with living patients.

The commercial element may also have a pecuniary advantage. In the construction and furnishing of buildings or in making articles for sale in the market the students in the trade schools may be more or less profitably employed.

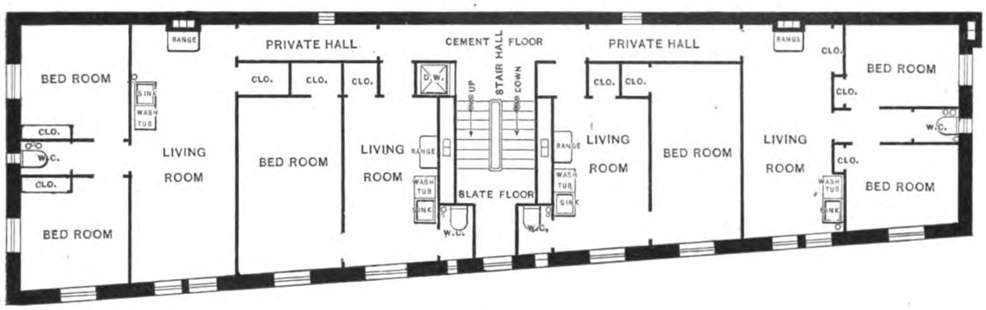
If the commercial element in the trade school may be so used that, 1, it sets a better standard for the students' work; 2, gives the student better training of all his faculties, mental and physical, and 3, may be made of financial advantage to the school, then its importance can scarcely be overestimated.

Making Plans for Heating Jobs.

For a number of years it has been a part of the agreement which has produced the harmonious relations between the manufacturers of house heating boilers and the members of the National Association of Master Steam and Hot Water Fitters that, as far as possible, the manufacturers would refrain from making plans for the assistance of customers, except those who have already secured the contract for work. This feature of the agreement has been observed to such an extent that no serious complaints of violations have arisen. The report is now made, however, that a supply house in the Central West plainly state in a circular letter to the trade that, with a view to extending their business, they will make plans and specifications for all customers who place orders with them. This has caused the steam fitters to file a complaint against this practice, which is claimed to be productive of no good. It is urged that competent men in this line of trade are better able, through being on the spot, to calculate the cost of a given piece of work than men at a distance, who have nothing but the plans to guide them. In consequence they are often drawn into unfair competition, and must either lose a job or take it at lower figures than good business judgment would dictate as advisable. It is also pointed out that in some instances salesmen who are eager to make sales of apparatus are led to make plans and specifications and to estimate on work for prospective customers, making prices much lower than those at which the work could profitably be done. This practice not only works hardship to the whole trade by lowering the value of their work, but also loss to the contractor who has accepted work on the salesman's figures. There can be no doubt that while the members of the steam fitting trade are endeavoring to protect their own interests, there is good, sound business sense in the argument which they present. In view of the arguments presented it is thought improbable that the departure of the concern referred to from the course that heretofore has met general approval will be widely followed.

Typical Floor Plan of New Fire Proof Tenement House.

We take pleasure in presenting herewith a typical floor plan of a new law five-story fire proof tenement house, with stores on the ground floor, which has been designed by Architect Ernest Flagg of New York City. An interesting feature grows out of the fact that the plan is said to be the first of its kind in construction, and the architect claims that by making the building fire proof he saves 1 foot of construction work and materials on every story and 4 inches in every partition. Further, he believes that this method of construction is better and more economical than the old way, to say nothing of the greater good brought about for those who live in tenements.



Typical Floor Plan of New Fire Proof Tenement House.

In commenting upon the new tenement house law, he is quoted as having expressed the following opinion: "The only fault I have to find with the new law is that it requires 10 feet of space in the rear of tenements erected on corner lots; this appears to be arbitrary and productive of no good. The owners of property who care to build tenements will soon find that the new law is no hardship. Upon a 50-foot basis a tenement may be erected which will pay better than under the old system."

New Publications.

APPLIED PERSPECTIVE FOR ARCHITECTS AND PAINTERS. By Wiliam P. P. Longfellow. 96 pages; size 8¼ x 10¾. Illustrated by 31 plates and 137 engravings. Bound in heavy board covers. Published by Houghton, Mifflin & Co. Price, $3 net.

This work, as its title indicates, is intended for both architects and painters, and in preparing it the author states that he has had in mind both the "everyday use" and the "skilled use" of the principles on which the practice of perspective depends. The work is divided into two parts, the first containing what in the author's judgment is necessary to qualify the student for ordinary perspective work, while in the second is included a series of special problems to show what trained draftsmen actually do. There are also discussions of some of the more theoretical topics, such as the perspective of oblique planes, the tangents and axes of circles and tri-conjugate vanishing points, which should be of value to students to whom perspective is a study interesting in itself, and should smooth the way to the more complicated problems which very often occur. Some of the other chapters deal with perspective from elevations, moldings, perspective of a pediment, entablature in perspective, a Romanesque arcade, a vault with lunettes and groined vaulting. The author states that, feeling the paramount importance of what may be called the "perspective sense"—the faculty of perceiving perspective relations in that which is before one in nature or in imagination—he has taken great care to set forth these relations as they appear to the eye and to show how they influence the painter's or the architect's way of looking at things. He who has such a sense will find it easy to acquire the various special devices and the instinct which he needs for the exigencies of practice. He who lacks it will make hard labor of mastering any but the most obvious processes and will always be liable to be blocked in his work by an unusual problem. In the discussions the author states he has no intention to adhere to the rigorous forms of theoretical mathematics, to get on with the fewest postulates, but rather to assume as much as seemed safe of the common stock of knowledge. A fair acquaintance with ordinary school geometry is taken for granted, and the mathematical demonstrations are intended to be clear and exact. Yet it is probable that an intelligent and careful reader who does not understand geometry may find profit in the book and learn what is fundamental in it without unreasonable effort.

MATHEMATICAL AND GRAPHICAL ROOF FRAMING. By G. D. Inskip. 160 pages; size 5 x 8¼ inches. Profusely illustrated. Bound in board covers. Published by the author.

TABLES FOR ROOF FRAMING. By J. D. Inskip. 326 pages; size 4¼ x 9¼ inches. Bound in board covers. Published by the author. Price of the two volumes, $2, postpaid.

The above work has been prepared especially for carpenters, builders and iron workers, and is intended to lessen the difficulty of angular computation, as in roof framing for example, where the hypotenuse of a right angle triangle is essential. The chief aim of the author has been to make clear to the student how to frame any roof. A few problems have been selected for elucidation, but they do not, however, embrace every description of roof, although a principle has been laid down whereby the student can apply it to any problem that may suggest itself. Special mention is made of the chapter on inclined planes, and is referred to as a great factor in locating any points or intersections of two or more inclined planes or roofs. The illustrations are clear and the elucidations explicit. An interesting chapter is that on projection drawing and descriptive geometry, and at the close are comments upon the designing of trusses.

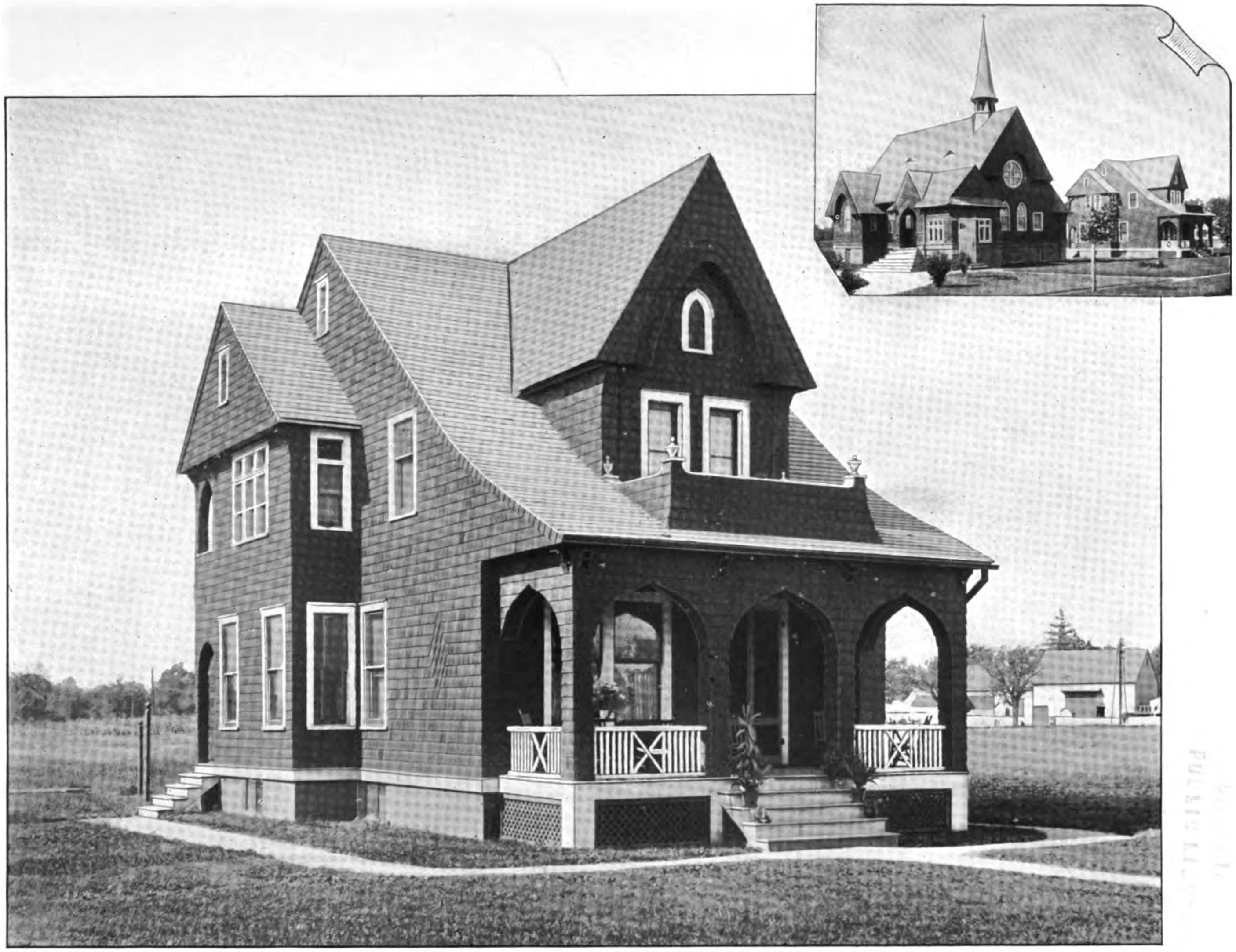
LIGHT, HEAT AND POWER IN BUILDINGS. By Alton D. Adams, member American Institute of Electrical Engineers. One 12mo vol.; 102 pages. Bound in cloth, Price, $1, postpaid. Published by W. T. Comstock.

This book is intended as a convenient manual on the subjects treated, its object being to present in compact form the main facts on which selections of the sources for light, heat and power in buildings should be based. In the discussion of the subject questions of economy and efficiency are very fully discussed, and the requirements of equipment to suit different conditions. While scientific theories are referred to, the purpose is rather to make practical suggestions that will be applicable in actual practice than enter upon theoretical discussions as to the merits of various classes of apparatus. The feature of special interest in the work and its main novelty, that of arrangement by cost of service from widely different sources, are set down side by side. This feature of this work is one that will be appreciated by all who wish to study up the essential features of plants of this character. It will be found a useful and ready reference for such purposes.

Some Fire Proof Insulators.

Architects and builders of the present day are confronted more than ever with the problem of rendering dwellings safer as regards fire, and the general public seem to be of the opinion that satisfactory results are obtainable without the cost being prohibitive. As dwellings cannot yet be built cheap enough entirely out of stone, it becomes necessary to protect the wooden portions so that a fire, when started, will not become too destructive. It is well known that fire spreads rapidly, if it finds openings to act as flues, such as empty partitions, narrow, long hallways, elevator shafts, &c. Hallways and elevators are still open problems, on account of presenting extended openings which readily become a chimney. By using fire proof plaster boards a partial remedy is secured. The partitions and outside walls are still often left vacant without occasional fire stops cut in between the joist, although they should be completely filled in with brick, plaster, mineral wool, or some other fire resistant. Besides improving the fire risk, it makes the walls, partitions, &c., a poorer transmitter of heat, cold or sound, thereby insuring more comfort to the occupants at a trifling increased cost.

CONTENTS.



PARSONAGE OF ST. JOSEPH'S EPISCOPAL CHURCH AT QUEENS, LONG ISLAND, N. Y.

TUTHILL & HIGGINS Architects.

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

APRIL, 1902.

National Association of Builders.

The preliminary meeting of the National Association of Builders, which was held at Hotel Willard in Washington on March 5, was attended by representatives to the number of about 40 from affiliated exchanges in the Eastern and Middle Western sections of the country, and great interest was manifested in the proceedings, informal though they were. There was a brief reception late in the afternoon, which afforded the opportunity of renewing old friendships and making new ones, after which was a banquet, thoroughly enjoyable in every way. The business meeting occurred in the evening, when there was a discussion of matters of interest to the National Association and to the building fraternity generally. One of the most important results of the gathering was the decision to hold a regular convention of the association in Washington in October of the present year. There was also passed a resolution unanimously approving the work which Secretary William H. Sayward has undertaken in New York City, extended reference to which has already been presented in these columns. As intimated above, the meeting was purely an informal affair, intended to be preliminary in nature and leading up to the starting of regular conventions again by the national body. It will be recalled that it is some three years since the association held a regular convention, and it is expected that a resumption of these gatherings will result in great good to building interests all over the country.

Local Building Trades at Peace.

After a fight lasting for six years the warring factions in the building trades unions of New York City and vicinity have buried the hatchet and joined forces, with the object of doing away with the internecine disputes which have been the cause of so many building strikes during the past few years. Six years ago the Building Trades Council was formed by unions which seceded from the Board of Walking Delegates, and since that time there has been a constant series of strikes and disputes in the building trades, owing to the rivalry between the two bodies of workmen. Twice in the interval they have come together and reached an agreement to amalgamate, but in each case the agreement fell through and failed of consummation. This time, however, it seems that an actual agreement has taken place and the breach is understood to have been finally healed. The settlement was reached at a meeting of the two bodies on March 11, when an amalgamated association, to be known as the United Board of Building Trades of New York, was formed, with a full list of officers. Furthermore, a committee was appointed to provide a constitution and by-laws, a leading feature of which will be a clause providing for the arbitration of all labor disputes. Thus, it is hoped, an end has at length been put to the troublesome and unnecessary interruptions to building operations, through the disputes of the rival unions, which have been afflicting New York City for so long. Already the settlement has resulted in the calling off of a strike involving some 1500 workmen employed on a number of large buildings that are being erected by one of the big contracting concerns. The settlement of this war of unions will be hailed with satisfaction by a long suffering public as holding out the prospect of a new era of improved conditions and the removal of a seriously disturbing factor from the local building industry.

Furnace Air Supply.

Laws to compel the change of air, in school buildings in particular, by taking fresh air from out of doors, warming it and then sending it into a building, with provision to exhaust the air previously contained therein, have had a noticeable influence in the East on the method of supplying furnaces with air. It is quite a common custom, and one that is growing, to provide the furnace with a duct connected at the bottom and leading to a point outside of the building, so that the exterior air can readily flow in, to pass over the heated surface of the furnace and be distributed through the building by means of the hot air pipes. The size and location of this air supply duct have remained an unsolved problem to many in the furnace trade, although experienced men favor running it from the most exposed side of the building and providing it with a capacity equal to from two-thirds to three-quarters of the area of the combined hot air outlets from the top of the furnace. Evidently this custom is by no means universally observed, at least in some sections, in the West. The conditions there are somewhat different from those obtaining in the Eastern part of the country. The Western winters are apt to be more severe throughout their entire length, and the period at which the mercury ranges below zero is much longer extended. Consequently the heating of buildings with furnaces is a somewhat more difficult problem in that section. Quite a strong favor is shown to the use of return air ducts in the West. In many instances provision is made to take some air from out of doors, but the damper in this section of the air supply duct is frequently closed as soon as severe weather is experienced and the supply of air for the furnace is taken from the inside of the building. Whatever may be urged against this practice from an advanced sanitary standpoint, the arguments are strongly in its favor from an economic point of view. There is no question but that the building in which the heating is so arranged can not only be more readily warmed and the temperature more evenly maintained, but also with a much smaller consumption of fuel than if the entire air supply was taken from out of doors with the mercury from zero to 20 or 40 degrees below. The fact that this method of using furnaces has been customary for many years also strengthens the position of those who advocate it. When the question of the purity of the atmosphere in such buildings is raised it is pointed out that the buildings are occupied by comparatively few people to vitiate the atmosphere, and that a sufficient change to maintain a satisfactory purity is effected through he natural leakage around the crevices of the windows and the building generally, in addition to the large amount of air that will naturally be admitted through the opening and closing of the doors.

Stanford University Buildings.

On March 4 work was begun on two additional structures in the outer quadrangle of the university. It is the purpose of Mrs. Stanford to push the work on the outer quadrangle, which she wishes to complete within the next few years. One of the buildings just started is to accommodate the drafting rooms and recitation room of the mechanical engineering department. This will be used in connection with the laboratory started a short time ago. It will have a frontage of 115 feet on Lasuen avenue and 120 feet on the south. It will be two stories in hight, and will correspond to the building occupying a similar position on the northeast corner of the quadrangle, which is now about completed. The other building recently started will be one story in hight, 76 feet wide, and will have a frontage of 117 feet. The designs for another building are already drawn, and contracts are to be let at an early date. This building will be occupied by the geology department, and will be erected on the southwest corner of the outer quadrangle. This will be identical in exterior arrangement to the engineering building just started. As in the case of the buildings on the inner quadrangle, these buildings on the outer quadrangle will be connected with a continuous arcade, the total length of which will approximate ½ mile.

John J. Tucker.

In the death of John J. Tucker, which occurred on February 18, the building trade of the metropolis lost one of its veteran members, he having been prominently identified with it for something like 57 years. Mr. Tucker was born February 26, 1828, and was therefore almost 74 years old at the time of his death. He completed his apprenticeship in 1845 and was employed by his uncle, Joseph Tucker, until 1852, when he engaged in business on his own account.

He was president of the National Association of Builders in 1890-91 and presided over the deliberations of that body when the convention was held in New York City in 1890. He was the second president of the Building Trades Club, the first president of the Mason Builders' Association, a president and life long member of the General Society of Mechanics and Tradesmen, as well as a director of several banking and other corporations. Among the work which he executed as a builder may be mentioned the College of Physicians and Surgeons, the Lenox Library, the Tiffany and Villard houses, the Roosevelt Hospital, the Stevens Building, the Library and Hall of Fame of the New York University, and others.

At a meeting of representatives of the Mechanics' and Traders' Exchange, the Mason Builders' Association, the Building Trades Association, and other organizations, held on Saturday, February 22, appropriate action relative to the death of Mr. Tucker was taken.

Modern Factory Heating Systems.

A good example of the heating methods employed in a modern shop may be observed at the new repair shops of the Rhode Island Suburban Railway Company on Cranston street, Providence, R. I., says the *Journal* of that city. These shops cover about 3 acres of ground and are heated by what is known as the indirect hot blast system. Near the rear of the building is located a vertical tubular boiler, and the steam is conveyed through asbestos covered piping to a heating chamber on the second floor in the center of the shops. In this chamber the steam passes through a series of cast iron radiators of large heating surface. The cold air is drawn over these radiators by two large exhaust fans and warmed. After passing through the fans the air is forced through galvanized iron piping to the various divisions of the shops. The piping varies in diameter from 5 feet near the central heating chamber to 6 inches at the various outlets, which are mostly located on the inside of the outer walls of the building about 7 feet above the floor level. At each outlet is a hand damper to control the admission of hot air into the shops. There are several of these outlets, averaging about 12 feet apart, so that the warm air may be distributed very freely through the rooms, and the large number of outlets does away with cold spots.

The fan apparatus is in duplicate, so that either one or both fans may be run, depending on the atmospheric temperature, or either fan may supply the entire system. The fans are operated by two specially constructed motors so that they may run at two different speeds, thus making at least four variations in the amount of hot air that may be supplied.

The galvanized ducts are in and under the roof trusses of the building, entirely out of the way of the shop work, and are so gauged in size that the velocity of the delivery of the hot air at any outlet is substantially the same. The condensed steam or return drip goes back to the boiler automatically.

In some of the ducts there are baffle plates, or deflectors, which make it possible to keep some at a higher temperature than others.

During the recent cold snap, which is the first real trial the system has had, the heating plant kept the shops at a suitable temperature. It is believed that this system is superior to the system which diffuses the air to the various rooms through a few very large openings.

The entire system is installed in a first-class manner, and these 3 acres of building, averaging about 25 feet in hight, are heated at the present time at an expenditure of about 2 tons of coal per day.

A Huge Safe Deposit Vault.

Some idea of the security of the vaults of the Standard Safe Deposit Company, which have recently been opened in the basement of the Broad Exchange Building in this city, may be gathered from the statement that the main vault is 53 feet wide and 27 feet deep, the door to which weighs 42,000 pounds, or 21 tons. The vestibule to which it is hung weighs 29 tons. The door is said to be liquid proof against nitroglycerin and dynamite, and is also drill proof. The door is controlled by improved combination locks and by four movement time locks. The capacity of the vault is 16,000 safe deposit boxes of different sizes. The door of the vault is connected with a system, which, when the door is closed, cannot be released except from the central office.

Fires in Tall Buildings.

A recent fire in one of the tall office buildings in Chicago developed a feature which is worthy of consideration on the part of fire department officials in the larger cities. Although in the case referred to not much damage was done it was noticed that the flames went up the elevator shafts with extraordinary rapidity, considering that in this particular building there was nothing for them on which to feed. When an investigation was made it was found that the steam pipes, instead of being covered with asbestos, as the law demands, had been covered with some inflammable material. There had been one thin layer of asbestos paper, then a thick layer of felt and finally a canvas covering. When a match was put to the felt it burned like tinder. This discovery explained at once several mysteriously rapid fires in "fire proof" buildings, and a thorough investigation of pipe coverings all over the city is to be made. Possibly it would not be a bad plan to have a similar investigation made here in New York City.

The announcement is made by President Theodore C. Search that the seventh annual convention of the National Association of Manufacturers will be held in Indianapolis, Ind., April 15 to 17, inclusive.

COTTAGE IN A PITTSBURGH SUBURB.

THE half-tone supplemental plate which is to be found with this issue of the paper represents a frame cottage erected not long since for Robert A. Walker in Ben Avon, one of the many attractive suburbs of which the city of Pittsburgh can boast. While unpretentious in the character of its design, it is well adapted to meet the requirements of a small family, and as the cost of erection was represented by modest figures, it is likely to prove of interest to many among our readers.

According to the specifications of the architect, Elmer E. Miller, Penn Building, Pittsburgh, Pa., the foundation is constructed of local rubble stone, pointed with cement. The building is of balloon frame, all rough lumber being of hemlock, while the dressed lumber, unless otherwise specified, is of white pine. The floor joist are 2 x 10 inches, the studding 2 x 4 inches, placed 16 inches on centers; the collar beams 2 x 6 inches, the sills 4 x 10 inches, the girder in the cellar 8 x 10 inches, and the rafters 2 x 6 inches. The floor joist are placed 16 inches on centers, and are framed into the girder. The outside of the frame is sheathed with surfaced hemlock boards placed diagonally, over which is laid white pine lap siding, with heavy building felt between. The gables are shingled and the roofs are covered with surfaced hemlock sheathing laid close, over which is a layer of heavy felt paper, and this is in turn covered with 10 x 20 inch Excelsior Bangor slate laid with a 3-inch lap.

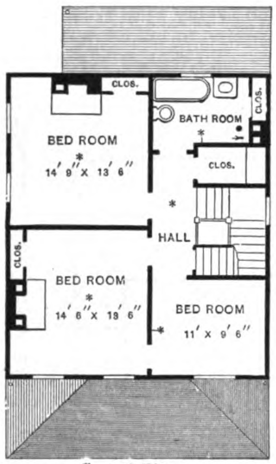
The front porch has turned columns, with floor joist 2 x 8 inches and rafters and ceiling joist 2 x 4 inches. The front and rear porches are ceiled with 1-inch beaded yellow pine, while the floors are of pine strips, not more than 3 inches wide, with joints well leaded. The porch ceilings are filled and have two coats of varnish.

The outside wood work has three coats of paint, and all tin and galvanized iron work two coats.

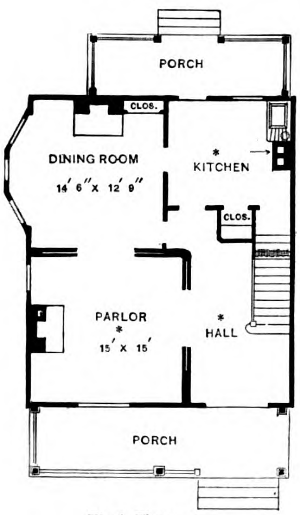
The floor joist, which have a row of herring bone bridging to each run, are covered with flooring 1 inch thick and not wider than 4½ inches, blind nailed to every joist. All the inside finish is 1 x 5 inch molding, mitered at the corners. The base is 1 x 9 inches, including a 3-inch molding, and a quarter round is placed at the intersection of the base and floor. The doors in dining room and parlor are 2 inches thick and of the five-panel variety. The kitchen is wainscoted 3 feet high, and the bathroom 5 feet high, with narrow beaded yellow pine with molded cap. The finish of the parlor is grained mahogany, and the dining room and hall of the first story grained oak. All grained work was first given three coats of paint and after graining a coat of varnish. The kitchen and bathroom have a coat of white shellac and two of varnish. The sash of the house are glazed with Pittsburgh double strength American glass. The stairs have treads and risers of yellow pine, and the newels are 5 inches square, with sides reeded and molded tops and bases. These with the rail and balusters are of oak.

All walls and ceilings have two coats of brown mortar, over which is a coat of plaster of paris finish, well troweled.

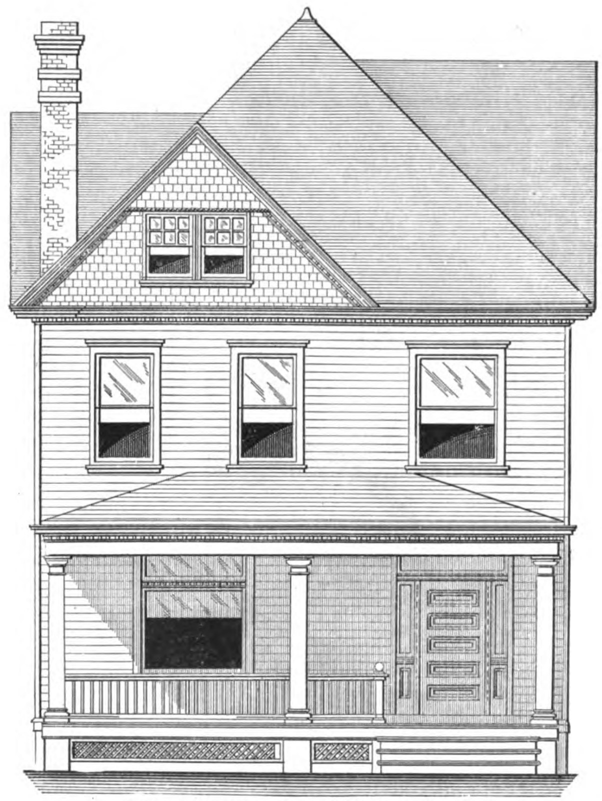
The plumbing fixtures include Italian marble 15 x 17



Second Floor.



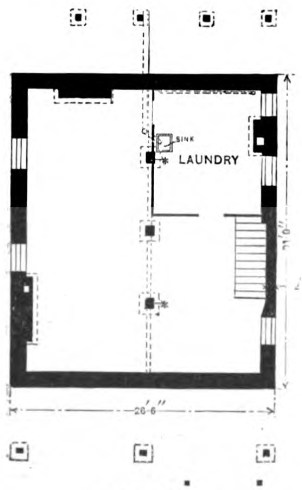
First Floor.
Scale, 1-16 Inch to the Foot.



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

Cottage in a Pittsburgh Suburb.—Elmer E. Miller, Architect, Pittsburgh, Pa.

inch oval bowl, with nickel plated brackets, &c., in lavatory, a 5-foot Columbia bathtub with nickel plated fixtures, a "Fino" siphon jet water closet with oak tank and seat, a 20 x 30 inch iron sink in the kitchen, and a 24 x 24 inch sink in the laundry. The soil pipe extends

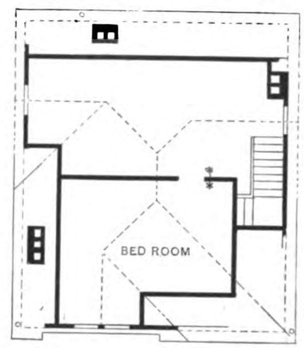


Foundation.

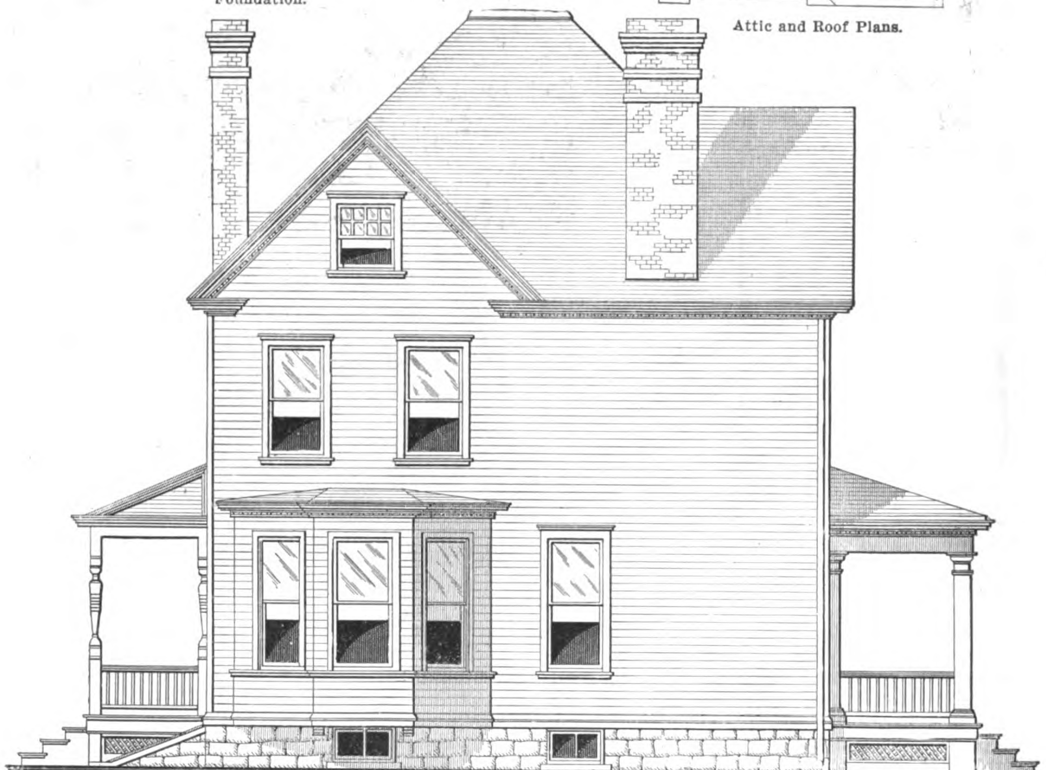
2 feet above the roof, and connects in the cellar with a 6-inch terra cotta drain, which extends to a cesspool 75 feet at the rear of the house.

The house is piped for lighting by gas and also for natural gas supply to fire places, range in the kitchen, and to the open grates on the second floor.

In referring to the house, the architect states that it was not designed to make an elaborate display, but rather to produce a plain, substantial, comfortable dwelling of neat appearance. No money was wasted on needless ornamentation, as the idea was to secure as roomy a house as possible for the money expended, without slighting the character of the work. While the halls are sufficiently large for a house of its size, yet no rooms were allowed to suffer at their expense.



Attic and Roof Plans.



Side (Left) Elevation.

Cottage in a Pittsburgh Suburb—Plans—Scale, 1-16 Inch to the Foot—Elevation.—Scale, 1/8 Inch to the Foot

New York State Association of Builders.

The annual meeting of the New York State Association of Builders was held in the rooms of the Builders' Exchange in Utica on February 20, various cities being represented by delegates as follows:

ALBANY: E. A. Walsh, James Feeney, Edward A. Keeler and Elmer Havens.

BINGHAMTON: C. H. Mitchell, George M. Moffatt.

BUFFALO: C. A. Rupp, Charles Geiger, John W. Henrich, Frank Kempf, Thomas Dwyer, James M. Carter, E. C. Rumrill, Emil Machwirth and B. I. Crooker.

LITTLE FALLS: J. D. Clark.

NEW YORK: Ernest F. Eidlitz, counsel.

NIAGARA FALLS: John Lennon, Martin F. Ryan, Fred

J. Allen, Peter B. Secord, G. A. Viesta and Nicholas Brass.

ROCHESTER: J. H. Frederick, Fred. P. Stallman, Fred. Gleason, Henry Stallman, Henry F. Stallman, Frank Sauer and J. L. Stewart.

WATERTOWN: George J. Townsend.

UTICA: William Fisher, president of the local exchange; Joseph Wicks, treasurer of the local exchange; B. McDermot, William George, C. Yates Fuller, George B. Allen, John F. Hughes, John S. Jones, Griffith Griffiths, Pius Kerner, Daniel Sabine, R. R. Roberts, Thomas R. Bailey and John Ulrich.

The convention was called to order by President F. P. Stallman, when Mayor Talcott, in behalf of the citizens of Utica, extended to all visiting delegates and friends a most cordial welcome to their city.

The secretary's report showed that the State association was launching out into a broader field of usefulness, that numerous matters of interest to the whole building fraternity of the State had been handled successfully by the association the past year, and that five exchange bodies—the Builders' Association of Niagara Falls, the Carpenter Contractors' Associations of Rochester and Albany, and the Builders' Exchanges of Watertown and Binghamton—had joined the State association during the past year.

The next meeting of the association will be held on the second Wednesday in January at a place to be designated by the Executive Committee. The officers of the association elected for the ensuing year were:

President, F. P. Stallman of Rochester.
Vice-president, Charles Geiger of Buffalo.
Secretary-treasurer, James M. Carter of Buffalo.
Counsel, Ernest F. Eidlitz of New York.

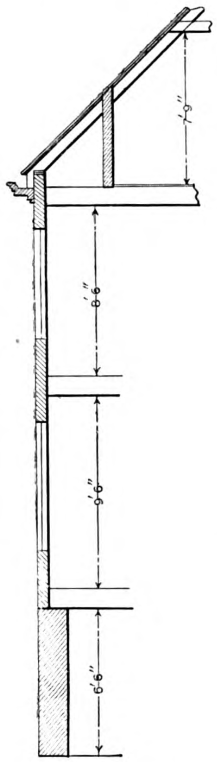
President F. P. Stallman appointed as an Executive Committee for the coming year: Charles A. Cowan of New York, William Fisher of Utica, J. E. Summerhays and J. L. Stewart of Rochester, John Lennon of Niagara Falls, E. A. Walsh of Albany, J. D. Clark of Little Falls, and George J. Townsend of Binghamton.

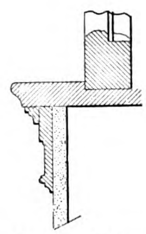
A special Legislative Committee appointed consisted of Fred Gleason of Rochester, Charles Geiger of Buffalo, and John F. Hughes of Utica.

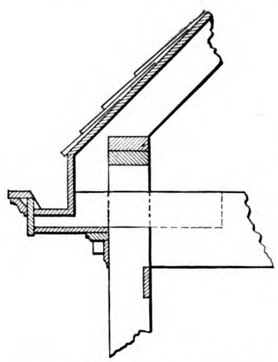
After the business session adjourned a banquet was served in the rooms of the Arcanium Club, William Fisher of Utica acting as toastmaster. Ernest F. Eidlitz of New York, in responding to the toast, "Builders' Needs From a Legal View Point," said in part that the building industry is not in its infancy, but is a full fledged, grown man, and all admire the handsome structures and grand edifices this twentieth century manhood is constructing. Building is no longer a trade; it is a profession. It needs brains, education, experience and the same qualities and characteristics required of an attorney or a physician.

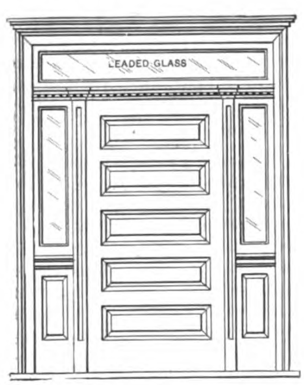
Charles Geiger, in responding to the toast, "Needed Reforms," pointed out that many customs as well as habits of the builders needed reforms; that the hours for closing certain business places of Utica needed reforming, and that reform was also needed along the lines of the State association. More cities and more organizations should be represented in its membership.

Fred Gleason of Rochester spoke on "Legislative Needs" and suggested that they ask for and favor only just legislation, and at the same time endeavor to interest all manufacturers in legislative matters. They are employers the same as are contractors. Mr. Walsh of Albany spoke on "State Secrets," and remarks were also made by F. H. Gouge, John F. Hughes and F. S. Kellog of Utica, B. I. Crooker and J. M. Carter of Buffalo, G. Townsend of Watertown, and Geo. M. Moffatt of Binghamton.

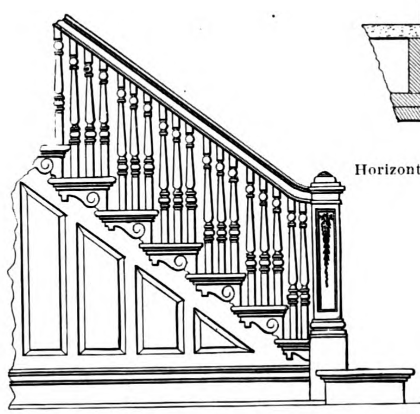

Section.—Scale, 1/8 Inch to the Foot.

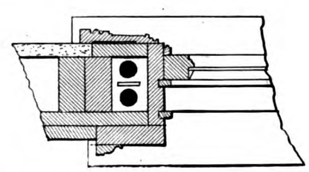

Window Stool and Apron.—Scale, 1½ Inches to the Foot.

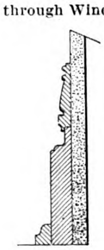

Main Cornice.—Scale, 1 Inch to the Foot.



Elevation of Front Entrance.—Scale, ¼ Inch to the Foot.


Detail of Main Stairs.—Scale, ⅜ Inch to the Foot.


Horizontal Section through Window Frame.


Base.—Scale, 1½ Inches to the Foot.

Miscellaneous Constructive Details of Cottage in a Pittsburgh Suburb

CONVENTION OF BRICK MANUFACTURERS.

THE sixteenth annual convention of the National Brick Manufacturers' Association was held at the Hollenden Hotel, Cleveland, Ohio, during the week ending February 15. This was by far the most successful and largely attended meeting in the history of the association, nearly every State in the Union being represented. The first session of the convention opened on Wednesday afternoon, February 12, with President W. H. Hunt in the chair.

After an official welcome to the city, to which response was made by W. A. Eudaly, President Hunt delivered his annual address. In it he referred to the prosperity of the year which had just closed and to the extent and magnitude of the building operations, showing, in large cities, increases ranging from 15 to 250 per cent. He stated that from every section of the country emanated reports indicating that the present year will eclipse any previous period in the history of the building industry, which means a continuance of the great demand for all grades of materials which enter into building construction. The president then contrasted present conditions in the clay working industry with those existing 20 years ago, showing what remarkable progress had been made within the last decade. He referred to the strength of the association as being greater than ever before in its history, but held out the warning that its growth must not lead to a feeling of undue satisfaction, for while much had been accomplished there was yet much to be done. The successful clay worker, he said, should carefully study all conditions of his industry and should know the chemical analysis of his clays, and he pointed out that in considering the proposition of brick making the question of uniformity throughout the entire process was of prime importance. He suggested to the manufacturers that patient consideration should be given to any appliances that affect possible economies or improvements in the character of the product and to keep the machinery and buildings in good repair. President Hunt also offered a number of other suggestions of interest and value to the members addressed, and stated that while they were made from the standpoint of one engaged in the manufacture of press brick, they applied with equal force to other clay working establishments, either great or small. He expressed the thought that if the convention should succeed in awakening an interest in the features of the business enumerated a great and lasting good will have been accomplished.

The address was followed with close interest on the part of those in attendance and was vigorously applauded.

The chairman of the local Press Committee, E. A. Roberts, announced the programme for the entertainment of the visiting delegates and their friends, after which the report of Treasurer Sibley was presented, showing a handsome net balance for the year 1901.

Election of Officers.

The election of officers was the next business, resulting in the following choice: President, George M. Fiske of Boston, Mass.; first vice-president, Clifford Chase of Milwaukee, Wis.; second vice-president, H. C. Bradley of Cleveland, Ohio; third vice-president, John Miller of Washington, D. C.; secretary, for the sixteenth term, T. A. Randall of Indianapolis, Ind., and treasurer, John M. Sibley of Birmingham, Ala.

The new officers were then duly installed and each made a few remarks, thanking the members for the honor conferred upon them. A number of interesting papers, bearing upon the subject of clay working, were read and in many cases were followed by a spirited discussion. The first of these was entitled "A Twentieth Century Retrospect and Prophecy," by Clifford Chase of Milwaukee, Wis., the first session of the convention ending with a discussion of this paper.

The Banquet.

The annual banquet, held Wednesday evening at the Hollenden Hotel, was a delightful affair. Retiring president Wm. H. Hunt of the association acted as toastmaster, and the programme of after dinner speeches was participated in by H. R. Cooley, who spoke for the city of Cleveland; S. H. Holding, representing the Chamber of Commerce; Arthur Bradley, representing the Builders' Exchange; Rev. C. W. Hiatt, who spoke on "Lincoln;" Geo. M. Fiske of Boston, W. D. Gates of Chicago, Jno. W. Sibley of Birmingham, Ala., and others.

Thursday Morning.

The following morning was devoted to an excursion to the yards of the Hydraulic-Press Brick Company, by whose courtesy a special train was furnished. There were 350 delegates, who carefully inspected the details of this plant, of which ex-President Hunt is the general manager and whose product, the Akron Impervious red press brick, has a national reputation. Luncheon was served at the yard, and on the return trip visits were made to other brick plants, thus giving to the morning a decidedly business trend.

The ladies, of whom there were nearly 100, were entertained on Thursday morning with a trolley ride and luncheon at the Colonial Club.

At the session on Thursday afternoon a committee on resolutions was appointed and letters from absent members were read. Among them was one from Secretary Roberts of the local Builders' Exchange, extending greetings to the delegates and expressing the hope that the session would be one of great profit and interest. He also extended a cordial invitation, on behalf of the Board of Directors, to all visitors, to call at the exchange and make themselves at home.

The first regular number on the programme was a paper entitled "Clay as a Commercial Commodity," which was discussed by several of the members. This was followed by papers on "Experimental Work in Brick Making," by E. Rodgers of Alton, Ill.; "Modern Brick Plant Prospecting and Construction," by F. W. Butterworth of Danville, Ill., and "Economy in Building and Repairing Permanent Kilns," by C. B. Stowe of Cleveland. All of these were variously discussed, after which the Committee on Technical Investigation presented its report through Prof. Edward Orton.

A feature of the convention was a number of questions for general discussion, the first of these being "Is There Not More Danger of Fire from the Hot Air Direct Heat Dryer Than from the Steam Heated Dryer?" A discussion of this question concluded the second session.

Thursday evening a theater party was given at the Empire, in which the members of the local Builders' Exchange joined, the entire central portion of the theater being occupied.

Friday's Sessions.

At the Friday morning session a resolution was presented in regard to an exhibit of the clay working industries at the St. Louis Exposition, and after some discussion it was referred to the Committee on Resolutions. The members then took up further consideration of the question presented at the close of the second session, after which other topics were discussed. J. M. Dyer of Cleveland read an interesting paper, entitled "Brick in Architecture," which brought out the views of the members. Some of the other papers read and discussed included "Burning Brick with Oil," by George H. Drew; "The Permanent Improvement of Public Highways," by W. H. Evers of Cleveland, the latter being of such importance that it was ordered printed in pamphlet form. The Committee on Specifications for the Construction of Brick Pavements then presented their report, after which the session adjourned.

In the afternoon several topics were discussed and a number of papers presented. Among the latter may be mentioned "The Economy of the Soft Mud Process," by William Sankey; "Drying Brick with Waste from Cooling Kilns," by J. W. Sibley, and another on the same subject by Robert Twells of Elyria, Ohio.

Mayor Johnson was present at the afternoon session and made a short address. The Committee on Resolutions presented their report, after which the convention adjourned without date.

PROPORTIONING JOINTS IN WOODEN ROOF TRUSSES.—I.

BY F. E. KIDDER, CONSULTING ARCHITECT.

As the strength of a structure is measured by the strength of its weakest part, it is evident that unless the joints of a truss are as strong as the members of which it is composed the truss will not be safe for the load it was intended to carry.

To design the joints of a wooden truss so that they will be capable of transmitting the full stress from one member to another often requires more thought and skill than to compute the size of the members, and the weakest point in most timber trusses is usually at one of the joints.

The correct method of computing the strength of the various joints in wooden trusses can best be shown by considering each kind of joint separately and illustrating by practical examples.

We will first consider the joint formed by the principal strut of a King or Queen truss, or of a truss with a horizontal top chord, with the tie beam.

The simplest form of such a joint is that shown in Fig. 1, or in case one bolt is not sufficient then two bolts may be used, as shown in Fig. 2. The strap joint shown in Fig. 3 is also frequently used for light trusses. Fig. 4 shows a better and stronger joint than that shown in Fig. 2, while the strap joint in Fig. 5 is also a stronger joint than that shown in Fig. 3. In Fig. 6 is shown a plate joint, which is suitable for heavy trusses. The joints shown by these six figures may be considered as representative types, although variations of them will often be seen.

In order to understand the principles involved in proportioning any of these joints to the stresses in the rafter and tie beam, one should comprehend the manner in which they are likely to fail. Fortunately a series of tests have been made on joints like those shown, which were carried to the point of destruction,* and from these tests we can gain a pretty good idea of the strength and weakness of such joints. A joint made exactly as in Fig. 1, the timber being of hard pine, failed first by the shearing off of the shoulder on the tie beam and then by the breaking of the bolt. The stress in the strut at the time of the first failure was 72,300 pounds.

The joint shown in Fig. 2 first failed by the shearing of the tie beam, then by the breaking of the inner bolt and finally the outer bolt broke. The joint shown in Fig. 3 broke by shearing of the tie beam and then by the breaking of the strap. A view of the joint after the strap broke is shown in Fig. 7. The end of the strut, where it bore against the shoulder, was considerably splintered, as shown in the illustration. A joint, like that shown in Fig. 4, but without the cast washers on the bottom of the tie beam, failed by the pulling apart of the tie beam opposite the bolts, as shown in Fig. 8. This joint developed a strength 70 per cent. greater than the joint shown in Fig. 2, although the bolts and timbers and the inclination of the strut were the same. The compression in the rafter at the time of failure was 82,900 pounds. The cutting of the washers into the bottom of the tie beam must have materially weakened the beam, so that had a cast washer, as in Fig. 4, been used, still greater strength would probably have been developed. A joint, similar to Fig. 6, but with only one bolt at B and C, failed first by the lug on the plate drawing out of the tie beam, as shown in Fig. 9. For some time before complete failure the bolts B and D had been shearing through the tie; finally the bolt B broke by tension and bending. In the joint tested the bolt B was placed some 3 or 4 inches back from the end of the strap. Had it been placed close to the end, as in Fig. 6, the lug could not have pulled out and a much greater strength in the joint would probably have been developed.

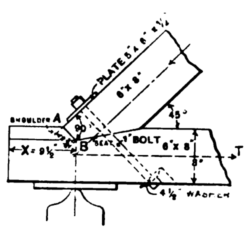


Fig. 1.—Simple Form of Joint.

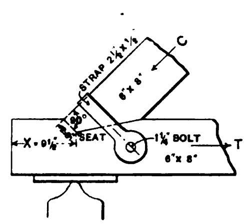


Fig. 3.—Strap Joint.

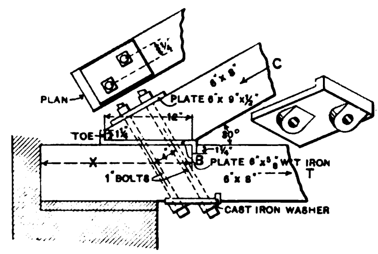


Fig. 4.—A Stronger Form of Joint than that Shown in Fig. 2.

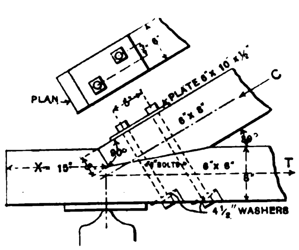


Fig. 2.—Simple Joint with Two Bolts.

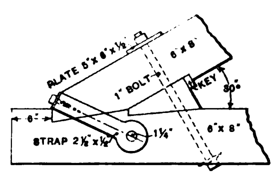


Fig. 5.—Another Form of Strap Joint.

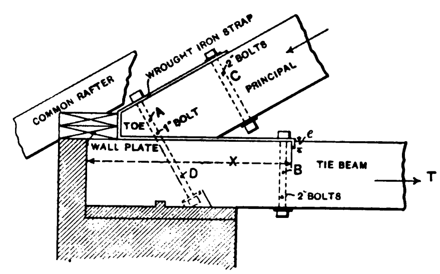


Fig. 6.—A Plate Joint for Heavy Trusses.

Proportioning Joints in Wooden Roof Trusses.

In all of the joints where the rafter butted against a shoulder on the tie beam the first failure was by the pushing off, or shearing, of the portion of the tie beam beyond the notch. As soon as this was done the whole stress in the strut was, of course, thrown on the bolt, or bolts, or strap. In some cases the resistance of the shoulder was sufficient to crush or splinter the toe of the strut. In the case of joints 4 and 6 there was no shearing, and the failure was due either to the breaking of the bolts or to the pulling apart of the tie beam. In the joints shown in Figs. 1, 2 and 3 the bolts or strap and the shoulder of the tie beam both united in resisting the thrust of the strut, but just what part was borne by the shoulder and what part by the bolts or strap it is impossible to determine.

In designing such joints, therefore, the distance X should either be sufficient to resist the entire thrust or else no dependence whatever should be placed upon the shoulder, and the bolt or strap should be made strong enough to resist the entire stress. There are undoubtedly many trusses standing to-day in which the joints

* The tests referred to were made at the Massachusetts Institute of Technology in 1897. A description of the tests and analysis of the results was published by the writer in the *Engineering Record* of November 17, 1900.

are not made on this principle, but it is more from good fortune than from any precaution on the part of the builder or designer.

The resistance of the shoulder to being pushed off, as in Fig. 7, is known as the resistance to longitudinal shearing, and is due to the adhesion of the fibers of the wood. As the number of fibers are proportional to the area sheared, it is evident that the greater the distance X the greater will be the resistance of the shoulder.

RULE I.—To find the distance X necessary to resist the entire thrust of the strut, divide the stress in the tie beam in pounds by the breadth of the tie beam multiplied by the value for F given in Table I. The result will be in inches.

Where the shoulder is depended upon to resist the thrust of the strut, it is also necessary to proportion the depth of the notch A B, Fig. 1, so that the toe of the strut or the face of the shoulder will not be splintered by compression.

ting out of the notch. Such a bolt also does much to prevent twisting of the timber while seasoning. The bolt need not be more than ½ or ¾ inch in diameter.

There is still another very important point which needs to be considered when the foot of the rafter comes on the tie beam inside of the support, and that is the cross breaking of the tie beam. At the point of support the tie beam has to resist a vertical force equal to one-half the load on the truss—that is, when the truss is symmetrically loaded. This vertical force is considered as applied at the support. The tendency of this force is to shear the beam vertically across the grain, and also to break the beam at the toe of the rafter by cross bending, as shown by the dotted lines in Fig. 11. When, therefore, the toe of the rafter comes inside of the support the minimum depth of the tie beam on the line B E should be computed, both for shearing and bending.

RULE III.—The minimum depth of the tie beam at B E of Fig. 11 to resist shearing should equal one-half

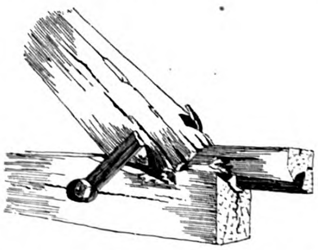


Fig. 7.—Showing How Joint in Fig. 3 Gave Way.

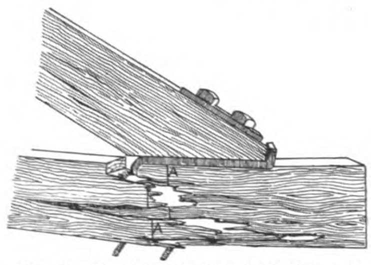


Fig. 8.—Showing Tie Beam Pulled Apart.

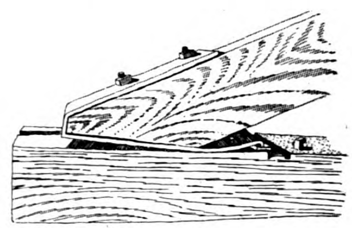


Fig. 9.—Showing Failure of Joint Similar to Fig. 6.

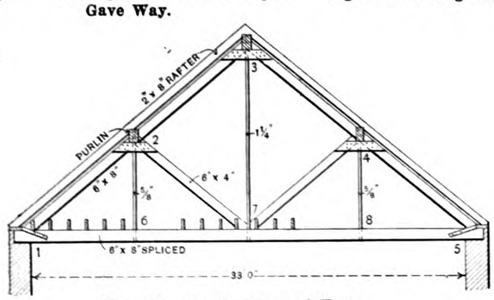


Fig. 10.—Simple Form of Truss.

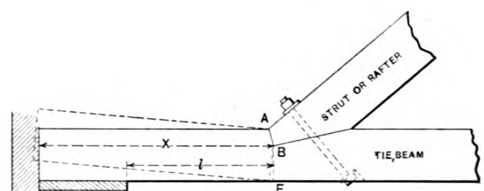


Fig. 11.—Showing Foot of Rafter Resting on Tie Beam Inside of the Support.

Proportioning Joints in Wooden Roof Trusses.

Table I.—Values for Constants to Be Used in Connection with the Rules for the Strength and Proportion of Truss Joints. All Values Are in Pounds.

	Longitudinal shear.			—Crushing.—		
Wood.	Wood free. F.	Wood under compression. F_1.	Cross shear. F_2.	End-ways. C_1.	Across the grain. C_2.	Transverse strain. A.
White oak	150	250	1,000	1,350	600	75
Yellow pine	125	250	1,200	1,500	500	100
Oregon pine	125	250	900	1,350	400	90
Spruce	90	180	750	1,200	300	70
White pine	80	160	500	1,000	250	60

RULE II.—To prevent crushing the toe of the rafter the depth A B should be equal to the tension in the tie beam (at the joint) divided by the breadth of the tie beam multiplied by the value for C_1 given in Table I.

To show the application of these rules, we will apply them to joint 1 of the truss shown in Fig. 10, which is the truss for which the stresses were determined in the October, 1901, issue, and the sizes of the members computed in the January issue, 1902. The stress in the tie beam was found to be 16,260 pounds and the stress in the bottom of the rafter 21,300 pounds. The breadth of the tie beam is 6 inches, and the wood is to be white pine. The distance X in Fig. 1 should therefore $= \frac{16,260}{6 \times 80} = 34$ inches. The depth of the notch A B should $= \frac{16,260}{6 \times 1000}$, or 2¾ inches; this would give the proportions shown in Fig. 11. Even though the distance X may be great enough to resist the thrust of the rafters, a bolt should still be used, as shown in Fig. 11, to stiffen the joint and to prevent the rafter get-

the load on the truss, divided by the breadth of the beam multiplied by the value for F_2, Table I.

Application of Rule III.

One-half of the load on the truss shown in Fig. 10 is 13,736 pounds (see Fig. 2, January issue); hence the depth of D E should equal $\frac{13,736}{6 \times 500}$, or 4⅝ inches. As the depth required for the notch was found to be 2¾ inches the depth B E will be 5¼ inches, if the beam is full 8 inches deep, or a little more than required by the formula.

RULE IV.—To find the depth of the beam at B E necessary to resist the bending moment, multiply one-half the load in pounds by the distance l, Fig. 1, in inches, and divide by three times the breadth of the beam multiplied by the value for A, Table I, and extract the square root of the quotient: or, if we let b = breadth of the beam and P = one-half of the load on the truss, then B E should equal $\sqrt{\frac{P \times l}{3 \times b \times A}}$.

For the joint shown in Fig. 11 l measures 21 inches, therefore B E should equal $\sqrt{\frac{13,736 \times 21}{3 \times 6 \times 60}} = \sqrt{267}$, or 16¾ inches. It is therefore evident that we must reduce the distance X, so that the joint will come over or nearer to the wall, and depend upon the bolt to resist the thrust of the rafter, or else put a heavy bracket under the truss. For a depth at B E of 5 inches it would be necessary to bring the point E within 2 inches of the support to resist the cross strain.

COMPETITION IN FARM HOUSES.

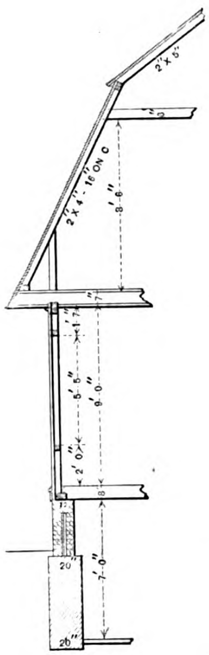
FIRST-PRIZE DESIGN.

THE subject of the thirty-fourth competition was a farm house, thoroughly modern in its design, construction and appointments, and such as one would naturally expect to find upon the property of the progressive farmer of the present day. The conditions governing the contest were presented in detail in our issue for December last and do not call for special enumeration at this time. We might add, however, that in order to place all those submitting drawings upon the same basis of equality it was stipulated that the cost of the completed building should not exceed $2500 in the section of the country in which it was designed. The response to our invitation was generous, and drawings were received from contestants covering a territory extending from Maine to Colorado, and representing, as might naturally be supposed, widely varying ideas of design and arrangement.

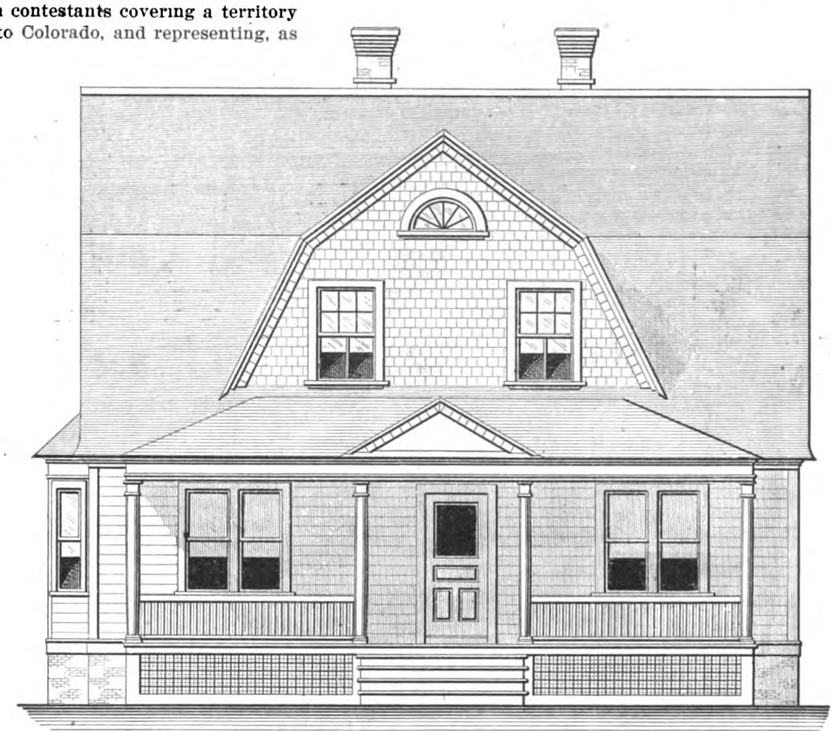
In carefully examining the designs submitted, it was found by the committee of architects and builders into whose hands the drawings were placed that several competitors had failed to conform in all respects to the conditions as published, and it was decided that the efforts of all such should be regarded as not entitled to consideration. Some competitors placed their names and addresses directly on the drawings, instead of in sealed envelopes as called for by the conditions, this being a very common mistake and one which has been found to occur in every competition which we have conducted in the past. Others failed to furnish an estimate of cost in detail, being content to simply give a lump sum for the various parts of the work, instead of by items, while still others submitted designs which obviously could not be fairly executed for the sum to which the competition was limited. While in all such cases the estimates were accompanied by builders' certificates, the committee were in no wise misled by them, as it was evident that they were given under the impression that the signers would never be called upon to carry out the work on the lines indicated. In some cases the authors apparently failed to realize the requirements of a modern farm house, and many designs were thrown out by the committee owing to lack of merit.

The announcement of the committee shows that, under the terms of the contest, John P. Kingston of 518 Main street, Worcester, Mass., is entitled to the first prize of $100; that M. W. Fuller of Fort Collins Col., is entitled to the second prize of $60, and that H. S. Woodward of 51 Spring street, Carbondale, Pa., is entitled to the third prize of $40.

While not entitled to a prize, there were several designs which the committee felt to be worthy of special mention, and we take pleasure in presenting their comments regarding them.



Section.



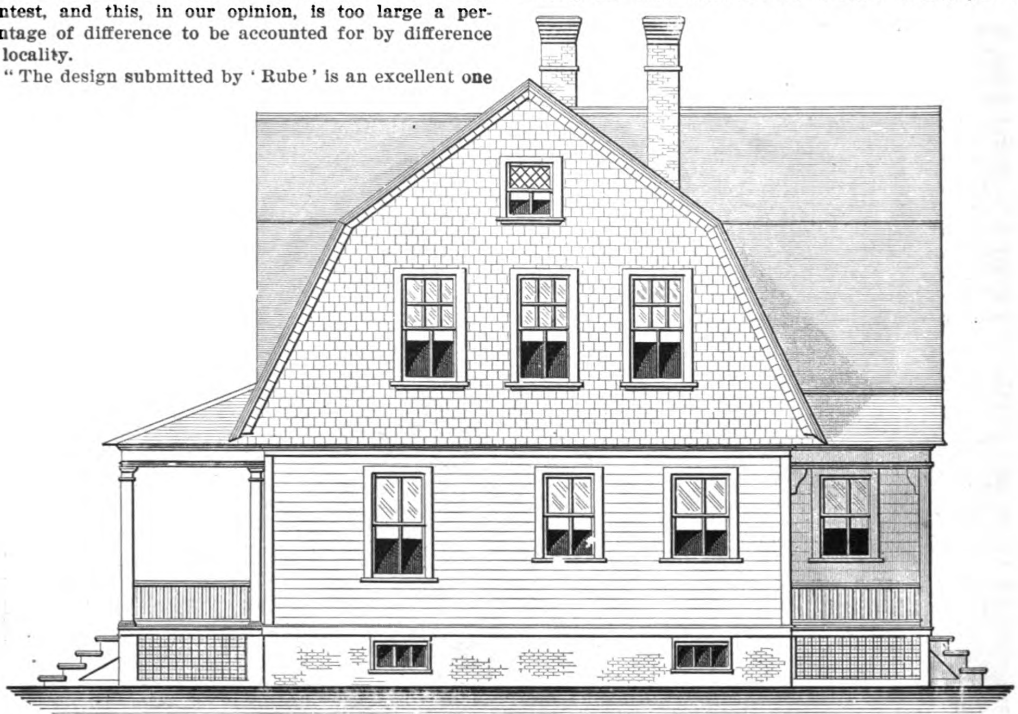
Front Elevation.—Scale, ⅛ Inch to the Foot.

Competition in Farm Houses.—First-Prize Design.—John P. Kingston, Architect, 518 Main Street, Worcester, Mass.

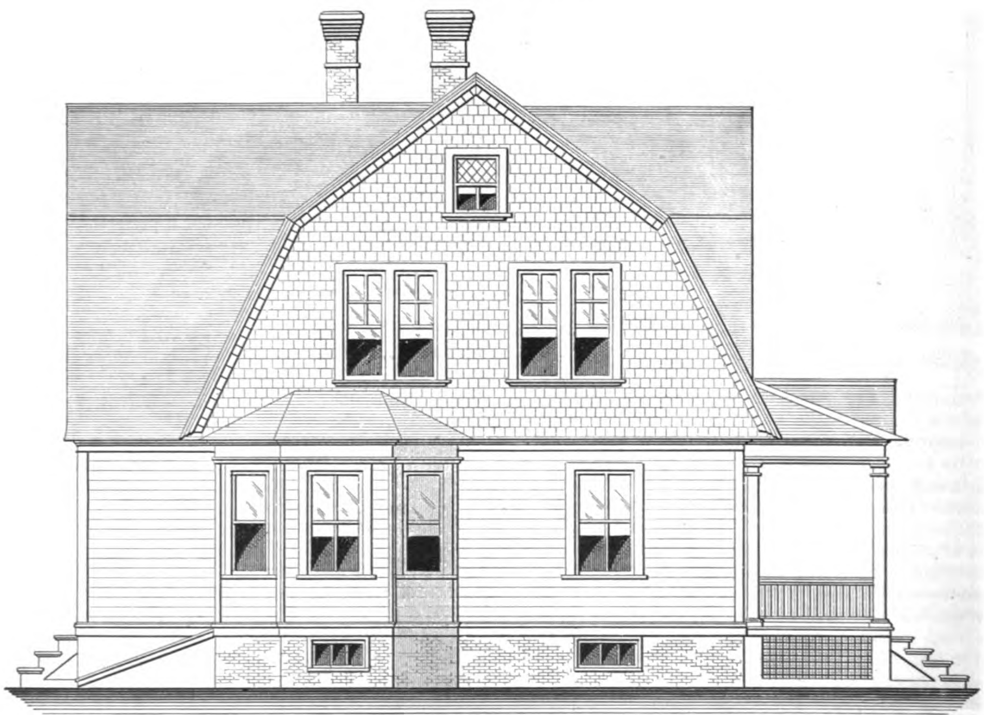
"A very good design in our judgment is that submitted by 'Hustler,' the floor plans being well adapted for a farmer's wife. Special points are the rear porch, where the men can directly enter the kitchen, and in summer can have a bench and wash basin on the porch, using it as a wash room before entering for their meals. In the winter they can wash in the kitchen and enter the dining room directly, without going through the hall or any other apartment. After the meal is over, they can step out directly onto the side porch for a rest. The general arrangement avoids the necessity of the farmer, or his help, passing through the front of the house in order to reach the second story, and again the room for the help separated from the family rooms, together with the arrangement for reaching the attic, are very good features. Objections to the plan are the two front entrances, which will chill the parlor or dining room every time the door is opened. If there was a vestibule in the angle and the main front door was on the side, opposite the parlor door, with one from the vestibule to the sitting room, and a window where the sitting room door is now located, it would be a great improvement. The cost, however, is excessive, and the design could not be executed, exclusive of plumbing, in this part of the country, for less than 60 per cent. in advance of the sum stipulated by the conditions of the contest, and this, in our opinion, is too large a percentage of difference to be accounted for by difference in locality.

"The design submitted by 'Rube' is an excellent one tending the full depth of the house, the broad open fire place, the cozy dining room, and the conveniently located kitchen.

"A very good plan is that of 'Wyo,' and we think it among the best exteriors for a farm house, yet we



Side (Right) Elevation.



Side (Left) Elevation.

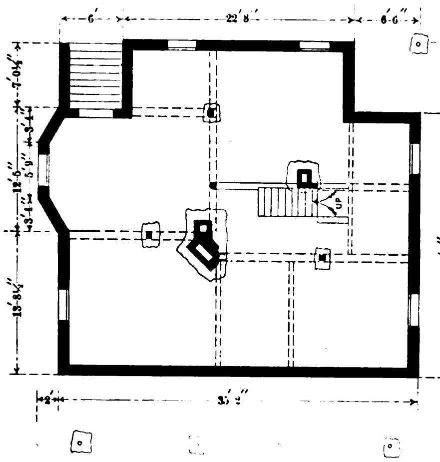
Competition in Farm Houses.—First-Prize Design.—Elevations.—Scale, ⅛ Inch to the Foot.

for a mountain or seaside cottage, or, in fact, for a gentleman's country home, say at Lenox or Tuxedo, but is not adapted to the requirements of a farm house in the sense in which the term is usually employed. It is, however, worked up in good shape, with its living room ex-

should object to the men being obliged to enter the kitchen to wash and then having to go out on the side porch, or else through the pantry or main hall, in order to reach the dining room.

"'Neptune' has a fairly well arranged plan, although the provisions which would particularly adapt it to meet the requirements of a farm house are not as satisfactory as some of the others. We also think he would have difficulty in properly lighting the main stairs. Another point which we should question is the ability to execute the design within the figures stipulated by the contest.

"While the style of the design 'Oceanic' does not



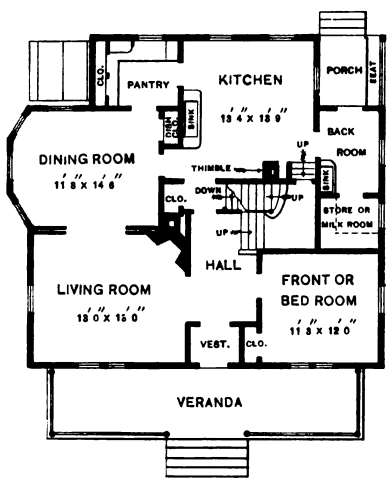
Foundation.

will not have to stop and put on extra clothing to go out in a cold shed. The wood can be put in the cellar in convenient lengths and cut up at any time in any kind of weather. It also does away with the (very often) obnoxious shed which connects with so many otherwise fairly good looking buildings.

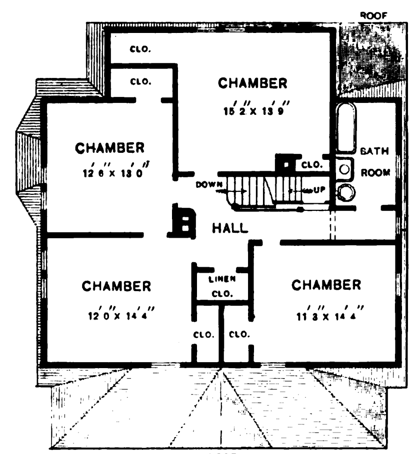
"It is not my purpose to elaborate too much on the exterior, rather leaving that to the style of the house—the gambrel roof Dutch Colonial—which attracts so much attention in many New England towns, this being warmer in winter and cooler in summer and less affected by heavy winds. The other special features outside are the spacious front veranda and a rear porch with a seat.

"The interior is where I have given most attention, the idea being to get an attractive, convenient and pleasant home with large, airy and well lighted rooms in the limited space available for the amount stipulated by the conditions. The front hall is large and easily accessible to all parts. The one stairway is attractive and convenient to both front and rear and lands on the second floor in the midst of all the chambers.

"The front room is arranged so it can be used for a reception room or a bedroom for old people or sick persons. The living room is connected with the hall by a finished opening, has a cozy fire place and is the largest room of the house. Passing through the sliding doors we reach the dining room with china closet. Passing through either the pantry or a direct door is the kitchen. This has a sink convenient to stove, pantry and dining room. The panty is large and has all modern conveniences. In an ordinary house I should omit the door between kitchen and dining room, but in the case of a farm house with so many going to the dining room from



First Floor.



Second Floor.

Competition in Farm Houses.—First-Prize Design.—Floor Plans.—Scale, 1-16 *Inch to the Foot*

strike us as particularly favorable for a farm house, yet there are some good points in pantry, cellar and bathroom. We would say, however, that the bathroom would be likely to be very cold, opening as it does from the outside and with no cellar underneath. A very bad feature, and one to be strongly condemned from a sanitary point of view, at least, is the direct opening from the dining room into the bathroom."

We take pleasure in presenting herewith the design awarded the first prize, giving in this connection the specifications for material and labor. At the same time, we present the comments of the author.

"In submitting these drawings for a farm house, it is the author's purpose to depart somewhat from the ordinary idea of such a house. I have planned a cellar under the whole house, with a convenient bulkhead, so that besides the ordinary things usually put there, as well as the furnace, there will be room for the fire wood. This will be so convenient that it will save many steps for the usually overworked farmer's wife; besides, she

the rear it would not be wise to have them all pass through the pantry. Adjoining the kitchen is a large back room, with a sink for washing. Off this is the store or milk room; also off from the back room is the porch, with the ever ready seat for a rest.

"The second floor contains four chambers, with a large closet for each, one having two. Off the hall is a linen closet and a well equipped bathroom with all modern plumbing.

"The attic is floored all over with a single tight floor. There is ample space for two chambers, if desired, or it can be used for storage and for drying clothes in stormy weather."

Specifications

Excavate the cellar, making cellar 7 feet in clear; also trenches, bed stones, piers and other places required by the drawings. The bottom of the walls to be at least 4 inches below cellar bottom.

The materials taken from the cellar to be graded up around the building, the loam, &c., to be evenly spread over the whole as directed.

Foundations.

To be built of flat field stone with footings well bedded 4 inches below cellar bottom. To be laid up dry, with inner face laid even, and well bonded with through stone, and all joints trowel pointed. The wall to be 20 inches thick. Chimney stone to be at least 6 inches thick. The bottom of all the stone work to be 4 inches below cellar bottom.

Cesspool.—To be a cesspool for sewerage, to be 6 feet in diameter at bottom, 4 feet at top, inside measure. The bottom to be at least 8 feet below cellar bottom. The wall to be not less than 18 inches thick. The top wall to be about 2 feet 6 inches below finished grade.

Sewer.—To be drain pipes from cellar to run to cesspool. The pipes to be 6-inch cement or salt glazed vitrified drain pipe; joints to be made with cement.

Mason Work.

Chimney and Underpinning.—To be built as shown. All joints to be well filled, and to be smoothly plastered from bottom to top on outside. Caps to be of stone, with lead flashing at junction of roof. Build in the thimbles for kitchen, dining room and one chamber.

The underpinning wall to be 12 inches thick with air space. All brick used to be good merchantable quality, with those for outside of even color. All mortar to be good quality, with proper proportions of best lime and clean sharp sand. Fire place to have tile facing and hearth. Build in all fixtures, and do all necessary work in connection with and helping other workmen employed about the work.

Lathing and Plastering.

Lathing.—Lath all the parts with good spruce lath, to be laid about ⅜ inch apart. All well nailed to each and every bearing. To be carried down to lining floors on outside walls.

Plastering.—The walls and ceilings of the entire building where finished to be plastered with a coat of best lime, sand and hair mortar. To be well worked into the lath and smoothed up in best manner. Fill plastering down to lining floors on outside walls and well up to grounds and beads. All ceilings of rooms to have a good coat of kalsomine wash. The work to be done true and straight.

The exposed parts of brick and stone wall in cellar to have a coat of whitewash.

Carpenter Work.

The framing work to be done in usual manner for such a building. The timber to be spruce or hemlock, and of good merchantable quality. The sills to be 4 x 7; girders in cellar, 8 x 8; first-floor joist, 2 x 8; second-floor joist, 2 x 7; third, 2 x 6; exterior wall studs, 2 x 4, with double plates; partition studs to be 2 x 4 and 2 x 3, all set not more than 16 inches on centers; hips and valleys, 2 x 7; furring for ceiling, ⅞ x 2½ inches, put on 16 inches on centers. Rafters to be 2 x 5, 24 inches on centers, and 2 x 4, 16 inches on centers.

Put beads on all corners and three-quarter grounds at all openings and bottom of all partitions to plaster against.

Inclosing Boards, &c.—The walls and gables to be covered with No. 2 planed ⅞ matched spruce or hemlock boards nailed with two nails to each bearing.

Boarding for Roof and Lining Floors.—The roofs and lining floors to be covered with ⅞ planed hemlock boards. Those for floors and steep part of roof to be laid close and well up to all openings and corners. Those for top roofs to be laid open not more than 2½ inches, nailed to each bearing with at least two nails.

Clapboarding.—The side walls, except otherwise specified, to be covered with 6-inch spruce clapboards laid not more than 4½ inches to the weather.

Side Shingle.—The gables to be shingled with clear butt 16-inch cedar shingles, laid not more than 5 inches to the weather, well nailed, with joints even on bottom.

Paper.—The side walls and lining floors to be covered with good quality of sheathing paper, well lapped, before any finish, clapboards or side shingles are put on. Do all flashing necessary.

Roof Shingle.—The roof to be shingled with best quality 16-inch sound, clear cedar shingles, put on to show not more than 4¾ and 4½ inches to the weather, with at least two nails to each shingle. Valleys to be laid open, with 14-inch painted tin. Ridge to be covered with 6-inch pine saddle boards and a 2-inch three-quarter round on top.

Cellar and Piazza Supports.—The girders in cellar to be supported on 6 x 6 chestnut posts, and veranda to be supported on 2½-inch pipe with cap.

Bulkhead.—To be done with 3 x 8 spruce frame finished on top and sides. To have sheathing covers hung with three heavy hinges and proper fasteners. Steps and stringers to be of 2 inch and risers ⅞ inch spruce. To be a plank frame at bottom of steps, with cleat doors hung and fastened in proper manner.

Exterior Finish.

To be made from well seasoned pine lumber. Veranda and porch floor to be North Carolina pine 6 inches wide. Ceiling to be cypress or North Carolina pine sheathing. Finished veranda work as per detail. Steps to have ⅞-inch risers, 1½-inch treads and 2-inch stringers. Do all flashing about frames, finish, &c., to make job complete.

Frames and Sash.—The cellar windows to have plank frames and 1¼ pine sash. Frames above cellar to have 2-inch stool, ⅞-inch jambs and casings, with ¾ x 1½ inch molding around outside of casings. To have pockets finished, sash pulleys, and grooved for 1⅜-inch sash.

Sash.—The frames to be fitted with 1⅜-inch pine double sliding lip sash, glazed with No. 1 glass well fastened and puttied in place, and to be well fitted in frames and hung and evenly balanced with weights and cord. Stationary sash to be where shown.

Blinds.—All windows above basement to be fitted with best 1⅛-inch pine blinds hung in proper manner.

Exterior Doors and Frames.—Frames to be made of 1¾-inch pine, with 2-inch hardwood thresholds, ⅞ inch casings and moldings like windows. Front door to be No. 1 cypress 1¾ inches thick, flush molded, with No. 1 glass in top part. Rear door to be hung with three butts.

Interior Work and Finish.

All to be as shown by drawings or described in specifications, to be worked out from good, clear, sound, kiln dried stock, to be sandpapered and put in place in good workmanlike manner, and put on after all plastering is done. Finish in the several parts to be as follows:

The hall and living and dining rooms in cypress to finish natural, and the remainder to be white wood.

Door Jambs.—To be 1⅜ inches thick. Cased openings the same, all set plumb, level and true.

Doors.—Slide door to be 1¾ inches thick, hung to roll at top with trolley rollers and track.

Other doors to be 1⅜ inches thick, five horizontal panels with quarter round ogee on edges for first floor, and 1¼ four-panel, bevel edges, on second floor. Vestibule door to have glass same as front door.

Door and Window Finish.—The hall, front room, living and dining rooms to have 4¾-inch casings, 1 x 5 turned corner blocks. The remaining parts to have 4½-inch side architraves and 1-inch molded header. Stools to be ⅞ inch thick, rebated to rest on outside stool, with ⅞ x 3½ inch molded aprons. Window stops 5 inches thick, with molded edge, sides put in with screws, tops nailed in.

Base and Molding.—Each room not sheathed to have 8-inch bevel base. The vestibule, front hall, front room, living and dining rooms to have 1½-inch molding on top of base.

Sheathing Wainscot.—The kitchen and back room to be wainscoted 3 feet 4 inches high; bathroom 4 feet high, with narrow beaded sheathing.

Chair Rail.—The dining room to have a rail 3½ inches wide, about 3 feet 4 inches from floor to top.

Closets.—To have narrow base and casings, with two rows beaded wardrobe strips with coat hooks and one shelf. Put wardrobe strips and hooks in back room.

Floors.—The finished or top floors in front hall, dining room, kitchen, back room, storeroom and bathroom to be ⅞ smoothly worked matched birch or maple flooring. Top floors in other parts to be square edge smoothly worked pine or spruce. All top floors to have paper under and put down between base.

Store or milk room to have four shelves.

Linen Closet.—To have four shelves at one end and wardrobe strips on wall space.

Sinks.—To be sheathed up under with small cleat door. Backs to be 12 inches high, with 6-inch shelf on top. To have drip shelves.

Pantry.—To have counter shelf, with case of three drawers under. The remaining part closed in with beaded sheathing and cleat doors; over to be four shelves 12 inches wide. The part shown to be closed in with sheathing and have two cleat doors.

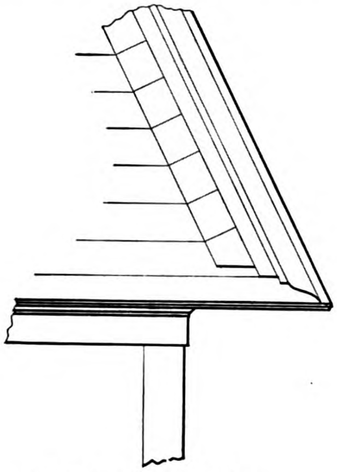
Closet in Dining Room.—To have a case of four drawers under broad shelf, and have three shelves over.

Shelf.—The living room to have a mantel with mirror.

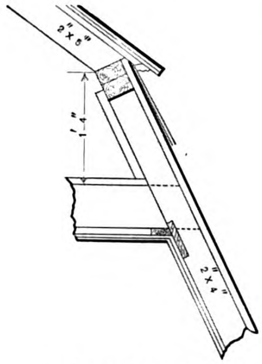
Bathroom.—To be fitted for open work.

Tank.—To be a 30-gallon tank made and placed in attic, and supported in proper manner. To be lined by the plumber.

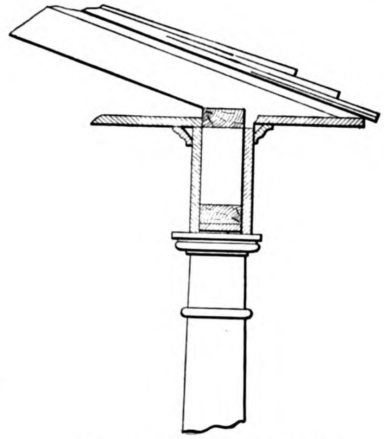
Stairs.—The stairs to be built as shown, on plank stringers, accurately cut to the required dimensions for risers and treads, and firmly secured in place. To have 1⅛-inch treads grooved together and base into risers. Front stairs to have 6 x 6 newel post, 4 x 4 angle post, 1½-inch turned balusters and 2½ x 3¾ inch hand rail.



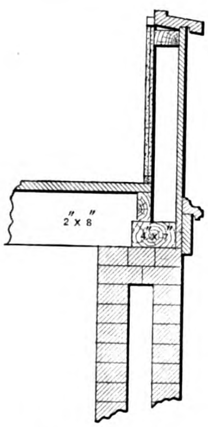
Elevation of Main Cornice.



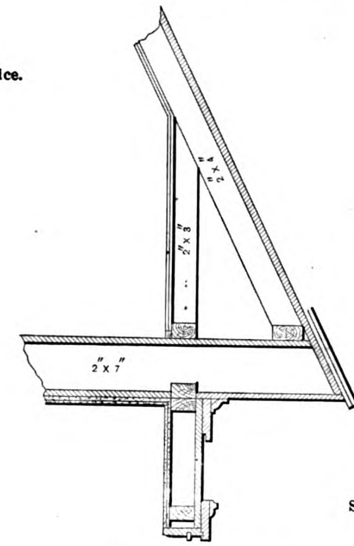
Section of Gable Construction.



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



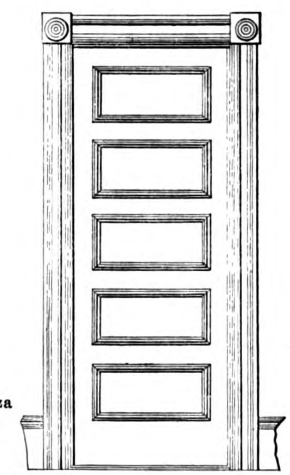
Section at Water Table.



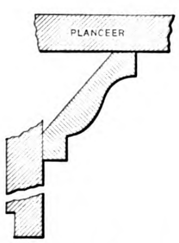
Detail of Main Cornice.

Scale, ½ Inch to the Foot.

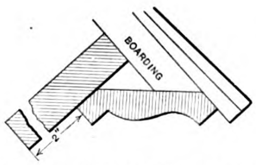
Section through Piazza Floor and Lattice.



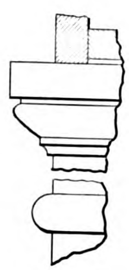
Elevation of Five-Panel Door, Showing Finish in Vestibule, Front Hall, Living, Dining and Bed Rooms.—Scale, ⅜ Inch to the Foot.



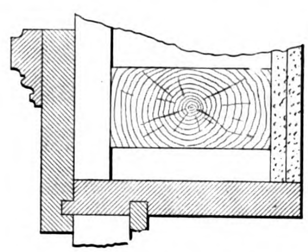
Detail of Bed Mold of Main Cornice.—Scale, 3 Inches to the Foot.



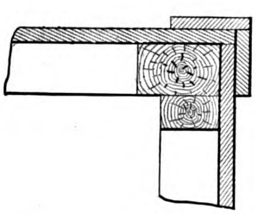
Detail of Gable Cornice.—Scale, 3 Inches to the Foot.



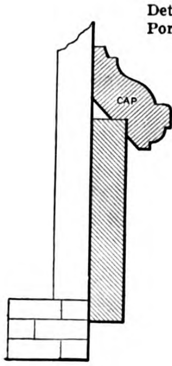
Detail of Cap of Porch Columns.



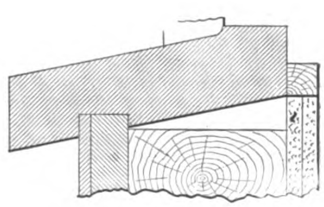
Horizontal Section through Window Frame.



Section Showing Corner Boards.—Scale, 1 Inch to the Foot.



Detail of Water Table.



Vertical Section through Window Sill.

Scale, 3 Inches to the Foot.

Competition in Farm Houses.—First-Prize Design.—Miscellaneous Constructive Details.

Bell.—To be a small electric bell in kitchen to ring from front door.

Hardware.—The contractor will figure in $40 for purchasing the hardware for door and window trimmings, slide door rollers, small hinges and catches, wardrobe hooks and brackets, and screws for same; window stops, and barrel swing for pantry; but does not include weights, cords, pulleys, nails, brads or screws for other purposes.

Wall Papering.—The contractor will figure in $40 for purchasing wall paper, moldings and all labor in connection with putting in place.

The walls of bathroom, kitchen, pantry and back room are to be painted, and come under painter's contract.

Heating.—The contractor will figure in $125 for heating apparatus.

Painting.

Outside Work.—All the exterior work, and except otherwise specified, to be painted with two coats of pure lead and linseed oil and turpentine, all colors to please owner.

Side Staining.—The shingles on gables, &c., to have one coat of pure linseed oil stain and one coat of pure linseed oil as directed.

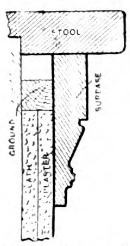
Inside Work.—All interior work must be well cleaned work must be delivered to owner complete in every particular.

Plumbing.

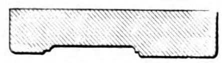
To be a 4-inch cast iron soil pipe with a running trap inside of wall, with fresh air inlet and hand hole. To be continued along to and under fixtures up through at least 2 feet, and flashed tight at roof with 3-pound sheet lead. To have all necessary Y-branches, bends, offsets, &c., to connect the several fixtures to. All branch joints to be made and calked with oakum, and molten lead well driven in and properly calked.

Water Closet.—To be all earthenware, with copper lined, beaded finished tank properly supported. To have hard wood double seats. Supply from tank to be 1¼ and to tank ½-inch brass pipe and fittings, with vent pipes, chain and pull. To have good valve, ball cock and float complete. To be properly trapped and have necessary vents. All exposed parts nickel plated.

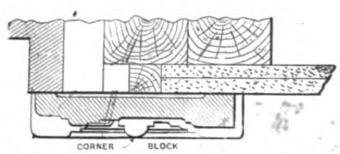
Wash Bowl.—To have marble slab resting on nickel plated brackets, with a 14-inch white earthenware bowl properly clamped to same. Back to be 8 inches high, ⅞



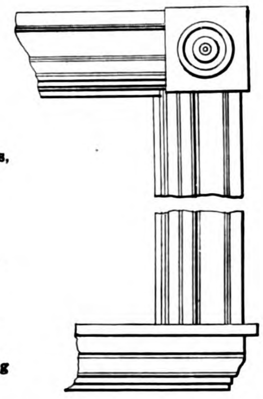
Detail of Window Stool and Apron.



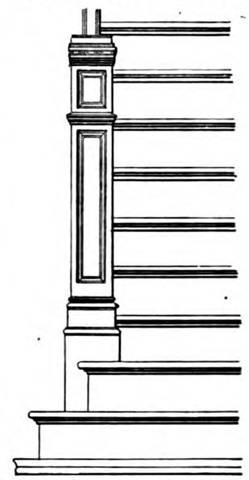
Top Casing in Kitchen, Pantry, Back Rooms, Bathroom and Bedrooms.



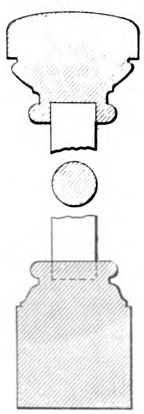
Top Finish in Vestibule, Front Hall, Living and Dining Rooms, &c.



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

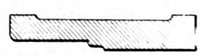


Elevation of Newel Post.

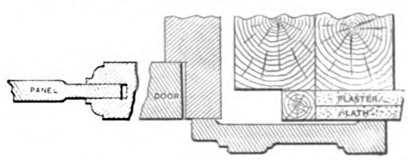


Detail of Porch Baluster.

Base.

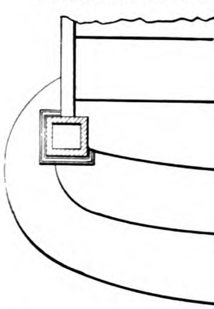


Side Casing in Kitchen, Pantry, Bath and Bed Rooms.



Side Finish in Vestibule, Front Hall, Dining, Living and Front Rooms.

Scale, 3 Inches to the Foot.



Plan of Newel and Foot of Stairs.—Scale, ½ Inch to the Foot.

Competition in Farm Houses.—First-Prize Design.—Miscellaneous Constructive Details.

before any finish is put on. All nail holes and other imperfections well puttied, matching wood as near as possible.

Floors.—The hardwood floors in front hall and dining room to have a coat of alcohol shellac, sandpapered, and a coat of floor finishing wax. The floors in bathroom, pantry, kitchen and back room to have a coat of oil and turpentine and a coat of floor varnish. The closet floors to have one good coat of paint.

Finish.—The hall and living and dining rooms to have one coat of liquid filler and two coats of varnish; the last coat to be rubbed a little with pumice stone and oil.

The work in kitchen, pantry, back room, &c., to have a coat of liquid filler and two coats of varnish.

The front room, first floor, and rooms on second floor to have three coats of paint. The closets to have two coats of paint.

Walls.—The walls of bathroom, kitchen, pantry, back room, storeroom, &c., to have a coat of oil size and two coats of paint.

All work to be done so as not to hinder or interfere with other workmen in any particular. All finished floors must be protected with paper at all times. No interior work to be done except in best weather, and all thick, of marble, fastened to sheathing with round head screws. To have side arm brass basin cocks, chain, stay and plug complete, all nickel plated.

Bathtub.—To be 2-inch roll rim porcelain enamel iron bathtub 5 feet long of regular pattern. To have brass bath cocks, chain, stay and plug complete, all nickel plated.

Sinks.—To be one 20 x 42 inch and one 18 x 32 inch beaded iron sink, with cesspool outlet. To have two arm brass compression bib cocks. Cold water to be hose bib.

Supplies.—The above fixtures to be supplied with cold water through ½-inch standard size brass water pipe and hot water through ½-inch brass tubing pipe branches.

Wastes.—The above fixtures, except water closet, to waste through 1¼-inch lead branches and 4-inch round trap, with screws, connecting to iron soil pipe.

Hot Water Boiler.—Fit up in closet near chimney a 30-gallon copper hot water boiler to rest on iron stand. To have all necessary couplings, sediment cock, stop cock, complete. To be supplied with water through ½-inch 2 pounds per foot lead pipe.

Tank.—Fit up in place in attic and line with 20-

ounce copper the 30-gallon tank made by carpenter. To be supplied with water through ⅝-inch 2½-pound lead pipe; good ball cock and float complete, with shut off in cellar; to overflow into nearest practicable place with ¾-inch lead pipe.

Branch Supplies.—To be branches from cellar, one each for bathroom and sink of best ½-inch standard size water pipe, with stop and waste for each in cellar.

Main Supply.—The main supply is intended to be from town supply or from wind mill and large tank, and is not included in the contract.

Estimate of Cost.

The estimate of cost accompanying the specifications and drawings is as follows:

EXCAVATION, FOUNDATION, CESSPOOL AND CELLAR DRAIN.		
128 yards of excavating at 25 cents	$32.00	
1035 feet stone work at 8 cents	82.80	
Cellar drain	10.00	
		$124.80
MASON WORK.		
11,000 brick at $12 per M	$182.00	
Thimbles, caps, lead flashing	8.00	
Tile and linings for fire place	15.00	
715 yards of plaster at 12 cents	85.80	
11,000 lath at $3.25	35.75	
11,000 lath put on at $2 per M	22.00	
		298.55
CARPENTER WORK.		
8000 feet framing timber at $17	$136.00	
Piazza supports	3.00	
2765 feet matched boards at $17 per M	47.00	
2250 feet roof boards at $16 per M	36.00	
3250 feet lining floor boards at $16 per M	52.00	
Grounds and beads	6.00	
16,000 roof shingle at $3.25	52.00	
9000 side wall shingle at $2.75	24.75	
1400 feet clapboards at $22 per M	30.80	
600 feet outside finish lumber at 4 cents	24.00	
330 feet moldings at 2 cents	6.60	
Rear porch finish	7.00	
Front veranda finish	56.80	
6 cellar windows and sash	9.00	
26 windows, sash and blinds, at $3.75	97.50	
2 outside door frames at $1.60	3.20	
Front door	5.50	
Rear door	3.50	
Bulkhead finish	6.00	
750 feet birch flooring at 4 cents	30.00	
1700 feet pine flooring at $22 per M	37.40	
28 door frames at 60 cents	16.80	
1 pair slide doors	8.00	
Vestibule door	5.00	
12 doors, first floor, at $2.25	27.00	
13 doors, second floor, at $1.75	22.75	
48 side door finish at 55 cents	26.40	
9 side closet door finish at 30 cents	2.70	
27 side window finish at 75 cents	20.25	
500 feet sheathing for wainscoting at 3 cents	15.00	
120 feet cap for sheathing and chair rail	2.40	
350 feet room base at 6 cents	21.00	
350 feet base molding	1.60	
132 feet closet base at 4 cents	5.28	
75 feet of shelving for closets at 3 cents	2.25	
Pantry shelving, drawers and sheathing	14.00	
Dish closet	5.00	
Stair finish complete	55.00	
Mantel	20.00	
Shelves in kitchen and bathroom	2.00	
Nails, paper and flashing	27.00	
Carting	15.00	
Hardware not included above	40.00	
Carpenter labor	500.00	
Bell	5.00	
		$1,533.48
Plumbing complete		225.00
Painting complete		135.00
Wall papering and molding		40.00
Heating, piping, registers and cold air box		125.00
Incidentals		18.17
Total		$2,500.00

The builder's certificate was signed by Peter Jaques, contractor. of Millbury, Mass.

THE dam now being constructed for New York's water supply will, when finished, be the largest in the world. It will form a reservoir 19 2-3 miles long, fed by a water shed of 373 square miles. The water will submerge the old Croton dam 34 feet, put farms and houses, now tenanted, 50 feet or more under the flood and increase the present available storage capacity of Croton Lake from 2,000,000,000 to 32,000,000,000 gallons. New York will then have in all the reservoirs of the Croton water shed about 74,500,000,000 gallons of water in storage as protection against drought. After the new dam is completed it will take five years to fill the reservoir.

Construction of Factory Chimneys.

In describing the construction of chimneys intended for use in connection with factories or industrial establishments, Francis Schumann says that the outer form of brick chimneys is either circular, octagonal or square in plan, and pyramidal in elevation, the sides having a regular taper of about ⅝ inch per foot; the diameter at the base, the inscribed circle of octagon or square, being between one-tenth and one-eighth of the hight, the proportion being dependent upon the required stability and ratio of flue area to hight.

The shell which incloses the nonconducting inner lining should be of good hard burned brick, of uniform size, laid in cement mortar. To insure circular bondage stretchers should preponderate, say four courses of stretchers to one of headers. It is good practice to bind the shell by iron bands or hoops made of, say, ¼ x 4 inch bars, securely riveted at joints. These should be built in with the brick work about 8 feet apart throughout the hight of the chimney. The bands are made in sizes to allow the laying of one course of stretchers between the band and the outer surface of the shell, the space between band and inner course of brick being well filled and packed with mortar. The bands should be so placed as to come immediately above or below a header course.

Care must be exercised to secure thorough packing of the joints in the brick work with mortar, so that the chimney walls be as impermeable as possible to the inflow of external air, which would tend to lower the temperature in the flue.

The inner or flue lining should extend the full hight of the chimney, and in no case bond with the outer shell, except at the duct inlets at the base. An annular space of not less than 1 inch should separate the lining from the outer shell. The lining, which is usually one-half brick thick at the top, increasing by a half brick in sections, is held in position vertically by projecting corbels of outer shell just touching the outer surface of the lining, thus permitting the free movement due to expansion.

The lower third of the lining should be faced with fire brick, laid in fire clay, to resist the higher temperature of the gases; the upper portion may be of ordinary brick. It is important to avoid sharp corners where the ducts enter the flue; the larger the curve, the better.

The top of a chimney should be covered by a cast iron cap serving as a binder, or tie, for the upper courses of the brick work, also as a cove, or protector, of the shell, space and lining from the weather, and as a deflector of the wind by inclining the upper surface at an angle of 30 degrees down and outward. The cap should be so arranged that it rests upon and is secured to the outer shell only. The upper surface of the cap projects over the inside of the inner lining, from which point a flange or apron extends down several inches below the top of lining, care being taken to leave a clear space of, say, not less than 6 inches between the top of lining and under side of cap to permit unobstructed longitudinal movement from expansion.

Protection from lightning is very essential in tall chimneys; a good method is the use of a heavy copper band placed several inches below the bottom of the cast iron cap, where it is secured to the brick work by copper belts to prevent its sliding downward. To this band copper rods, pointed and gilded, are soldered and riveted; the rods are placed at intervals not exceeding 2 feet, and of a length to bring the points about 2 feet above the highest part of the cast iron cap, the rods being bent outward so as not to touch the edge of the cap. Conductors made of about ⅛ x 1 inch copper strips lead from the band to a copper plate about 3 feet square by 1-16 inch thick buried in the ground near the base of the chimney, at least as deep as the bottom of the foundations, and where dampness exists, or, better still, in any adjacent deep well or body of water. All joints should be riveted and soldered and expansion provided for by slightly corrugating the conductor at intervals, being careful to avoid sudden bends. No insulation should be used.

CORRESPONDENCE.

Which Form of Roof Truss is the Stronger ?

From S. O. Y., *Richmond, Ind.*—I inclose sketches of two roof trusses intended for a factory building with a span of 100 feet and supported by an iron column in the center. I would like very much to have Mr. Kidder criticise the construction shown, stating which he considers the better truss for the purpose. What I especially want to know is whether the members shown are of proper size and arrangement to safely sustain the loads. There is a difference of opinion between certain people and myself regarding the matter, and we have decided to accept Mr. Kidder's opinion as binding and conclusive.

Answer.—We have prepared engravings from the two sketches of trusses furnished by our correspondent, and have designated them Figs. 1 and 2 for the sake of convenient discussion. Mr. Kidder's comments upon the trusses shown are as follows:

The arrangement of trusses indicated in Fig. 2 is the correct one, when there is to be a support at the center. Except for the size of one of the rods, the truss would be safe for a slate roof, and a load of 100 pounds per square foot on the tie beam, provided the trusses are not more than 12 feet from center to center. The truss shown in Fig. 1 is the correct shape for spanning the full width of the building, although it is not strong enough for the loads. The column in Fig. 1 would probably do more harm than good, for if the truss bore upon it at all it would bring a bending moment on the tie beam at X and Y, which is undesirable.

If, therefore, the column is to be used, there should be two trusses, as in Fig. 2. There should never be a support under a truss between the ends.

The correspondent does not give the distance the trusses are to be apart. Assuming the distance as 12 feet, center to center, and that the floor supported by the tie beam will be loaded to 100 pounds per square foot (including its own weight), and allowing 19 pounds per square foot of roof surface for the weight of truss and roof, and 26 pounds per square foot for wind and snow, the loads and stresses on one of the trusses shown in Fig. 2 and the single truss shown in Fig. 1 would be as indicated in Figs. 4 and 3, respectively. These latter figures also give the size of the rods and members required to sustain the stresses. No center rod will be required at B, Fig. 2, and the beam A should be fitted between the trusses after they are in place.

The possible load on the column may be 79,000 pounds. The column should be safe for this load, if the length does not exceed 16 feet. If the length is greater than 16 feet the diameter should be 8 inches, or it would be better to use a 10 x 12 inch or 12 x 12 inch Georgia pine post.

The dimensions given for the rafter and tie beam, Fig. 3, are for Georgia or Oregon pine, the braces to be of white pine. The dimensions in Fig. 4 are for white pine. If the distance between trusses is greater than 12 feet the size of timbers and rods should be increased in proportion.

The joint over the column, Fig. 2, should be made as in Fig. 5, and the joint at the wall should have three 2¼-inch bolts with cast washers on underside of tie beam, as in Fig. 4 of the article on " Truss Joints."

It would be good practice for those readers who have followed the articles on " Stresses in Roof Trusses " to draw the stress diagrams for these trusses and see how near the stresses scale to the values given in Figs. 3 and 4.

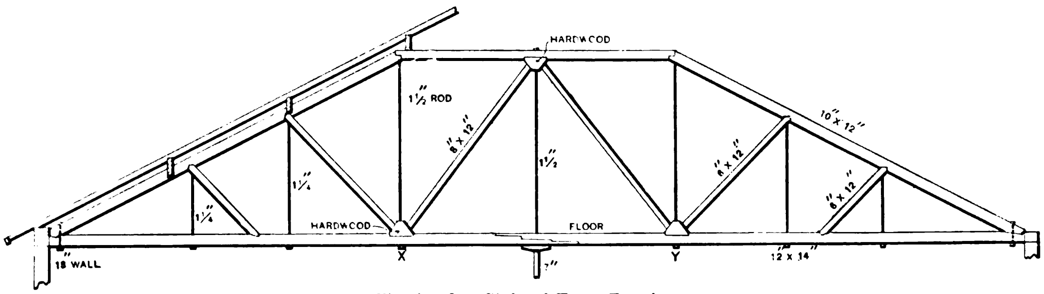


Fig. 1.—One Style of Truss Framing.

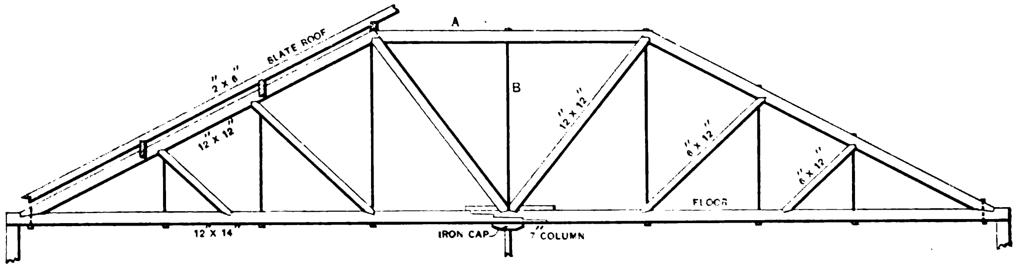


Fig. 2.—Another Style of Framing a Truss.

Which Form of Roof Truss is the Stronger?

Pyrography, or Burnt Wood Work.

From G. J. S., *Mendota, Ill.*—Will some reader who has had experience in this kind of work tell me how to burn furniture so as to finish it in the natural color? I think basswood is used.

I would also like to have some expert give suggestions which will be of value to a beginner who has never had any experience in upholstering. I would be glad if illustrations were furnished in connection with the matter.

Note.—We take pleasure in presenting below some comments on the subject of burnt wood work, furnished by Paul D. Otter, an expert in this line, and in the near future we shall lay before the readers a short article illustrating some ideas in upholstering work.

In regard to the question raised by your correspondent, I would say that this branch of decorative work may be acquired more readily than most of the applied arts, and with it, as with all such work, the quality largely depends on practice in drawing. However, if a steady hand is preserved throughout the work, it is more a matter of tracing outlines.

The outfit is a very simple one, consisting of a good stocky bottle containing a half or two-third quantity of benzine. The instrument, tubing and cork for the bottle must, of course, be secured through the manufacturers, dealers in art materials, or from department stores in any large city. The cork, or stopper, consists of a cork with a two-way pipe or tube, to which on one end is attached a short piece of small rubber tubing, terminating with a rubber bulb; on the other end is a longer piece of tubing, the end of which is slipped over the handle of the platinum burning instrument. The outfit is now suggestive of a ladies' cologne bottle and sprayer, and the principle is identical, with the exception of the spray being contained and conducted through the tube to the very end of the burning point. This is to be considered as a pencil and used in the same manner. The better outfit is one with a double bulb or bellows, which permits of an easier action on the part of the operator and a steadier heating of the point.

As in all such work, experimenting should be done on a waste piece of wood to become familiar with working the bulb with the left hand and using the burning point with the right, the bottle being placed just out of the way on the table. To heat the drawing point, it is first dipped into a small bottle containing alcohol, and this is ignited by a match; meanwhile the bellows are started until the point becomes red hot, when it is ready to make a trial of it on wood. Use the point as though it were a soft lead pencil, lines from which you could intensify or lighten at will. To produce shading, or even dark tones, a broader point is desirable in connection with the regular drawing point, although much of the shading or dark work may be put in by cross hatching, such as is seen in magazine illustrations in pen and ink.

With the outfits generally sold are given a few designs which will answer for trial work. After this, designs covering a wide range of furniture and other articles may be obtained from the dealer. It is best to transfer the design by carbon paper onto the wood, tracing the outline only with a pencil or tracing point; then have the design or drawing at hand, so that you can note the shaded parts after you have burnt in the outline. Any soft, close grained wood will answer, whitewood generally being preferred for its even character.

To finish the work and preserve the natural color, use bleached raw linseed oil, if possible, or plain raw linseed oil, which darkens slightly; to this add one-half quantity of turpentine, and coat the work all over, both sides, as a protection and a preventive to warping, to which this wood is very susceptible. After thoroughly dry, rub over with No. 00 sandpaper, and then coat with bleached shellac, this being rubbed down also with sandpaper when hard dry. A second coat of shellac is then applied, which after drying well is rubbed down with powdered pumice stone and oil. Pour out a half saucer full of raw linseed oil, to which add two or three tablespoonfuls of pumice powder, which mixes to a thick paste. Into this dip the piece of heavy cloth, or strip of cloth tied up in a tight roll the size of a shoe dauber, and apply the mixture to the surface of the work with a circular motion, which soon removes the gloss and leaves a smooth, dull finish which brightens when rubbed over with a dry cloth, and will improve when it is gone over with the dusting cloth.

Comments on Tool Chest Construction.

From D. F. M., *Syracuse, Neb.*—Might I say a word about the old subject—tool chests? After receiving the February number for 1901 I remodeled my chest after the plans of "E. C. N.," Boston, Mass., as it struck me as something unusually good After using it now about a year I feel as though I might "get up in meetin' and testify." It suits me better than any "Grandpa" chest I ever saw, and every one who has seen it says it is the neatest thing that ever came to their notice in the shape of a tool chest. I know of one or two being built like it. The older it gets the better it works, and I find it as easy to carry around as a "Grandpa." One disagreeable thing about it, however, is that nearly every person thinks it was made at a furniture factory. They do not seem to realize that an ordinary carpenter could put up such a neat piece of cabinet work. I have been looking for something better than *Carpentry and Building*, but fail to find it.

In looking over the floor plans published in the March issue of the paper, I am constrained to ask the designer of No. 56 if he would furnish for publication as neat a set of elevations as he has floor plans?

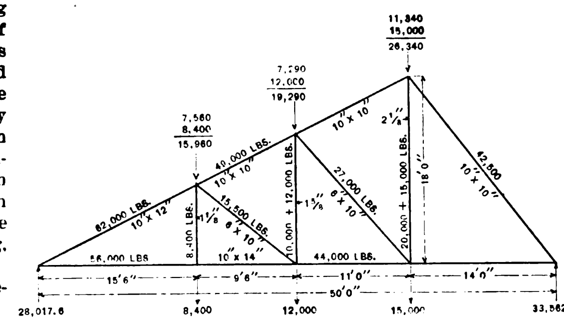


Fig. 4.—Diagram of Loads and Stresses of one of the Trusses Shown in Fig. 2.

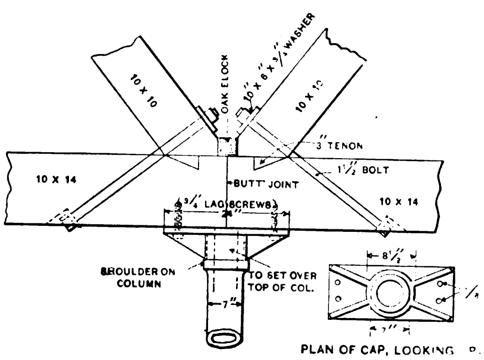


Fig. 5.—Detail of Column Support.

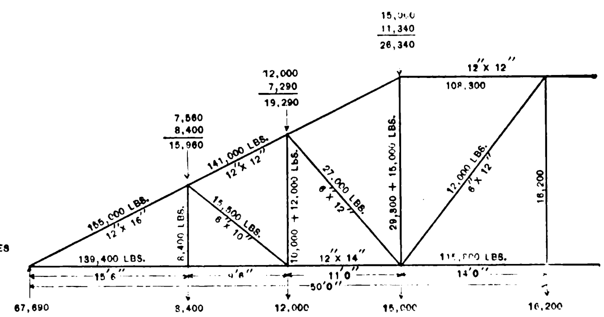


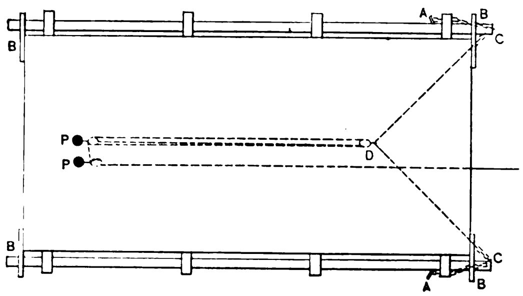
Fig. 3.—Diagram of Loads and Stresses of Single Truss Shown in Fig. 1.

Which Form of Roof Truss is the Stronger?

Suggestions for Moving Buildings.

From W. F. W., *Warrensburg, N. Y.*—In the issue of *Carpentry and Building* for June of last year I saw an article on house moving by Charles W. Smith, in which I was greatly interested. The writer stated that the screws most used in such work are from 12 to 18 inches, with lifting capacity of from 12 to 16 tons each. My experience is that 2-inch screw jacks from 10 to 16 inches in hight, with a lifting capacity of 5 tons, are more suitable for house moving than the kind above mentioned. The large screws lift too hard in one place if worked to their full capacity, and are liable to spring the building and crack the walls. Mr. Smith says the first thing is to place 10 x 12 inch timbers underneath. That is all right if the building is far enough from the ground to admit of it. But I find more buildings setting close to the ground than I do high enough to get timbers under. When the building rests close to the ground, the first thing is to place enough short screws under to commence raising. Set the screws on a short piece of plank and commence to raise, and if the building is weak or rotten place timbers under. When you get high enough, set the schews under the timbers and raise high enough to take the runners. Then place the runners in position, and set some jacks underneath them, after which level off the ground and lay the track or runs. Next put in the rolls and take out the jacks. Plank makes a good run, and it is lighter to handle than timber. Railroad ties are good for track, but I prefer 3-inch plank where the ground is smooth, although if rough timber is better.

Mr. Smith says it is safer and quicker to raise both



Suggestions for Moving Buildings.—Sketch Submitted by "W. F. W"

sides at once, but I cannot agree with him. In my opinion, it is safer to raise one side at a time, raising from 6 inches to 1 foot, then block up good and solid, and lift on the other side, raising twice as much and then blocking as before. Repeat the operation until the building is high enough to load. If a set of screws is used in the center of the building, let them remain all the time. Occasionally we use three or more sets of rolls, in which case great care must be taken to keep all the tracks of the same hight. Mr. Smith says, place a 2 x 6 piece, 8 feet long, under the runner at each end. I think it would be better if it were 10 or 12 inches wide and longer. Leave about 2 feet between the ends of the plank shoes, and if the building is long three or more shoes may be spiked to each runner. The rollers should not be less than from 6 to 7 inches in diameter and about 4 or 5 feet long. Yellow birch, soft maple and elm make very good rollers for a house 40 feet long. Mr. Smith's method of butting three rollers under each end would allow the center of the house to spring, and it if were a heavy building would draw too hard. I want the rollers to extend the whole length of the building, and the more there are the easier the house will draw. For a building 40 feet long, ten or more rollers on each side should be used. If there is not room in front to draw, a post can be set in the ground to hitch to, and run the rope around a snatch block, drawing from the back end.

Reference to the sketch which I send will, I think, enable the readers to understand my method of fastening the runners, also the way to arrange the rope and chains for drawing a building up against another. In the sketch P P are posts set in the ground to which to attach the snatch blocks; A A are two iron pins driven into the runners to which to fasten the chain; B B and B B are pieces of 2 x 4 spiked to the end of the building and down into the top of the runners, the ends of the latter projecting a foot or more beyond the end of the building. The chain used in drawing the building goes around the pins A A, then over the 2 x 4 marked B B, and then over the end of the runners C C, the tackle D being fastened to it under the building.

Handling and Setting Plate Glass.

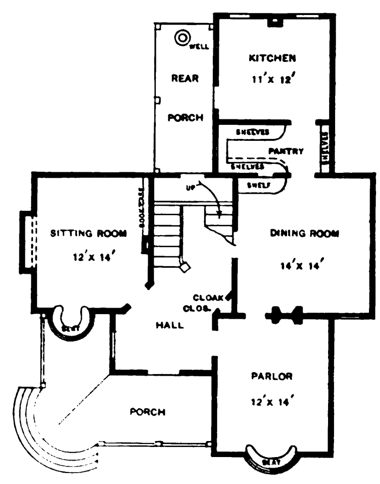
From J. B. P., *Hawkeye, Iowa.*—In answering the inquiry of "R. R.," in the March number of the paper, as to the best way of handling plate glass, I take the opportunity of telling him how we do the work in this section of the country. The case which I shall take for illustration involved the handling of glass for five store fronts, the work being done in one day. The glass came set on edge, with four or five in a box, which was forwarded on a flat car. The first move was to tip the box a little, so that when the side was taken off the glass would not fall out. The next step was to take two pieces of 2 x 6 a foot or two longer than the glass and lay them on edge on the dray wagon, one on each side, as far as possible. Then we cut some ½-inch pieces, the same in length as the width of the glass, and nail them onto the previous pieces about 3 feet apart, thus making a platform, which we set up in front of the box and tip out one glass and then let the frame and the glass down to a level, when four men could place it on the dray, after which it was hauled to the building. Reaching its destination, the men pick up the frame and glass and carry it into the building, placing the foot of the frame at the bottom of the sash. A couple of pieces were bolted onto the top of the frame to serve as stays when the frame was raised. A padded block was put down at each corner to receive the glass as it was raised nearly plumb. Then we took the outer casing of a bicycle tire, cut it into pieces about 15 inches long, and with them four men can lift a heavy plate into place at the bottom. Then by going to the top of the plate and pushing it over it will lift one corner, so the tire or strap can be removed. Proceed with the opposite corner in the same way. Now the glass can be pushed home at the top and a few strips tacked on for a stop. The frame can then be taken down, the stays unbolted, and everything is ready to go and get another plate of glass. This is our way of doing the work, and I should like to hear from others.

Finding Bevel of Hip Rafters with Steel Square.

From H. R., *New Jersey.*—When a common rafter of one-quarter pitch is cut off square on the projecting bottom end in order to receive the fascia, how can I obtain the cut on the hip to correspond with it, using the steel square applied directly to the timber, or by means of a diagram?

Elevations Wanted for Floor Plan.

From J. L. L., *Perry, Okla.*—I have been reading *Carpentry and Building* for several years, and have gained much knowledge from the Correspondence columns. I am glad to know that the paper is growing in interest. I have a matter to present to the readers for their criti-

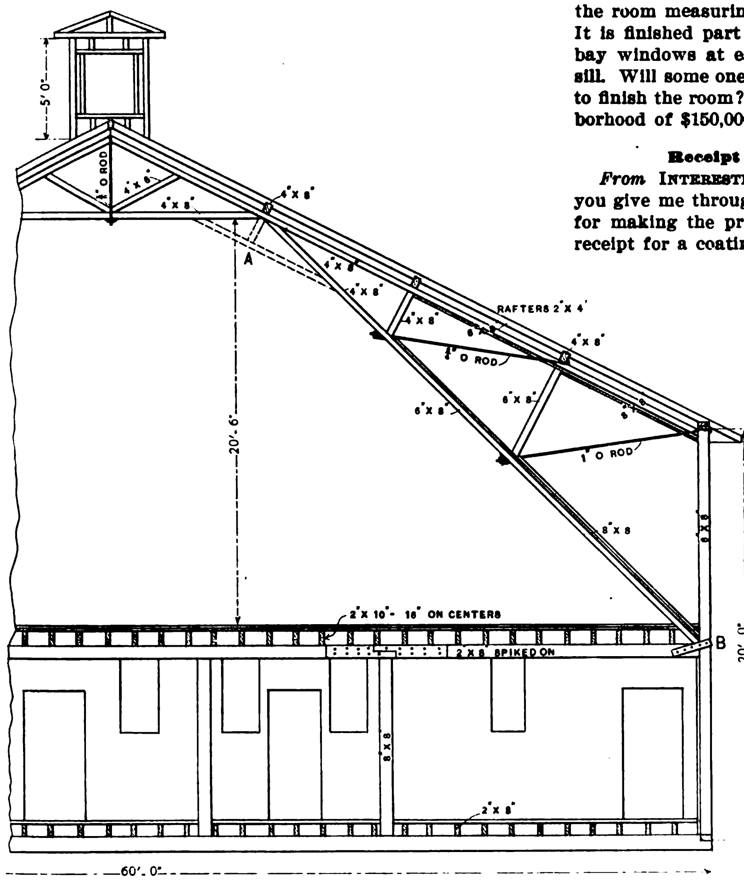


Elevations Wanted for Floor Plan

cism, and, at the same time, desire some of the architectural friends to furnish for publication a front and left side elevation of the first or ground floor plan which I send herewith. The second floor is to be the same size and shape as the first and all the windows in the second story are to be 20 x 30 inch, two lights. The circular windows shown in the front on the first floor are not to be extended through the second story. The porches are also to be only one story. The plan is intended for a 50-foot lot, with driveway on either side, and small rooms are desired.

Truss for Dairy Barn.

From W. F. C., *Elk River, Minn.*—Looking over the issue of *Carpentry and Building* for November, 1901, I noticed on page 285 a communication from "G. H. K." of San Francisco, Cal., in regard to remodeling an old dairy barn and asking Mr. Kidder to reply. This made me think of a barn I built in 1887, which was a structure 60 x 90 feet in size, with 20-foot posts, and as indicating the method of framing I send a blue print of one truss or bent. This form of structure was original with me, as at that time I had never seen such a truss, and the man for whom the building was being erected desired very much not to have the old fashioned posts and braces.



Truss for Dairy Barn.—Submitted by "W. F. C.," Elk River, Minn.

An examination of the truss, of which only a portion is here presented, shows by means of the dotted lines at A that a brace was put in after the frame had been raised. I found here a weak place before the braces were put in, and while the men were shingling I noticed that the roof swayed up and down, one side moving up when the opposite side went down. After the braces were put in the roof was all right. At B is an iron strap 3 inches wide, and fastened by two ⅝-inch bolts. I am inclined to think that the building shown in Fig. 2 on page 285 would do the same thing if it were not for the wing on that side of the building; possibly it might not, as this roof is much steeper than on the barn I built. This barn is standing to-day in just as good shape as when it was erected, and I can see it now from where I am writing this letter.

Last year I built a horse barn costing over $2000, and the year before I erected a barn costing over $6000. If I had the time I would send blue prints of them to the editor, as they might be of sufficient interest to publish; perhaps I may yet find the opportunity.

Note.—We have no doubt it would interest many of our readers to see published the drawings of one or both of these barns, and we trust our correspondent will find the time to send us blue prints of the horse barn at least, together with a short description covering the essential features of construction.

Softening a Grindstone.

From W. A. K., *Garnaville, Iowa.*—Will some reader of the paper kindly tell me, through the columns of the Correspondence department, the best way, if there is any, of softening a grindstone? Most, if not all, grindstones sold by local dealers are too hard.

Suggestions Wanted for Finish of Billiard Room.

From W. L., *Du Bois, Pa.*—I have under construction a billiard room on the third floor of a fine residence, the room measuring 20 x 26 feet, with a 12-foot ceiling. It is finished part way up the rafters and has octagon bay windows at each end 6 feet from the floor to the sill. Will some one please give me suggestions as to how to finish the room? The residence will cost in the neighborhood of $150,000.

Receipt for Copying Preparation.

From Interested Reader, *Cincinnatus, N. Y.*—Can you give me through the columns a receipt and directions for making the preparation used in a hectograph, or a receipt for a coating which is put on the paper in a duplicating process, similar to the hectograph, only the negative is made directly on the coated paper instead of on the gelatin pad in the pan? I should also like to know how to make black copying ink.

Answer.—The coating on paper for hectograph transfer should be made of the same material as the hectograph pad, but to be applied by dipping the paper or passing it through the gelatin solution while it is hot and laying the charged paper on a flat board or glass to cool and to give it time to set. For the composition use the proportions of 1 ounce of the best white glue—Cooper's gelatin preferred—and 6 to 7 ounces of white glycerin, more in winter than in summer. Soak the glue or gelatin in water overnight to thoroughly swell it, pour off the excess of water, add the glycerin and heat to near the boiling point, and carefully stir until the water is evaporated. Add 20 drops of oil of cloves to prevent molding, if to be kept for a time. When the solution is clear of bubbles and hot, dip the sheet of paper into and through the solution, or, by care, one side of the paper may be passed over and in contact with the solution and laid flat, so that the solution will harden evenly on the surface; or the solution may be painted on the paper hot with a brush. When paper is to be used for copying it should be quickly wet with a damp sponge and allowed to nearly dry. The ink is prepared by dissolving 1 ounce of aniline violet or blue in 7 fluid ounces of hot water, and, on cooling, adding 1 ounce of alcohol with ¼ ounce of glycerin, a few drops of ether and 1 drop of carbolic acid. For a black use "Nigrosine" (aniline black), as above.

Construction of a Silo.

From A. R. V., *Akron, Ohio.*—I am an interested reader of *Carpentry and Building* and would be very much pleased to have some one furnish, for publication, a good plan for a silo inside of a barn and also one for outside.

Note.—We shall be glad to have those of our readers making a feature of silos send us drawings for publication, together with such descriptive particulars as will render the method of doing the work clear and explicit.

It is possible our correspondent may gain some valuable suggestions from a perusal of a little pamphlet, entitled "Silos and Silage," issued by the Secretary of Agriculture, Washington, D. C. The matter is contained in what is known as "Farmers' Bulletin, No. 23," a copy of which can be had for a nominal sum (10 cents, we think it is) on application to the department.

Location of Hot Air Furnaces and Registers.

From E. H. S., *Clinton, N. Y.*—I would be glad to see in the Correspondence department of the paper a discussion of the question of locating hot air furnaces and registers in dwellings and churches.

Derricks for Raising Heavy Frames.

From J. J. H., *Colorado Springs, Col.*—Will some of the readers send for publication their ideas as to the best and cheapest device for raising large barns, mills or reduction works? I would like to see sketches and description of both hand and power derricks.

Design Wanted for Two-Story Brick School House.

From O. A. G., *Dresden, Tenn.*—Will some of the architectural friends of the paper kindly furnish drawings of a brick schoolhouse, two stories high, to cost in the neighborhood of $4000? I want the main front to face north, and the west side should be rather attractive, as it will face a road in the distance.

How Are the Rail Lines Found in Stair Building?

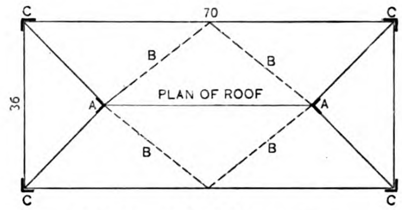
From W. B. R., *Davenport, Iowa.*—I notice more or less discussion of the hand railing question just now, and, as I am greatly interested in this branch of work, I desire to ask some of the experts who have so kindly contributed to the columns of the paper to further elucidate along the lines which I shall indicate. I have a great deal of stair work, and can build different stairs with ease, but I find more or less trouble in obtaining the rail lines. I find, as a rule, in *Carpentry and Building* that the writers tell us to draw lines from one letter to another until all are completed. There are probably a great many readers besides myself who do not thoroughly understand the lines, and who desire to know why each line is drawn and what particular object is gained by such lines. I find nearly all the stair rail illustrations appearing in the paper more or less criticised by some writer who is apparently well versed in the matter, but if "doctors disagree," what can be expected of those knowing but little about the rail lines and for what purpose they are constructed? A student should always know why the line is drawn, otherwise it will be difficult for him to understand.

Getting Out the String for Winding Stairs.

From G. E. S., *Brooklyn, N. Y.*—Will some of the practical stair builders kindly furnish, for publication, their method of getting out the string for a flight of stairs around a cylinder containing winders, similar to those presented in issue of *Carpentry and Building* for July, 1901, and contributed by "C. B. H." of Warren, Pa.?

A Question in Roof Construction.

From T. D. G., *Council Bluffs, Iowa.*—Referring to the trouble of "Green Hand" in the February issue of *Carpentry and Building*, I would suggest that he use 2 x 6 rafters at least, and double them to a little above the



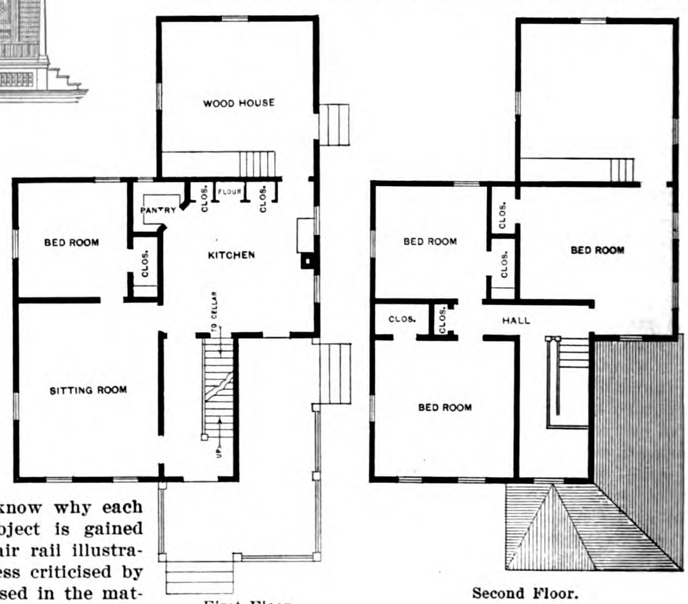
A Question in Roof Construction.

intersection of the collar beams. He should get two heavy steel wrought angles with ¾-inch holes drilled for ⅝-inch bolts, and put them in place, as indicated by the sketch sent herewith. This form of construction will keep the roof in good shape. Referring to the sketch, A A are the steel angles between the end hips, B B are the rods through the rafters, and C C are strap irons around the corners of the plates.

Criticism of "W. C. E.'s" Floor Plan.

From W. H. W., *Adams, N. Y.*—I notice in the February number, page 37, that "W. C. E." of Athens, Maine, invites criticism of a floor plan there presented. I would say that in his plan he needs more room for the hall stairs, for where he has about 8 feet he should have at least 10 feet. Again, in the kitchen there is no pantry and no outside door to the kitchen, while he has too many openings in the wood house. Another thing, he has not sufficient area of piazza. I inclose herewith a front elevation, together with the first and second floor plans, which may be of interest to him, the whole cost of building running in the neighborhood of $1500. I may not have made a very slick job of the drawings, owing, in part, to poor light and poor paper and old age, I being in my seventy-eighth year. In my plan it will be noticed there is less frontage, and the wood house is placed in the rear. As "W. C. E." had it, the front was 46 feet, while I have made it only 30 feet, which I think a better arrangement.

Front Elevation.



First Floor. Second Floor.

Criticism of "W. C E.'s" Floor Plan. Scale, 1-16 Inch to the Foot

WHAT BUILDERS ARE DOING.

LEADING representatives of the building and allied trades of Akron, Ohio, have, after mature consideration of the question, formed a Builders' Exchange, the organization having been perfected on February 17 of the present year, when the following officers were elected:

President, F. H. Weeks.
First vice-president, James Brown.
Second vice-president, H. P. Cahill.
Treasurer, W. A. McCellan.
Secretary, F. J. Wettach.

BOARD OF DIRECTORS.

F. C. Kasch.	J. H. Myers.
A. M. Harm.	J. Ed. Good.
John Crisp.	Frank Fiebeger.
A. E. Lyman.	Thomas Brady.

The exchange was organized with a membership of 47, representing practically all the different branches of the building business as conducted in the city. The exchange has rooms in what is regarded as the best office building in Akron—The Hamilton—and is open every day from 8 a.m. to 5 p.m. The 'change hour is from 10.30 to 11.30 a.m. We understand that any responsible person in any way connected with the building business in the city is eligible to membership. The exchange begins its existence with a very bright outlook.

Baltimore, Md.

The regular quarterly meeting of the Builders' Exchange was held in their rooms on March 4, when pertinent talks upon popular topics were given by prominent representatives of the city. Mayor Hayes spoke of the urgent need of a sewerage system for Baltimore and the advantages such a system would have from a sanitary standpoint. The same subject was discussed by City Engineer Fendall, and as a result of the views expressed a resolution was unanimously adopted by the exchange in favor of the building of a sewerage system for the city. J. B. N. Wyatt of the architectural firm of Wyatt & Nolting spoke of the commercial value of the beauty of the city, and William H. Sayward, secretary of the National Association of Builders, who was on his way to Washington, made some very interesting remarks, in the course of which he paid a high tribute to the hospitality of Baltimore. Prior to the addresses the members of the exchange and their friends partook of a "spread," which had been provided as a feature of the evening.

The Builders' Exchange has issued a little pamphlet giving a classified list of the membership for 1902. The front cover is embellished with a general view of the building in which the exchange has its quarters, and it also carries the names of the president and secretary. A glance at the list of members shows all branches of the building and allied industries to be represented and the little folder is gotten up in a style to prove of interest and value to all concerned.

The feeling among architects, contractors and builders is that the coming season will witness increased activity in the building line, both in the way of business improvements and suburban residences.

Boston, Mass.

The first annual reception of the Contractors' and Builders' Association was held the latter part of February at the Exchange Club. About 75 members and their guests were present and the occasion was one of great interest to all. President Walter F. Burk was master of ceremonies, and at his right and left at the head of the table were representatives of the city government, the Building Department, the Society of Civil Engineers, the Boston Society of Architects and of the Architectural Club.

In opening the literary part of the exercises of the evening President Burk presented a brief history of the association from its inception, 60 years ago, around the old pump in State street, where a few old timers used to meet daily and exchange opinions and ideas. W. F. Kearns was introduced as toastmaster, and his first duty was to ask the company to sing a verse of the original song printed on the bill of fare and written by an associate member. Short addresses were made by Alderman Slattery, Lawson B. Bidwell, president of the Boston Society of Civil Engineers, who offered some very interesting remarks on "Engineering as Applied to Modern Building;" Capt. John S. Damrell, Building Commissioner, who commented upon the relations between the builder and the Building Department, and then read a highly instructive paper on "Municipal Building Laws," and before closing touched upon the desirability of engineers, architects and master builders being licensed. Col. J. P. Bradley, chairman of the School House Commission, spoke of Boston's need of school buildings, and pointed out that while the city was now using portable buildings, permanent structures were required, and that eight new school houses were to be erected in the immediate future.

The officers of the Contractors' and Builders' Association for 1902 are: President, Walter F. Burk; vice-president, E. A. Abbot; secretary, T. F. Harrigan, and treasurer, W. H. Keyes.

Bridgeport, Conn.

The members of the Builders' Exchange recently held their annual meeting, when the following officers were elected for the ensuing year:

President, A. W. Burritt.
First vice-president, Edward Casey.
Second vice-president, W. W. Walker.
Secretary, W. H. R. Du Bois.
Treasurer, J. M. Sanger.

BOARD OF TRUSTEES.

D. C. Mills,	L. H. Mills,
Charles Bottomley,	J. P. Coughlin.

Charlotte, N. C.

Early in February a number of the leading contractors of the city held a meeting and formed a builders' association. By-laws and regulations were adopted and officers elected as follows: President, C. H. Chamblin, vice-president, G. R. Davis; secretary, C. G. Kelly; treasurer, J. M. Byrd, and door keeper, J. E. Colson.

It was decided to hold meetings on the second and fourth Saturday evenings of each month. All contractors in the building trades are invited to join the association.

Clinton, Mass.

As a result of several conferences on the part of the leading builders in Clinton a master builders' association has been formed with a membership of 20. The quarters are in the Bank Block and the officers for the ensuing year are as follows: President, Josiah H. Wilder; vice-president, Robert Maitland; recording secretary, Edgar W. Weeks; treasurer, Henry W. Welch, and financial secretary, Fred. E. Wilder.

The directors are John J. Philnin, George A. Barnard, William H. Walker, Charles P. Nelson and John E. Phinney.

Erie, Pa.

The Board of Directors of the Erie Builders' Exchange organized on the evening of March 4 by the election of the following officers to serve during the ensuing year:

President, R. T. Sbenk.
Vice-President, Jos. Frank.
Treasurer, E. D. Carroll.
Secretary, N. D. Sweigard.
Assistant secretary, D. W. Schafer.

Routine business occupied the remaining time of the session.

Honolulu, H. I.

The Builders' Exchange, which was recently formed by the master builders of the city, inaugurated its regular monthly sessions on February 19. About 50 persons were present, including the Governor of Hawaii, the Speaker of the House of Representatives and other prominent people. The officers of the association are T. F. Osborn, president; W. T. Paty, vice-president; James F. Langston, secretary; W. P. Barry, treasurer; Julius Asch, auditor; F. W. Beardslee, chairman of the Executive Committee, and J. H. Craig, secretary of the Executive Committee.

Kansas City, Mo.

The prevailing opinion among architects, contractors and builders seems to be that more building will be done in Kansas City the present year than in any corresponding period since the boom in the later eighties. From present indications a large number of residences, flat houses and small store buildings will be erected, as well as some office buildings. In the opinion of one of the prominent contractors of the city there will be from 50 to 75 per cent. more building of all kinds done in the city this year than last year. He thinks the greatest need of the city is more good office buildings and business houses, as rents for offices and store rooms have reached a hight which cannot be passed without serious detriment to the town. Among the larger improvements, the plans for which have already been made public, will be the addition to the Savoy Hotel, and there are indications that definite action will be taken toward building a new Union Railroad station, which is likely to have a stimulating effect upon real estate values of some particular section of the city, especially if a change of the station's location is made. Preparations are also under way for building an electric railway to Topeka, and it is thought that many fine residences will be erected along this line and many suburbs spring into existence.

Los Angeles, Cal.

The year has opened remarkably well for the building industry in Los Angeles. The total building permits for February amount to nearly $400,000, or two and a half times as much as the total for February, 1901. In fact, the building permits for the first three weeks of February this year were in excess of the total for seven months of last year. Among the buildings which are to be put up immediately are a number of handsome apartment houses and residences. A type of the new apartment houses now being constructed in this city is that of the Barr Realty Company, which is now nearly completed. It is a two-story, brick, cement and frame structure. The front is cement on steel lath, the interior walls are brick and the rear portion is frame. The central portion of the building is recessed, leaving an open court 28 x 60 feet in dimensions in front and two projecting wings on either side. The mission style of architecture was employed. It contains 45 rooms, distributed into eight flats. The interior wood work is cedar and the hardware solid brass. The floors are polished oak and the ceilings are beautifully carved. Each apartment is fitted with handsome mantels, porcelain bathtubs, instantaneous water heaters, combination gas and electric chandeliers and other conveniences. The building will cost between $25,000 and $30,000.

Louisville, Ky.

The Building Contractors' Association are contemplating removal about April 1 to new quarters in the Tyler Building, where they will have more room than in their present location in the Board of Trade Building. In the new premises, which will measure 30 x 40 feet, the equipment will be all that is requisite to meet the requirements of the members. There will be large plan tables, bulletin boards, mail boxes, &c., while connecting with the exchange will be a secretary's and directors' room, handsomely fitted up for the purpose. The membership at present numbers 125, which is about two-thirds of the leading contractors of the city. With the increased facilities the management look forward to a rapidly growing membership and future prospects are regarded as very bright.

The officers for 1902 are as follows:

President, A. N. Struck.
First vice-president, Jos. H. Peter.
Second vice-president, W. B. Pell.
Treasurer, Fred. Hoertz.
Sec. and assistant treas., J. V. Beckman.

DIRECTORS.

J. B. Ohligschlager,	J. L. Strassel,
Fred. Krebs,	Owen Tyler,
Chas. Hamsley,	A. D. Scott,
Jos. McWilliams,	G. N. Lortz,
H. W. Newman,	Edward Peter.

Lowell, Mass.

The annual meeting of the Builders' Exchange will be held in their rooms in Appeton street on April 16. The affairs of the organization are in a flourishing condition and new members are constantly added.

Indications point to a continuance of good business in the building line, although no very large work is at present in prospect. No action has yet been taken by the exchange as a unit on the eight-hour question. The consensus of opinion is that individually some will work eight hours, others nine, payment being by the hour.

McKeesport, Pa.

The leading contractors and builders of the city have recently organized a Builders' Exchange and meetings are for the present held in the Lyceum Building. As soon as matters are running smoothly it is the intention of the membership to have headquarters nearer the center of the city. The officers are: President, William McCord; first vice-president, Henry Pitzer; second vice-president, William Nowell; treasurer, E. I. Clark, and secretary, G. Edward Peterson, whose address is 516 Coursin street.

The outlook for an active business season is regarded as most encouraging, although there are some signs that carpenters may demand higher rates of wages. It is hoped, however, that everything can be adjusted satisfactorily to all concerned, and that McKeesport will witness a building record during 1902 of which it may be justly proud.

Philadelphia, Pa.

On March 8 the city lost one of its most prominent builders in the death of Stacy Reeves, who was 74 years of age. He was born in Mount Holly, N. J., and came to the city at an early age. He was prominently identified with the building organizations, having been the third president of the Master Builders' Exchange, and in 1891 was elected a director of the National Association of Builders. At a meeting of the Board of Directors of the Master Builders' Exchange, held on the afternoon of March 11, resolutions were adopted relative to the death of Mr. Reeves, and eulogistic addresses were made by several members. The officers and a large representation of the membership attended the funeral, which took place from his late home, 5711 Thomas avenue, West Philadelphia.

A considerable number of the members, including President Shields, attended the preliminary meeting of the National Association of Builders, held in Washington on March 5.

Secretary William Harkness of the Master Builders' Exchange has recently devised a plan for increasing the usefulness of the organization, which, we understand, has met with the approval of the officials and members generally. He proposes calling personally on the secretaries of the various other exchanges and trades bodies in the city with a view to concerted action on matters of public interest.

A considerable amount of building is being done in and about the city and especially in the suburbs. A number of building operations, involving the erection of many dwellings in the aggregate, are under way and the outlook is for a most active season. Among the many important projects may be mentioned an operation which will include 56 two-story houses and four two-story stores and dwellings in West Philadelphia, the permits having been issued to B. S. Sterling. Another operation involving 100 houses will be conducted by J. M. Holmes in the Twenty-second ward and still another by Alexander Cowan in West Philadelphia, involving 65 dwellings.

Quincy, Ill.

The Master Builders' and Traders' Association of Quincy held its annual meeting on the evening of Tuesday, February 4, when various reports were presented and officers for the ensuing year were elected. The voting resulted as follows:

President, J. Winthrop Pratt.
Vice-president, E. J. Sandberg.
Clerk, A. W. Stetson.
Treasurer, William Westland.

DIRECTORS.

J. W. Pratt,	John O. Hall,
E. J. Sandberg,	A. A. Murphy,
Julius Johnson,	W. A. Bradford,
William H. Teasdale,	William Westland,
William Harkins,	H. Everett Crane.

The building outlook is encouraging and there are several tracts which will be developed the coming season. President Pratt is one of the leading builders of the city and has done much to build up certain sections, more especially that in the vicinity of Independence avenue.

Rome, N. Y.

After a long discussion of the question, and as a result of many conferences between leading builders, contractors and others connected with the trade, a committee was recently appointed to frame a constitution and by-laws for a buildrs' exchange. A short time afterward the committee reported and the organization was perfected, with officers for the ensuing year as follows:

President, Lawrence Carey; vice-president, L. A. Martin; secretary, S. C. Baldwin, and treasurer, Jacob Gerwig. The Executive Committee consists of Ezra Hilltz, E. H. Owens and David Parry.

The organization is composed of men of sound judgment and reputation, and it is the intention of the association not only to protect themselves against any and all influences tending to injure their business, but to look after the interests of their customers as well. The exchange is the result of years of talk and misunderstandings, but the builders of the city apparently have finally come to a realizing sense of the position in which they stand as compared with other interests arrayed against them, and it is expected that great good to all connected with the building industry will be the outcome.

The outlook for building operations in the city the coming season is encouraging, regardless of the recent advance in price of materials, and it is the general feeling among builders and contractors that a fairly busy season will ensue.

San Francisco, Cal.

Never before has San Francisco witnessed such activity in building as prevails at this time, says our correspondent, writing under date of March 7. The number and value of building contracts for the first two months of 1902 have far eclipsed any similar period in San Francisco's history, and so far there is no indication of any slackening in this regard. In 1901 the building contracts awarded amounted in value to $7,418,615, which broke all records except that for the year 1889; but 1902 promises to far outdo any previous year in building records, the figures for the first two months showing building contracts valued at $2,212,928 to have been filed. If the remainder of the year keeps up to this average the building business of 1902 will be nearly double that of last year.

Among the finer buildings which are about to be constructed may be mentioned the Flood Building, a 12-story structure, on the old Baldwin Hotel site; the Pacific Union Club Building, at the corner of Stockton and Posts streets, to cost about $470,000; the Mrs. Hermann Oelrichs five-story hotel on California street, a new apartment house at Bush and Powell streets, and the Isidore Schwartz apartment house on Eddy street, to cost $60,000.

The agreement which has existed for two years between the large brick manufacturers of San Francisco and vicinity will expire on April 1, and it is rumored that the arrangement will not be renewed. If the combine should go to pieces it is generally believed that there will be a decisive fall in the price of bricks, which have been held at $10 per 1000 during the existence of the combine.

Seattle, Wash.

The building permits issued in Seattle during the month of February show a total valuation of $663,593, the largest in the history of the city with the exception of March, 1901, and are almost double those of the same month last year. Of a total of 442 permits issued during the month 104 were for one-story frame buildings, 47 were for one-and-one-half-story frame buildings, 51 for two-story frame buildings and 5 for three-story frame buildings. The activity in building is not confined to any section of the city, but is noticed in the southern suburbs and other outside sections as well as in the business portion.

Worcester, Mass.

The members of the Builders' Exchange held their fourteenth annual banquet at the rooms on Main street on the evening of Thursday, February 13. The affair was largely informal, but thoroughly enjoyable in every way. A large representation of the membership was present, and, after the wants of the inner man had been supplied and all signs of the banquet removed from the room, the guests gathered around an improvised stage for a vaudeville entertainment, over which O. S. Kendall presided as master of ceremonies. Chaffin's Orchestra, which had furnished music while the banquet was in progress, opened the programme, after which the various numbers of the vaudeville entertainment were rendered.

Notes.

A movement is on foot in Richmond, Va., looking to the establishment of a Builders' Exchange, the membership of which will be composed of contractors in the various building and allied trades. The objects of the exchange will be to correct evils now existing through competition, to overcome delays in completing buildings and to bring contractors in the various branches in closer touch one with another.

The contractors and builders of Barrie, Vt., have recently formed a Master Builders' Association with the following officials: President, S. D. Allen; vice-president, H. O. Camp; secretary, F. L. Page, and treasurer, George A. Drew.

DESIGN FOR AN ODD FELLOWS' HALL.

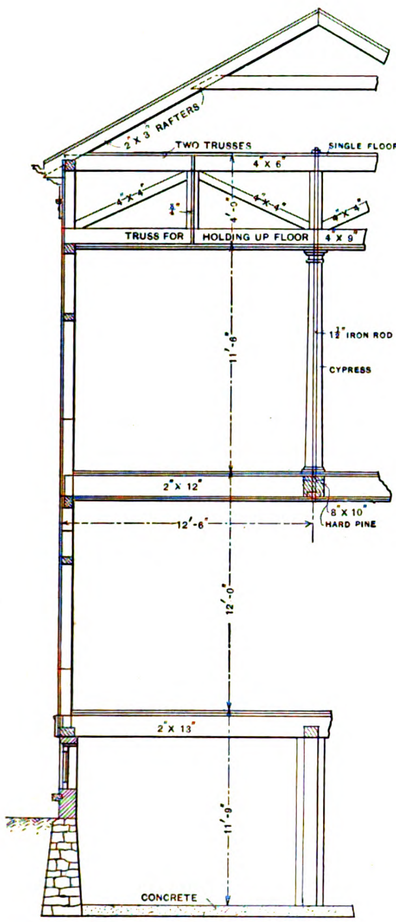
A SHORT time ago a correspondent made a request in these columns for a design of an Odd Fellows' Hall, enumerating in connection therewith various requirements which the design should meet. In reply to this request we have received from George J. Kellemen, architect, of East Providence, R. I., the drawings of an Odd Fellows' Hall, which we present herewith.

According to the requirements of the correspondent the building was to be 25 x 40 feet in area, two stories in hight and of frame construction. In regard to the design shown herewith the architect says:

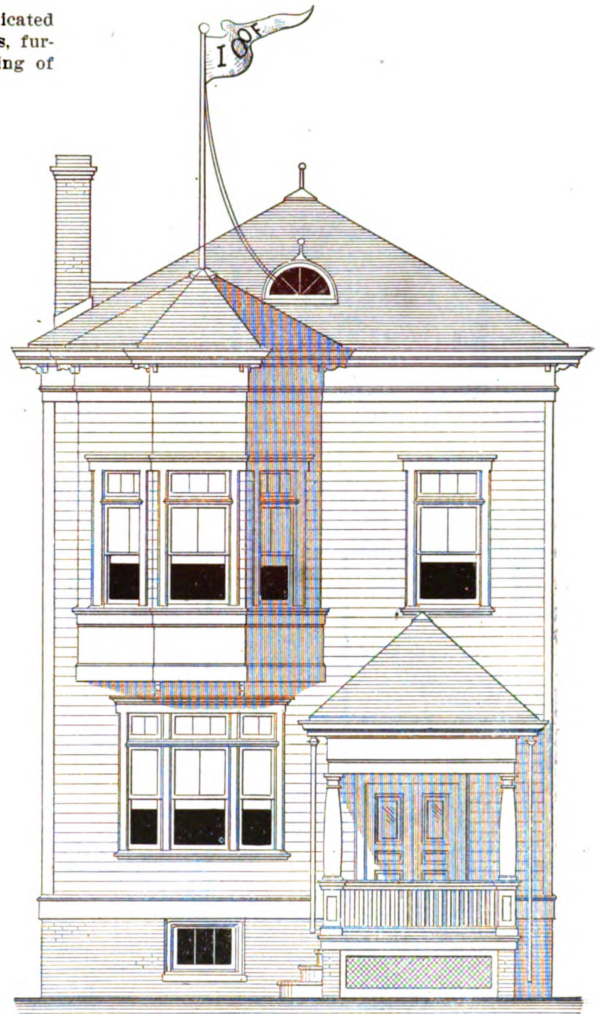
The foundation is of brick and stone, as indicated in the sectional elevation, the cold air duct, piers, furnace foundation, cellar way and porch piers being of good sound brick, laid in black mortar and pointed. The chimney and fire place are also of brick, while the fittings are of North River blue stone. The face of the fire place is of deep red brick, and in the cellar way the risers are of brick. The plastering is left rough on the side walls, while the ceilings are hard finished.

The frame of the building is of spruce. The first floor joist is 2 x 13 inches, the second floor joist 2 x 12 inches, the ceiling joist 2 x 9 inches, all as indicated on the sectional elevation. The collar joist on the long jack rafters is 1⅛ x 6 inches. A detail of the trusses is also presented in the sectional elevation. The hip rafters are 3 x 8 inches, all jack rafters 2 x 8 inches, the girder on second floor 8 x 10 inches, and other girders are 4 x 6 inches; the sills are 4 x 6 inches, porch joist 2 x 9 inches, and the porch rafters 2 x 6 inches. All rafters are placed 20 inches on centers and the floor joist 16 inches on centers. All floor joist, including the porch floor, have herring bone bridging. The porch joist are covered with tar paper.

The outside finish of the building includes spruce clapboards, with pine base, corner boards and moldings; also outside casings, stools and caps on the windows. The porch, however, has a cypress finish, with porch floor of hard pine. The columns are of Koll's patent, made by Hartman Bros. Mfg. Company of Mt. Vernon, N. Y.



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



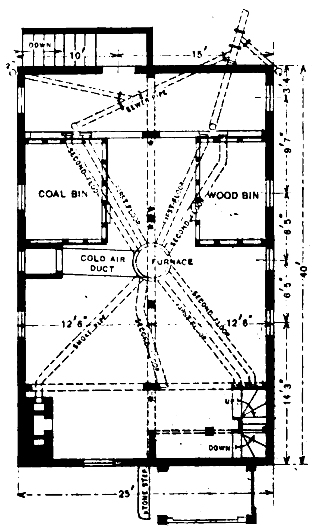
Front Elevation.—Scale, ⅛ Inch to the Foot.

Design for an Odd Fellows' Hall.—George J. Kellemen, Architect, East Providence, R. I.

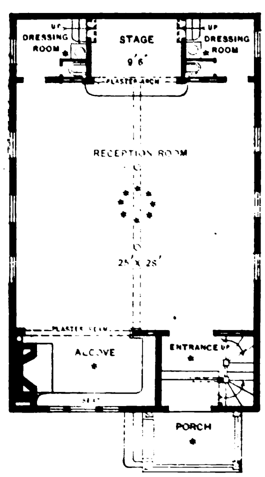
The interior finish of the building is of white wood, except the stairs, mantel, columns and floors. The first floor is of 3-inch strips of North Carolina hard pine, blind nailed, laid the grain way and then polished. The stage floors are of spruce, the vestibule floor of North Carolina hard pine, the second floor of spruce blind nailed, the stairs of hard pine, the mantel is of hard wood, and the doors are of white wood, five panel style 1½-inch thick, except on the stage, alcove and anterooms, where a flexifold pattern is used. The window frames are of hard pine and the sash are of pine, weighted. All hard wood throughout the building is of good quality and the building is piped for gas lighting, the fixtures being of brass. The heating is done by a

Demarest warm air furnace, made by Innes & Demarest of Binghamton, N. Y., its position, with pipe connections, being clearly indicated on the foundation plan.

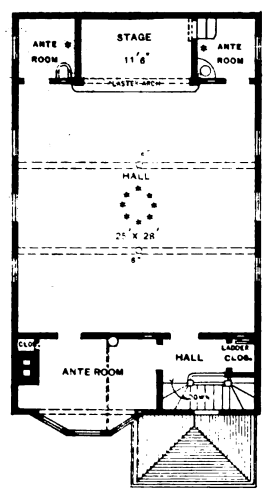
The outside of the building is painted two coats lead and linseed oil, and all base, cornice, corner boards and window frames painted white, the clapboards yellow, the sash green and the gutters red, using United States Marine paint. The porch cornice, columns, rail and balusters are filled and given two coats of Spar



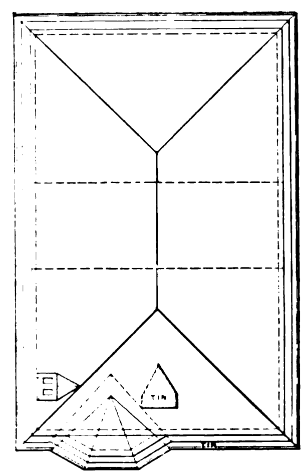
Foundation.



First Floor.



Second Floor.



Roof Plan.

Design for An Odd Fellows' Hall—Floor Plans.—Scale, 1-16 *Inch to the Foot*

kyanize varnish, as are also the cellar door and front doors. The porch floor and steps are treated to two coats of oil. The interior wood work is filled and treated with two coats of kyanized varnish, rubbed down. The floor of the reception room is filled and polished, while the floors of the stages are stained green. The windows in the reception room, hall, dressing and anterooms near the stage are glazed with Chances' muffled glass.

THE drawings have recently been completed for a colonial residence to be erected in Ambler, Pa., for William S. Acuff, which will embody many interesting features. It will be constructed of Agontz stone and will have a stained shingle roof. There will be front, side and rear porches, and upon the first floor will be a reception hall and stairway finished in red oak, a parlor finished in white enamel and gold, a library finished in birch, a large dining room finished in quartered oak with paneled walls, and a kitchen, laundry and pantry. On the second floor will be four sleeping rooms, a sewing room, bathroom and linen room, while on the third floor will be a billiard room, servants' quarters and a trunk room. The house will be equipped with all the modern conveniences, including gas and electric lighting, a hot water heating plant, the latest improved plumbing, tiled mantels, leaded glass work, &c. The plans were prepared by C. E. Schermerhorn and Watson K. Phillips, associate architects, of Philadelphia, Pa.

Carelessness in Slate Roofing.

It is proper to charge to slaters the faults that belong to them, and they are sufficiently numerous, but it is not always through the lack of skill, thoroughness or honesty that roofs fail to perform the function for which they are built. Even with the best intention and the utmost care some hidden fault is liable to come to light, it may be, many months after the work is completed; hence the custom prevails, says a writer in *Cement and Slate*, of requiring the slater to warrant his work for a given length of time.

We have known what appeared to be a most thoroughly laid slate roof to be extensively damaged by means of what was esteemed an excellence of construction. The slates themselves were of the best quality, they were skillfully applied, and the roof boards were sound and well seasoned. "Well seasoned," and therein lay apparently the root of the mischief. Being dry, laid closely and covered with roofing paper, all of which are among the desirable points, no sooner were the upper stories plastered than the under side of the roof boards became swollen by the rising moisture to that degree that the nails were started in many places, and the warping of the boards to which the slates were nailed broke them and let them slide down. In this case the boards curled by the swelling of the under surface. If the boards had been of inferior quality and but partly seasoned it is doubtful whether from this cause they would have warped sufficiently to injure the slates. Ample nailing would perhaps have held the boards to the rafters, but this was not the slater's business, although a good workman ought not to proceed with work knowing it is being done at a disadvantage.

On another roof a similar result followed an opposite cause. The roof boards were but partially seasoned when, late in the fall, they were covered with the roofing paper and then overlaid with slate. There was no trouble until some months afterward, when the house had been plastered, and, by means of thorough ventilation and heating, was thoroughly dry. Then the boards on the roof began to "get their backs up," and loosened the slates by the score. Here the boards curled by the shrinking of the under surface. If they had all been nailed through the middle to every rafter as well as at the edges this might possibly have held them, but few builders would think such thoroughness necessary. It is perhaps needless to say that in both cases the boards were spruce, and, as everybody knows, the old serpent himself is not more stubbornly inclined to warp and twist and crawl than is spruce lumber if it has any provocation or opportunity.

In the former of these two cases the trouble could doubtless have been prevented by providing thorough ventilation while the building contained any moisture, and in the latter by using well seasoned stock, which, it is safe to say, is always best for building purposes.

Acetylene and Electricity for Lighting.

Many of the recent disastrous fires have, on investigation, been traced to the use of electricity, and the public is not by any means satisfied that the methods of electric illumination and electric motive power have yet been developed to the point of perfection. Yet, great as have been the loss and damage resulting from this cause, there is no doubt that the popularity of electricity for lighting and other purposes will continue. The acetylene people, however, are taking these electrically caused fires as a text for arguments in support of the interests of their form of illumination. They urge that while the bright white light produced by acetylene is of itself a strong argument in its favor as a substitute for the yellow and dull red of the incandescent electric light, the element of safety is a far greater inducement. The advocates of acetylene point out that the losses sustained last year by fires directly traceable to electric wiring amounted to over $20,000,000. On the other hand it is claimed that not a single fire loss amounting to $1000 was reported as being caused by the use of acetylene gas, notwithstanding that there are in use over $200,000 worth of acetylene gas generators of more than one hundred different makes and of good, bad and indifferent construction. That there is still room for improvement in the installation of electric systems is acknowledged, and the same is true of the acetylene lighting apparatus and its construction. The plumber and general mechanic, however, is more interested in acetylene lighting, as the field for its use is not confined to cities but is found wherever a fine residence or small village exists. As an individual system for an isolated building requiring, say, 1000 lights, as in the various rooms of a summer hotel and its grounds, the acetylene system has proved acceptable, as well as for lighting the streets of small towns. It is equally well adapted for the small cottage of the suburban resident or the farm house. These features, together with the superior light afforded, have already made the light popular, and it only requires a greater familiarity with it on the part of the public to greatly increase its use. There are certain principles that have been discovered in connection with the generation and use of acetylene gas that must invariably be observed. Where these principles are thoroughly understood and the apparatus used accordingly, the comparative immunity from fire losses referred to above is likely to be maintained where acetylene gas is used.

Glass Bathtubs.

Bathtubs of glass are being made in Germany and are said to have many advantages over metal and enamel, the principal one being that they are much cheaper. They are also strong. Those being made now are 5 feet 6 inches long, about 2 feet wide and about 2½ inches thick. They are made in a solid piece, and one can be turned out complete in about five minutes. The method of manufacturing glass bathtubs, as described by a contemporary, is very simple. The molten glass is taken from the furnace and placed in a mold, which can readily be swung into any desired position. Compressed air is then admitted through a flexible tube which connects with the bottom of the mold. The air pressure is regulated by valves. As soon as the article is finished it is switched into an annealing chamber, where it is again heated and then allowed to cool. This toughens it, and after the process it is ready for use.

New Publication.

Useful Designs and Details. Size, 10¼ x 13 inches; 43 full page plates; bound in paper covers. Published by Porter, Taylor & Co. Price, $2, postpaid.

This work, as its title indicates, presents a great variety of designs and details relating to building construction. The subjects embrace porches, bay windows, columns, doors, newels, mantels, stairways, cornices, gables, sideboards, brackets and braces, bank counters, office partitions, drug store shelving, bar front fixtures, balusters and other turned work. There are also designs of interiors, both foreign and American, together with examples in brick work for gables, chimneys, cornices, &c. The details are to a scale, and the matter is presented in a way to interest the student of architecture and building.

The Elmira Reformatory Trade School.

E. E. Clark, director of the trade school of the New York State Reformatory, at Elmira, N. Y., who was a recent visitor at the office of *Carpentry and Building*, reports that important extensions and improvements are in contemplation at Elmira in connection with this department. Should the appropriations from the State be sufficient it is proposed to erect new buildings for the accommodation of the trade schools, thus systematizing the work and making it more efficient. Between 400 and 500 young men are each year paroled or discharged from the reformatory with sufficient knowledge of some trade to enable them to make an honest living when again thrown upon their own resources. Some of the inmates who spend a longer time in the reformatory are, on discharge, equipped with sufficient knowledge of the theory and practice of a trade to enable them to become journeymen. Employment is secured by the authorities for numbers of young men each year. The result of this work has been highly satisfactory. Hundreds of youths, who otherwise might have been forced to return to a life of crime, through their equipment with a means of livelihood have been given the opportunity and encouragement to lead an honest life. Some 30 separate trades are taught at the present time in the Elmira Reformatory. Each of the inmates is obliged to take up some line of industry, and for ten hours each week is given trade instruction. Mr. Clark is convinced that this is the most satisfactory solution of the question of the disposal of young prisoners. It is the most effective reformative method yet devised.

New Lying-In Hospital.

The new Lying-In Hosital which has recently been completed in this city is an eight-story fire proof structure of steel, brick and stone, and cost $1,250,000. It has a frontage of 83 feet on Seventeenth street, 166 feet on Eighteenth street and 184 feet on Second avenue. It is probably the most perfectly equipped institution of its kind in the world. The walls are heated, and it is unnecessary to open the windows for the purpose of ventilation, as the air in the rooms can be changed every few minutes without this. The window curtains are outside to prevent danger from infection by harmful bacteria which might lodge in them. Another thing tending to prevent the lodgment of bacteria about the rooms is that they have no angles. The corners are curved, the cornices are curved, and a disinfecting solution can be sprayed over the entire surface of each room with a hose. The walls are of porcelain, iron and glass. The floors are of fire proof sawdust and give back no echo to the footfall. Baths are wheeled to the bedside of the patients.

Working Men's College, Melbourne, Australia.

The 1902 prospectus of the Working Men's College of Melbourne, Australia, which has just reached us, a substantial publication of 128 pages, profusely illustrated and well arranged, gives full particulars of the extensive line of work in technical, trade and commercial education that is being carried on by that valuable institution. The statistics show a total of 2160 pupils enrolled in the various classes in the year 1901. During the past year nearly $10,000 were spent in machinery and equipment for the new workshops erected in 1900 at a cost of about $25,000. The trade school department of the college embraces classes in carpentry, sheet metal working, plumbing and gas fitting printing, carriage building, turning and fitting, blacksmithing, metal founding, house and sign painting, graining and marbling. Civil, mechanical and electrical engineering, architecture, chemistry, mining and metallurgy and agriculture are other subjects in which instruction is provided. The courses extend over periods of two or three years, and the year is divided into four terms.

Keeping Windows Free From Frost.

A correspondent of the *Electrical World* tells of a new use for electric fans. "Passing along Van Buren street in Chicago," he writes, "I noticed the windows of the shops were so thickly incrusted with frost that it was impossible to tell what business the proprietor of the shop was engaged in. Suddenly, at Wabash avenue, a large, attractive looking window of a sporting goods house burst into view with everything in it as plainly visible as it would be on a bright midsummer's day, only more prominently emphasized on account of the condition of its neighbors. I noticed an electric fan in the window running full blast."

Water Proof Cement.

The following recipe for water proof cement will stand both heat and water:

Take freshly calcined oyster shell lime, sift it well and grind fine. Make into a paste with white of egg. Apply to the fractures and press broken pieces firmly together.

The following will stand water but will not stand heat:

1. Also boil four parts, by weight, of gum shellac and one part, by weight, of borax in water until shellac is dissolved. Keep on boiling until mixture is of pastelike consistency. When required, heat and apply to fractures with a clean brush.

2. Mix hydraulic lime and water glass.

Origin of Rosin Sized Sheathing or Building Paper.

For the facts contained in this sketch of the origin and growth of the manufacture of rosin sized sheathing paper for building and other kindred purposes, we are indebted to Chapman & Soden, 410-412 Atlantic avenue, Boston, Mass.:

Previous to 1871, we are advised, the only papers used for sheathing purposes were tarred and common dry sheathing. So far as water proof properties were concerned, the tarred papers were excellent, but to many the odor was offensive; besides the wearing qualities were not good, as the heat in summer destroyed the life of the paper. The dry sheathing was good as a protection against wind, but would not shed moisture.

Some time during the year 1871 a paper was introduced, called rosin sized cane fiber sheathing. This product was supposed to have all the good qualities of tarred and dry sheathing, as well as being odorless and water proof. The paper was made near Norfolk, Va., from sugar cane, the method of preparation being somewhat peculiar. Having cut the cane into the required lengths, the material was placed in an old fashioned muzzle loading cannon and then discharged against a brick wall. This so bruised and crushed the cane that it was easily prepared for the beating engine, and after being run into rolls of about 60 pounds each when dried, was ready for the market.

These goods were made for about three years, but, upon the destruction of the mill by fire, the production ceased, there evidently not being money enough in the venture. After this product was withdrawn from the market, the idea occurred to A. H. Soden of the firm of Chapman & Soden, Boston, Mass., of making rosin sized paper of the same material as used in the manufacture of the dry sheathing, and, by the addition of rosin obtain a water proof odorless sheathing paper, the life of which, unlike the tarred product, would not be destroyed by heat, and which would shed water. This resulted in the introduction of the beaver brand water proof rosin sized sheathing paper, which for a long period was a leading product in this class of goods, and even now is said to have a high position for its water proof quality. From this beginning have sprung, we are advised, the endless brands and qualities of rosin sized sheathing papers.

A VERY good paint for cement work is said to be made by mixing cement and water to the consistency of whitewash and adding some oxide as a coloring material. A dull red color can be obtained by mixing yellow ocher, lampblack and Pecora mortar stain with the cement paste, and other colors can readily be obtained by using properly colored oxides in place of the ocher. This produces a water proof paint, if Portland cement is used, with quite a fair polish. Care must be taken to secure a pure oxide, for if the latter contains sulphur or kindred impurities the color is not permanent and the coating is apt to become blotched or spotted and scale off.

CONTENTS

FRAME RESIDENCE ERECTED FOR ROBERT A. WALKER, AT BEN AVON, A SUBURB OF PITTSBURG, PA.

E. E. MILLER, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, APRIL, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

MAY, 1902.

Labor Agreements.

From various parts of the country come reports that building operations are being delayed through the adjustment of the wage questions which usually come up about this time. Evidently the negotiations, instead of being carried on about the first day of May, as heretofore, have been opened earlier this year. The delay in arriving at an agreement between employers and workmen at different places not only depends on the character of the demand, but also on the business conditions. Too often those making the demand have seemed to hold the opinion that it was only necessary for their employers to increase their charges to dispose of the question without inconvenience. Unfortunately, however, there is a limit to the price which the general public are willing to pay, and, although it is by no means clearly defined where this limit is approached, it has the effect of stopping business or delaying enterprises until conditions are considered more satisfactory. A proposed agreement, presented by some of the journeymen plumbers, provides that none but members of their union shall be employed by the master plumbers. In another instance the demand is made that the number of apprentices shall be reduced, while some agreements provide for the employment of men at a rate of wages 50 cents less than the union scale, provided there is always in the shop one workman receiving union wages. Beyond these stipulations the agreements contain provisions to which little exception is taken by the master plumbers, reduction of hours and increased pay for overtime and holidays being regarded as in keeping with the times. In the main, it is safe to leave the adjustment of the questions raised, without comment, to the parties interested, even though some time may be lost by the men and some disadvantage be suffered by their employers. The one all-important question, however, that both sides must consider before some of the demands can be granted is whether or not those who have work to do will consider that they can afford to pay more for having it done. This question should be well weighed wherever controversies on the wage question are now being carried on.

Impediments to Learning Trades.

One of the institutions that is held in the highest esteem by the citizens of this country is the public educational system, which not only provides schools that the poorest may attend, but in many instances compels attendance at the schools and provides for a truant officer to enforce this law. No doubt this is considered by some a rather drastic measure, but it is doubtful if there is any number of well informed persons who fail to see the benefit that the country is deriving from the system. Notwithstanding this national provision for the general education of the young a disposition is manifest on the part of many citizens who are working at trades to interpose hindrances to those ambitious youths who desire to learn some trade. The master plumbers of Lynn, Mass., recently have been invited by the journeymen to enter into an agreement which, among other provisions, would extend the term of apprenticeship to six years, and would require that those who enter the trade shall be 17 years of age. At the present time the term of apprenticeship is but three years. Another clause of the proposed agreement is that only one apprentice shall be allowed in a shop. No objection has been raised to the time and wage clauses of the agreement, but the age of entry and term of apprenticeship and the limitation of the number of apprentices are questions of moment as to which there is a sharp difference of opinion. Already so many obstacles have been placed in the way of young men desirous of learning trades that public spirited citizens have established trade schools where, under the conditions now prevailing, the rudiments of a trade can be better learned than in the shop. The fact that many young men at the end of their apprenticeship are not competent workmen is due not so much to the shortness of the term as to the fact that under the conditions in which business is done to-day neither the employer nor his workmen spend the time in instructing the apprentices to which their service justly entitles them. Again, the higher educational training of the graduates of the public schools enables a bright, healthy boy to learn a trade in a shorter time than was possible when the old apprenticeship system was in vogue. Any attempt to hinder a young man from learning a trade and thereby preventing his becoming a useful citizen is not only a great injustice to the would-be apprentice, but also to the community to which he belongs and to the country at large. Those who are identified with such an effort doubtless feel the necessity of preventing their branch of trade from being overcrowded with workmen, with the attendant danger of a reduction of the rate of wages. The grounds for these fears, however, are hard to discover by those who are familiar with the history of the different trades, which shows that a larger number of workmen are employed and at better wages than ever before. The policy of limitation is reactionary and inconsistent with the spirit of modern progress.

Profit Sharing in England.

The plan of profit sharing is regarded by many as offering the best solution of the problem of the proper relation of capital to labor. It is argued that by giving to employees a direct pecuniary interest in the prosperity of the business with which they are connected, more and better work is secured, a community of interests is established, and a condition of contentment and good feeling is promoted which tends to obviate strikes and other labor troubles. While the system has been practiced with more or less success in this country and abroad by a few scattered concerns for some time past, it is only within the past few years that the movement has assumed any degree of importance. From a statement recently issued by the labor department of the British Board of Trade it appears that there are now 73 firms in the United Kingdom who have profit sharing schemes in operation. Of these full returns were received from 66 concerns. These returns show that an average bonus of 6.4 per cent. on wages paid was distributed in 1900. The results in the several cases, however, differed widely. Out of the 66 cases cited there were 13 in which no bonus was given, while, on the other hand, there were two instances in which as much as 41 and 39 per cent. respectively was paid. In the large majority of instances the bonus varied between 5 and 7 per cent. The report mentions seven cases in which the profit sharing system was abandoned, the reasons for failure being mostly of one character—viz., dissatisfaction of the employees when there were no profits to be shared. This seems to point to the conclusion that profit sharing is regarded by many of the employees as a good thing when the business prospers and the bonus comes in regularly. But as soon as adversity overtakes the concern and the would-be profit sharers are asked to assist in making good the debit balance they have no further use for the plan. Nevertheless, it is undeniable that the system has worked well in a number of instances, and it may be that, after all, the profit sharing principle will form an important feature of industrial conditions in the future.

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Frequent reference has been made to the conveniences for tenants found in some of the modern office buildings in New York City, but it is probable that readers of this journal do not fully realize the extent to which these features are carried at the present day. In one of the latest skyscrapers there is to be found a newstand, tobacco counter, café, restaurant (with music at lunch), drug shop, press bureau, physicians, stenographers, barber (with his modern associates, the chiropodist and the manicurist), dentist, laundry agent, cable, telegraph, telephone, automobile information, theater agent, obituary bureau, notary public, &c. You can take an elevator to a man who will draw a will, or one who will arrange a funeral; without going from under your own roof you may liquidate a corporation or buy a locomotive. There are ten elevators in a bewildering row, which announce their coming by electric signals, some going 13 floors at a jump. Having all this so near is what spoils the New Yorker for any other city in the world—unless he is trying to get away from it.

Standard Fire Resisting Buildings.

The Fire Department of the Royal Insurance Company of Liverpool has recently sent out copies of specifications drawn up with the object of encouraging the construction of fire resisting buildings. Fire proof construction as a science develops more slowly in England than it has in this country, and many of the details, as we read them in the English papers, says the *Brickbuilder*, sound like old stories to us, simply because we have had to fight worse conditions here than have ever existed abroad, and what progress we have made in fire proof construction has been forced upon us by dire necessity. But evidently the Liverpool company have taken a leaf out of our experiences, for their recommendations in regard to fire proof building include practically all of the features which we have learned are of such vital importance. For example, doors and frames and window frames are to be of iron or other hard metal. Glass above the ground floor is to be not less than ¼ inch thick, in sections not less than 2 square feet, or if of wire glass, in sections not larger than 4 square feet. The hight of buildings is not to exceed 80 feet, and the cubic contents of any one compartment are not to exceed 60,000 cubic feet. Brick, terra cotta or concrete is to be used for external walls, except that stone may be used as a facing when it has a backing of not less than 13 inches of brick. As we understand it, these specifications were prepared to form a standard of fire resisting construction as far as the insurance companies were concerned, and to give direct encouragement to building owners by reducing the rate to those who would build in accordance therewith. We have always maintained that a general application of fire proof constructive principles in large cities can be better brought about by the rulings of the insurance companies than by any municipal regulations, and our only regret is that the action of the insurance companies should not be more general and that higher premiums should not be put by them upon buildings of anything but the first class.

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In advising a correspondent, who asked how many coats would be required to make a first-class job in painting a brick wall, a part of which was old and the other part having been built only last summer and never having been coated in any way, the *Painters' Magazine* says: "If the walls are to be painted in red, prime or first coat them with a good Venetian red—that is, ground in linseed oil, thinned with raw linseed oil and a little oil drier. Rub this prime in well, and, after drying, putty up the joints with a good linseed oil and whiting putty, that has been colored with Venetian red. The priming coat should not weigh over 10 pounds to the United States gallon.

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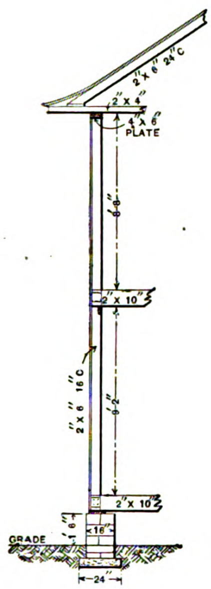

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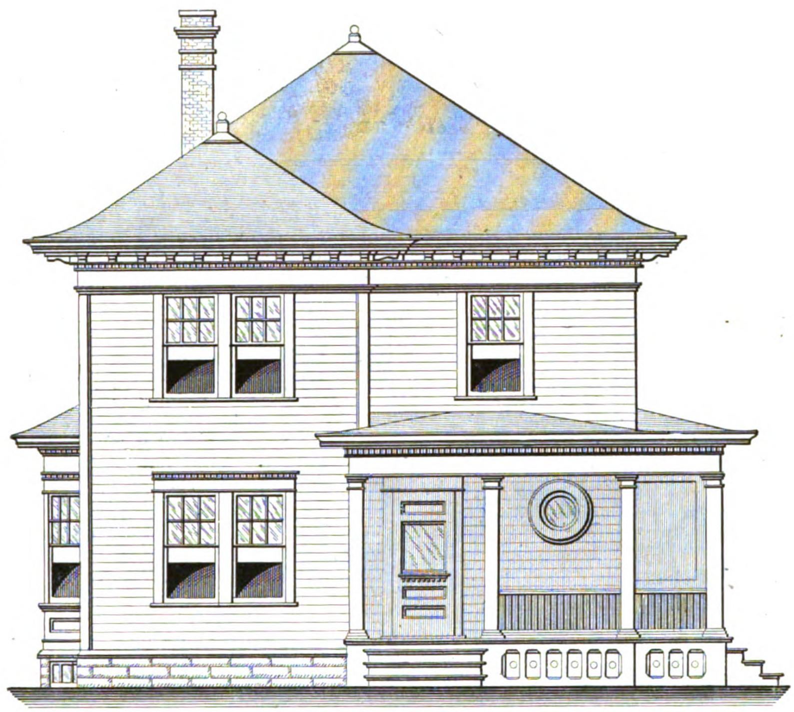

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The Committee of Award, in commenting upon this design, said in their report: "The designer has given much thought to the question of convenience, as he has provided a direct entrance for the men to a room where they can wash and clean up and, if necessary, pass directly to their rooms on the second floor before entering the dining room for their meals. They can also reach the dining room directly from the washroom and without going through the kitchen, which is a great convenience in a house of this kind. There is a large pantry, with dresser for dishes and flour and meal bins; also an ample storeroom for supplies and stores for farm use. The rear stairway is very convenient to the men's rooms and there is a side porch for the help and a front one for the family."

The specifications, as submitted by the author of the design, are as follows:

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All stone walls and footings are to be laid to grade line with a good quality of gray rubble stone laid in the best of lime and sand mortar, pointed tight both inside and out. All walls above grade on exposed fronts laid in parallel courses of hammer dressed rubble stone from selected rubble; rear exposed wall rubble work. All exposed walls ½-inch raised beads pointed with cement. All cellar opening sills 4-inch flagstone, coal chute the same. On account of the dry climate of the State frost proof walls not required. Cellar floors flagged with 3-inch gray flagstone bedded in sand and joints cemented.

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Lath and Plastering.

First and second floors and ceilings in cellars lathed with 4-foot soft pine No. 1 lath. Cellar ceilings one coat cement plaster, troweled smooth. The first and second floors plastered throughout with the Consolidated Plaster Company cement plaster and stucco hard finished.

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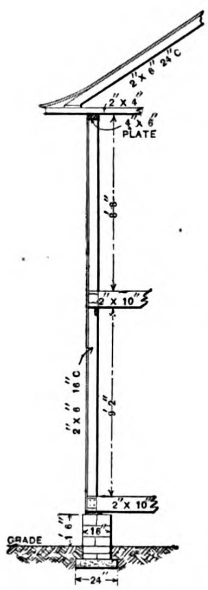

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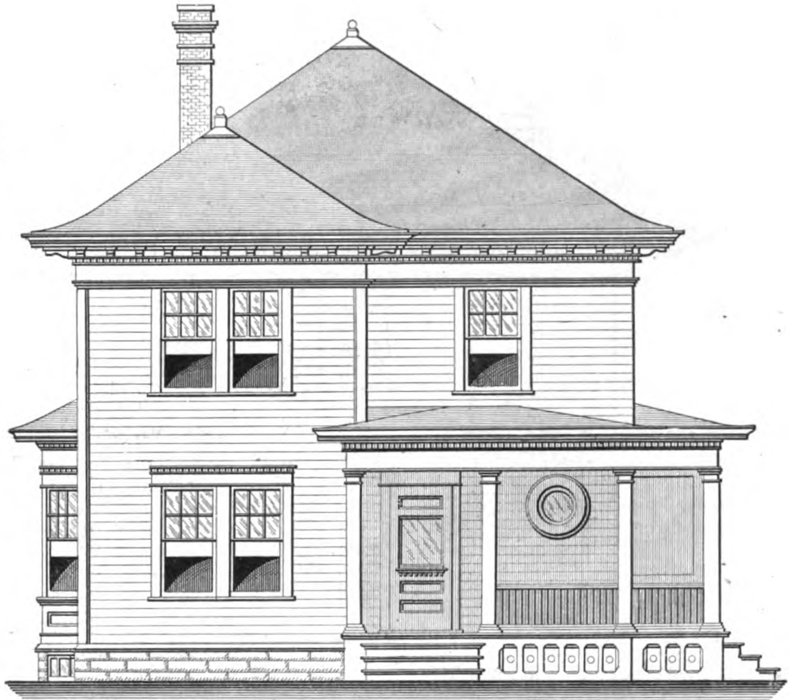

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36 lineal feet porches, without tin, including carpenter work, at $2.50	90.00
8 cellar windows, complete, at $2.25 each	18.00
1 air duct opening	1.00
1 outside cellar door, complete	4.50
2 inside cellar doors, complete, at $4	8.00
2 side doors with Gr., complete, at $9	18.00
9 inside doors, downstairs, at $7.50	67.50
8 inside doors, upstairs, at $7	56.00
5 inside doors, upstairs, at $6	30.00
1 set roll doors, downstairs	25.00
26 windows, complete, at $7	182.00
1 stairway window, triplet	18.00
Fitting up pantry, complete, including work	25.00
Shelves in closets and storeroom, strips, &c	15.00
Front stairs in place, including carpenter work	65.00
Back stairs in place, including carpenter work	35.00
Cellar stairs in place, including carpenter work	10.00
Wainscoting, bath, washroom, kitchen	25.00
600 lineal feet base, laid, at 6c. per foot	36.00
Carpenter work on frame, shingling, siding, cornice and floor	200.00
Miscellaneous items	.14
Total	$2,498.00

A Concrete Court House.

It is probable that the court house which has recently been completed at Mineola, N. Y., for Nassau County will rank as one of the most important buildings ever constructed entirely of cement concrete.

The general dimensions of the building are 195 x 95 feet, in the form of an inverted T. It is two stories in hight, 36 feet from the ground to the roof, and the hight to the apex of the dome is 65 feet. The general measurements of the court room are 38 x 50 feet and 18 feet high to the ceiling.

The foundation walls, floors, pillars, partitions and dome are of cement concrete. The building is practically an immense rock, cut and dressed with architectural ornament on the outside and mined inside in the form of rooms. The entire work was executed under the Ransome system, which consists of reinforcing the concrete with cold twisted steel bars of great strength, which are placed at proper points, both vertically and horizontally, in the concrete.

The exterior of the new county court is especially attractive. The concrete is finished in a very satisfactory manner; both smooth and rough surfaces are produced with perfect success. To give the concrete the appearance of rough dressed stone, it is gone over with pneumatic tools, except on ornamental and fine dressed work, where hand chisel is used. The appearance is so perfect that the difference between natural stone and the concrete is hardly distinguishable. The lines representing the joints between stones are made by placing strips of molding lightly nailed to the inner surface of the mold. They may be arranged in such manner as desired, and of any shape or size to suit requirements. The concrete is then filled into the molds in the usual manner, and when it is sufficiently set the molds are removed. This leaves the concrete marked off as if built up with stone. The ornamental work was made from plaster molds, and each part has imbedded in it the bars of twisted steel, which not only serve to strengthen it, but also afford a means of securing the ornament to the wall in a most satisfactory way. The sharpness of the detail in ornamentation of the most elaborate design is a feature of the work on this building. The court house is connected by a concrete tunnel with the jail, which was also built according to the Ransome system.

A Large Power House

All the contracts for the building of the main power station of the Pittsburgh, McKeesport & Connellsville Electric Railway, to be erected at New Haven, Pa., have been awarded, the last contract given out being that for the buildings, which was given to James Stewart & Co. of Pittsburgh, Pa. The contract for the buildings calls for completion about June 20. The building will be constructed of buff brick and stone, with a steel superstructure. It will be 135 feet long, 100 feet wide and about 50 feet high. Included in the contract for building is the construction of a large brick smoke stack, which will have a diameter of 12 feet, and will be 200 feet high. The building will be a two-story structure, with the exception of 45 feet; but under the latter there will be a 12-foot basement to provide space for extra power machinery in the event of the increase being found necessary. That part of the second floor located over the boiler room, which will be separate from the main structure by thick fire walls, will be used for the storage of coal, as the entire supply will be kept there. The coal and ashes will all be handled by machinery, as it is the intention to install separate plants for that purpose.

A Southern California Home.

The residence of A. C. Burrage at Redlands, Cal., which has recently been completed, is typical of the present movement toward the construction of costly homes in the smaller towns of Southern California. The Burrage residence, which is situated on a knoll 350 feet above the business section of the town and covers an area of 128 x 148 feet, is modeled after the old Christian-Spanish style of architecture. The house is in the form of the letter H, with towers where the cross bar joins the two sides of the letter. The walls are of brick, with a coating of white cement on the outside. The roof is of red tiling. A board piazza surrounds the house proper on three sides.

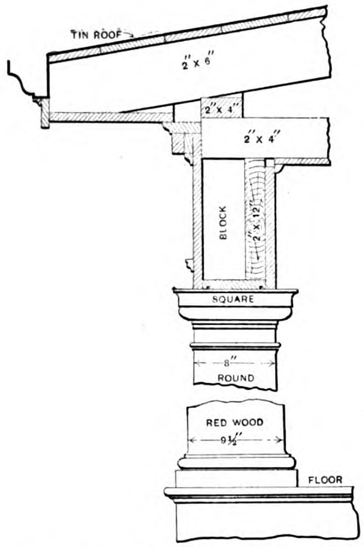
The main entrance, which is on the north side, opens into a Pompeiian reception room, with terraz pavement and mural paintings. In the center of the court is a marble pool containing a fountain surrounded by flowers. The balcony around the court is supported by ten pillars of white Italian marble. Across the court in the east wing are parlors, drawing rooms, library, billiard room, dining room and kitchen. This portion of the house is finished in hard wood, with polished oak floors. The dining room is circular and is finished in carved Mexican mahogany. To the right of the court, formed by the south portion of the letter H, is a swimming pool 24 x 28 feet in size. This is supplied with water from a reservoir built on the topmost part of the building. This reservoir also supplies water throughout the house, flower gardens, &c. On the second floor of the building are the guest chambers, six in number, so situated that their doors open on the balcony above the court. The servants' quarters are in the extreme wings of the house.

The building is wired completely for the use of electricity and is supplied with furnaces in the basement for heating purposes. Lynn & Lewis of Redlands were the contractors. The total cost of the building was $60,000.

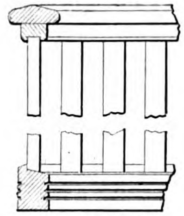
A BUILDING is about to be erected on the West Side in New York City, which will possess a number of rather novel features. The basement and street floors of the proposed structure will be devoted to a thoroughly equipped stable, having entrances on two streets. The next story, which will be of considerable hight, will be fitted up as a squash and tennis court. The upper floors will contain a few living rooms and also apartments adapted to the entertaining of the guests of the owner, J. Henry Smith, who is an enthuiastic horseman and is also greatly interested in many branches of sport, particularly in squash and tennis. We understand that the building and the site upon which it will rest represent an investment of nearly half a million dollars.

A CELEBRATED café on the Boulevard des Italiens, Paris, will shortly be transferred into a cabaret on the lines of those of Montmartre, and a novelty, in its new arrangement, will be a sliding floor. When the performance is over the whole floor will revolve and the seats and stage will disappear, giving place to tables, chairs and the usual paraphernalia of a café.

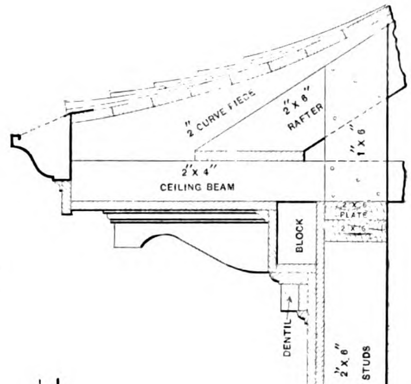
WE have received a copy of the proceedings of the Ontario Association of Architects, this being the second annual volume and bearing date of February, 1902. The matter is compiled from the minutes of the convention, and embraces a great deal that is of interest to the architectural profession.



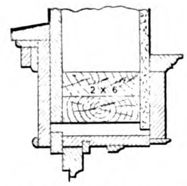
Details of Porch Cornice and Column.—Scale, ¾ Inch to the Foot.



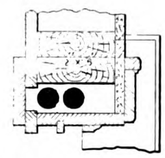
Detail of Porch Railing.—Scale, 1 Inch to the Foot.



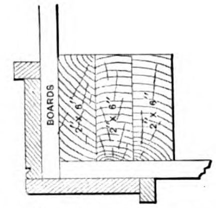
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



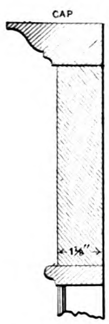
Section through Window Head.—Scale, 1 Inch to the Foot.



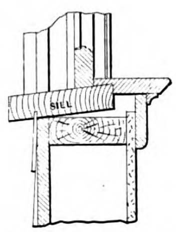
Horizontal Section through Window Frame.—Scale, 1 Inch to the Foot.



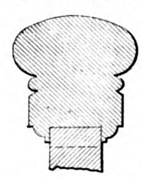
Section through Corner of Building.—Scale, 1½ Inches to the Foot.



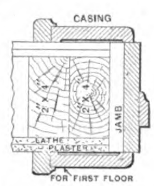
Detail of Head Door Casing.—Scale, 3 Inches to the Foot.



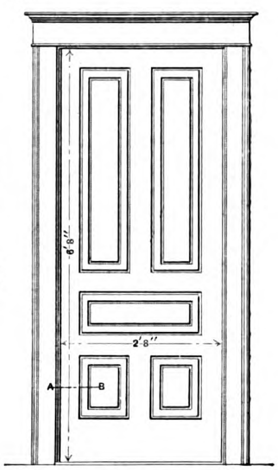
Vertical Section through Window Sill and Stool.—Scale, 1 Inch to the Foot.



Section of Hand Rail. — Scale, 3 Inches to the Foot.

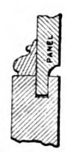


Section through Door Frame. — Scale, 1½ Inches to the Foot.

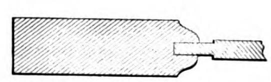


Elevation of Door, Showing Trim.—Scale, ⅜ Inch to the Foot.

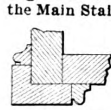
Detail of Molding at Top of Newel.



Section of Paneling at A B of the Main Stairs.

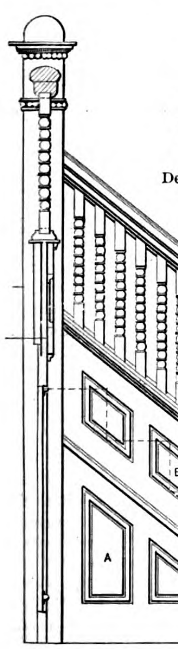
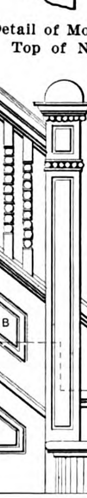
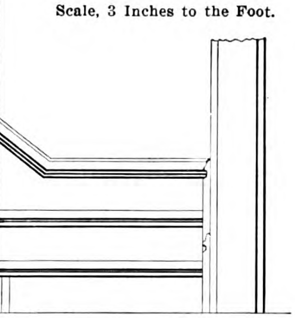


Section of Door on Line A B.—Scale, 3 Inches to the Foot.



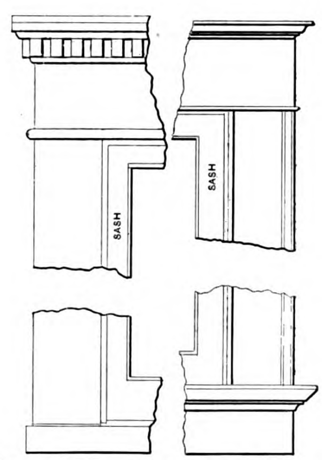
Corner of Newel Post.

Scale, 3 Inches to the Foot.

Elevation of Main Stairs.—Scale, ½ Inch to the Foot.

Base for First Floor.—Scale, 3 Inches to the Foot.



Details of Outside and Inside Window Trim.—Scale, 1 Inch to the Foot.

Competition in Farm Houses. Second-Prize Design.—Miscellaneous Constructive Details.

DECISION IN FLOOR PLAN COMPETITION.

AS announced in the March issue, the decision in the Competition in Floor Plans for an eight-room house was to be rendered by balloting on the part of the readers of *Carpentry and Building*. The result of the voting shows the interest in the contest to have been widespread, and there are few sections of the country from which ballots were not received. The race was exceedingly close between four sets of plans, the popularity of which was such as to render the outcome uncertain until almost the last day on which votes could be received.

An accurate count of the votes received up to the close of business on March 25 shows the set of plans designated as No. 90 to have received the largest number of votes, and therefore entitled under the terms of the contest to the first prize of $50. The author of this set of plans is John P. Kingston, 518 Main street, Worcester, Mass. The set of plans designated as No. 123 and submitted by C. A. Wagner of 144 Ball street, Port Jervis, N. Y., received the second largest number of votes and is therefore awarded the second prize of $30, while the set of plans designated as No. 18 and submitted by Robert Kurz of 26 Ackroyd avenue, Jamaica, N. Y., is entitled to the third prize of $20.

The set of plans designated as No. 25 ran so close to No. 18 and received such a widely scattered vote, thus clearly demonstrating its popularity and architectural merit, that the management of *Carpentry and Building* has decided to award the author, Frank J. Grodavent of Fort D. A. Russell, Wyo., a special prize of $20.

The following is a complete list of the competitors whose plans were published in the March issue of the paper, together with the numbers by which the various plans were designated:

No. 90.—John P. Kingston, 518 Main street, Worcester, Mass.

No. 123.—C. A. Wagner, 144 Ball street, Port Jervis, N. Y.

No. 18.—Robert Kurz, 26 Ackroyd avenue, Jamaica, N. Y.

No. 25.—Frank J. Grodavent, Fort D. A. Russell, Wyo.

No. 74.—E. W. Bonney, 89 Crescent street, Auburndale, Mass.

No. 56.—Walter P. Crabtree, 218 Chestnut street, New Britain, Conn.

No. 64.—G. W. Shepard, 510 Sixth street, Oakland, Cal.

No. 115.—Ira D. Worsfold, Dodge Building, Waukegan, Ill.

No. 45.—C. R. Hunter, 116 Park avenue, Carbondale, Pa.

No. 76.—J. J. Driscoll, 132 Laurel street, Fitchburg, Mass.

No. 88.—George A. Davis, Box 37, Sidell, Ill.

No. 5.—Charles A. Kneppler, 103 Cooper street, Brooklyn, N. Y.

Of the entire vote cast No. 90, the winner of the first prize, received 20 per cent.; the set designated as No. 123 received 18 3-5 per cent., while No. 18, to which was awarded the third prize, received 15 9-10 per cent. The contest between No. 18 and No. 25 was exceedingly close and the result of the vote showed a difference of only 1 per cent., No. 25 receiving 14 9-10 per cent. of the entire ballots. The next set of plans in the order of their popularity was No. 74, which received 7½ per cent., with No. 56 following with 5 2-5 per cent. and No. 64 with 5 2-25 per cent. Set No. 115 obtained 3 7-10 per cent. of the entire vote, No. 45 received 3 2-5 per cent., this being followed by No. 88, which secured 1 7-10 per cent. of the total vote, and finally No. 5, which received only a little more than 1 per cent. of the entire vote polled.

A careful study of the tally sheet made up from the ballots shows some interesting features. Of the entire vote cast for No. 90 the State of Massachusetts contributed a trifle more than 54 per cent., while the New England and Middle States together contributed 67 4-5 per cent. Taking the Central West, embracing the States of Ohio, Indiana, Illinois, with Minnesota added, we find that this section contributed 17 per cent. of the vote received by the winner of the first prize.

In the case of the plans receiving the second prize, No. 123, the bulk of the vote came from the immediate vicinity in which the author resides, with the whole State of New York contributing very nearly 62 per cent. of the total, and taking into account Massachusetts, Connecticut, New Jersey and Pennsylvania, the vote amounted to 89 per cent. The Central West, embracing the States of Ohio, Indiana, Iowa, Missouri and Wisconsin, furnished a trifle over 9 per cent., showing that the vote for this set of plans was largely concentrated in one locality.

In the case of the winner of the third prize, No. 18, the State in which the author resides contributed a little over 21¼ per cent., while the total for Maine, Vermont, Massachusetts, Rhode Island and New York was 46 4-5 per cent. The Central West and Northwest furnished 29 4-5 per cent., while Canada furnished 6⅝ per cent. of this vote.

Coming now to the set of plans designated as No. 25, the tally sheet shows the vote to have been widely scattered. The largest number of votes in the case of any particular State came from Massachusetts, Rhode Island and New York, each of which contributed 11⅝ per cent., while from the New England and Middle States No. 25 received 47¾ per cent. of its vote. The Central West and Northwest contributed 29½ per cent. and Canada 13⅝ per cent. It is rather significant of the efforts evidently put forth by some of the contestants to secure votes that the State in which the author resides furnished less than one-quarter of 1 per cent. of the vote cast for No. 25.

The State which furnished the largest vote was New York, which contributed 20 per cent., while next in order was Massachusetts with 15 3-5 per cent., Pennsylvania ranked third with 7 4-5 per cent. and Iowa fourth with 5¾ per cent. The vote cast by the New England States aggregated 27½ per cent., and by the Middle States 32 1-5 per cent. The Central West and Northwest furnished 24¾ per cent., and Canada, including British Columbia, 8⅛ per cent. The Southern vote—that is, the ballots received from Tennessee, West Virginia, North Carolina, Georgia and Louisiana—aggregated 3 7-10 per cent. of the entire vote, while the extreme West, embracing the States of Kansas, Oklahoma, Nebraska, Colorado, Wyoming and Utah, contributed 5 2-5 per cent. of the entire vote.

Building by the "Pouring" Process.

A short time ago attention was called in these columns to the construction of buildings by what is known as the "pouring" process—that is, the material, consisting of sand, cement, &c., was poured in a liquid state into properly prepared molds for the purpose of forming the walls of a building. The first house in St. Louis to be constructed by this process will be the Taylor Avenue Baptist Church, at the corner of Euclid avenue and Page boulevard. The compound which will be used is known as "Perannite," and is composed of river sand, cement fused with sulphur and colored with pigments. While the material is claimed to be permanent, it is so cheap that after the molds are made laborers can be employed in the process. It is regarded as proof against acid, water, electricity and is a nonconductor of heat or cold. Roofing of any color and shape can be made, and the inside walls can be finished with a high polish. We understand that the composition material can be used in a variety of ways, and the concern controlling it claim to be able to turn it out in the shape of cut stone, brick, sewer and drain pipe, columns, caps, fancy terra cotta work, imitation of marble and polished rock.

The Taylor Avenue church will have outside walls of imitation granite or rock in a light green color, while the interior walls will be highly polished and appear like cream colored marble. We understand it is the object of Mr. Brown, the inventor of "Perannite," to demonstrate in the building of this church just what can be done with the new material.

PROPORTIONING JOINTS IN WOODEN ROOF TRUSSES.—II.

BY F. E. KIDDER, CONSULTING ARCHITECT.

FOR the truss shown in Fig. 10 the requirements of the construction of the cornice and the supporting of the rafters on the purlin require that the joint shall be made as shown in Fig. 12. With this construction it is impossible to have a shoulder more than about 5 inches long, therefore the bolt must be made strong enough to resist the entire stress in the strut. As the shoulder is not expected to resist the thrust it is not necessary to make the notch as deep as required by Rule II, and, in fact, it is not necessary to make any notch at all, but for convenience in putting the truss together it is a good idea to have a notch of about 2 inches in depth. In the joint shown in Fig. 12 the center of the joint comes above the wall, so that there is no tendency to shear the beam and no bending moment. The only computation required by this joint, therefore, is that for the size of the bolt.

RULE V.—To find the stress or tension in the bolt or bolts when used, as in Figs. 1, 2 and 3, April issue, draw to a scale of pounds the line T, Fig. 12, parallel to the truss rafter and of a length equal to the stress in the rafter. From the lower end of this line draw an indefinite line parallel to the bolt or to the strap, and from the upper end of the line T a line at right angles, or square to the seat of the rafter, the two lines intersecting at the point *c;* then the line *b c*, measured by the scale used in drawing the line T, will give the tension in the bolt or strap. Having found the stress the size of the bolt can readily be determined by Table II:

Table II.—Safe Strength of Bolts, in Pounds, for Stresses Computed as Explained Under Rule V.

Diam.	Strength.	Diam.	Strength.	Diam.	Strength.	Diam.	Strength.
¾	6,000	1¼	17,700	1¾	35,000	2½	74,000
⅞	8,400	1⅜	21,400	1⅞	40,400	2¾	92,000
1	10,860	1½	25,740	2	45,000	3	108,000
1⅛	13,720	1⅝	30,000	2¼	60,000	3¼	130,000

From an inspection of the diagram, *a b c* in Fig. 12, it can readily be seen that the less the inclination of the bolt from a horizontal line the shorter will be the line *b c*, and therefore the smaller will be the stress in the bolt. For the joint under consideration the stress in the rafter is 21,300 pounds, and the line *b c* measures 34,800 pounds. From Table II we find that this will require a 1¾-inch bolt. On the underside of the tie beam a cast iron washer, made as shown in Fig. 13, with a bearing for the bolt head at right angles to the line of the bolt, should be used, as shown in Fig. 12. Without this washer it would be necessary to use at least a 4½-inch round cast iron washer, and cut it into the tie beam, which would dangerously weaken the strength of the beam. If one does not wish to go to the expense of having this cast iron washer made, a block of wood, preferably of oak or hard pine, may be bolted to the underside of the tie beam, as shown in Fig. 14. To prevent this block from slipping on the tie beam square keys of oak should be driven into notches cut in the beam, as shown. Under the nut on the upper side of the rafter a square wrought iron or steel washer, the full width of the rafter, should be used. The pressure of the rafter against this washer must obviously be equal to the tension in the bolt, consequently the washer should be as large as practicable to prevent crushing the wood. The above is the only safe method of calculating the strength of a joint like that shown in Fig. 12.

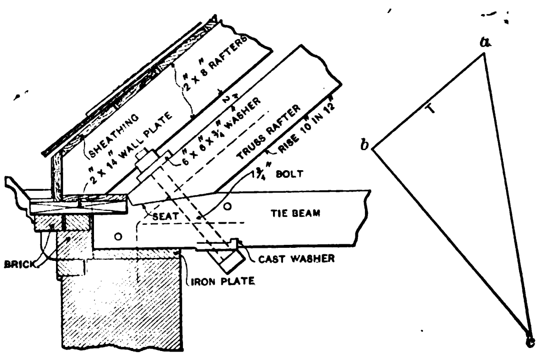


Fig. 12.—Construction of Joint for Truss Shown in Fig. 10, November Issue, When Rafters are Supported on Purlin.

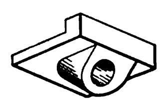


Fig. 13.—Cast Iron Washer

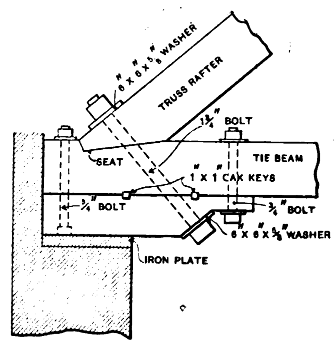


Fig. 14.—Block of Wood Used Instead of Cast Iron Washer.

Proportioning Joints in Wooden Roof Trusses.

Pin and Strap Joints as Shown in Fig. 15.

The points that must be considered in designing a joint like that shown in Fig. 15 are the strength of the strap, the bearing of the strap on the bolt, the bearing of the bolt in the timber and the resistance of the bolt to shearing.

The first step is to determine the tension in the strap. This must be found by means of a stress diagram, as explained under Rule V. In order to reduce this stress as much as possible and also to keep the bolt back where it will not too much weaken the tie beam, it will be better not to place the strap at right angles to the rafter, but to give it an inclinaion about as shown in Fig. 15, the end of the rafter being cut at right angles to the center line of the strap. It is evident that the strap pulling on the bolt, which in this case acts as a pin, will cause the bolt to bear against the tie beam with a pressure equal to the stress in the strap. When we find the stress in the strap, therefore, we also have the pressure exerted by the bolt on the wood.

Table III.—Strength of Pin Bolts in Tie Beams When Used as in Fig. 15.

Dia. of bolt in inches.	Breadth of tie beam.	Safe strength in pounds. In yellow pine.	In Oregon pine.	In spruce.	In common pine.
1	6 inches.	15,700	15,700	15,700	15,700
1¼		24,540	24,540	24,000	21,000
1⅜		29,680	29,680	26,400	23,100
1½		33,340	32,400	28,800	25,200
1¾		42,000	37,800	33,600	29,400
2		48,000	43,200	38,400	33,600
2¼		54,000	48,600	43,200	37,800
1¼	8 inches.	24,540	24,540	24,540	24,540
1⅜		29,680	29,680	29,680	29,680
1½		35,340	35,340	35,340	33,600
1⅝		41,460	41,460	41,460	36,400
1¾		48,100	48,100	44,800	39,200
2		62,832	57,600	51,200	44,800
2¼		72,000	64,800	57,600	50,400
2½		80,000	72,000	64,000	56,000
1⅜	10 inches.	29,680	29,680	29,680	29,680
1½		35,340	35,340	35,340	35,340
1⅝		41,460	41,460	41,460	41,460
1¾		48,100	48,100	48,100	48,100
2		62,800	62,800	62,800	56,000
2¼		79,500	79,500	72,000	63,000
2½		98,000	90,000	80,000	70,000
1½	12 inches.	35,340	35,340	35,340	35,340
1¾		48,100	48,100	48,100	48,100
2		62,800	62,800	62,800	62,800
2¼		79,500	79,500	79,500	75,600
2½		98,000	98,000	96,000	84,000
2¾		118,800	118,800	105,000	92,400
3		141,400	129,600	115,000	100,800

Computed for a bearing of 4000 pounds per square inch for yellow pine, 3600 for Oregon pine, 3200 for spruce, 2800 for common pine, and 20,000 for the strap and single shear of 10,000 pounds per square inch.

Table III gives the safe strength for bolts of several diameters in beams 6, 8, 10 and 12 inches thick, which will cover all ordinary cases. To find the size of the bolt, therefore, it is only necessary to look in this table and select the bolt having a safe strength for the kind of wood and the given breadth of the tie beam equal to the stress in the strap.

The values given in the table take into account the resistance of the bolt to shearing, and also the bearing of the strap on the bolt, so that no calculation for the bolt is necessary other than to find the stress in the strap.

The sectional area of the strap should be determined by dividing the stress in the strap by 20,000 pounds; the result will be in square inches. The thickness of the strap should never be less than that given in the columns of Table III. The width of the strap should, of course, be equal to the sectional area divided by the thickness. The width of the head W should be equal to 1 1-3 *w* plus the diameter of the pin.

Example 3.—To show the application of the above directions we will determine the size of the strap and bolt that would be required for the joint shown in Fig. 12, supposing that we wish to use a strap and pin in place of the bolt. The first step will be to locate the pin bolt and the center line of the strap, as in Fig. 15. Then draw the line T, Fig. 15, parallel to the rafter and equal to the stress in it, which in this case is 21,300 pounds, and from *b* draw a line parallel to the axis of the strap and from *a* a line at right angles to the seat of the rafter, these two lines intersecting at *c*. Measuring the line *b c* to the scale to which T was drawn we find that it indicates 25,600 pounds, which is the stress in the strap. The sectional area of the strap should therefore be equal to $\frac{25{,}600}{20{,}000}$, or 1.28 square inches. From Table III we find that for a white pine tie beam with a breadth of 6 inches the strap must be ½ inch thick. The breadth of the strap therefore should be equal to $\frac{1.28}{0.5}$, or 2.56 inches; or, say, 2⅝ inches. From Table III we see that a 1½-inch pin in a 6-inch white pine beam has a strength of 25,200 pounds, which is near enough to the stress. We should therefore use a 2⅛ x ½ inch wrought iron strap and a 1½-inch pin bolt. The width of the eye W should be 1 1-3 x 2⅝ inches + 1½ inches, or 5 inches. Between the strap and the rafter we should place a 6 x 6 x ⅜ inch plate to prevent the crushing of the wood. The joints shown in Figs. 12 and 15 should have about the same strength, and would probably cost about the same. The writer prefers the bolt joint, however, for the reason that it permits of being tightened by the screwing up of the nut on the bolt, while the strap joint can only be tightened by driving in steel wedges under the strap. Another objection to the strap joint is that it is somewhat difficult to bore the hole for the bolt exactly square to the tie beam, and if the hole is not true the strap will not bear evenly on the rafter. The strap joint, however, possesses the advantage that there is no projection on the bottom of the tie beam, which is a consideration when the bottom of the tie beam is to be cased.

Example 4.—As a further illustration of the method of designing the joint at the foot of the principal strut we will take joint 1 of the truss shown in Fig. 10 of the February issue of the paper, and for which the loads and stresses are shown by Fig. 11 of the same issue.

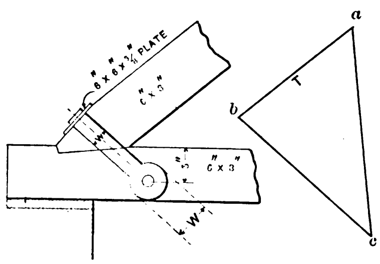


Fig. 15.—Joint with Strap and Pin.

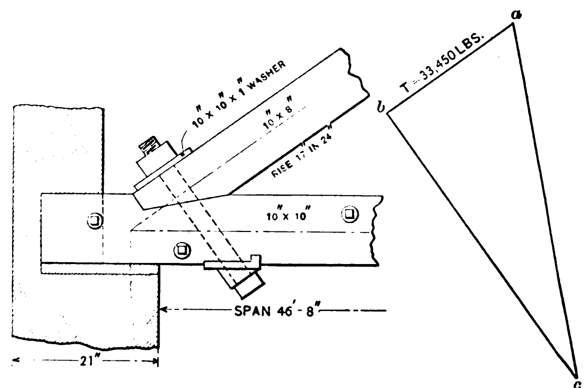


Fig. 16.—Detail of Joint 1, as in the February Issue.

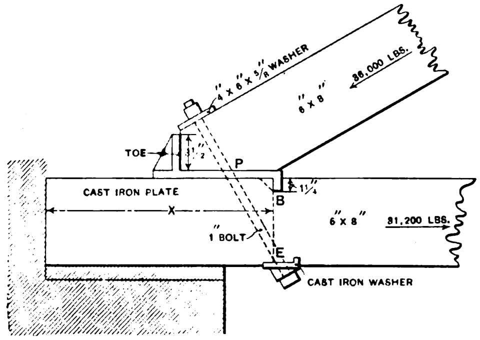


Fig. 17.—Joint for Rafter of 30 Degrees Inclination with Stress in Excess of 30,000 Pounds.

Proportioning Joints in Wooden Roof Trusses.

Fig. 16 shows the way in which the strut comes on the tie beam and the way in which the latter sets on the wall. For this joint a single bolt, used as in Fig. 12, will probably be sufficient. The problem is to determine the size of the bolt. The stress in the rafter is 33,450 pounds. We find the stress in the bolt by drawing the line *a b*, Fig. 16, parallel to the rafter and equal to 33,450 pounds.

The line *a b* should be drawn to a scale of about 10,000 or 12,000 pounds to the inch. If one has not an engineer's scale, an architect's scale of an inch to the foot can be conveniently used.

From *b* draw a line at right angles to the line *a b*, and from *a* draw a line at right angles to the seat of the rafter, intersecting the line from *b* at *c*. The line *b c* measured by the scale of T equals 70,000 pounds. Therefore, if we use a single bolt it must be capable of resisting a stress of this amount, or, if wish to use two bolts, each bolt must be capable of resisting a stress of 35,000 pounds. From Table II we see that the safe load for a 2½-inch bolt is 74,000 pounds, and as a 2⅜-inch bolt would be less than 70,000 pounds, we should use either one 2½-inch bolt or two 1¾-inch bolts. As the single bolt will weaken the tie beam and rafter much less than two 1¾-inch bolts, it would be better to use the single bolt. The joint therefore should be made as shown in Fig. 16.

Joints as in Fig. 17.

When the rafter has an inclination of about 30 degrees and the stress in the rafter exceeds 30,000 pounds a joint similar to that shown in Fig. 17 is generally the best to use. In this joint the end of the tie beam and the plate P offer a good deal of resistance to the thrust of the strut, even without any assistance from the bolt. As will be seen, the rafter is held in place by the plate P, and before this plate can be moved it is necessary either to shear off the top of the tie beam beyond the point B or to break off the lugs on the plate P.

If the distance X is long enough to resist the shearing tendency then a single bolt may be used of about 1 or 1¼ inches in diameter merely to hold the rafter in place and to provide against any possible tendency of sudden failure. Even when the distance X is not great enough to resist the entire shearing stress, it would still be great enough to resist a considerable portion, so that in the opinion of the writer if the bolt is made strong enough to resist one-half of the stress in the rafter (which would usually cover the actual dead load on the truss) the joint might be considered as perfectly safe.

Example 5.—As an example of designing a joint of this kind we will assume that the rafter in Fig. 17 has a stress of 36,000 pounds; the corresponding tension in the tie beam would be 31,200 pounds and the supporting force 18,000 pounds. The wood to be yellow pine. The position of the joint on the wall to be as shown in the figure. This gives us a length for X of 22 inches. To find the length for X required to resist the entire thrust in the rafter we use Rule I, given in the last issue, which was to divide the stress in the tie beam

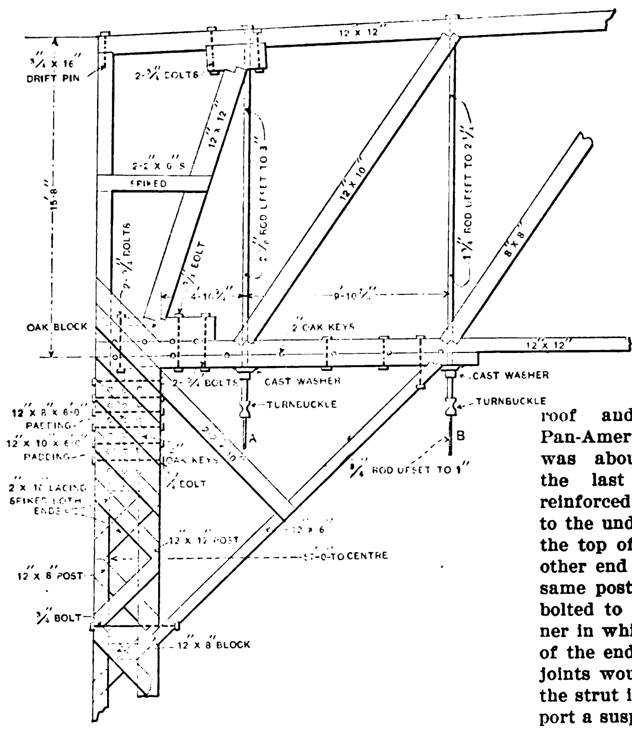


Fig. 18.—Good Example of End Construction of Heavy Wood Truss Supported by Wooden Posts.

Proportioning Joints in Wooden Roof Trusses

by the breadth of the tie beam, multiplied by the resistance of the wood to shearing. In this case we should use the values for F_1, in Table I, because the wood is under compression and tests have shown that under such conditions the resistance of the shearing is greatly increased. Dividing the stress in the tie beam, 31,200 pounds, by the product of the breadth by the value of F for yellow pine, we have 21 inches as the length required. As the actual length of X is 22 inches the tie beam is capable of resisting the thrust without any assistance from the bolt, and for this example a 1-inch bolt is all that would be needed.

Hight of the Toe.

If we are to depend upon the resistance of the tie beam to shearing for the strength of the joint, then the hight of the toe must be sufficient to prevent the end of the rafter from crushing the wood. The hight of the toe should therefore be equal to the stress in the tie beam, divided by the breadth of the rafter, multiplied by the value for C_1, given in Table I, which for this example would be $\frac{31,200}{6 \times 1500}$, or 3½ inches; therefore the depth of the toe should be 3½ inches. The plate P should be made of cast iron, at least ¾ inch thick, and should have a bracket back of the lug at the toe to prevent its being broken. The lug at B should also be strengthened by a bracket, as shown by dotted line. When making a joint of this kind one should be careful to see that the net sectional area of the tie beam at B E is sufficient to resist the tensile stress. In this particular case the net sectional area required will be equal to $\frac{31,200}{2000}$, or not quite 16 square inches; and as the breadth of the beam is 6 inches this would require a clear depth between B and E of about 3 inches. The actual depth is nearly 6 inches, consequently the beam has sufficient strength at this point. For trusses in which the stresses run up to 60,000 or 70,000 pounds a joint like that shown in Fig. 4 of the last issue should be used, the bolts being made strong enough to resist one-half of the thrust in the rafter and the tie beam being depended upon to resist the balance. With these examples the reader should be able to choose the best form of end joint and to proportion the parts with absolute safety.

Bracing of Trusses When Supported by Posts.

When a truss is supported by posts a rigid connection is necessary between the post and the truss to prevent racking of the building by wind pressure. This connection is generally made by means of a brace, which should be secured at the ends so that it may act either as a tie or as a strut. Fig. 18 is a good example of the end construction of a heavy wooden truss supported by wooden posts. This represents a portion of one of the four trusses which supported the domed roof and ceiling of the Music Hall of the Pan-American Exposition. The length of the trusses was about 114 feet. It should be noticed that the last two panels of the lower chord are reinforced by a 6 x 12 inch piece keyed and bolted to the underside. At one end this piece is notched over the top of the inside post of the main column, at the other end it receives the thrust of a knee brace to the same post. It should also be noticed that the brace is bolted to both the tie beam and the post. The manner in which the joints are made at the top and bottom of the end strut of the truss is also of interest. Such joints would be advisable only when the inclination of the strut is 60 degrees or more. The rods A and B support a suspended dome ceiling below the truss.

Rapid Office Building Construction.

In the erection of the 15-story office building which is to be known as "No. 68 William street," New York City, and costing something over three-quarters of a million dollars, record time was made by the contractors, the Thompson-Starrett Company of New York, who executed the work. The new structure stands upon the site formerly occupied by the Kemp Building, which was a ten-story steel ribbed structure of the type popular some 15 years ago. It was necessary to demolish this building and make deep excavations for the caissons of the new structure before the work of actual construction could commence.

The first brick was removed from the Kemp Building August 1, 1901, and in a month its demolition was completed. The work of excavating was immediately commenced, and this was finished November 9. On that day the first steel rib of the new structure was laid, and January 9 of the present year the frame work was completed. Since then the walls have been finished and the interior of the building made practically ready for occupancy.

SOME SUGGESTIONS TOUCHING UPHOLSTERY WORK.

By Paul D. Otter.

IN response to the request of a correspondent for some suggestions on the subject indicated, I would say the plain upholstering of furniture may be very readily accomplished by following a few instructions and taking care to keep form and outline true and evenly balanced. A chair frame is taken as an illustration, and the operations necessary to upholster it may be enlarged upon for a settee or larger piece; practice and the article itself suggesting more than could be told.

The first illustration shows the usual custom of upholstering. The work starts with putting on the webbing or bands on the bottom of the seat framing, and this should be done in a very firm way. For a chair seat, three strips from front to back rail and three interlaced through these across the width of the chair will be sufficient to make a firm support for the springs. Fold the ends of the webbing sufficient to have the tacks hold and then stretch across to the other side by hand or by means of a steel stretching tool, folding and tacking and cutting off the webbing to start another strip. For this use 10-ounce tacks. Five springs of the shape shown in

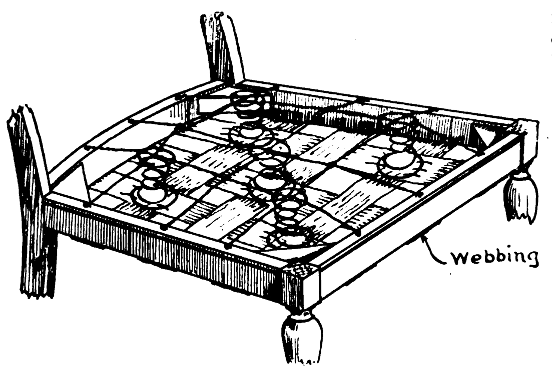


Fig. 1.—Showing Usual Method of Upholstering.

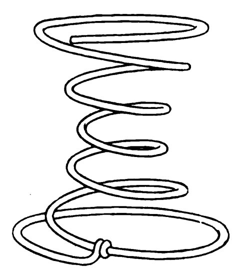


Fig. 2.—Shape of the Springs.

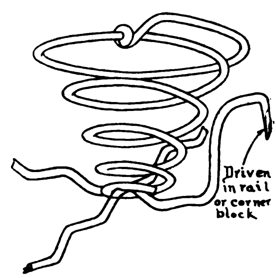


Fig. 3.—Shape of Springs Used in Modern Upholstering.

Some Suggestions Touching Upholstery Work.

Fig. 2 will be sufficient for the usual size of chair seats. This spring is 3¾ inches high, and is of 10½ gauge wire. The position of the springs on the webbing should be about 1 inch from each corner, with one placed in the center. They are then held in place by stitching through the webbing sufficient to hold them to one position, and for this use an upholstering curved needle and good twine.

The tops of the springs are now held in the same relative position, and for this, use heavy cord, securing the end to the top of the seat rail with a matting tack or staple driven inside of a hard knot; then engage the outside wire of the spring with a loop knot drawn, so that it does not compress the spring too much. From here loop across the spring and then to the opposite spring and down on to the rail, making a hard knot and holding the cord down snug with a staple. In this manner do the other springs and then criss-cross, so that they are all bridged together.

Cover this net work with burlap or muslin, tacking the first edge sufficiently folded to have the tacks hold on to the edge of the back seat rail, and stretch forward and tack down on front rail, then on side rail, folding the edges as you tack. Upon this distribute in an even manner about 2 pounds of moss, tow or hair. The way it is put on is a matter of a little judgment, the idea being to maintain an arched shape. When this is placed to your satisfaction, stitch over with long stitches with a curved needle and twine to prevent the material from shifting. Over this tack down the muslin securely. Frequently this operation is repeated by another layer of moss, tow or hair, but this is not necessary where a good quantity of hair is used. Always place a layer of cotton batting over the muslin, covering to prevent the hair from coming through, and also on the edges, that may be sharp and liable to wear. The final outer covering being a matter of one's own selection, nothing can be said as to this, except to caution when using figured goods to adjust the figure to the shape with some idea of balance. As to the backs of chairs when springs are used the same operations apply with a smaller spring used.

Most chairs have backs filled in against a webbing applied along the inner edge of the frame, the moss or hair being carefully stuffed in under a muslin covering tacked down as the work proceeds, then the leather or figured goods is laid over cotton batting intervening and tacked carefully to the rabbett on the outside of the framing, over which is neatly stretched gimp to match the material. When a corner is turned, lap the gimp while stretching it, so that it strikes the corner with a good miter.

The custom is so general to use quite large metal or leather headed tacks as a border finish, that care should be used to evenly space them and have the corner button hold down the miter neatly. The back of the chair is usually covered with the same goods, but may have a cheaper grade of the same tone neatly tacked on the rabbett and lined with gimp. To hide the unsightly webbing on the bottom of the chair, tack with edges folded, a piece of chintz of suitable color, hiding all the rough edges on the rails.

The spring and wire illustrated in Fig. 3 is used in later day upholstering, the wire taking the place of the webbing. This style of creating a spring foundation is coming into great favor for its general simplicity, and is well adapted for square frames, such as Morris chairs, settees and built-in hall seats. The scalloped wires shown cross each other at the base of the spring, a "half" spring being used. The wires are sold in different lengths, bent with a crook at each end, as partly shown in the cut, having a sharp point which is driven into the top of the seat rail. As an extra precaution a stout staple should be tacked over the wire. It will be seen that with the peculiar shaping of the wire the springs, when placed and secured by a similar intersecting wire, occupy about the same level as though the webbing were tacked on the bottom of the rail. In a chair all that is necessary is to cross diagonally two of these formed wires of proper length, so that the points are driven into each corner block, then screw in to catch the middle spring over the intersection and place the four other springs about 2 inches from corner blocks, securing them on to the main wire by inserting a cut off section of the scalloped wire used for the purpose. The upper part of the springs are then tied with heavy cord, as shown in Fig. 1.

Much more could be said of upholstering. Practice on the plain work will give one many suggestions relative to a trial on more pretentious work of the overstuffed class, and dissecting an old piece having tufted work and spring edges will add to one's store of information.

FRAME RESIDENCE AT WEST LIBERTY, IOWA.

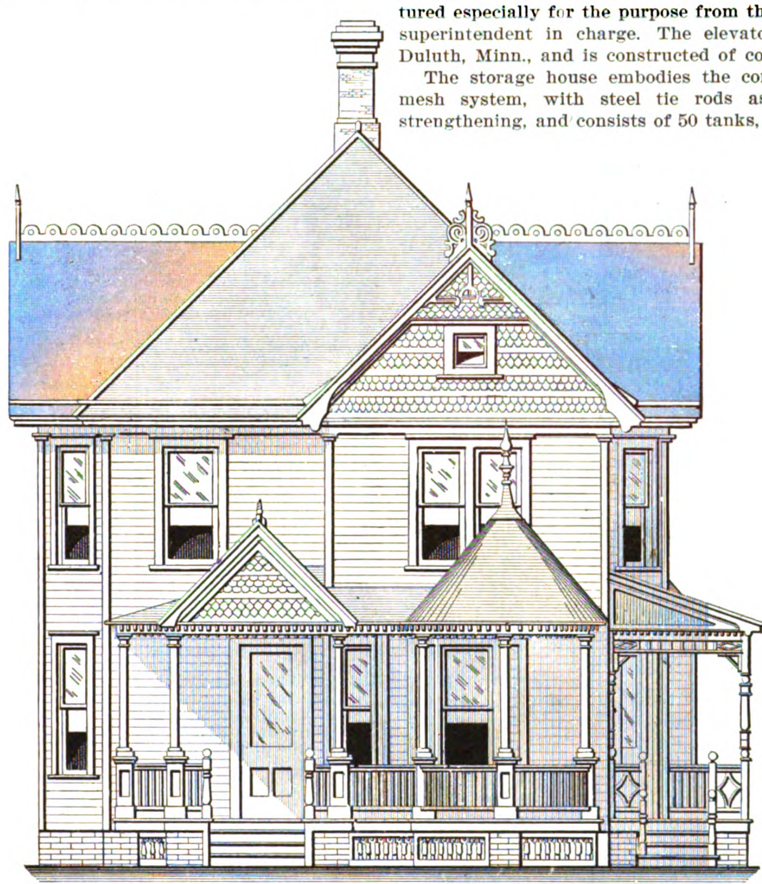
(WITH SUPPLEMENTAL PLATE.)

WE take for the subject of our double supplemental plate this month a frame residence erected in the West a little more than a year ago. The half-tone engravings give our readers a good idea of the appearance of the completed structure and also of the interior of a portion of the main floor. One picture represents the main stairs and lavatory, as viewed from the parlor, while the second interior gives a glimpse of the library.

An examination of the plan shows that on the first floor are parlor, library, dining room and kitchen, with an entrance to the library from the side porch. The space under the main stairs is utilized as a lavatory, and the position of the kitchen is such that it is thoroughly isolated from the library and parlor, so as to prevent the odors of cooking from reaching these rooms.

The house is of balloon frame with 18-foot studding, and the exterior is covered with 4-inch siding. The gables are finished with 4-inch dimension shingles and trimmed with frieze scrolls, gable brackets, &c. The front porch is finished with 6-inch Tuscan columns and pedestals, swell floor and circular roof. The hall, parlor, library and dining room are finished in red oak; the hall floor is of black walnut and white maple laid in figures; open grille work separates the parlor and library, and also the lavatory from the hall. The kitchen, coat room and the entire second-story rooms are finished in soft pine.

The house here shown is located on Calhoun street, West Liberty, Iowa, and was erected by W. A. Warren from plans prepared by himself. The mason work was executed by Raver & Hartman; the carpenter work by Mr. Warren; the electric work and plumbing by W. A. Houston; the tinning, hardware and heating contracts by Frank Doty, and the painting, glazing, &c., by Henry Pugh, all of West Liberty, Iowa.



Front Elevation.—Scale, 1/8 Inch to the Foot.

Frame Residence at West Liberty, Iowa.—W. A. Warren, Architect.

A Grain Elevator of Concrete.

In the Northwestern section of the country there has lately been completed a grain elevator which represents a departure from accepted methods, not only in material and manner of construction, but in shape and size as well. It is said to hold under one roof more grain than any structure heretofore built, and so different is it from anything before constructed that even the tools with which it was made had to be manufactured especially for the purpose from the designs of the superintendent in charge. The elevator is located in Duluth, Minn., and is constructed of concrete.

The storage house embodies the concrete and wire mesh system, with steel tie rods as an additional strengthening, and consists of 50 tanks, of which 30 are circular and the others occupy the interspaces between them. These circular bins are arranged in five rows of six bins to the row, and between the rows, set in the foundation, is a tunnel carrying an endless belt, upon which grain stored in the bins alongside falls for delivery to the working house adjoining. There are also steel concrete floored galleries, running from the upper part of the working house to the tops of the bins in the concrete building for filling the latter. In one-half of this building the concrete ceilings vary from 12 to 8 inches in thickness, extending to a hight of 104 feet, and are strengthened by 1½ x ⅝ inch flat bands, placed horizontally and spaced 8 inches apart. In the other half these straps are supplemented by a system of steel wire built into the concrete as a large mesh.

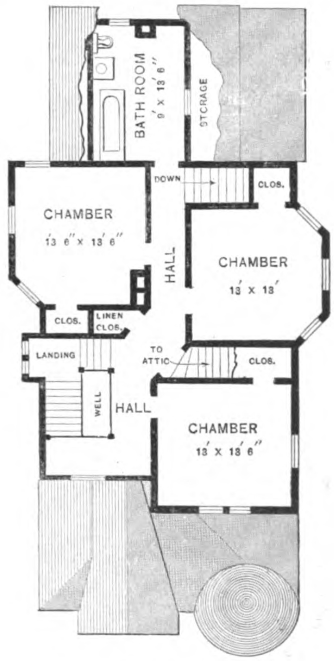
The concrete used in the building was ordinary Portland of a leading brand, mixed in the usual way and by machinery. The forms in which the work was done were built up of angle iron and plank, and were 3 feet high. They were set by knocking in wedges carried in the outside of the forms, and were loosened when these wedges were knocked down. Jacks set into the forms and lifting on the completed concrete structure raised the form, each set being continuous for an entire row of six bins.

The elevator was erected on a pile foundation, more than 9000 being driven to refusal in the sand and clay bottom of the harbor. Sheet piling was driven around the outside of the entire space and was filled with sand. An asphaltum course in the foundation effectually prevents the rise of moisture from the bottom. It is said that the walls of concrete are found in actual practice to dry the grain inside them, and no outside heat is able to injure the grain stored.

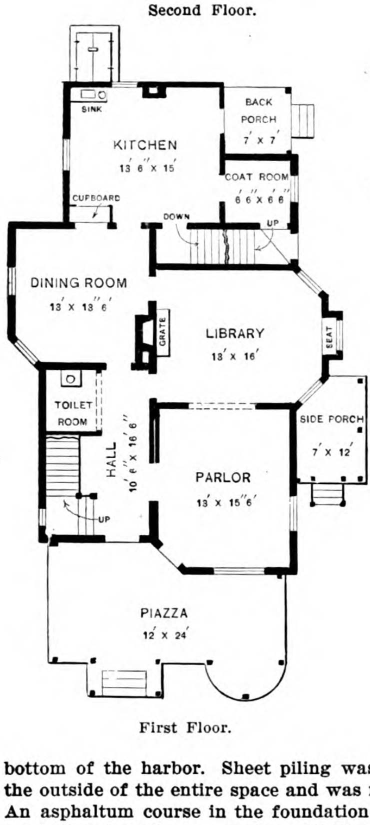
The roof of this elevator is of concrete, built flat in between I beams woven with wire. The pathways on top of the bins and the tracks for the great belts, their trippers and dischargers, are of the same construction, the concrete in these cases being 4 inches thick and the beams being spaced about 4 feet apart. There is absolutely no wood in the entire building. The elevator and its subjacent working house—that is, the building containing all the machinery for cleaning, transmission, weighing, shipping, &c., have a combined capacity for 6,200,000 bushels of grain. Wheat can be transferred from one to the other at the rate of 100,000 bushels per hour, and both inflow and output can be carried on at the same time at this speed.

Planning Small Houses.

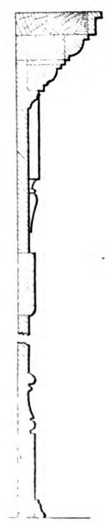
In one of the Public Library lectures delivered at Boston a short time ago, by R. C. Sturgis, the subject discussed was how to plan small houses. In the course of his remarks, the lecturer pointed out that a disregard of elementary features in house and grounds was



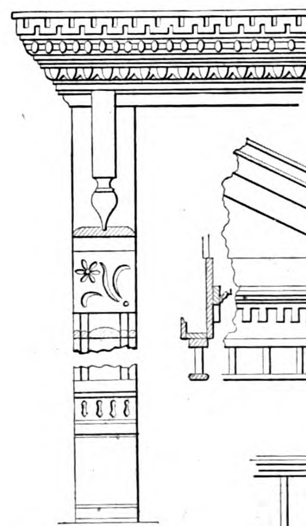
Second Floor.



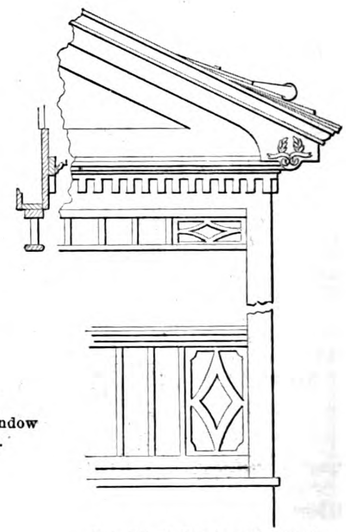
First Floor.



Section of Trim.



Detail of Inside Window and Door Casing.



Details of Porch and Cornice.

Frame Residence at West Liberty, Iowa.—Floor Plans.—Scale 1-16 Inch to the Foot.—Details.—Scale, ¾ Inch to the Foot.

the cause for so many inartistic homes at the present day. "The elementary divisions of a house," said Mr. Sturgis, "are the portion occupied by the owner and the family, and the portion devoted to the servants and the household economy." The suitably arranged house is one where the first portion is on the east and south sides of the house and where light and air are abundant. The service portion is usually in the most desirable position, and the hallways, stair cases, &c., in the darkest and most undesirable places. The connecting link between the two, the dining room, should be in the place where the morning sun can always be counted upon.

The grounds also have certain divisions, generally lost sight of, or are unsuspected in the poorly planned ground. There should be a forecourt, or portion immediately in front of the house, treated as a screen or not from a prying public, according to circumstances. A flower garden that may be in view of the owner's portion of the house; a vegetable garden, more remote and placed with special reference to the service portion of the house; a kitchen court for domestic traffic; while lawn spaces, shade trees, &c., may be disposed around or among these, if available. The foregoing, however, are the elements that centuries of experiment have prescribed as necessary to good form in a home.

WHAT BUILDERS ARE DOING.

THE reports which have come to hand from leading centers since our last issue went to press indicate an active season in the various branches of the building trades. Throughout many sections projects are under way calling for the construction of large numbers of dwellings of moderate cost, while office buildings and business blocks are contemplated to an extent which will compare very favorably with previous records. Here and there we hear of building operations being temporarily suspended, by reason of higher prices of materials which enter into construction or by the scarcity of structural iron and steel. These deterrents, however, are likely to be only temporary, and projects which are now held in abeyance will doubtless be pushed to completion ere the close of the building season.

Thus far the labor situation has developed no very serious aspects, although minor differences have arisen in many sections of the country, as is very often the case at this season of the year. In some instances workmen have secured an advanced scale of wages, and in others the men are out on strike pending a settlement of their demands. Taking the country over, however, there is perhaps no more disturbance than is natural, considering the diversified interests, and the outlook is in no sense discouraging.

Albany, N. Y.

There is a promising outlook for building in the city of Albany and vicinity, the contemplated improvements covering both dwellings and business structures. There are now in progress three large churches, a ten-story bank building, a new telephone exchange and a large apartment house, together with a number of attractive residences.

At the annual meeting of the Carpenter Contractors' Association the following officials were elected for the ensuing year: President, Adolph Knuth; vice-president, W. G. Sheehan; secretary, Edward A. Keeler; treasurer, Peter Blake, and financial secretary, Henry Kronan. The trustees for one year are William Wickham, John J. Mass, E. A. Walsh, M. Walbilling and John A. Enselein.

Binghamton, N. Y.

The second annual banquet of the Master Builders' Association of the city was held at the Hotel Crandall on the evening of Wednesday, April 2. Covers were laid for 25 builders and their guests, the toastmaster of the occasion being George N. Balcom, president of the association. In introducing the speakers he likened the banquet to a building, the gastronomic features being the foundation and that which followed the superstructure.

Among the speakers of the evening were William F. Seward, who outlined the way in which the master builders held the destiny of the city in their hands, and pointed out that the monument of their greatness was the buildings they erected. Supervisor E. W. Van Slyke, the poet of the organization, recited an original poem, entitled "One of Charlie Mitchell's Fishing Trips." A. E. Badgley gave the history of the organization, its aims and objects, pointing out that thus far it had proved a success in every way. T. I. Lacey spoke on "Relations of Architects and Builders," and in the course of his remarks he stated that one of the greatest faults in the present system employed by the architects and builders was that the latter did not refuse to figure on plans and specifications when they were not made out in detail, and thus lost money by bidding on a piece of work before they knew all that would be required of them.

Short informal addresses were made by many others present, the burden of their remarks being to the effect that the reason better buildings were not erected and builders did not receive better prices for their work was because builders allowed themselves to cut their bids to the architects' estimates when they could not afford to do the work for the price. This was explained by the architects, who stated that a client would demand a house for a certain sum, and wanted it according to plans which to execute would exceed the amount the client was willing to pay. It was pointed out that this trouble could be remedied only when contractors would refuse to figure on a job until detailed drawings were furnished and then refuse to do the work for less than it could be executed at a fair margin of profit. The builders expressed themselves as willing to put a stop to all underbidding and to having the architects combine in making them live up to the specifications.

Buffalo, N. Y.

Building conditions in and around Buffalo are in a fairly healthy state. Quite a number of good sized contracts have already been awarded, and contractors are busy figuring plans for proposed buildings. That the architects are busy is shown by the fact that a certain out of town party, wanting a draftsman for a week or so, searched the city over, but could not find a good one out of employment. No serious labor disturbance is looked for the coming season, as contracts for the year have been made with practically all the unions represented in the various departments of building.

The wages scale of workmen for the coming year will be as follows:

Bricklayers and plasterers, an hour	$0.50
Stonemasons, an hour	.45
Carpenters, an hour	.30
Wood workers and mill men, an hour	$0.20 to .25
Laborers, an hour	.18 to .20
Painters, per day, 8 hours	3.00
Plumbers, per day, 8 hours	3.50
Hoisting engineers, per day, 8 hours	3.50

In the way of building improvements it may be stated that Havens & Son of Philadelphia have the contract for erecting 454 brick houses at Stoney Point. The Lackawanna Iron & Steel Company have placed an order with the Buffalo Brick Association for 8,000,000 common brick to be consumed the coming summer. This gives one an idea of the work the Steel Company themselves intend doing the coming summer.

Henry Schaefer Sons have started a building at the corner of Main and Swan streets for the Fidelity Trust Company to cost about $300,000. The same firm have a contract to build a handsome mansion for J. J. Albright on West Ferry street to cost about $150,000, and are building two fine houses on Delaware avenue for a Mr. Goodyear and a Mr. Mathews. Charles Berrick Sons are building a big plant for the American Radiator Company on Reno street to cost about $70,000. This firm are also building a station for the Bell Telephone Company, Baynes and Delevan avenue. Kehr & Felton have the contract for a large building for the Central branches of the Young Men's Christian Association Building, to cost $275,000. Mosier & Summers are building a high school that will cost $200,000. Thomas Brown has the contract for the erection of a building 600 x 40 to be erection at West Seneca as a workshop and dormitory for the St. John's Industrial School. Other buildings that are in course of construction are additions to the plant of the Snow Steam Pump Works, a high school at Lancaster, and the State Hospital at Gowanda.

According to the figures issued by the Department of Public Works there were 165 permits issued in March for building improvements, estimated to cost $372,796, as compared with 131 permits for improvements costing $480,791 in March of last year. The figures for the first quarter of the present year show a considerable increase in the number of permits issued, but a slight decrease in the cost of improvements. For the first three months of 1902 there were 425 permits issued, covering building improvements costing $844,414, as against 294 permits for improvements costing $1,086,770 for the first quarter of last year.

Detroit, Mich.

Architects now have a considerable amount of work on their boards, and the outlook for building the present season is encouraging. The permits which have recently been issued indicate a somewhat better class of work than was the case a year ago, at least to the extent of involving an expenditure of a greater amount of capital for a less number of permits issued. During March of the present year there were issued 293 permits for improvements costing $648,400, as against 297 permits for building operations involving an outlay of $488,500 in the corresponding month of last year. According to C. W. Brand, Permit Clerk, the figures for the first quarter of the year show a very gratifying increase over the corresponding three months of 1901. During January, February and March of the present year permits were issued for 544 operations, involving an estimated expenditure of $1,237,400, as against 505 permits for improvements costing $813,800 for the first quarter of last year.

Harrisburg, Pa.

Present indications warrant the belief that this season will witness a greater degree of activity in the building line than has been the case for many years past. It is said that plans drawn and accepted, up to the middle of March, for buildings in the city will require at least 11,000,000 common brick. This is exclusive of facing brick, and when it is borne in mind that the entire yearly output of the local yards is only 14,000,000 brick, an idea of the situation may be gained. Architects are said to have enjoyed a very fair business during the winter, and it is also said that their spring work has been heavier than for some time past. A number of industrial improvements are in progress which are calculated to stimulate building operations, and there are several tracts of land which it is thought will be opened up in a way to call for the erection of many houses. In fact, in the Tenth Ward the necessity for houses is even greater than in many other parts of the city, and at the present time Harrisburg has not enough houses to fill the demand.

Kansas City, Mo.

The outlook is regarded as favorable for a good volume of business in the building line, although it is possible that the aggregate may not be quite up to a year ago, this opinion being based upon the figures issued by the Superintendent of Buildings for the first quarter of the present year. According to Superintendent McTernan there were 413 permits issued in March for building improvements estimated to cost $529,090, as compared with 437 permits for improvements costing $652,540 in March of last year. For the first quarter of the present year there were 791 permits issued for buildings involving an estimated expenditure of $1,134,635, as compared with 872 permits for buildings costing $1,359,810 in the first quarter of 1901.

Los Angeles, Cal.

So far this year, says our correspondent under date of April 5, the number of building permits issued by the city authorities in Los Angeles is about double the number issued during the corresponding period of last year. A feature of the present building is the erection by investment companies and individuals of houses for sale, the average value being less than $1500. This is due in a large part to the character of the prevailing styles of architecture, which are lighter and less expensive than formerly employed. There are, however, a number of large and costly buildings planned for the early part of the year. Among these are the Mason

Opera House, on Broadway, near Second (on which work is now in progress) to cost $250,000; the R. A. Rowan Block on Broadway, to cost $35,000; the adding of four stories to the Grand Building on the corner of Fourth and Broadway, to cost $175,000; the Bilicke Block on Broadway, to cost $40,000; the Bilicke Block on Fifth street, to cost $30,000; the seven-story Johnson Block on Fourth and Broadway, to cost $175,000; the California Savings Bank Building, a nine-story structure, at the corner of Fourth and Spring streets, to cost $250,000, and the Burdick Block, a seven-story building at the corner of Second and Spring streets, to cost $250,000.

Milwaukee, Wis.

The prospects for an active building season are regarded by architects, contractors and builders as of a most encouraging nature. The improvements consist largely of residences and business structures, with perhaps a few large apartment houses. According to the figures of the Building Department for the month of March there were issued 195 permits for building improvements, estimated to cost $377,598, and for the first quarter of the present year there were 352 permits issued for buildings to cost $587,342.

For something like a year past efforts have been made looking to the consolidation of the Federated Trades and the Building Trades Councils, but thus far the movement has not met with success. At a recent meeting of the Building Trades Council resolutions were passed discharging the Consolidation Committee and instructing the secretary to notify the Federated Trades Council of its action. This practically means that the effort looking to consolidation has failed

Newark, N. J.

The members of the Builders and Traders' Exchange have for some time been seriously considering the question of occupying a building of their own, and from present indications the movement is likely to meet with success. What may be regarded as a preliminary step in this direction was the incorporation on April 1 of the Builders and Traders' Exchange Building Company with an authorized capital stock of $25,000. Among other objects for which the company were established is said to be the erection of buildings of all kinds, and particularly the construction and maintenance of a building adapted for the use of a Builders and Traders' Exchange. Among the incorporators are A. H. Vreeland, Hugh Kinnard, Albert Courter, George S. Clark, William J. McGrath and William S. Schouler.

For some little time past a movement has been under way among some of the master builders of Newark to effect an organization which would include the leading builders of the city. As a result of the agitation of the question there was recently organized what is known as the Master Builders' League, with permanent officers as follows: President, J. C. McGuire; vice-president, A. A. Sippel; secretary, A. J. Crowder, and treasurer, John L. Earl.

At the meeting of organization the trades represented included carpenters, plumbers, electrical workers, structural iron workers, tinners, masons, and the tile and mantel workers. The object of the organization is said to be to minimize the possibilities of disagreements and other troubles with their men. Each building trade, however, will handle its own affairs the same as in the past, and the new organization, which will be known as the Central Body, will have nothing to do with any matters except what is referred to it by the individual trade organizations. The prime object, we understand, is to bring the employers and workmen into closer touch and thus promote a more cordial relationship.

New York City.

There is a fair amount of activity in the building line in Greater New York, but the showing is not up to that of a year ago. A noticeable feature of that section of the island below Fifty-ninth street is the number of instances where old buildings are being torn down to make way for modern structures mostly intended for business purposes. A great deal of work in the way of apartment houses and family hotels is in process or in prospect, and the tendency seems to be toward a better class of construction. An idea of the extent of building operations since the first of the year in the boroughs of Manhattan and the Bronx may be gained from the statement that up to the close of the second week in April permits had been issued to the number of 468 for improvements, estimated to cost $23,242,894, as against 1534 permits for buildings, costing $61,012,150 in the corresponding period of last year. In Brooklyn there were 835 permits issued for buildings, costing $4,204,370, as compared with 1347 permits for improvements, involving $7,431,760 in the same period of 1901.

The Stone Mason Contractors' Association of Greater New York recently entered into an agreement with Stone Masons' Unions 30, 66 and 74, by which its members agree to employ only members of these unions. In return the members of the three unions have agreed to work only for the members of the association.

An agreement affecting several thousand bricklayers in 17 unions in the city by which the wages are advanced 5 cents an hour has been entered into by the Master Builders' Association and the local unions, the agreement to take effect July 1 and last a year. By this agreement, which is entered into yearly, all labor disputes within the year must be settled by a joint Board of Arbitration.

As we go to press several thousand plasterers' laborers are out on strike for an increase in wages to $3.50 per day.

Philadelphia, Pa.

The figures issued by the Bureau of Building Inspection for the month of March and also for the first quarter of this year indicate an active building season in and about the city. The improvements are not confined to any one locality, but are more numerous in the outlying districts, more especially in the Twenty-second, Twenty-seventh, Thirty-fourth and Thirty-eighth wards. For the month of March 738 permits were issued, covering 1559 operations, the estimated cost of which is placed at $5,932,990. These figures compare with 779 permits, covering 1285 operations, costing $3,040,860, for March of last year. The figures for March of this year make a new record, the previous one being held by the month of May, 1897, when the cost of building improvements was a trifle over $4,000,000. Not only did the month of March eclipse all records, but the last day of it exceeded any previous one in the history of the Bureau of Inspection, the value of the building improvements being placed at $1,508,570, as against $1,302,205 on May 6, 1897, which was the previous record. The section of the city in which improvements of the greatest value are being made is the Ninth Ward, permits being issued for 18 operations involving an outlay of $1,753,190. During the month permits were issued for 935 new dwellings, estimated to cost $2,108,035, the nearest approach to these figures being March, 1896, when 900 buildings were projected, costing $2,006,475.

The first quarter of the present year is ahead of the first quarter of last year, which up to that time held the record, with 1634 permits, covering 2464 operations, estimated to cost $5,775,055, whereas the first three months of this year showed a total of 1444 permits, covering 2366 operations and involving an estimated expenditure of $7,714,905.

Some of the more notable building operations include an 11-story apartment house, 100 x 190 feet in area, from plans by Architect E. F. Bertolett; a steel skeleton frame office building at Fifteenth and Chestnut streets, covering an area of 78 x 132 feet, and costing $1,200,000; an improvement in the Thirty-fourth Ward involving the construction of 76 two-story houses by James Arthur and estimated to cost $155,000; an operation by Isaac Dunne in the Fortieth Ward, involving the construction of 114 two-story houses and two two-story stores and dwellings, to cost $160,000; an improvement in the Thirty-fourth Ward by David Cram, involving the building of 12 two-story houses and four two-story stores and dwellings; while in the same ward J. A. Wickersham has under way 91 houses and two stores and dwellings, costing about $228,000. James Kane has taken out permits for the erection of 15 two-story houses and two two-story and two three-story stores and dwellings, in West Philadelphia. H. P. Snyder has under way 20 three-story houses in the Thirty-third Ward. Moody & Beverlin are about erecting 46 dwellings in the neighborhood of Parrish and Fifty-first and Fifty-second streets. Samuel Shoemaker has broken ground for 60 two-story houses and four two-story stores and dwellings in the Thirty-fourth Ward, to cost $125,000. Another notable operation has just been commenced by the well-known builder, William T. B. Roberts, involving the construction of 83 houses in the Twenty-second Ward, the cost of which will be about $200,000. All the dwellings are to be erected from drawings prepared by Architect E. Allen Wilson of Philadelphia.

The quarterly meeting of the Master Builders' Exchange was held on March 25, when President Shields announced the committee from the various exchanges, organizations and city departments to confer with the Underwriters' Association regarding an adjustment of the differences between property owners and the insurance companies over the increase in insurance rates. At that meeting William Copeland Furber delivered an address on the subject of fire protection, using and illustrating by means of lantern slides the recent conflagration at Paterson, N. J., as the principal topic of his remarks.

The exchange held its sixteenth annual banquet at the Bellevue on the evening of April 9, covers being laid for 40 persons. W. S. P. Shields, president of the organization, delivered a brief address on "Master Builders, which was very well received. The committee having the banquet in charge consisted of J. Lindsay Little, A. B. Barber, F. R. Whiteside, John R. Huhn, Charles P. Hart, W. J. Collins, John R. Wiggins, Frank H. Reeves and W. J. Gear, Jr.

Pittsburgh, Pa.

Present indications point to a considerable degree of activity in and about Pittsburgh during the present year, as architects have more or less work under way and some of the largest dealers in builders' supplies express the opinion that there is nothing in the way of a good volume of business. Scarcity of structural steel is retarding the work on some large buildings, and the danger of tardy delivery of brick and lumber is holding back many builders of dwelling houses. While there are mutterings of discontent on the part of labor, the consensus of opinion seems to be that the wage question will be amicably settled through the medium of compromise. There are several important building improvements in prospect in and about the city, and with the present degree of prosperity in the iron and steel industry it is reasonable to suppose that a large amount of constructive work in the way of dwellings will be done in the outlying districts. We understand that, among others, a contract has just been made for the construction of 50 houses at Swissvale, to cost in the neighborhood of $175,000. These houses will each contain six rooms and bath, and will be of brick-veneer construction. The demand for small houses in and around Pittsburgh is said to be greater this spring than ever before, and Swissvale being in high favor with home seekers is rapidly building up. This, perhaps, may be said to be true of all the intervening territory between East Liberty and Braddock.

The figures issued by Superintendent J. A. A. Brown of the Bureau of Building Inspection show comparatively small changes for the month of March and for the first quarter, as against the corresponding periods of a year ago. The number of permits issued for building improvements during March was 387, estimated to cost $1,225,340, as against 282 permits for new buildings costing $826,960 in March of last year, the latter figures being exclusive of additions and alterations. For the first quarter of this year permits were issued covering 750 operations, involving an estimated outlay of $2,372,402, as against 997 operations, costing $2,650,953, in the first three months of 1901.

In regard to the building situation Superintendent Brown says that although operations are lagging now building will in all likelihood be as brisk this year as last, if tradesmen do not ask too large advances in wages. This danger, he believes, is the greatest one in the way of a building boom. "If labor troubles are averted," he said, "I look for a prosperous year for builders and do not think materials will go any higher than they are now."

The painters' strike, which was in progress during the early part of March, was satisfactorily settled through a conference between a committee of the striking painters and the officers of the Master Painters' Association, which was held in the rooms of the Builders' Exchange on the evening of March 15. By the agreement eight hours will constitute a day; all overtime shall be paid as time and a half, except Sundays and holidays, which shall be paid at the rate of double time; and the minimum rate of wages shall be 40 cents an hour for house painters. The rate is an advance from $2.80 to $3.20 a day.

The contract for the erection of the Oliver office building on Wood street, which is to be 25 stories high and which was designed by the architects D. H. Burnham & Co. of Chicago, to cost about $2,000,000, has been awarded to the George A. Fuller Company.

The report of the Assistant Building Inspector, Ellsworth Murphy, of Allegheny, shows 65 permits for building improvements estimated to cost $409,900. This is regarded as a very good showing, considering that most of the month was unfavorable for building operations. With the improvements contemplated and assumed to have been taken by the Pennsylvania Railroad Company, it is expected that the building enterprises will receive a fresh impetus.

Portland, Ore.

The building season in Portland, Ore., opened comparatively late this year on account unfavorable weather conditions, and thus far operations have been confined almost entirely to small structures. It was not until the end of March that building activity really began to make itself felt. During the last week in March, however, work was begun on tearing down a number of out of date buildings in the heart of the city in preparation for modern business blocks. Among the building undertakings of the larger sort which are now under way are the erection of the large bank building adjoining the building of the First National Bank, the remodeling of the McKay Building, at the corner of Third and Stark streets, and the erection of the Masonic Temple at the corner of Morrison and Fifteenth streets.

Rochester, N. Y.

The differences existing between the Carpenter Contractors' Association of the city and members of the various carpenters' unions have been amicably adjusted, and an agreement governing the rates of wages, hours of work, employment of apprentices and arbitration has been signed. to take effect on May 1 and to continue until May 1, 1903. By the terms of the agreement eight hours shall constitute a day's work and the minimum rate of wages shall not be less than $2.50 per day for regular working hours. When the men work on Sundays or holidays it shall count as double time. and all overtime shall be paid for at the rate of time and a half. The carpenters agree not to work for any person not regularly engaged in the carpenters' and joiners' trade for less wages than $3.20 per day for regular working hours and not less than double time for all hours known as "overtime." The men also agree that as a body they will not demand any advance in wages until the expiration of the agreement.

It is also agreed that no contractor shall employ more than one apprentice to each five journeymen in his employ, but shall be allowed the privilege of employing as many laborers as desired, but in no case shall the laborers be allowed to use carpenters' tools. Any one working at the trade less than three years and being under 21 years of age shall be classed as an apprentice. In case any difference should arise between employers and employed, no strike or lockout shall be declared, but all differences shall be submitted to the joint arbitration board, consisting of an executive committee of the Carpenter Contractors' Association and the Arbitration Committee of the carpenters' unions, together with an umpire, whose decision shall be final and binding on both parties and shall be rendered within 48 hours of submission of the grievance.

St. Louis, Mo.

There is a fair amount of building in progress in and about the city, yet nothing approaching what might be termed a "boom," notwithstanding the fact that this impression seems to have gone abroad over the country. There is, however, a good demand for buildings of all kinds, but according to some of the real estate men this is due more to the natural growth of the city than to the fact of the World's Fair being held there in the near future. As a consequence, rents are showing an advancing tendency and places are now being rented at a good figure which a year ago were vacant more or less of the time. The feeling is that in the course of the coming months the demand for new buildings will be met and thus give to the year a gratifying degree of activity in the building line.

According to the figures of C. F. Longfellow, Commissioner of Public Buildings, there were 363 permits issued during March of the present year, involving an outlay of $1,087,053, as compared with 312 permits for improvements costing $911,988 in March of last year. The record, however, for the first quarter of this year is not quite so favorable when compared with the corresponding quarter of 1901, owing to the fact that in January of last year the cost of building improvements was nearly double those for January of this year. In the first quarter of 1902 permits were issued to the number of 815, covering building improvements valued at $2,494,017.50, as compared with 738 permits for improvements valued at $2,893,845 for the first quarter of last year. One of the sections in which just now there is considerable activity is East St. Louis, where new buildings in the way of stores, flats and dwellings are going up on all sides.

The contract for the Machinery Building has been awarded by the Louisiana Purchase Exposition Company at a public hearing to Smith & Eastman, a general contracting concern, for $496,957. The Machinery Building is one of the largest of the exhibit group, its dimensions being 525 x 1000 feet.

San Francisco, Cal.

Our correspondent, writing under date of April 5, says that the records show that more new buildings were started in March than in any previous month since the department was established. Permits for 172 new buildings were issued by the City Commissioners during the month and a proportional showing was made by the suburban cities and towns. The most noticeable feature of the present building situation is the construction of new hotels. Among the list of hotels, either now under way or about to be begun, are at least half a dozen whose hight will vary from five to 12 stories. One of these, a five-story building, will cost upward of $2,000,000, and the total cost of the entire group will approximate $10,000,000.

Although building, both in frame and brick, has never been so active as now, owners of property and contractors are aghast at the advances being made in the prices of lumber, iron and steel. The price of clear redwood lumber has advanced within a very short time from $32 per 1000 feet to $44 per 1000 feet, and another rise is impending. Similar advances have been made in building pine. The cause for the advance in lumber prices seems to be twofold. There is a lack of sufficient shipping facilities to bring the lumber to the market, and there is an extraordinary demand for California lumber abroad. Structural iron and steel are both high in price and hard to get. The condition in the brick industry is, however, rather more favorable for building than it has been. The dissolution of the brick combine on April 1 has caused something of a drop in brick prices and it is believed will lead to a greater use of this material.

William Mooser, Jr., city architect of San Francisco, has handed in his resignation to the city Board of Works. This position, which carries with it a salary of $3000 per year, will, it is believed, be given to Matthew O'Brien, who has previously been in the service of the city.

Seattle, Wash.

Building operations in Seattle show a very gratifying increase for month over last year's records. The preference seems to be for two-story frame buildings, suitable for residence purposes. Persistent efforts are being made to finally settle the labor troubles in the building trades, which have been affecting Seattle building for a number of months. At present the outlook is very favorable for a cessation of these disturbances. Few large buildings have been begun so far this year, though a number of plans are on foot.

Trenton, N. J.

The Master Builders' Association of Trenton, N. J., held their first annual banquet on March 25 at the Trenton House, where covers were laid for 20. The guests of the evening included several members of the Builders' Exchange of Philadelphia. George E. Fell was toastmaster and addresses were made by William S. Morris, Lewis Lincoln, John Barlow and Andrew J. Case. The amusement of the evening was furnished by Charles S. Thompson of New York, a professional entertainer.

Washington, D. C.

The present season gives promise of considerable work in the building line, as there are a number of operations in progress and others are contemplated. Dealers in materials are busily occupied in meeting the demands made upon them, and in some instances there is difficulty in making prompt deliveries. Architect N. F. Haller has recently completed drawings for 29 three-story brick and stone dwellings, to be erected on W street, in the northwest section of the city, the cost being placed in the neighborhood of $150,000. The fronts will be of gray brick and light stone and of such a variety of design as to make it appear as if there were three separate rows.

Efforts are being made to prevent the erection of skyscrapers on residence streets in the city, and in the latter part of March the Senate District Committee introduced a measure looking to this end.

According to the report of Snowden Ashford, the Inspector of Buildings, permits were issued during the month of March to the extent of 354, calling for an estimated outlay of $1,087,921. Of this number 107 were for brick dwellings, 23 for frame dwellings, 25 for apartment houses, 1 for an assembly hall, 6 for tables and 40 for sheds.

Notes.

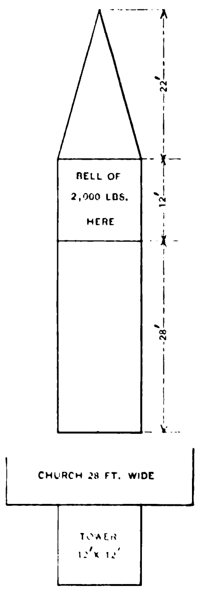
Judging from the number of permits which are being issued by the City Engineer of York, Pa., more houses will be erected this season than ever before in the history of the city. It is said that during the first 20 days of March 66 building permits were taken out, of which 43 were for brick dwelling houses, 13 for frame dwellings and 10 for repairs and alterations.

Advices from Duluth, Minn., are to the effect that prospects were never so bright as at present for an active year in building operations. There is a growing fear in certain quarters, however, that the high price of building material may restrict operations to some extent.

CORRESPONDENCE.

Framing and Bracing a Church Tower.

From H. M., *Hull, Iowa.*—Will the practical readers of the paper show in the Correspondence columns how to frame and brace the tower or spire of a church of the dimensions indicated in the sketch? The upper part of the drawing represents the elevation, while the lower



Framing and Bracing a Church Tower.

portion is a plan of the tower, indicating its position with regard to the church proper. I would be glad to have those answering the inquiry furnish sketches and state the sizes of the various timbers to be used.

Finding Bevels of Hip Rafters with Steel Square.

From O. A. G., *Dresden, Tenn.*—In reply to "H. R." of New Jersey, whose inquiry appears on page 96 of the April number of the paper and who asks how to find the bevel on the projecting end of a hip rafter, to correspond with the square cut of the common rafters, I would suggest that he take 17 inches on the blade of the square and one-half the rise of the common rafter to 1 foot run on the tongue, and the tongue will give the cut. For example, the roof is ¼ pitch, this being 6 inches rise to the foot run; 6 and 12 will make the common rafter cuts, and 17 and 3 the cut on the end of the hip or valley, to correspond to the square cut of the common rafters. I would suggest to this correspondent that if he obtain from David Williams Company a copy of Hicks' "Builders' Guide," price $1, he will find within its covers much that is of value in connection with roof framing.

From D. F. W., *Nichols, Iowa.*—Replying to "H. R.," New Jersey, as to the method of finding with the steel square the cut on the lower end of the hip corresponding to the square cut on the common rafter, in order to receive the fascia, I would say that it may be done in the following manner. Take 17 inches on the blade of the square and one-half the rise per foot run on the tongue, and the tongue gives the cut. In this case, for a ¼-pitch roof the figures would be 3 inches on the tongue and 17 inches on the blade, the tongue giving the cut.

Tool Chest Construction.

From O. A. G., *Dresden, Tenn.*—For the benefit of new subscribers will "D. F. M.," Syracuse, Neb., or "E. C. N." of Boston, Mass., kindly reproduce the plan of tool chest on which "D. F. M." comments in the April number of the paper.

From F. D. W., *Nichols, Iowa.*—In the April issue I notice an article from "D. F. W." of Syracuse, Neb., commenting on his tool chest modeled after the plans of "E. C. N." of Boston, Mass. As I have only been a subscriber to the paper since December, 1901, I have failed to see the plans in question. A few months ago I had the misfortune to have my chest and tools destroyed by fire and am now making calculations for a new tool chest. I am an interested reader of the paper and will be very much pleased to see a reproduction of those plans, as they may be of great service to others as well as myself.

Note.—As the matter in question appeared only a little more than a year ago, we fear the majority of our readers would not feel we were justified in thus using space for which other articles are now awaiting publication. It is possible some of the friends of our correspondent may have a file of the paper for last year, to which he can refer for the tool chest article.

Cold Storage Room for Eggs.

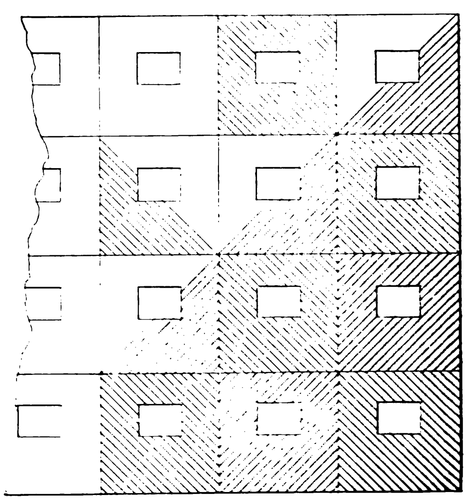
From G. W. M., *Rogers, Ohio.*—I would like some reader to furnish for publication plans for a cold storage room for eggs where ice is in abundance. I have just finished putting up a building for this purpose and have another to erect, if the first one proves entirely satisfactory, and it seems as if it would.

Plans Wanted for a Double House.

From H. H. G., *Sioux Falls, S. D.*—Will some of the architectural readers of the paper kindly furnish for publication plans of a double house costing in the neighborhood of $2000?

Diagonal vs. Horizontal Sheathing.

From G. L. McM., *Tacoma, Wash.*—There is in process of construction in this city a building which will be occupied as a match factory. It is four stories in hight and about 200 feet square. It is being sheathed diagonally in blocks, as indicated in the inclosed sketch, and I would like to have the opinion of some of the read-



Diagonal vs Horizontal Sheathing—Sketch Accompanying Letter from "G. L. McM."

ers, both architects and practical builders, as to whether it is advisable to sheath a building in this way. Is it enough better than horizontal sheathing to pay for the extra expense and waste of material? Is any diagonal sheathing enough better than horizontal sheathing to pay for the trouble?

Estimating Seating Capacity of Churches, Halls, &c.

From G. L. McM., *Tacoma, Wash.*—Will some of the many readers of the paper kindly inform me how many square feet of floor space are usually allowed per person in estimating the seating capacity of churches, lecture halls, &c., or in estimating the size of a building necessary to accommodate a congregation of any given size ?

Perspective of a Two Gable House.

From E. I. F., *Deering Center, Maine.*—In answer to "D. E. P." of River, Ind., whose inquiry I noticed in the February issue, I inclose herewith a drawing showing an outline perspective of a house with two gables, together with a detailed drawing indicating all the necessary steps. I send this not only in reply to "D. E. P.," but as a guide and help to others. To this end I have tried to make the drawing as clear and distinct as possible, and at the same time suitable for reproduction, but have not attempted to describe any of the theories connected with the subject.

The first step in drawing a perspective is to locate the station point (S. P.) or position of the observer's eye. This can be placed as near the bottom of the paper as convenient, as the further it is from the picture plane the less distorted will be the picture. Having located the S. P., the next step is to draw the line representing the picture plane (P. P.), which should be as far from the S. P. as possible, usually from 60 to 100 feet by scale. Next draw the ground line (G. L.), about one-third way between the S. P. and the P. P. Now draw the horizon line (H. L.) from 4 to 6 feet above the ground line. Draw a line vertically upward from the S. P. to intersect the picture plane. This line is called the principal line of vision (P. L. V.), and it indicates the direction in which the observer looks. Now from the S. P. draw a line at the angle it is desired the picture should be, and produce it until it intersects the picture plane, designated in this case by A on the drawing. Again from the S. P. draw the line B at right angles to line A just drawn and produce it until it also intersects the picture plane. From the two points where these lines intersect the picture plane, drop perpendiculars C and D to the horizon, the points of intersection being termed the vanishing points. The one to the left we will call vanishing point (V. P. 1), and the one to the right V. P. 2. All of these construction lines should be drawn on a piece of brown paper. Then tack the perspective plan with outline of roof, chimneys, &c., in the place where it is shown on the accompanying drawing, so that the line E is parallel to the line B, and the line F is parallel to the line A. When this is done tack down the front elevation in the position here shown on the drawing, taking care that the ground line of the elevation coincides with the ground line that has been drawn. By using the T.-square horizontally, the hights can be transferred directly to the measuring lines. Now tack down the piece of paper on which is to be drawn the perspective, as shown herewith.

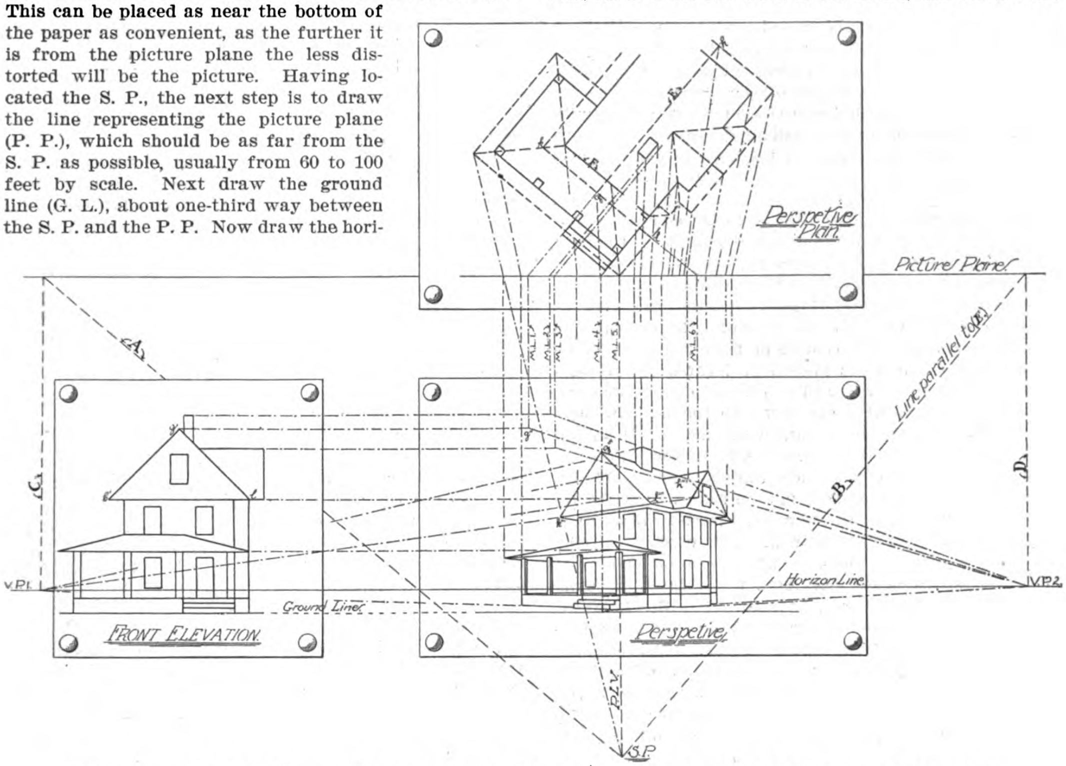
The next thing to do is to draw the measuring lines (M. L.). To project a measuring line, first decide on the point of which it is desired to obtain the hight; then draw a line from this point parallel to the line A or B, until it intersects the picture plane. From the point of intersection, drop a perpendicular to the ground line, which will be used to measure the hight above the ground line of the point from which it is projected, or any other point in the same vertical plane.

In making a perspective it is necessary to use several measuring lines, one for the ridge, one for the chimney, one for the cornice, one for the side of the house, &c. Thus, in my drawing, I have used six measuring lines—M. L. 1 for the ridge, M. L. 2 for the chimney, M. L. 3 for the point where the small gable intersects the side of the roof, M. L. 4 for the sides of the house, and on this are measured the hights of the windows, doors, belt, courses, &c.; M. L. 5 for porch roof and M. L. 6 for the house roof.

Now from all the points in the perspective plan draw converging lines to the station point (S. P.) to intersect the picture plane (P. P.). Having done this, lay off the hights of the various points on the measuring lines by projecting them across from the elevation by means of the T-square. From the points where these lines intersect the proper measuring lines, draw lines to the vanishing points, taking care that all the lines in the plan which are parallel to A shall vanish at V. P. 1 and all the lines parallel to B shall vanish at V. P. 2.

Now from the points where the lines from the perspective plan intersect the P. P., drop perpendiculars to intersect the lines drawn to the vanishing points. The points where they intersect is the perspective of the points in the perspective plan.

In order to make this more clear, we will take the point g, which is one end of the ridge and trace it to the perspective. First produce the line E until it intersects the P. P. From this point drop the perpendicular, M. L. 1, to the ground line (G. L.). This is the measuring line for the ridge, so project the point g (shown at g' in the elevation), across until it intersects M. L. 1. From g''



Perspective of Two-Gable House.—Reduced Fac-Simile of Drawing Submitted by "E. I. F.," Deering Center, Maine.

draw a line to V. P. 2. From the point g in the plan draw a line to the station point (S. P.) until it intersects the P. P. From this point drop a perpendicular, and the point where it intersects the vanishing line drawn from g'' is the point g in perspective g'''.

In the same way, the point h, which is the other end of the ridge, is found to be point h''' in the perspective, and by connecting the points g''' and h''', the perspective of the whole ridge, $g\ h$, is found.

Again the perspective of the points k and l is found to be k''' and l''', and by joining the points g''', k''' and l''', the perspective of the front gable is found. In this way the whole perspective may be drawn by finding the perspective of the points and connecting them by lines, and then again connecting the lines with each other. Thus it will be seen that the whole secret of perspective drawing is in accurately finding the perspective of one point.

Comments on Floor Plan Competition.

From C. W. B., *Reading, Pa.*—I would like very much to see elevations and details of No. 56 published in the columns of the paper, as I consider this to be the most convenient and roomy of any of the plans published in the March issue. I do not like to see a house cut up with so many corners, or have so much "ginger bread" work on it, as the saying goes. Give me a plain, roomy house every time.

From ARCHITECT, *Iowa.*—In looking over the floor plans which were submitted in the March issue, I cannot say that I consider any of them as entirely satisfactory. With regard to the location of the bathroom in a house, undoubtedly the most economical location for cost of plumbing is directly over the plumbing fixtures in the kitchen, but where the cost item does not have to be considered the bathroom should be located as conveniently as possible with regard to the principal bedrooms. If it can have one door opening into the hall and one into the family bedroom so much the better. It should never be located where it is necessary to pass the servant's bedroom to reach it. While the placing of the bathroom over the dining room is not, so far as I am aware, the general practice in any locality, I have so placed the bathroom in a house recently finished, costing $16,000, and about a year ago finished another one of nearly the same cost, in which the bathroom was located over the dining room. I would say, however, that the floors of one bathroom were of the tile and the other of marble mosaic, the wainscoting being of tile. I have never heard of any complaint of noise in either case, and am satisfied that with proper precautions there need be no objection to placing bathroms over dining rooms. In the average six or eight room house, however, the extra cost of plumbing is generally prohibitive of placing the bathroom anywhere except over the kitchen.

From J. B.—I hope the editor will be able to give the elevations of some of the floor plans published in the March issue of the paper. The vestibule, alcove and lavatory found in connection with No. 90 are just splendid for comfort and style, but I cannot say that I like those long, straight lines in the plan.

From O. K. W., *Minneapolis, Minn.*—I must confess that I was very much disappointed because the plans which I submitted in the competition received no consideration from the experts having the matter in charge. At least, this was what I assumed, as the plans did not appear among those published in the March issue. It may have been due to the fact that my name and address appeared on the drawings, but I was of the opinion that in a prize contest the merits of a plan would be the first essential and the preliminaries come only second in line, but I see I have been mistaken. I would like, with the permission of the editor, to express my views on the planning of dwellings.

I do not consider a house having sleeping rooms on the second floor a house at all, if there is only one stairway leading to the second floor. Such a house is nothing more than a fire trap, because in case of fire, should it happen to start near the stairway on the first floor, especially at night, the occupants would find great difficulty in escaping, unless they jump out of the windows, or get out on the porch roof and slide down the porch columns, or fall down and break their bones. We are having too many cases of this kind, where life is destroyed, or people are crippled, and I would beg to ask whose fault is it? In most cases I blame the architect, who had the full confidence of the owner and who neglected in his plans to provide sufficient exits in case of fire or other accidents.

Combination stairways are just as bad as single ones, but some house designers believe they are just the thing in order to save a little room, and then again they look so fancy. They do not seem to realize that from the constant use by all the people in the house they will be worn off in a very short time, and, of course, they never expect the house to burn. I therefore say that a house for one family, with sleeping rooms upstairs, should have at least two starways leading to the second floor, and these should be placed as far apart as possible. Grave mistakes in this line will be found in the published plans Nos. 88, 18, 64, 5, 25, 76, 45 and 74.

A house without entrance hall or vestibule, particularly in the colder climates, will not give satisfaction. This mistake will be found in plans Nos. 18 and 64, especially also in Nos. 5, 25, 123 and 45.

Stairways to the cellar should be as close as possible to the back entrance and directly from the back hall, because if the groceryman wants to bring his potatoes, &c., down into the cellear, it will not be necessary for him to first pull off his boots to walk over the clean kitchen floor. He also will not be shocked seeing roasting meat on Fridays.

In designing a house, I think the kitchen should be placed on the cold, and the principal rooms on the sunny side for several reasons. One is that children do not grow up in the kitchen, and the more sunlight they can get, the better for their health. I believe this mistake will be found in plan No. 18.

I could still criticise some of the plans published, for some are too wide for the size of lot and some are too long for the width of the house, for, when finished, the house would not look to be in proportion as regards its length and breadth. I am afraid, however, I have already taken up too much valuable space. What I have said about house planning is only my opinion, and no one is obliged to accept it for himself.

From S. M. P., *Ouray, Col.*—In all the competitions which I have yet seen there seems to me to be an inequality or unfairness which should not exist. To be sure, there is no stated price or limit in the floor plan competition, but plan No. 18 has only 1550 square feet of floor inside, while No. 64 has 2000, and Nos. 56 and 90 have 2200 square feet. Assuming that No. 18 would cost $2000, No. 56 or No. 90 would cost $3000 at the same rate, but, owing to location, might be built for $2000. I have just completed a set of plans for an eight-room house of 1850 square feet inside floor, which will cost here $3000 to $3200, and is very plain.

A competition on an eight-room plan, or any other size, based on a given number of square feet floor surface, and a given amount of cubical contents would result in plans which could be compared, no matter where they were located; say, for example, 1800 square feet inside, 250 square feet outside and 300 feet in cellar floors, with a cubical contents of 17,500 feet, not to vary more than 100 feet either way. This would allow an arrangement of rooms of practically the same cost, irrespective of the location. If desired, a cost price per cubic foot could be set.

From T. K. W., *Lake Providence, La.*—Inclosed find my ballot for voting in the floor plan competition. I do not consider any of the plans meritorious, as each competitor seems to have crowded too much into a given space. Again, three or four fire places in corners of the rooms seem to me the most undesirable places to put them. My choice is for large rooms and less closets. In this section of the country, where heat and humidity have to be considered, we prefer the portable wardrobe, or *armoire*, as closets are considered too stuffy, musty and moldy, while the wardrobe can be taken down, aired and moved from place to place to suit the seasons.

From J. G., *Moosomin, Northwest Territory, Canada.*—I send inclosed my ballot for voting in the floor plan competition, and would like to say that in my opinion the majority of the plans published do not comply with the requirements, as they are only suitable for corner lots. They have to obtain light and air principally from the sides, which would make the rooms dark and close, providing buildings were erected on both sides. One of the plans showing street line on the side, No. 25, thereby giving two frontages, violates the conditions, as such were not specified, while several other plans show bay windows on one or both sides. This would be very unpleasant on lots with the narrow frontage specified, unless the house was on the corner. I think, therefore, that these do not comply with the conditions. I am much interested in the paper, and would suggest that in any future competition the situation of the lot be specified, as very different plans and arrangement can be had on corner lots than on inside ones.

From H. W. S., *Elizabethville, Pa.*—In looking over the floor plans presented in the March issue I am inclined to favor No. 76, owing to the chimney and heating arrangement, which I consider the most convenient of all. One of the flues can be used for hot air and heat four rooms on each floor. Another reason why I prefer this plan is because most people in this section of the country want square rooms. The platform and stairs are conveniently accessible from the reception hall and kitchen, and on the second floor every room can be readily reached from the hall. I should like very much to see published a neat plan of a roof for No. 76.

From R. F., *St. Marys, Ont.*—In giving my vote in the contest, I base my decision upon what I consider the most economical and best proportioned rooms considering the size of the house, as the heating is evenly divided. There is one thing, however, in all the plans which, in my opinion, is a complete botch, and that is the stairs. Do the so-called architects of America go to a high school and do they study geometry? I think not. For in all the plans I have seen there is not one with a continuous stair rail. I think it would be a profitable investment for some of the architects to treat themselves to a copy of old Peter Nicholson's works, or Nicholson revised by Treadgold. I will, however, leave stair building and hand railing to my friend, Morris Williams, of Scranton, Pa., for consideration.

Shingling a Circle in a Gable.

From G. M. B., *Barnesburg, Ohio.*—I would like to know how my brother chips would shingle a circle in a gable. Kindly give description of how the work is done, together with sketches showing details. I want the shingles to give a diamond effect.

Promising Building Outlook.

From H. C. D., *Canadian, Texas.*—I am very much pleased with *Carpentry and Building*, and do not believe I could get along without it. Every man who works with wood workers' tools should have it. Our town is small, but the country surrounding it is large, and the outlook is fair for a good season in the building line.

Finding the Back Cut of Hip Rafters When the Inclination is Other Than 45 Degrees.

From A. K. C., *Cuyahoga Falls, Ohio.*—In reply to "W. F. S.," Hermitage, Tenn., who asks with reference to finding the bevel of a hip against a ridge or deck of a roof of any pitch, I would suggest the following as a useful method of accomplishing what he desires. Take, for example, a roof of one-third pitch. For 1 foot run of common rafter we find the run of the hip or valley to be 17 inches, and for every 1 foot run of common rafter or 17 inches run of hip we find 18¾ inches to be the length of the hip. Take the run of the hip on the tongue and the length of the hip on the blade of the square and the blade gives the cut; for example, 17 inches on the tongue and 18¾ inches on the blade and cut by the blade. Taking 17 inches on the blade and 8 inches on the tongue gives the cuts for seat and top of rafter. Measure across the square from 17 inches to 8 inches and we have 18¾ inches, the length of the hip per 1 foot run of common rafter.

Rodding a Church.

From J. C. W., *Pine Hill, Pa.*—I would like to ask the readers a question in regard to rodding a church, as this belongs to the building business, and there seems to be quite a difference of opinion concerning the matter. The church is 72 x 52 feet in size and has a steeple 93 feet high. The structure is of brick, with a slate roof, and there are four gables. What I desire to know is how many points the church steeple should have and how many down wires? What is the theory in regard to hight—that is, will the rods be a protection to the building in an electrical storm? How many points should the building have in order to be properly protected and how many down wires are necessary? I shall be glad to have some of the readers experienced in this line of work furnish for publication their views on the subject. I like *Carpentry and Building* very much and am just now renewing my subscription for the thirteenth time. I have every copy carefully preserved, making quite a pile, but excellent for reference.

Instructions Wanted for Building a 16-foot Cedar Boat.

From R., *Georgian Bay, Canada.*—Will some of the readers of the paper who have had practical experience in the building of boats send for publication full instructions for building, say, a 16-foot cedar skiff? I think that such instructions given in a good practical way would be of value to a large number of the readers, as well as to myself.

Note.—The subject has been treated somewhat exhaustively in past volumes of *Carpentry and Building*, and if our correspondent will refer to the April number for 1898 he will there find a lengthy article giving full dimensions with bill of materials relating to such a boat as he mentions, although its length is 12 feet instead of 16. Illustrations are presented showing the method of framing, and the ground is covered in such a way as to enable a practical mechanic to readily construct such a boat as there described.

With this much said, however, we shall be glad to hear from readers of the paper who have had experience in boat building.

Hanging Doors.

From CARPENTER, *Ohio.*—I would like to ask of the readers of the paper how many doors ought an average workman to hang, fit and trim in a day of eight hours. There has been more or less discussion on the subject, and some of the "smart Alecs" have made such claims that I am disposed to think they were giving me fairy tales. What has been the experience of the practical members of the craft?

"Carpentry and Building" Viewed in Retrospect.

From H. K. R., *Larned, Kan.*—After reading the Correspondence columns of *Carpentry and Building* for the past year I am constrained to take a retrospective view of volume XXIII and offer a few comments. There are too many subjects of interest to touch upon all of them, and to do so would take too much of the space allotted to correspondents. However, I will commend the articles on tool chest construction by "W. C. A." of Detroit, Mich.; "G. H. J." of East Woodstock, Conn.; "E. C. N." of Boston, Mass.; "C. E. W." of Kansas City, Mo., and "D. F. M." of Syracuse, Neb.; also the comments on roof framing which have appeared in the various issues of the paper, especially the communication on finding the pitch of roofs by "M." of Denver, Col. I like his comments, and would commend them to "G. L. McM." of Tacoma, Wash., who follows "M." on page 160 of the June number with a kick against trade schools.

If the trades were to-day as they were 50 years ago, "G. L. McM." would not be kicking against public trade schools. It is a two-to-one bet that either "G. L. McM." did not "serve time" at his trade, as was the custom 50 years ago, or he is a "back number" and does not believe in education. It may be, however, that he is one of the craft to whom "M. H. K." of Mena, Ark., refers in the issue of January, 1900.

I would like to comment on some of the correspondence, but think this will be sufficient for one round. Personally, I am in favor of the public trade schools for two reasons: First, it will, in time, force the master carpenters to adopt a stringent system of apprenticeship in order to compete with the graduates of such schools; second, it will force the majority of the carpenters who are now following the "trade" to do some studying or else fall behind.

Designs of Newel Posts Wanted.

From S. F. L., *Ellinger, Texas.*—Will some of the readers of "our" valuable paper send for the Correspondence department designs of newel posts such as a carpenter can build himself without the necessity of going to a planing mill for certain parts, and without the necessity of using a turning lathe. I am sure such designs would be of great assistance to a large number of carpenters located in small country places, as I am.

That Stair Rail Question Again.

From MORRIS WILLIAMS, *Scranton, Pa.*—I intimated in the February issue that "criticisms" were likely to have a tendency to lead to useless disputations, which were usually harmful and seldom beneficial. The communication of "C. B. H." of Warren, Pa., in a recent issue of the paper is a case in point. I fail to see what possible benefit is to come from it, yet the harm it may accomplish is obviously great. The beginner not possessing the requisite knowledge of lines to enable him to discriminate between what is correct and incorrect, or to detect the false premises assumed by a critic, is thrown off the right track to arrive at correct conclusions. In this manner conscientious endeavor to help on the part of any one may be counteracted by criticisms which are not warranted by the conditions of the problem.

If "C. B. H." had taken up the problem submitted in the November issue on the same lines as it was taken up by me, it is more than probable he would have had neither taste nor time for criticism. My treatment of the problem in the December issue contained the stretch out portion and the square well hole. I assumed the center of the rail at the crown of the well hole to be in line with the landing riser and developed my face mold accordingly. In his criticism in the January issue "C. B. H." incorrectly asserts that in my Fig. 3 "the center or tangent lines of rails are represented as being directly over the face line of the strings and platform risers." The truth is that no line either in the problem or in my Fig. 3 represents the "face line of the string." The lines mistaken for same by him are the lines representing the center of the rails. The center of the crown rail in my Fig. 3 and in the problem form a continuous straight line with the landing risers. This being the truth, what reason was there for "C. B. H." to criticise? He maintains that the landing risers should project beyond the crown tangent, but the problem submitted placed them in line with the crown tangents, and my development of the face mold strictly follows the lines of the problem as far as this feature is concerned.

In the March issue "C. B. H." again refers to my Fig. 3, this time to proclaim that the development of a rail continued around a square well hole is not a wreath. It is a twisted rail. Why not a wreath? His advice is to "miter a straight rail on the same angles and for all practical purposes one would be as good as the other." I fail to see the wisdom of a remark like this.

Correct hand railing admits of no such treatment of a continuous rail around a square well hole. It calls for one solid piece, and scientifically constructed, the tangents must be developed, and the bevels, to give it the correct twist, must be found. Now this is exactly what my Fig. 3 illustrates. Is the development correct? I claim it is. Is there anything wrong in the bevels? I claim they are perfectly correct.

Let me say here that the same treatment will obtain in developing the tangents and finding the bevels in both square and round corners. This is evident when we consider that the developed tangents are the outlines of a sectional cut made obliquely through an assumed prism. If the quadrant is placed in the corner, as in my Fig. 1 of the March issue, it will not affect the tangents, but rather it will call for an additional development of the quadrant, which will be the contour of the assumed sectional cut made obliquely through a cylinder.

The mischievousness of "C. B. H.'s" criticisms is plainly exhibited in the March issue, where he misconstrues a statement of mine made in the February issue, to the following effect: "It is well to know that in all cases where the plan tangents are at right angles the bevels are to be applied reversely, and that this is not the case where the plan tangents assume either acute or obtuse angles."

This is what follows from "C. B. H." "This staggering proposition leads me to think that what I do not know about stair lines would make a very cumbersome volume. I would like very much to see an object lesson given in the case of a wreath around less than a quarter circle (obtuse angles) and both angles equally pitched in which the bevels are not reversed," &c.

Now if he had read my statement correctly he would have understood it in such a way that would have saved him the trouble of calling for an "object lesson." The idea my statement conveys is that in all cases where the plan tangents are at right angles the bevels are applied reversely (of course when the two tangents are pitched) but that where the plan tangents assume an acute or obtuse angle the bevels are not to be applied in all cases reversely. I feel in writing that I am deep in the mire of "useless disputations," the very thing I have strenuously tried to avoid. It is a thing that creates doubts in the minds of those whom I wish to assist and therefore should be avoided as much as possible.

A sign of its injurious effect has already appeared in the April issue. "W. B. R." of Davenport, Iowa, innocently remarks: "If doctors disagree, what can be expected of those knowing but little of the rail lines and for what purpose they are constructed?" My advice to him is to take no notice of the "criticism" and to study my diagrams and explanations with a determination to understand every line. Any questions he may present I will endeavor to promptly answer.

Laying Church Floors.

From W. J. McI., *Remus, Mich.*—I would like to hear from readers of the paper with regard to the best method of putting down an inclined floor in a church, giving the size of joist and timber required to support it over a basement. The area of the floor is 28 x 45 feet, and there is in front a class room, 16 x 28 feet. Any information which the practical readers can give will doubtless be of interest to others, as well as myself.

Finding the Number of Brick in a Chimney.

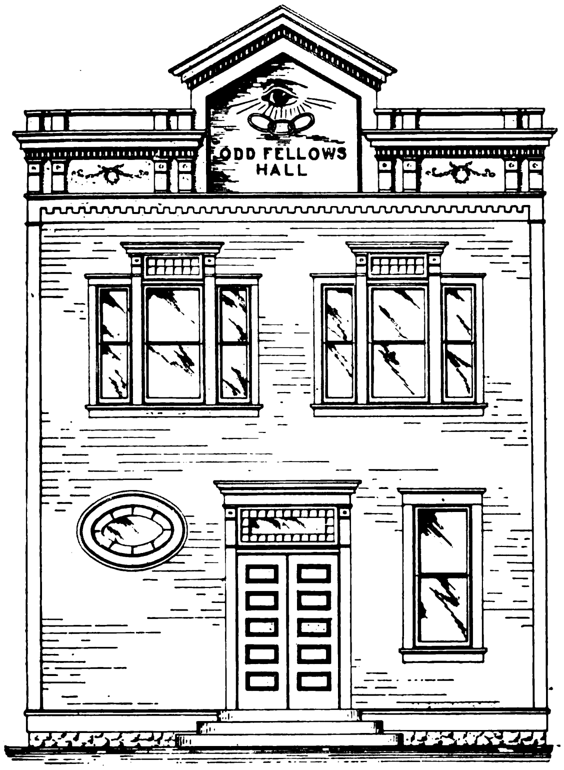
From O. A. G., *Dresden, Tenn.*—Will some of the readers of the paper kindly give me a rule for finding the number of brick required to build an ordinary single or stack chimney? I can readily figure the number of brick required for a building, but am puzzled when it comes to the chimney.

Placing a Truss in Position.

From W. T. L., *Kingston, Ohio.*—I would be pleased to have some reader of the paper describe in detail how to build or place in position a horizontal truss, such, for instance, as the one represented in Fig. 10, in the November issue, and repeated in connection with Mr. Kidder's article in the issue for February of the present year.

DESIGN FOR AN ODD FELLOWS' HALL.

In answer to a request which appeared in these columns a short time ago for drawings of an Odd Fellows' Hall, we have received the accompanying matter from Lloyd & Frank of 100 South Eighteenth street, Pitts-



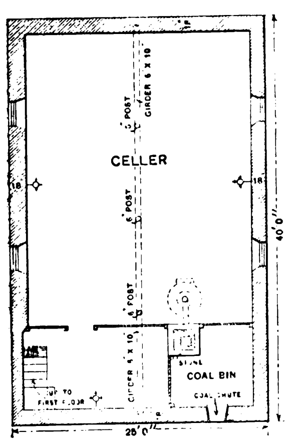
Front Elevation.—Scale, ⅛ Inch to the Foot.

in mortar composed of sharp river sand and freshly burnt lime. All visible surfaces are to be neatly pointed, rock faced work. The chimney is to be of common brick and topped with hard burnt front brick, the last with tin treated with one coat of Dixon's graphite paint and one coat of lead and oil. The floor of the reception hall is to be laid with Michigan maple not over 2 inches in the face, and the other floors are to be laid with No. 1 yellow pine, not over 3 inches in the face. The stairs are to have 1⅛-inch treads and ⅞-inch risers of clear six courses to be built in cement. There is to be a flue opening for the furnace in the cellar and a 7-inch cast iron pipe ring for the kitchen stove.

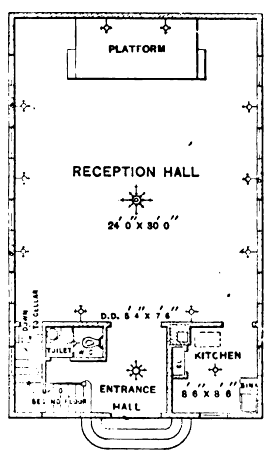
The timber used in the framing is to be hemlock, the sills being 6 x 10 inches, the corner posts 4 x 6 inches, the studs in outside walls 3 x 4 inches, placed 16 inches on centers; the first-floor joist 2 x 10 inches, the second floor joist 3 x 14 inches and the studs for inside partitions to be 2 x 4 inches, all placed 16 inches on centers, and the top plates are to be 2 x 4 inches. The outside of the building is to be covered with siding and the roof yellow pine. The main outside doors are to be of the five-panel variety and to be 2¾ inches thick. The reception hall doors 1¾ inches thick and all other doors 1⅜ inches thick.

All dressed wood work except the second floor is to have three coats of pure white lead and linseed oil paint and the wood work in the reception hall is to have three coats of Flood & Conklin's spar varnish. The transom over the front entrance door and the elliptical windows on front and side elevations are to be glazed with art glass. The entire building is to be plastered three-coat work, the last coat to be a hard white skim of white sand and plaster of paris. The second coat is to continue under the base finish.

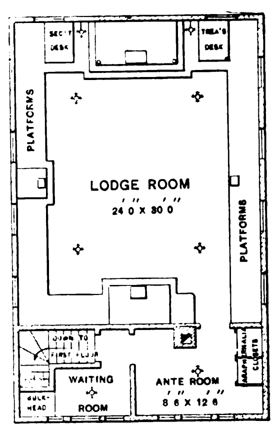
The building is intended to be heated by means of a hot air furnace placed in the cellar, as indicated. Hot air ducts from the cellar to the lodge room on the second floor can be brought up in the outside walls and have their outlets at cast iron registers set in the riser of



Foundation.



Main Floor.



Second Floor.

Scale, 1-16 Inch to the foot.

Design for an Odd Fellows' Hall.—Lloyd & Frank, Architects, Pittsburgh, Pa.

burgh, Pa. In submitting the drawings they state that they consider the building adequate to meet the demands of an ordinary lodge in the suburbs and that they have endeavored to make the arrangement compact and convenient. It will be seen that provision is made for reception room, kitchen, toilet and entrance hall on the first floor and a lodge room with two anterooms on the second floor. The authors consider the kitchen an important factor in a building of this character and have therefore made provision for one on the main floor.

According to the specifications accompanying the drawings, the foundation is to be of building stone laid

platform. The anterooms on the second floor are to have registers set in the partition between the anterooms and the hall. The first floor is to have register openings along the walls where desired and all ducts are to be tightly covered with asbestos wool and the joints made perfectly air tight.

Aberdeen, Scotland, boasts of a new development in the lines of women's employment, quite a number of the granite cutting yards employing women as draftsmen.

PLAN OF A MODEL KITCHEN.

ONE of the features of house planning, as practiced at the present day, which does not always receive the consideration its merits deserve, especially in moderate cost dwellings, is the arrangement and equipment of the kitchen. The idea seems to prevail in many quarters that so long as there is a room designated as a kitchen it is immaterial whether or not its appointments be such as to best conduce to convenience and a saving of steps, thereby lessening, in a measure, the task of those performing the domestic duties of the household. It is well said that the kitchen is the "heart of the house," for out of it come "the issues of life," and it is therefore incumbent upon the architect to give its planning a fair measure of his best efforts. Some very happy suggestions touching the arrangement and appointments of a thoroughly modern up to date kitchen are found in an article contributed to the *American Kitchen Magazine*, by Nina C. Kinny, and as the subject has in it so much of interest to readers of *Carpentry and Building*, we take pleasure in presenting copious extracts herewith.

The planning and building of a model kitchen is an end well worth patient thought and experiment. Ugliness should not be tolerated. Why may not the kitchens of American housewives be fittingly furnished with what shall please both the hand and the eye? There is no virtue in ungainly tables or cooking ware. The ancient Greeks made beautiful the most common utensils. In modern Japan nothing is made which is not beautiful, at least in form. Beauty is the primal law, the keynote to the order of the universe, and whatever is unbeautiful is, in its very nature, out of harmony and a discord producer.

In the planning of the kitchen itself, the beauty of light and comfort, and of a harmonious fitting of means to ends, should have full expression. With a conviction of the importance of the matter, bearing in mind that the kitchen should be sunny, and must be a light, comfortable, workable place, and that the work to be done in the kitchen, the work for which the kitchen is built, has a vital relation to the life of the household, these plans were made.

In the kitchen as one enters from the back hall, the lift or dumb waiter, which runs from cellar to garret, is at your right, as shown in the accompanying plan. Both car and shaft should be enameled in white.

The sink arrangement is at your left. The table or shelf in which the sinks are set measures 24 inches deep and 9 feet long. It is 36½ inches from the floor. This is higher than sinks are usually set, or than kitchen tables are usually made, but this extra hight enables a woman who is from 5 feet 3 inches to 5 feet 6 inches tall to work in an erect position. The top surface of this sink shelf may be of rubber tile, or it may be of wood in white enamel finish.

Standing at these sinks, the glass, silver and china from the dining table is piled on the right-hand end of the shelf, washed in the right-hand sink, rinsed in the left-hand sink, drained on the left end of the sink shelf, wiped and placed in the hot closet from which they are taken into the dining room and put in their places in the china closet. Back of the right-hand sink is a stationary draining bowl into which to empty water when both sinks are in use. At the upper right-hand corner of the washing sink is a double standard soap dish.

The space directly under the sinks is open. Under each end portion of the shelf are four drawers, or shelves, as one prefers. There is a space between the bottom drawer or shelf and the floor of 16½ inches, so that all the floor space under the sink arrangement is open. As originally planned each of the sinks has two goose neck faucets, one each for hot and one for cold water, but now after over a year's use I can see no reason why two swinging goose necks—one above the other—would not serve as well as four.

The sliding doors back of each end of the sink shelf open into closets 20½ inches wide, 19 inches deep and 21 inches high. These both open by wooden paneled doors into the dining room. The hot closet should be lined with one solid seamless compartment of white porcelain, with door openings, of course, and two circular openings for the entrance and exit of hot water pipes. The inner surface of its two doors should also be of white porcelain. There should be an interlining of asbestos to this closet. It should have one shelf of hot water pipes. Soups and all hot courses when ready for serving can be placed in this closet from the kitchen. From the closet they are removed to the dining table. Standing in the dining room, facing the sideboard, the courses as removed from the dining table are placed in the hot closet, and the soiled china in the closet at the left, the dining room closet doors closed, and the contents of each closet removed in the kitchen through the sliding doors which are at once closed to keep kitchen noises from the dining room.

There are regular house doors opening to the refrigerator space. Within this space the refrigerator is built, with a door at each end, one opening to the kitchen and one to the dining room. The ice is put in through the "high window" opening to the porch. The refrigerator should be built with solid white porcelain or glass compartments. If any compartment has a shelf it should be made of solid smooth woven wire, which offers the slightest obstruction to free circulation, and affords a safe resting place for small articles. The refrigerator draining pipe runs through the floor to an open cup trap which empties into a sewer pipe. Salads and cold desserts prepared in the kitchen are placed in the refrigerator, and when wanted they are taken from the refrigerator in the dining room.

There is a large glass panel in the porch door to light the sink.

A stationary screen is built at the left of the gas range to protect it from drafts when the door is open. Against the surface of the screen next the range is a rack to hold saucepan and pot covers.

A tier of small shelves at the left of the marble or glass pastry slab holds baking powder, soda, cream of tartar, spices, measuring cup, &c. The patent flour bin stands on the bin shelf above the right-hand corner of the slab. This is the baking corner in this kitchen, and here on the shelves or in the drawers under the slab, and on the shelves above, are all the baking utensils and staple supplies. Above the flour bin a narrow shelf runs round the corner from window to window. This holds seasoning extracts, lime water, ginger, corn starch, cocoa, &c. The pastry board is 30½ inches from the floor. It measures 46 x 26 inches, and projects in front and at the left end 5 inches beyond the drawers below it. The outside measure of the bottom drawer is 38 inches wide, 20 inches long and 9 inches deep. Above this drawer is a central division. In the right hand of the space are two small swinging flour bins, 20 inches deep, 8 inches wide and 20 inches long. They have close fitting, sliding covers. This makes three bins; two for flour and one for meal. In the left half of the space are three drawers, all 20 inches long and 18 inches wide. The bottom one of the three is 7 inches deep, the next 5 inches and the next 3 inches. This upper shallow drawer is for knives, forks, spoons and egg and cake beaters. It is divided into five compartments, four running from the front of the drawer to a division about 12 inches back, that cuts off a rear compartment 16 inches wide—the inner width of the drawer—and 6 inches long. The four front compartments are about 3½ inches wide, and 11½ inches long.

The "high shelf," above the range and baking corner arrangements, holds stew pans and sauce pans.

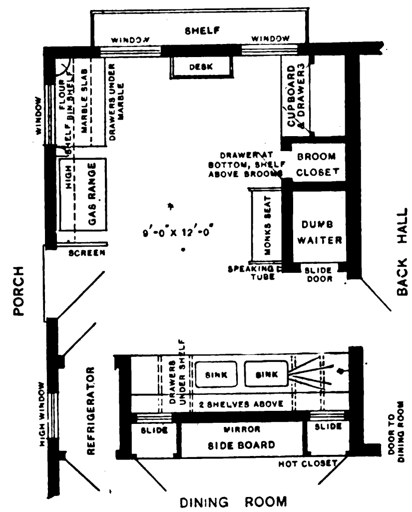
The "desk" between the two windows is a simple little drop lid arrangement for a standing desk. It holds bills, butcher and grocer books, pencil, paper, &c. Above it are three shelves to hold cook books, tea and coffee pots, and tea and coffee canisters.

"Cupboard and drawers" has a floor space 42 inches wide by 32 inches deep. Starting from the floor are two tiers of drawers—four on each side. The bottom drawers are 9½ inches deep, the next 7 inches, the next 5 inches, and the top drawers 4 inches deep. The drawers are 28 inches long and 18 inches wide. Across the top of the drawers is a wood shelf 42 inches wide and 32 inches deep, thus filling the space and projecting 4 inches beyond the drawers. The top of the shelf is 30½ inches from the floor. Twenty-four inches above this shelf is the bottom of a three-shelved cupboard 42 inches wide and 14 inches deep. It has glass paneled doors. In the under surface of the bottom shelf are two strong screw hooks, for holding jelly bags while the juice drains into large bowls on the shelf.

The broom closet is for brooms, kitchen aprons and dusters. A shelf near the top of the closet holds cleaning materials—condensed lye, sal soda, aqua ammonia, whiting, French chalk, Fuller's earth, &c., while a drawer below the closet proper, opening directly into the kitchen, holds cleaning cloths. The interior of this closet should be finished in white enamel.

The monk's seat is stationary. By pulling up the back, after the fashion of monk seat backs, you have an extra table. The seat proper is cushioned. Under the seat is a box for overshoes.

If steam or hot water heating is used pipes should



Plan of a "Model" Kitchen.

be run against the wall under windows and desk from cupboard to pastry board. If hot air is used the register should be under the desk.

Outside the two windows is a shelf, the second story projects above this shelf, and the space between this projection and shelf is inclosed by wire mosquito netting. This makes a screen for these windows, summer and winter, and leaves the shelf free to use.

AMONG the many improvements contemplated in and around the suburbs of Philadelphia is a handsome residence for George C. Bull, to be erected in Wynnewood. It will cover an area of 54 x 40 feet, exclusive of a kitchen wing in the rear. The first story of the structure will be of stone, above which will be half timber and shingle work. On the first floor will be a large open hall, library, dining room, living room, billiard room, pantries and kitchens, while on the upper floors will be ten sleeping rooms and four bathrooms. The house will be heated by means of hot air. The plans have been prepared by architects Bailey & Truscott of Philadelphia, Pa., who have awarded the contract for the construction to Gray Bros. of Bryn Mawr.

THE library which will be erected as the gift of Andrew Carnegie, at Jackson, Tenn., is now in process of erection, and it is expected that the building will be ready for occupancy by July 1. It will cost $30,000, the site being given by the city. The contract is being executed by Parish Bros., of Jackson, Tenn.

New Publication.

The Use of the Slide Rule. By F. A. Halsey, Associate Editor *American Machinist*. D. Van Nostrand Company. Price, 50 cents.

The preface tells us that this little book of 84 pages is mainly a reprint of articles which originally appeared in the *American Machinist*. The writer confesses to being an habitual user of the slide rule, who would almost as soon think of dispensing with a lead pencil as with the rule. It is, in his opinion, the greatest mental labor saver that has ever been devised.

It is based upon the theory of logarithms, but to make satisfactory use of the rule a knowledge of logarithms is not necessary, though Mr. Halsey's explanation of the principle upon which it operates is most helpful to those who use it in order to escape from the drudgery of mathematics. A brief examination of the "how" and "why" of the process may be in order, to understand what the book endeavors to accomplish. The first problem is to multiply 2 by 3; the product is, of course, 6. It is well known that the logarithm of 2 added to the logarithm of 3 will give the logarithm of 6. The slide rule is divided into a number of spaces, varying in length, but corresponding to the logarithms of the digits. To solve the problem before us, the procedure is to set 1 of the slide scale below 2 of the body scale, and above 3 of the slide scale will be found 6 on the body scale. The distance from 1 to 2 on the body scale is really the logarithm of 2, and the distance from 1 to 3 on the slide scale represents the logarithm of 3. The logarithms of 2 and 3 added give the logarithm of 6, which is read as a natural number direct from the scale on the body of the rule. The user has in this example employed natural numbers, which the slide rule with its unequal divisions has translated into logarithms, added them together, and, so to speak, having performed the purely mathematical part of the work, gives the answer in natural numbers. The book deals with mechanical addition as performed by the rule, mutiplication of fixed numbers and the multiplication of fractions; in short, all the various mathematical operations which engineers, architects or draftsmen are constantly called upon to perform are explained. The use of the "runner," which is an adjunct of the rule, is also made clear.

The limit of error of the slide rule, when of usual size, is about one-half of 1 per cent. This is well within the limits of permissible error in most engineering calculations, and is, as Mr. Halsey says, aside from this margin of error, more reliable than mental calculations.

The illustrations, some 18 in number, are on wide pages folded in at the back of the book. When opened out these illustrations lie beyond the printed page, so that they are always before the eye, no matter how many pages may be turned in reading the explanations of the cuts. This is the best plan of placing diagrams before the reader of which we have any knowledge, and is a convenient feature in the book which will not fail to be greatly appreciated by the student. This device, like the slide rule itself, is a time and labor saver.

Commencement Exercises at New York Trade School.

Commencement exercises of the twenty-first season of the New York Trade School occurred in the auditorium at Sixty-seventh street and First avenue, New York City, on Wednesday evening, April 9. More than 1000 students and their friends were present, and great interest was manifested in the work of the different departments, and in the examples of the students' handicraft which were on exhibtion.

The exercises were opened by the president of the school, R. Fulton Cutting, who introduced as speaker, Edward Murphy, chairman of the Trade School Committee of the Master Plumbers' Association. In the course of his remarks, Mr. Murphy expressed his pleasure that the instructors of the school, not in the plumbing class alone, but in all the classes, seemed to have acquired a mastery of the art of teaching their pupils, and congratulated them on the result, as shown by the high proficiency reached by each class. The New York Trade School he regarded as an invaluable institution, not only in the direct good which it does by its own work, but also in being the parent of other trade schools, and, through them, doing great good to an immense number of young men throughout the country. He expressed the opinion that the high standard set at the school and the excellent start it gives to young men not only produces a high grade of workmen, but also proves that the time of young men to-day is too valuable to be spent in a long apprenticeship. Improved systems of instruction have shown that as much can be taught in as few months as the old apprenticeship system took years to teach, and the school has the effect of turning out a better qualified beginner to attempt the mastering of the trade. The grand opportunity his hearers had enjoyed in this invaluable institution was due, he said, to the interest its founder, the late Col. Richard T. Auchmuty, took in giving the American boy a chance to become a valuable citizen, and no better monument could be erected to his memory than his dearly loved New York Trade School.

Following Mr. Murphy, President Cutting introduced William H. Oliver, president of the General Society of Mechanics and Tradesmen of the city of New York, who said that success in any vocation is not the result of accident, but of careful training. In every branch of life there is a why and a wherefore, and those who apply themselves can learn them. Nothing makes such competent, self reliant tradesmen as the knowledge acquired by those who make the best of their opportunities.

The certificates of the graduates were distributed by representatives of the Master Plumbers' Association and of the General Society of Mechanics and Tradesmen, after which several of the instructors were presented with appropriate gifts by the members of their respective classes.

The gold medal offered by the proprietors of the *Painters' Magazine* to the most proficient student of the painting class was awarded to Orville T. Crane of Atlantic City, N. J. The Industrial Publication Company, whose editor was a former graduate of the carpentry class, presented a set of technical books to the best pupil in the class in carpentry, this being Andrew Schillinger of Garfield, N. Y., honorable mention being made of S. W. Brown. The gold medal offered by the New York State Master Steam and Hot Water Fitters' Association to the most proficient student in the steam fitting class was awarded to John T. Huber of Erie, Pa., while A. A. Thompson of Detroit and E. D. Sorg of Brooklyn secured honorable mention.

The largest number of graduates were found in the day classes, there being 13 in carpentry, 72 in plumbing, 34 in electrical work, 3 in house painting, 1 in bricklaying, 4 in sign painting and 7 in cornice work. In the evening classes there were 9 graduates in plumbing, 4 in steam fitting, 3 in fresco painting and 1 each in cornice work, electrical work and printing.

The exercises were brought to a close with some well chosen remarks by President Cutting, who pointed out the value of trades unions when they teach men to live for each other rather than for themselves, so that all members may be benefited.

A New Trade School.

On Wednesday evening, March 26, the new Lucas A. Steinam School of Metal Working, which has been erected as an adjunct to the Hebrew Technical Institute at 225 East Ninth street, New York City, was formally opened. The school has been built and equipped at an expense of $100,000 by Abraham Steinam and his wife in memory of their son, Lucas Steinam, who died a year or two ago.

The new building is a six story and basement structure of brick and granite, forming a wing of the Hebrew Technical Institute. In the basement is a heating and lighting plant for both buildings. On the first floor is an assembly or lecture room, with a seating capacity of 250. The second floor is occupied by a machine shop, equipped with benches and vises for hand work, lathes, planing machines, milling machines and other tools, while the third floor contains a pattern making and wood turning shop. On the fourth floor is a joinery shop, and on the fifth floor a mechanical drawing room and two class rooms. The sixth floor contains a forge room and a molding and casting shop. The school accommodates 250 boys, who are taught the carpentry trade, forging, metal working, mechanical drawing and mathematics. The course extends over three years. At the end of the time the pupils are graduated, after successfully passing the examinations, and receive certificates of competency. The Steinam Memorial School will be under the general management and supervision of the directors of the Hebrew Technical Institute.

Combination of Sash and Blind Makers.

As we go to press reports are current that 45 manufacturers of and wholesale dealers in sash, doors and window blinds, located in Pittsburgh, Cleveland, Chicago, St. Louis, Kansas City, St. Paul, Minneapolis and other large wholesale cities as far west as the Rocky Mountains, are about to organize for the purpose of establishing and maintaining prices. The capital represented is said to be $12,000,000.

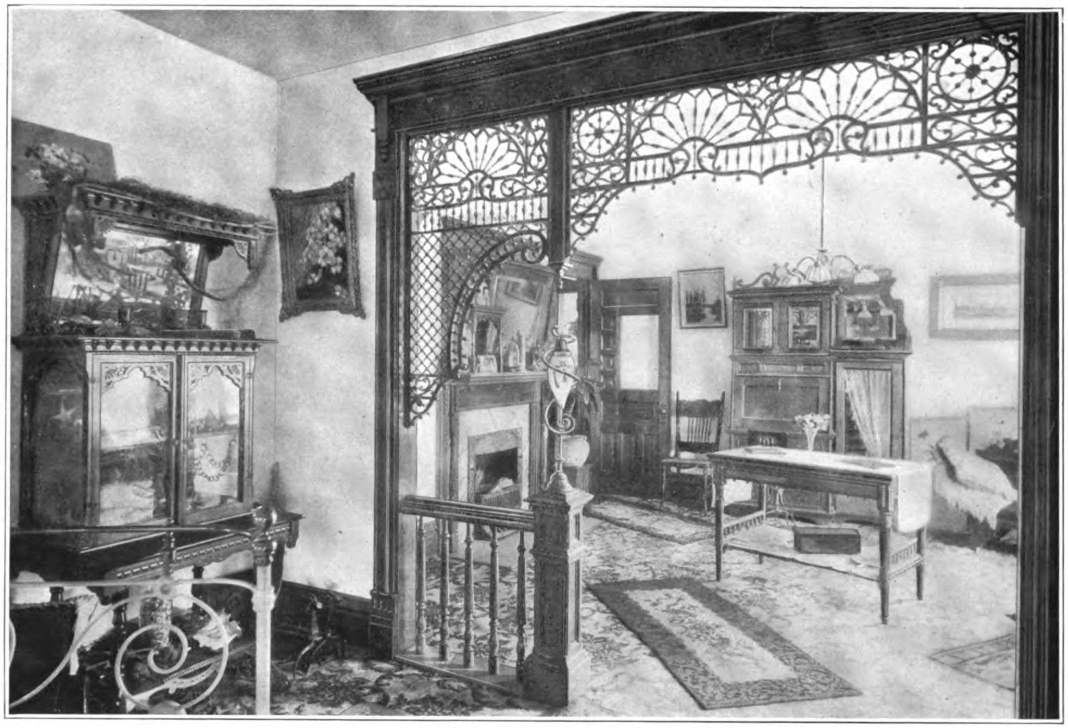
"The Cow Pea" is the title of the latest publication issued by the Experiment Farm of the North Carolina State Horticultural Society at Southern Pines, N. C. This book neatly bound and illustrated in plain and concise manner discusses the value and uses of this important crop, the Cow Pea. Any reader can get a copy free by writing to the Superintendent of Experiment Farm, Southern Pines, N. C.

CONTENTS

RESIDENCE OF MR. W. A. WARREN, ON CALHOUN STREET, WEST LIBERTY, IOWA.

W. A. WARREN, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING MAY 1892.



VIEW OF INTERIOR, LOOKING INTO THE LIBRARY.

THE STAIRCASE HALL, AS VIEWED FROM THE PARLOR.

INTERIOR VIEWS IN RESIDENCE OF W. A. WARREN, WEST LIBERTY, IOWA.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JUNE, 1902.

The Value of Licenses.

Ever since the authorities of many States and cities have provided that the plumber must demonstrate his competency before he can secure a license to engage in this branch of business those plumbers who have complied with the requirements of the law have been impressed with the idea that the same authorities should see that they are protected from competition with men who have no licenses, and who, in consequence, are violating the law. The correctness of this contention has not been questioned, but for their own protection it has been found necessary by the plumbers in many instances to themselves bring the violators of the law to justice. In a number of cities the plumbers support a man whose business it is to look after such violations and bring them to the attention of the magistrates and courts. The laws of many States are clear on this point, as well as the local regulations of cities prepared in accordance with the provisions of the laws. It is not, however, just that the plumbers should be expected to bear the burden of enforcing the laws, particularly as the violations are mostly on the part of men who shirk the examinations or have not the competency to pass them. In consequence much of their work, even though it be merely the repairing of old plumbing systems, is improperly done, and often so as to leave the plumbing in an unsafe sanitary condition. Such workmen are a menace to the general public, and the health boards, which have a large measure of influence in the preparation of the plumbing regulations, should give more attention not only to preventing the infringement of sanitary laws, but also to the protection of the rights of those who have complied with the legal requirements.

Some New Office Buildings.

The colony of towering office buildings in the lower section of New York City is to be augmented by some important additions which are now under way in William street. The contract has just been signed for a 20-story office building for the banking firm of Kuhn, Loeb & Co., at the corner of Pine and William streets, the structure to cover an area of 65 x 91 feet. It will be of skeleton frame, with an exterior of granite, brick and terra cotta. There will be six high-speed elevators and all the modern appliances of an up to date office building. The interior trim will be of fire proof wood and every floor will have a wainscoting of marble. The work of tearing down the old buildings on the site to be occupied by the new structure is rapidly going forward, and it is the hope of the contractors, the Thompson-Starrett Company, to complete the new building in record time, which will bring it within less than five months of actual work. The same concern have the contract for a 12-story structure at the corner of Platt and William streets, to be known as the Stokes Building. The above make four tall office buildings which have been planned or built on William street within the last two years.

Street Heating Systems.

A field of effort which is now attracting the attention of capital and engineers is the laying of mains in the streets for the heating of buildings. The authorities of many cities and good sized towns all over the country are being petitioned to grant permits to use the streets for laying these mains, the promoters of the enterprises expecting to derive a return for their outlay by furnishing heat, by means of steam, water or other mediums, to customers on the streets along which their heating mains are run. In a majority of instances franchises of this character are sought by those who are building electric lighting plants, for the purpose of utilizing the exhaust steam after it has passed through the engines used for the generation of electricity. The petitions, however, are by no means confined to electric lighting companies. Many come from manufacturing plants which have heretofore allowed their exhaust steam to go to waste, but are now desirous of utilizing their exhaust steam through the street mains for heating. It is already noticed that where such methods of heating have come into use there has been a transfer of activity from the stove department of the smaller tradesmen to their steam and hot water heating department, and the steam fitter is therefore more actively engaged in running pipes and setting radiators in the houses and buildings of customers. It is by enterprises of this kind that it is possible to heat a large number of buildings from a central plant and thus reduce the annoyances incident to the care of individual house heating systems to a minimum.

Compulsory Arbitration.

Considerable interest has been shown the world over in the system of compulsory arbitration of labor disputes in vogue in New Zealand. It was believed in some quarters that the adoption of this system would furnish a satisfactory solution to the problem of the prevention of strikes and the adjustment of labor disputes. It seems, however, that the New Zealand system has not in all respects worked out to the satisfaction of either the employers or the employed. According to a statement made by J. Grattan Grey, a prominent New Zealander recently in the United States, the system of compulsory arbitration as operating in his country is by no means a success. In fact, he says it has proved so ineffectual as to leave strong doubts as to the desirability of its continuance. The accusation is made that the members of the Board of Arbitration are in the habit of prolonging cases in order to secure the fees that are paid to them each day in which they are occupied thereon. Mr. Grey says further that the arbitrators encourage disputes, with the result of making capital timid and arresting the development of industrial enterprise. Of 90 cases brought before the Board of Arbitrators in the ten years from 1890 to 1900, only 29 were settled. Thus it would seem that the enthusiastic reports of the beneficial effects of the compulsory arbitration system in New Zealand published from time to time should not be completely relied upon. New Zealand has for many years been held up as a criterion in labor matters. The workingman there is in the ascendant, and her legislature is practically controlled by the labor vote. Yet the millennium of labor and capital still seems afar off, even from the point of view of the worker in that country.

Conciliation and Arbitration.

In the report of the Industrial Commission on labor disputes and arbitration, issued not long since, the commission note a growing movement in favor of conciliation and arbitration between organizations of employers and employees in the United States. This system has been adopted in a number of single industries throughout the country or throughout sections where the conditions of business are generally similar. Systems of arbitration have been established on a national scale in the stove molding, general foundry, machinists' and printing trades. The report gives great credit to the State boards of arbitration, which are doing much toward furthering industrial peace. Representatives of employers and workingmen, however, who testified before the commission almost uniformly opposed any system of compulsory arbitration. Several State boards of arbitration also have expressed their opinion against the adoption of the principle, although the New York, Indiana, Ohio and Illinois State laws provide for compulsion in certain cases, as where life and public welfare are in danger or great inconvenience or loss is entailed on the public, as in railroad strikes.

Building Activity in the South.

Some idea of the extent to which building operations are being conducted in various parts of the South may be gleaned from the statement of William H. Given, recently presented in the New York *Tribune*. Mr. Given has for many years past made a study of building operations all over the country, and has recently returned from an extensive tour of the Southern States. Among other things, he says:

Building operations in the South are on a more liberal scale than ever before in many Southern cities. Jacksonville, Florida's busy little metropolitan city, is disbursing millions to replace the $20,000,000 fire loss sustained last fall. The entire burned area will soon be entirely re-covered with substantial brick and stone business buildings of a grade superior to those destroyed. From the swiftness with which these new improvements are coming forth and being pushed toward completion there seems to be ample capital at hand to finance them and no dearth of skilled labor wherewith to execute the work.

I found business very brisk at Atlanta and Birmingham. Atlanta is the Southern home of the "skyscraper," and they have them there almost as large as the best of them in our cities of the million population class, although Atlanta's population can scarcely exceed 150,000. A new hotel now under construction there is a ten floor, steel frame, terra cotta structure which will cost $500,000. The apartment house idea is very much to the fore down in Dixie, and especially in Atlanta and Birmingham, where several are scheduled for construction this season, to cost from $25,000 to $150,000 each

There is evidence of a house famine in Birmingham, and there is scarcely sufficient capital in sight wherewith to finance the many building improvements which are demanded. In fact, dozens of families have been unable to locate there this season for lack of dwellings to house them. The openings there for young professional and business men, and those skilled in the useful arts, are many, and Birmingham has much the advantage of Atlanta in its more even topography and general municipal sightliness.

Coming northward I found Knoxville conspicuously busy, and thoroughly impregnated with the apartment house idea; but the busiest place between Atlanta and the national capital is Norfolk, which is a kind of pocket edition of New York. Norfolk is forging to the front with rapid strides, and the immense shipbuilding industries and other activities which center thereabout are all contributing to swell her building operations. I understand that the site of the recently destroyed Atlantic Hotel there will be utilized for the erection of a huge office and hotel caravansary, after the manner of the Auditorium in Chicago. I learn that upward of $500,000 will be expended this year on this projected structure.

The vitality of building activity at Richmond is quite remarkable also. The palatial Jefferson Hotel, which Louis Ginter built to stand as one of the show places of the Virginia capital, proved an excellent investment, and when it was destroyed by fire recently the trustees decided to restore it in its entirety, which is now being done. Yes, Richmond, too, is down to expend several millions for new buildings in 1902, and Roanoke, Danville and many other Old Dominion points are participating in the boom.

Making Veneered Doors.

More or less has been said in the columns of the trade press regarding methods of executing veneer work of various kinds, the latest contribution to the subject being a letter from a correspondent of the *Wood Worker*, who tells how to make veneered doors. He says:

Take, for instance, a lot of quarter sawed oak veneered doors, with built up stiles and rails, cove and bead molding stuck solid on stiles and rails, raised panels, doors to be 1¾ inches thick, core of poplar or white pine.

The strips are ripped about ⅞ x 1¾, double dressed, then sent to bench to be scratched and glued. When dry, they are taken to jointer and faced up, then run through pony planer and made uniform in thickness, which is about 1½ inches. The core is now ready to be scratched and receive the veneer. In preparing the veneer we resaw 1-inch stock into three thicknesses, then double dress it with pony planer to 3-16 inch, allowing 1-16 inch to be taken off after veneer has been glued to core.

The veneer is now scratched, then glued, and placed in veneer press, as many pieces as press will hold. When dry, they are taken to jointer and edge straightened up, then again put through pony planer on light cut, to remove bruises. Stiles and rails are now ready for the door maker to lay out. They are then mortised, tenoned, stuck and sent to the bench to be put together and pinned up, brought back to and put through the sander, then taken to bench to be inspected and finished.

THE improvements contemplated in connection with the City College at Amsterdam avenue and 138th street, New York City, include five new buildings, the plans for which have recently been completed by the architect, George B. Post of this city. The main college building, which will face St. Nicholas terrace, will be three stories high, the first floor having 18 reception rooms, with bicycle rooms, locker rooms and concourse for students. On the second floor will be 22 recitation rooms, a museum, laboratories, a library and an apparatus room, while on the third floor will be 16 recitation rooms, a physical laboratory, lecture room and chapel. The chapel will be in the center and its dome will be several stories above the roof of the third floor. There will also be a sub-freshmen building, a mechanical arts building, a chemical laboratory and a gymnasium. The plans call for an expenditure of over $2,000,000 and it is expected that work will be commenced this summer.

THE architects selected for the mammoth tunnel station of the Pennsylvania Railroad to be erected at Seventh avenue and Thirty-third street, New York City, are McKim & White of New York. The station will be a gigantic affair, probably the largest of its kind in the world. There will be two stories below the street level and the train shed will have, it is said, accommodations for 32 tracks.

THE fourth annual convention of the Architectural League of America will be held in Toronto, Canada, on May 29 to 31, inclusive.

A "DUTCH COLONIAL" HOUSE AT CRANFORD, N. J.

THE house which forms the subject of our half-tone supplemental plate this month is an excellent example of a dwelling treated in the Dutch colonial style of architecture. The general effect has been well carried out by the architects, particularly in connection with the dormer windows, the side gables and the quaint Dutch door by which admission is obtained to the main hall. The entire exterior of the house is shingled and is of a deep red color, thus forming a very striking contrast with the white trimmings. A feature which will attract the attention of many is the broad veranda extending across the front of the house and the capacious hall, which is so disposed as to give in effect a suite of rooms extending the entire breadth of the building. The plans show the main stairs located toward the rear of

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

A "Dutch Colonial" House at Cranford, N. J.—Architects, J. A. Oakley & Son, Elizabeth, N. J.

the building and lighted by the window at the broad platform two steps down from the level of the second floor. The interior arrangement is such as to give a parlor, library, dining room and kitchen on the first floor, together with spacious hall and pantry. On the second floor are five sleeping rooms and bathroom and in the attic are three finished rooms, in addition to a trunkroom and large closets.

According to the specifications of the architects the foundation walls are of brick laid in cement mortar and plastered on the outside as run up, while above grade they are floated off smooth as shown in the photograph. The cellar bottom has a floor of cinders and cement well mixed and finished with a coating of one-third Portland cement and sharp sand.

The house is of balloon frame, all timber, unless otherwise specified, being of hemlock. 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.

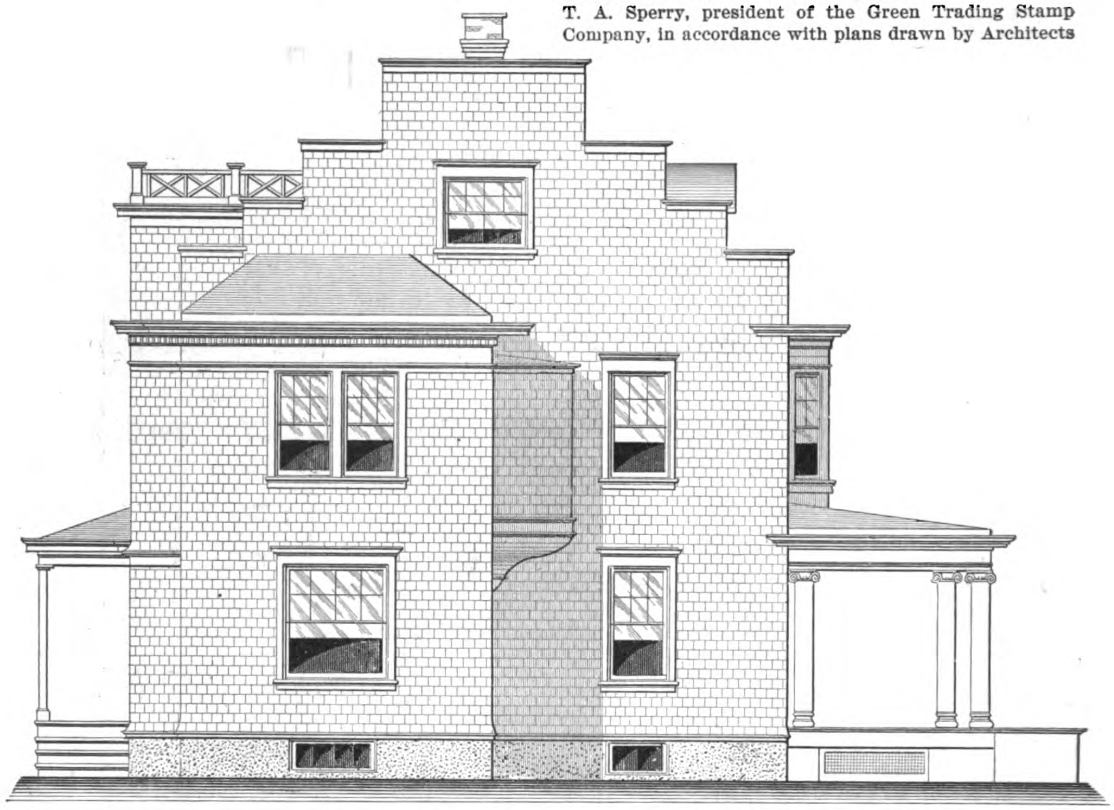
The outside frame is inclosed with 1 x 9 inch tongued and grooved hemlock sheathing boards laid horizontally and the same material is used on all deck, dormer and porch roofs covered with tin. The exterior of the house is covered with 18-inch white pine shingles laid 5½ inches to the weather and with two-ply building paper between them and the sheathing boards. The roof is covered with 18-inch red cedar shingles laid on 1 x 2 inch hemlock shingle lath, with all hips run up "Boston" style. The veranda has 10 x 10 inch staved columns with turned base and composition plastic caps of the Ionic style with square abacus. The columns are Koll's patent, made by Hartman Bros. of Mount Vernon, N. Y. The veranda is ceiled with ½ x 3½ inch tongued and grooved North Carolina pine, blind nailed. The ceilings as well as the columns have a coat of filler and two coats of spar varnish, while the plastic caps are stained the color of natural wood. The first and second story floors are double, the under ones being of rough 1 x 9 inch hemlock boards laid diagonally and with a finishing floor of ½ x 2 inch North Carolina pine with a good quality of building paper between.

The trim throughout the house is of ⅞ x 5 inch white pine, molded. The stairs have strings and risers of white pine and treads of Georgia pine. The newels, rails and ballusters are of ash and have a coating of filler and two coats of Flood & Conklin's Crystal finish. The doors throughout are of white pine, molded on both sides. The sliding doors are fitted with patent trolley hangers made by Lane Brothers of Poughkeepsie, N. Y. All inside wood work, except the stairs, kitchen and the third floor, was treated to one coat of white lead and linseed oil and then two coats of white lead and oil mixed with such a proportion of Flood & Conklin's "Viter Alba" as to make a fine white finish. The kitchen wood work, as well as that on the third floor, has a coat of wood filler and two coats of hard oil finish. The first and second story floors have a coat of filler and two coats of floor varnish.

The kitchen walls to a hight of 5 feet and the floor have a coat of Adamant Company's finish and lime putty lined off in 6 x 6 inch squares. The room is fitted with an 18 x 36 x 6 cast iron sink, a No. 258 brick set Provident range made by the Richardson & Boynton Company, and a 35-gallon high pressure boiler. In the butler's pantry is a tinned and planished copper sink with nickel plated bibbs, plug and chain.

The bathroom has a tile floor laid on a body of concrete composed of small, broken stones, sand and cement. This rests on a 1 x 9 inch hemlock deafening floor, which is cut in between the beams on 1 x 2 inch strips 5 inches from the top of the beams. The walls of the bathroom to the hight of 4 feet are finished with tile laid on a bed of sand and Portland cement, supported by metal lath. The wainscoting finishes with a molded cap, under which is a raised decorated 4-inch frieze. The room is fitted with a Vigilant syphon jet porcelain water closet, marble wash basin and a Majestic roll rim porcelain bathtub made by the Standard Mfg. Company. The plumbing is of the open type and the fixtures are nickel plated. The house is piped for gas and wired for electric lighting and electric front door bell. There is a speaking tube from the hall on the second floor to the kitchen. The heating is by means of a No. 147 New Perfect hot air furnace made by the Richardson & Boynton Company of New York City and is connected with the outside through the medium of a cold air duct, as shown on the foundation plan. The pipes running through partitions are covered with metal lath and the sides of studs 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 dwelling here illustrated is pleasantly located in Cranford, N. J., and was completed last summer for T. A. Sperry, president of the Green Trading Stamp Company, in accordance with plans drawn by Architects J. A. Oakley & Son of 1201 East Broad street, Elizabeth, N. J.



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

A "Dutch Colonial" House at Cranford, N. J.

Apartment Houses for the Wealthy.

In commenting upon the accommodations afforded by some of the luxurious apartment houses of the present day and to a building of this high class which contains more than 1500 rooms, the *Sun* says that every feature to be found in the finest dwellings is duplicated in these apartments, with the important exception of the stairs. The suites vary in size from 6 to 30 rooms. The best apartments contain from two to five bathrooms, with special quarters for the servants.

The rooms are heated in winter with hot air and cooled in summer with refrigerated drafts. Hot or cold or iced water, each filtered, is supplied to every room. By living in an up to date apartment, in short, a housekeeper can save everything but money.

Not only does the economy of labor in housekeeping attract residents, but the apartment houses, by their lavish decorations, draw many to them. The architecture of these great buildings, their entrances and halls, are far more elaborate than any single tenant could afford in a house of his own.

In other words, a man who pays $10,000 a year for a flat has the satisfaction of entering a hallway as elaborate as that of many European palaces. Several of the apartment houses in New York, for instance, have plate glass doors covered with bronze scroll work valued at $5000 a panel. The hallway of one apartment house contains several ornate lounges costing many hundreds of dollars each.

Perhaps the most important feature of this modern form of living is the economy of time and patience which has been made possible in housekeeping. A good one-third of the drudgery of house care is performed by machinery. The heat is supplied from the cellar and can be regulated to a degree.

The foods are preserved in porcelain refrigerators cooled by cold brine, which can be turned on or off by an ordinary spigot. If ice be desired the cold brine is merely turned on full head for a few minutes and zero weather is produced, though it be the hottest of summer days.

Electricity has entirely superseded gas for illumination. Each apartment has, besides, a telephone of its own, and the hostess talks with her cook from any room or with a friend a thousand miles distant with equal facility.

To an outsider a most interesting part of one of these mammoth apartment houses is the cellar. It is here that the greater part of the housekeeping is performed. These cellars resemble nothing so much as the hold of an ocean liner. They are crowded with complicated machinery, attended by a score of engineers and electricians.

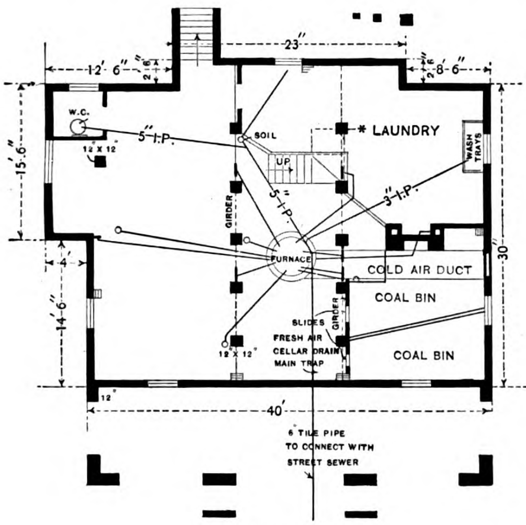
It must be remembered that the heat, light and general convenience of hundreds of living rooms are controlled from this center. And tenants who pay thousands a year for their suites are very intolerant of any neglect.

The bulkiest equipment of these cellars is the complicated system of pumps and engines used for forcing the water of various temperatures to the apartments. Every well regulated apartment house cellar is supplied with enormous filters, which clarify all the water used throughout the building. The water is then heated or cooled, as the case may be, before passing to the pumps.

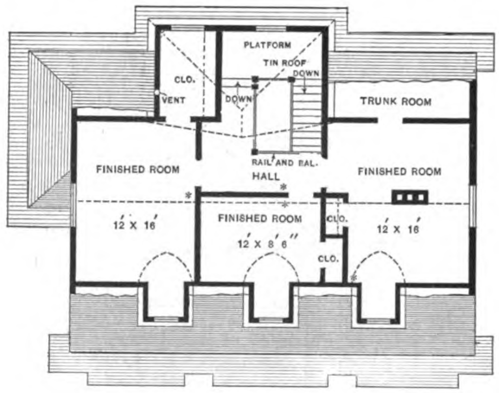
There are house pumps for the ordinary hot and cold water, brine pumps for the freezing apparatus, and still others for the ice water and the very hot water which heats the great buildings. The temperature of all these systems of piping must be controlled to a degree, or endless inconvenience will follow.

Each cellar has, besides, two complete electric plants, with complicated switchboards and buzzing dynamos.

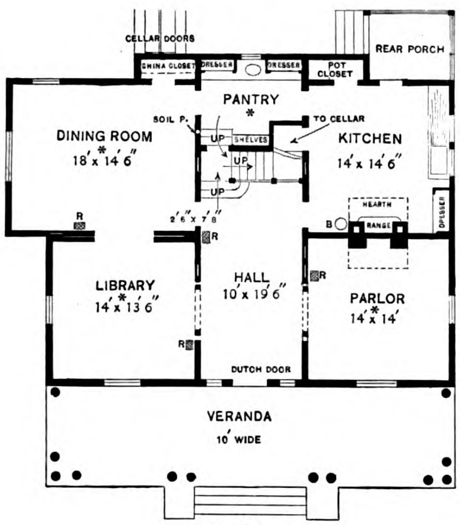
The cellar proper has besides a number of brick walled rooms, one corresponding to each flat, where the tenants



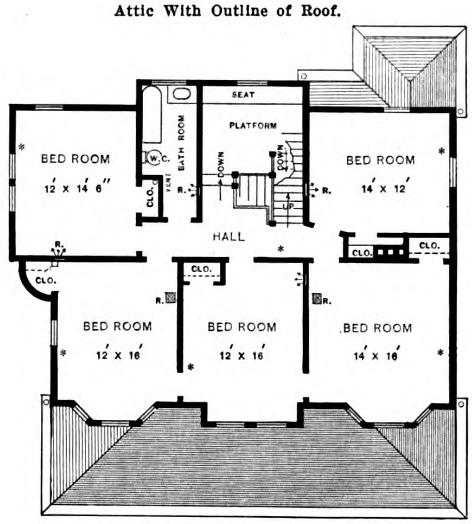
Foundation.



Attic With Outline of Roof.



First Floor.



Second Floor.

A "Dutch Colonial" House at Cranford, N. J.—Floor Plans—Scale, 1-16 *Inch to the Foot.*

may store bicycles, trunks, baby carriages and similar accumulations. These cellars are fire proof and are lighted by electricity.

Still another feature of the newer apartment house are the public laundries. Each tenant has a stationary tub in the cellar with an approved rack for clothes, which are dried by hot air blasts.

The cellar door is the back door of the apartment. The servants and tradespeople first enter the cellar and then proceed to the apartments by special freight elevators. In some apartment houses the freight elevators are so large that a loaded furniture van may be hoisted to the upper floors intact, there to be unloaded.

Fire proof arrangements are as complete as it is possible to make them. The floors and walls throughout are built of brick and cement. The staircase and elevator shafts are constructed entirely of metal and stone or cement. The floors of the rooms are merely covered with thin layers of wood.

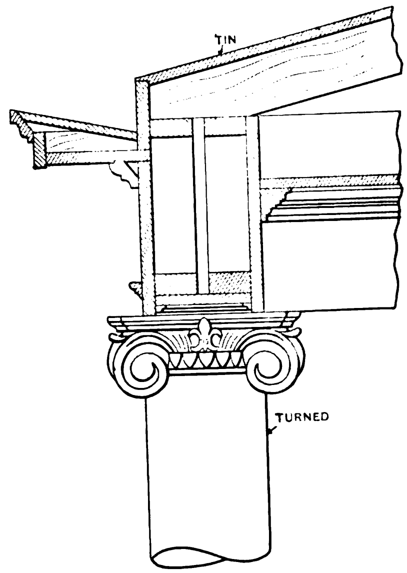
The day of the bell rope and speaking tube is past. The best apartments are provided with individual telephone systems connecting the various rooms one with another. The dining rooms are besides provided with burglar and fire proof safes, built securely in the walls or floors, for storing silver ware or other valuables. Still another luxury is the mail tube.

The apartment houses in New York are probably the finest in the world, and to appreciate their various refinements they should be compared with the best apartments in London or Paris.

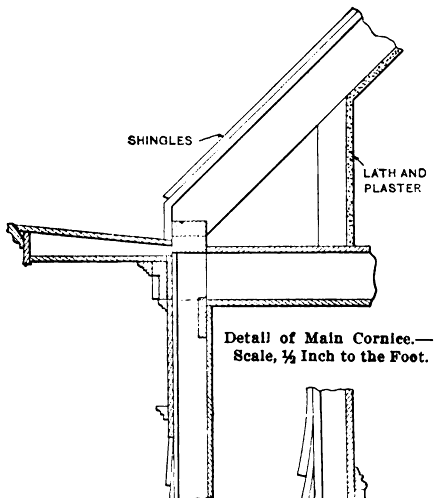
The Parisian apartment houses are doubtless the finest in the world in point of architecture and decoration, but are far behind those of New York in comfort and convenience. Those of London are decidedly inferior to both.

"The best Parisian apartment houses are very beautiful to look at," said an expert, "but are far behind our best apartments in every other quality. The London apartments are little more than lodgings, and are scarcely worth considering.

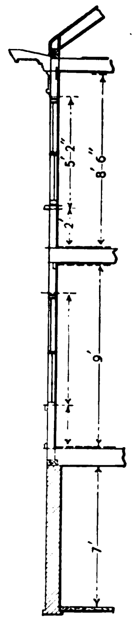
"The Parisian apartments are usually built upon lots of irregular shape, with streets on all sides and great courtyards in the center. The irregular formation of Paris streets, of course, gives a much better opportunity for architectural display than the square lots of New York. But the arrangement of the rooms in the Paris flat would be absolutely impossible in America.



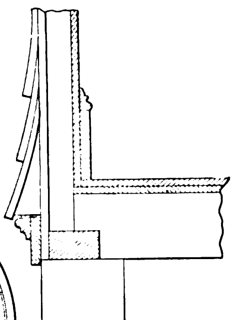
Detail of Veranda Cornice and Composition Capital on Column.—Scale, ¾ Inch to the Foot.



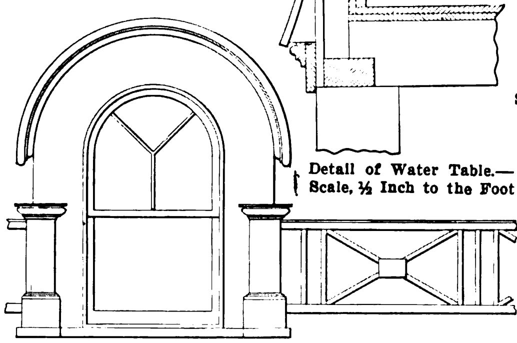
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



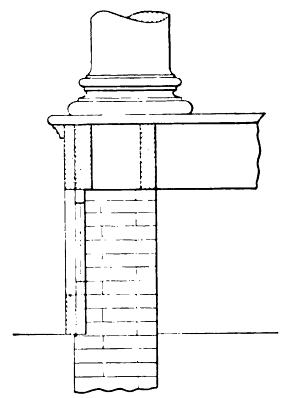
Section.—Scale, ⅛ Inch to the Foot.



Detail of Water Table.—Scale, ½ Inch to the Foot



Detail of Dormer Windows and Balustrade.—Scale, ¾ Inch to the Foot.



Detail of Veranda Floor, Lattice and Brick Pier.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of "Dutch Colonial" House at Cranford, N. J.

"The French sacrifice light and air and convenience for the sake of having a large reception room. This apartment is always the feature of a Paris flat. And this is very characteristic of French life. Guests are entertained in this room, and it is here that the Frenchman, so to speak, puts his best foot forward.

"The dining room is very small. The bedrooms also suffer, and are made dark and small in order to give every possible advantage of light and space to the reception room. The kitchens are often nothing more than closets, and badly lighted and ventilated at that.

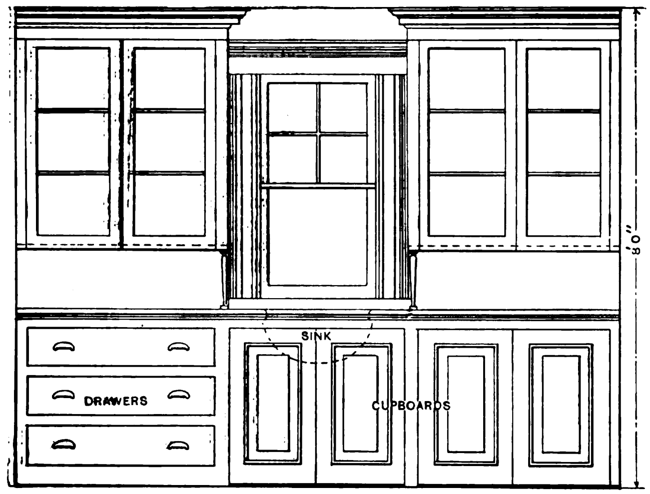
"Then, even in the best apartments, bathrooms are unknown. If one wants to bathe he must send out and hire a bathtub and have it carried in for the purpose. The elevators are not common as yet in Paris, even in the best apartments, and there is no heat and often very poor means of illumination."

Bricklaying in England.

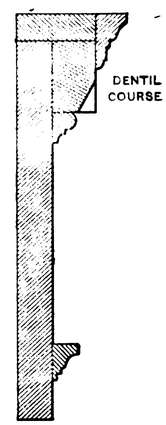
A great deal of attention has recently been given by the trade and daily press to the amount of brick work accomplished in a day by British bricklayers, the matter being brought up in connection with the construction of the buildings at Manchester, England, of the British Westinghouse Electric & Mfg. Company. The contractors for the construction of these buildings were an American concern from St. Louis, Mo., and previous to the commencement of work on the new factory it is said that the average number of bricks laid per day by union workmen in England was about 450. In a recent letter to the London *Times*, Mr. Stewart of the contracting company stated that the average attained under the direction of his superintendent on the Westinghouse Company's buildings was from 1400 to 1800 bricks per man, with nine hours constituting a day's work. These averages included face brick work, but on common brick an average of 2250 bricks per man per day was reached. The walls of the buildings ranged in thickness from 19 to 23 inches, and the bricks were laid in mortar.

In the construction of a chimney stack at Birkenhead, by the same contractors, an average was attained of 1976 bricks per man per day of nine hours. Mr. Stewart states that the results achieved in the last mentioned case were in part attributable to the facilities afforded the workmen, such as a double platform lift, each platform holding two barrows of bricks, one ascending, the other descending. Only 15 seconds was occupied in raising this platform to a hight of 150 feet. Soft mortar was used instead of the stiff mortar usually employed in England, thus permitting enough mortar to be laid with one stretch of the trowel for half a dozen to a dozen bricks, and allowing of the bricks being laid by a light pressure of the hand and a light tap of the trowel instead of by repeated hammering of the trowel to force the brick into place, as in stiff mortar. As an incentive to the workmen, they were paid 1½ pence per hour above the trade union rate. A record was kept of each man's work and the workmen who failed to measure up to the standard were dispensed with.

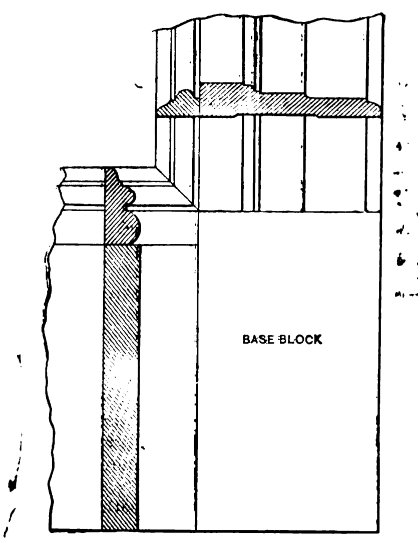
The new standard for workmen which has thus been established by American contractors should result to the advantage of English employers and prove a hard blow to the efforts of the unions to restrict to the greatest possible extent, as in the past, the amount of work which union men shall perform. Mr. Stewart states that in the United States the workman's average per day is from 2000 on the best class work, such as private residences, including face brick as well as common, to 2500 and even 2700, including face and common, on other structures.



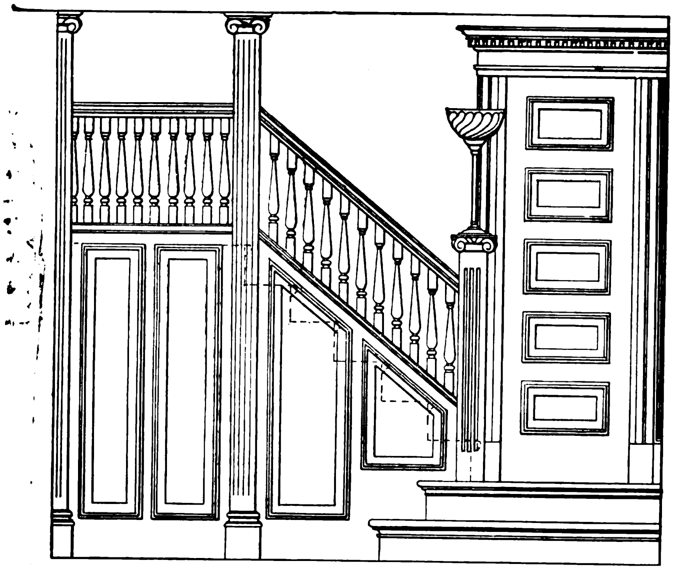
Detail of Butler's Pantry Fixtures.—Scale, ⅜ Inch to the Foot.



Detail of Head Casing on First Floor.—Scale, 3 Inches to the Foot.



Detail of Base and Trim on First Floor.—Scale, 3 Inches to the Foot.



Elevation of Main Stairs, Showing Trim.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of "Dutch Colonial" House at Cranford, N. J.

CONSTRUCTION OF MODERN RAILWAY STATIONS.

A FEATURE of one of the meetings of the Chicago Architectural Club, held at the Art Institute in Chicago, was a paper by A. H. Cranger on the "Construction of Modern Railway Stations." What the author had to say covered much that is of general interest to our readers, and we therefore present the following extracts:

In railway station planning and building, as in all building, the main point, I might say, is to make it as simple as possible. No unnecessary ornament should be applied. The designer should see if he cannot get along without it, and, if so, leave it off.

Railway station planning is very simple, and is generally divided into three types—the head house plan, such as the Van Buren Street Station and the Minneapolis Station of the Chicago, Milwaukee & St. Paul Railway Company; the side house, as at Des Moines, Iowa, and third where the tracks are on both sides of the building, such as the small station at Clybourn Junction, Chicago. The suburban station belongs almost always to the side house plan.

The general station plan has practically no variety in its requirements, which are large waiting rooms for both men and women, ticket offices, baggage and express rooms, toilet rooms, and often a small train order room for the use of employees only.

In manufacturing towns it is better to have two large waiting rooms of equal size, as there are often many people who wish to smoke. Off each of these waiting rooms should be toilet rooms.

Station For Small Towns.

An attractive type of plan for small residence town stations contains a large general waiting room and a small retiring room for women, and a smoking room for men.

Where the waiting rooms are of nearly equal size, the ticket office is generally located in an inner vestibule, off the outer or entrance vestibule, and between the two general waiting rooms. The old plan of having a ticket window open into each waiting room is practically obsolete, as one ticket agent can much better handle the people at a large central window.

Where there is but one large general waiting room, as in the second type of station described, the ticket office should open into it. The baggage and express rooms are generally separated from the main station by a covered way about 40 feet long, extending the entire width of the building. This gives a broad shade, which always adds to the architectural effect, and an extra platform for the handling of baggage and parcels in times of excursions or periods of unusual travel.

It is always wise to locate the baggage end of the building toward the larger terminal of the road.

Many railroads prefer to set the station quite a distance from the track, with a broad overhanging roof. This type was first introduced as an architectural feature by Mr. Richardson in his smaller stations for the Boston & Albany road. The Chicago & Northwestern Company, however, prefer to carry their shelter very near to the track line, so that people can get on and off the trains in time of storm without being bothered by umbrellas.

Train Sheds.

It is desirable that the sheds should be long enough to cover every car on the long passenger trains and be very broad and deep. A pleasing architectural effect is produced by making the piers to the shed on the side away from the track of brick or stone, which gives a cloistered effect to the buildings from a distance. On the track side it is essential to use small steel columns, so as to take up no unnecessary room for people getting on and off the trains. The most necessary thing, it seems to me, about a small station is to have plenty of sheds and plenty of platform.

In much recent work on the Northwestern they have abolished grade crossings, putting up a fence between the tracks the entire length of the platform and building on the opposite side of the track from the main station a small station containing a waiting room, a baggage room, with a broad, easy staircase to the subway. The two stations are connected underneath the tracks by ample subways, lined with dressed or enameled brick, lighted by electricity and kept clean and dry. This system avoids any possibility of accidents from people thoughtlessly crossing the tracks in front of trains, and is very desirable. The station at Lake Forest, Ill., has such a subway.

Where lunch room is needed, it is advisable to have it convenient to the general waiting room, and yet as far away as possible, because of the odor of cooking and other disagreeable details. In Omaha, Neb., this is between the secondary and the main building, rather further away than is general. This is done to accommodate a large traveling emigrant population.

A necessary feature of the large city stations is a middle concourse, or midway, between the station building and the tracks, which really forms a supplementary waiting room, but is useful for handling suburban traffic, as in every case it has direct access to the street, and this prevents large numbers of people from passing through the station proper. The concourse should be large enough to handle the biggest crowds in times of excursions or conventions.

Another thing that is essential is plenty of cab space under cover. In the West a good many roads are using umbrella sheds, constructed between the tracks. In cases of heavy storms the rain will beat under the roofs and wet people. It is claimed there is better ventilation in this plan. In the Minneapolis Station we have a shed that is of very simple construction, which covers the entire body of tracks, but is open on three sides. There are no platforms on the extreme sides, which are occupied by tracks. The trains standing on those tracks protect the platforms from the storms.

The station at Omaha for the Union Pacific Company is of the side house plan. In that city the Union Pacific Station and the Burlington Station are both approached most directly from the viaduct which connects two of the great hills of the city, but the tracks all enter at the river level. This makes quite an interesting problem, as what appears above the viaduct is merely a great vestibule, or portal, the waiting room, lunch and baggage rooms and all offices being located at the track level. On one side of the entrance at the viaduct level is a grand staircase. On the other track are large elevators to carry people to the trains; also a small parcel room is located up above for people who wish to leave parcels only for a few hours and do not care to descend to the larger parcel rooms below.

Designs of Stations.

In talking of station designs, it is hard to say what is generally liked; so many people have different ideas. Great arches and towers seem to be the prevalent fancy. I do not think either of them are absolutely necessary unless construction demands it.

Germany certainly leads the world both in plan and design of railway stations. Many large stations in our country seem to be attempts to reproduce monumental buildings, not designed originally for railway purposes. A great deal is sacrificed by doing this. In general a railway station should be as simple as it can be made. It should depend wholly upon its proportions and appropriateness for its beauty. The walls should be unusually thick in order to stand the jar of passing trains.

In suburban stations a great deal of attention is being paid to landscape effects. That these can be made very beautiful is shown by the suburban stations of the Boston & Albany and Pennsylvania roads. I do not, in general, recommend a flower bed arrangement, as that has to be changed every year; but the planting of ornamental shrubs is always wise, as they become each season more beautiful. The driveways or approaches to such suburban stations should be made unusually broad, to allow for the rapid passing of vehicles from different directions.

PROPORTIONING JOINTS IN WOODEN ROOF TRUSSES.—III.

BY F. E. KIDDER, CONSULTING ARCHITECT.

THE joint at 2, Fig. 10, April issue, should be made as shown in Fig. 19. When the rod at this joint is less than 1 inch in diameter a notch may be bored in the top of the rafter to form a bearing for the washer, which may be a round cast iron washer of the ordinary pattern. The bottom of the brace should be slightly notched into the bottom of the truss rafter, as shown in Fig. 19.

Depth of the Notch.

When the inclination of the brace and of the rafter is 40 degrees or more the notch for the brace may be made as in Fig. 19, and not more than ¾ inch deep. When the inclination of the rafter and brace is only about 30 degrees then a notch should be made as shown in Fig. 20, and the depth of the notch should be proportioned to the horizontal projection of the stress in the brace by the following rule:

RULE VI.—The depth of the toe *d* of any brace should be equal to the horizontal pressure divided by the breadth of the brace, multiplied by the value of C_1 in Table I of the April issue. The horizontal pressure will be equal to the horizontal projection of the stress in the brace, which can always be readily obtained from the stress diagram.

Example 6.—To show the application of Rule VI we will assume that the stress in the brace, Fig. 20, is 8300 pounds; that the brace is of the dimensions shown and has an inclination of 30 degrees. If the line S, Fig. 20, represents the stress in the brace, then the line H will represent the horizontal pressure on the toe. The horizontal pressure corresponding with S equals 8300 pounds; at 30 degrees is 7190 pounds. We will assume that the brace and rafter are of spruce, for which wood the value of C_1 is 1200 pounds. Then by Rule VI the depth of the toe *d* should equal $\frac{7190}{6 \times 1200}$, or 1 inch.

The best manner of supporting the purlin is by means of duplex hangers let into the rafter. For beams 8, 10 or 12 inches wide these hangers are made as shown in Fig. 21, and for beams 6 inches wide they are made in one piece, with a single nipple. These hangers are easily applied; they furnish a connection fully as strong as the purlin, and tie the purlins together longitudinally.

When the load on the purlin is not very great a 3-inch plank may be bolted to each side of the rafter and brace to support the purlin, as shown in Fig. 19. It is always best, however, to use a duplex hanger when they can readily be obtained. The common rafters should be notched on the purlin, as shown in Fig. 19.

JOINT 3 OF FIG. 10, APRIL ISSUE.—This joint should be made as shown in Fig. 21, the peak of the joint being cut off and a bent plate of wrought iron or mild steel set over the top of the rafters to receive the nut on the rod. For very heavy trusses a cast iron shoe, made as shown in Fig. 22, should be used in place of the bent plate. If the weight on the purlin is not very great it may be supported by a plank bolted to the rafters as in Fig. 19.

JOINT 7 OF FIG. 10.—The best way of making this joint is shown in Fig. 23, the oak angle block being let into the tie beam about ¾ inch for a 6-inch beam and 1 inch for an 8-inch beam. The hight of the bevel *d* should be at least equal to that which would be obtained by Rule VI, and never less than 2½ inches. A tenon on the brace may be let into the tie beam, as shown, to keep the brace from moving sideways. The length, *l*, of the angle block should be at least equal to the result obtained by Rule VII.

RULE VII.—To find the least length, *l*, of the angle block, as in Fig. 23, divide the stress in the rod less the weight of the floor or ceiling at that point by the breadth of the beam, multiplied by the value for C_2, Table I. In the truss shown in Fig. 10 the stress in the rod, less the ceiling load at joint 7, is 9100 pounds; the breadth of the tie beam is 6 inches and the value for C_2 for white pine is 250 pounds, therefore the length *l* should equal $\frac{9100}{6 \times 250}$, or 6 inches. The block, however, should be about 7½ inches long to give a good proportion to the joint.

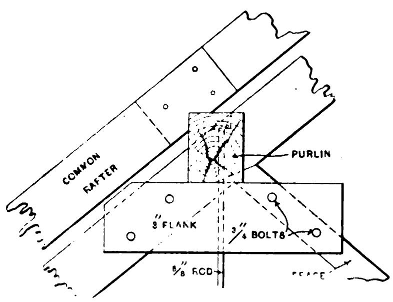


Fig. 19.—Detail of Joint 2 of Fig. 10, April Issue.

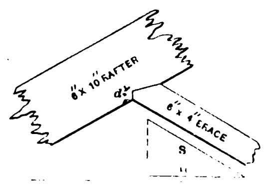


Fig. 20.—Showing Depth of Notch for Brace.

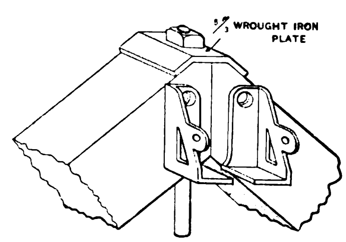


Fig. 21.—Detail of Joint 3 of Fig. 10.

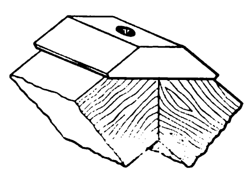


Fig. 22.—Cast Iron Shoe for Heavy Trusses.

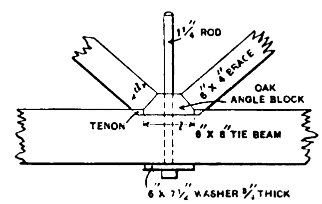


Fig. 23.—Detail of Joint 7 of Fig. 10.

Proportioning Joints in Wooden Roof Trusses.

Joint Formed by Principal Strut and Top Chord.

A joint such as No. 3 of Fig. 7 in the issue of the paper for November, 1901, should be constructed as shown in Fig. 24, a slight offset being made at the middle of the joint to hold the top chord until the load is brought on the truss. Sometimes a bent wrought iron plate is used for the washer, but a cast iron shoe, like the one shown in Fig. 24, is better. It is sometimes desirable to extend the top chord beyond the head of the strut, as in Fig. 25 and also in Fig. 10 of the February issue. When this is done a plain rectangular washer is sufficient. The depth of the notch *d* should always be proportioned by Rule VI. Sometimes two notches are made to receive the end of the brace, as shown by the dotted lines in Fig. 25.

In the opinion of the writer this does not make as good a joint as the single notch, for the reason that it is very difficult to fit the end of the strut so that it will bear evenly at both places, while with a single notch the full bearing must necessarily be brought on the toe. Also when there is a double notch the small triangular piece between the notches will generally offer but little resistance to shearing. The only place where two notches would be at all desirable is where the inclination of the strut is very steep, as is the case of the struts in Fig. 18.

In Fig. 25 is also shown the ordinary method of making a joint between any angle strut and the top chord, and if the toe *d* is proportioned by Rule VI it will answer for the ordinary roof trusses. If there is a counter brace at the joint it may be cut against the main brace and the top chord, as shown by the dotted lines. Fig. 25 reversed will generally answer for the joint between the tie beam and any main brace, as at joints 3 and 5 of Fig. 10 of the February issue. The notch for the toe of the brace, however, should never be made greater than required by Rule VI. When the stress in the brace is very great, so as to require a deep notch for the toe, it would be better to use an angle block cut into the tie beam for the strut to bear against, as in Fig. 23, as it is not necessary to make so deep a notch for the angle block. Wherever two counter braces come together, either at the top chord or tie beam, they should bear against an angle block, as shown in Fig. 23, as only one counter brace is brought into action at any given time.

Washers.

The rods in wooden trusses should always have a washer under the head or nut, proportioned so that the

The joints for scissors trusses will be considered in another article.

Built Up Tie Beams.

When the tie beam of a roof truss cannot be made from a single stick of timber it will generally be better to build up the beam out of 2 or 3 inch plank, breaking joints and bolted together, rather than to try to splice solid timbers. In building up a tie beam of plank the planks must break joint in such a way that the net cross section, after deducting for joints and bolt holes, will be sufficient to resist the tensile stress in the tie. There must also be enough bolts between any two consecutive joints to transmit the stress from one layer to the next. To meet this requirement usually necessitates considerable study in laying out the tie beam.

Example 9.—The method of computing the number of bolts required can best be shown by an example. Fig. 26 represents a little more than one-half of the tie beam of the truss shown in Figs. 10 and 11 of the February issue. In that number of the paper we found the net sectional area required in the tie beam at the different panels to be as indicated in Fig. 26. We also concluded to build the tie beam with five 2 x 10 inch planks of white pine. The size of the braces, rods and washers to be as indicated in Fig. 26. The rods will, of course,

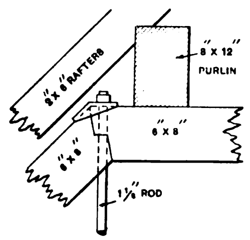


Fig. 24.—Detail of Joint 3 in Truss 7 of November Issue.

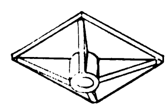


Fig. 27.—Cast Iron Washer for Large Rods.

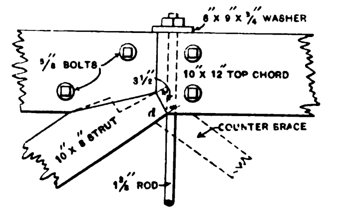


Fig. 25.—Detail of Joint 2 in Truss 10, February Issue.

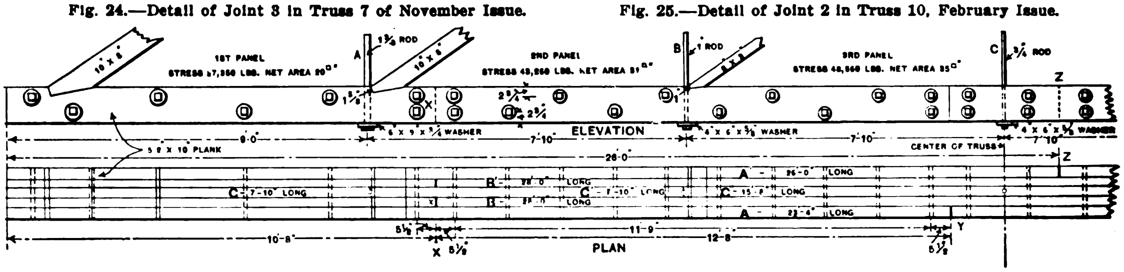


Fig. 26.—Detail of Tie Beam of Fig. 10, February Issue.

Proportioning Joints in Wooden Roof Trusses.

tension in the rod will not cause the washer to crush the wood. The resistance of the common framing woods to crushing against the grain without indentation is given in the column headed C_3, Table I, of the April issue.

RULE VIII.—To find the area of the washer divide the total stress in the rod by the value for C_3, Table I.

Example 8.—The total stress in the king rod of the truss shown in Fig. 10, which is also the rod shown in Fig. 23, is 11,089 pounds. Dividing this by 250, the value of C for white pine, we have 44 square inches as the area of the washer. As the tie beam is only 6 inches wide the washer should be 6 x 7½ inches.

Rod A of Fig. 26 has a total stress of 13,490 pounds. As the wood is white pine the area of the washer should be 13,490 divided by 250, or 54 square inches, which is equivalent to 6 x 9 inches, the long way of the washer being placed crossways of the tie beam. Rod B has a total stress of 5800 pounds, which requires 23 square inches, or 4 x 6 inches, for the size of the washer. Rod C has a stress of 1908 pounds, which requires a washer of only about 8 square inches, but as this would give a very small bearing for the tie beam the washer should be made at least 6 x 4 inches. When the washer projects more than about 3 inches beyond the head of the nut a cast iron washer with ribs, as shown in Fig. 27, should be used.

The rules and illustrations that have been given cover all the joints that occur in king, queen and Howe trusses.

pass through the center plank, consequently for the two end panels the center planks C C′ might as well be jointed at the rods, for they would be pretty nearly cut in two, anyway. The center rod being only ¾ inch in diameter, we will make the center plank C″ in one piece from rod B to the corresponding rod on the outer side of the truss. The outer layers of plank on each side should have but one joint if possible. In this case a 26-foot plank will extend beyond the center of the truss, so that for the outer layers, A and A′, we will use two planks 26 feet long and two planks 23 feet 4 inches long, starting the 26-foot planks from opposite ends of the beam, so that the joints will come on opposite sides of the center, as shown at Y and Z of Fig. 26. The joints in the next two layers, B and B′, should come as far from the center of the truss as the longest stock length will permit. We will therefore make the planks B and B′ 28 feet long, piecing out at each end with planks 10 feet 8 inches long. Now if we look at the plan of the tie beam we will see that the planks A and B, if bolted together, form a continuous tie from one end of the truss to the other, and that opposite the joint X the net sectional area is that of two 2 x 10 inch planks, or 40 square inches. Therefore the planks B and B′ will sustain all the tension in the two center panels of the tie beams, and the problem is to bolt planks A and B and A′ and B′ together so that the planks A and A′ will receive the stress in the second panel from B and B′ and transmit it to the end of the truss. We may consider that the plank B will have to transmit to A one-half of the stress in the second panel, which is 43,260 pounds, or 21,630 pounds for the plank B. We must therefore ascertain how many bolts are required between the points X and Y to transmit 21,630 pounds. This we do by means of Table IV, which gives the maximum stress it is safe to allow for ¾, ⅞ and 1 inch bolts in 2-inch planks.

Table IV.—Maximum Allowable Stress on Bolts in 2-Inch Plank of Built Up Tie Beams.

Diam. of bolt.	Yellow pine. Stress.	d.	Oregon pine. Stress.	d.	Spruce. Stress.	d.	White pine. Stress.	d.
¾ inch.	2,250	5	2,024	4½	1,800	5	1,500	5
⅞ inch.	2,620	6	2,366	5	2,100	5½	1,760	5½
1 inch.	3,000	6	2,700	5½	2,400	6½	2,000	6

From this table we see that a ¾-inch bolt in white pine will transmit 1500 pounds. We should therefore require as many ¾-inch bolts between X and Y as 1500 is contained in 21,630, or 14 and a fraction. This would bring the bolts quite close together. The number of ⅞-inch bolts required is equal to $\frac{21,630}{1760}$, or 12. The number of 1-inch bolts required is equal to 21,630 divided by 2000, or 11 bolts. It will probably be best in this case to use 12 ⅞-inch bolts. The figures under *d* indicate the distance in inches that the center of the bolts nearest the joint should be from the joint. There should always be two bolts at each side of each joint, which will take 4 of the 12 bolts required, leaving 8 bolts to be spaced evenly between.

From Table IV we see that ⅞-inch bolts in white pine should be spaced 5½ inches from the joint, so that the distance between the pairs of bolts at X and Y is 11 feet 9 inches; and as there will be nine spaces this will make the bolts 1 foot 3 2-3 inches on centers. These bolts should be staggered as shown in the elevation, Fig. 26. Five and one-half inches from joints Y and Z toward the center there should also be two more ⅞-inch bolts. Between the joint X and the end we should place ¾-inch bolts about 2 feet on centers. These bolts are required to bind the planks together so as to give a solid and even bearing for the main strut, and also for the ceiling joist. For lighter trusses ⅝-inch bolts might be used for the end panels. To properly unite the planks of the tie beam, therefore, will require 14 ⅞-inch bolts and seven ¾-inch bolts in each half of the truss.

The proper lengths of plank to be used in bolting up tie beams of different lengths will usually have to be studied out for each particular case, having in mind the longest length of planks that can readily be obtained. The principal aim should be to get as great a distance between consecutive joints, as X and Y, as possible, and not to have more than two joints opposite each other, or more than one joint opposite the rod besides the joint that is in the center plank. It should also be remembered that the tension is always greatest at the center of the truss, therefore there should be as few joints near the center of the tie beam as practicable.

Splicing and Bolting of Top Chord.

As the top chord is always in compression, it is not necessary to be as particular with the splicing and bolting as with the tie beam. For the top chord it will be better to use 3 or 4 inch planks, if they can be obtained. The splices should be made near the joints, and the planks should be bolted together with ⅝ or ¾ inch bolts, spaced from 2 to 2 feet 4 inches on centers.

Thus for the top chord of the truss shown in Figs. 10 and 11 of the February issue, which must be 10 x 12 inches, we would use 4 x 12 inch planks for the center layer and 3 x 12 inch planks for the two outer layers, giving a total breadth of 10 inches. The 4-inch planks we would make in three lengths of about 16 feet each. The 3-inch planks should be jointed near joints 2 and 6.

Two bolts should always be placed at each side of each joint. Fig. 25 shows how the bolts should be placed at joint 2.

In making the drawing for a roof truss, first draw out a truss to fit the roof and ceiling, then compute the loads, draw the truss and stress diagrams and determine on the size of the members. Then detail the joints, as in these articles, and finally make a ½ or 1 inch scale drawing of the truss to conform with the proportions worked out for the joints and members.

New Publications.

Estimating Frame and Brick Houses. By Fred T. Hodgson. Size 5 x 7 inches. 224 pages. Numerous illustrations, including scale drawings. Bound in board covers. Published by David Williams Company, 232-238 William street, New York City. Price, $1.00 postpaid.

This is a practical treatise on estimating the cost of labor and the quantities of materials in the construction of frame and brick buildings. The matter originally consisted of a series of articles in *Carpentry and Building* and attracted such widespread attention on the part of builders that they were subsequently issued in book form. In this, the second edition, which has been greatly enlarged, a chapter giving a number of handy rules for the estimator has been included in connection with that portion of the book relating to the estimating of a frame building, thus making the subject much more complete than was formerly the case. Other new matter includes a chapter showing the manner of estimating the cost of a stable and carriage house of a character to meet moderate requirements, and there is given in connection with it some comments on estimating by the square, a short specification for a stable and some details of stall construction. Still another chapter tells how to estimate a barn, the work concluding with a chapter on "Order in Estimating."

The material is presented in a shape to be of the greatest value to the builder and contractor, the subjects being treated in so simple a manner as to enable even the novice in building construction to readily follow the different steps from the excavation for the foundations up to the completed building.

Architectural Engineering. By John Kendall Freitag, 405 pages, illustrated by 196 engravings. Published by John Wiley & Sons. Price, $3.50.

This well-known work is now in its second edition, having been rewritten and almost doubled in size. It illustrates the fundamental principles to be followed in the constructive design of modern skyscrapers, and opens with a definition of "Skeleton" and of "Cage" construction, pointing out the advantages of the latter. The enormous loss of money owing to destructive fires, which in 1894 was said to have amounted to $128,000,000, emphasizes the very great importance of fire protection in all our modern buildings, and this without touching upon the vital consideration of the safety of human life. Mr. Freitag gives a very complete summary of the notable fires in various cities in the United States and has clearly pointed out the invaluabe lessons which these disasters have taught.

A chapter on "Typical Buildings" contains much interesting and useful information. "Floors and Floor Framing" deals with the subject of fire proof floors; the development of the flat arch with terra cotta arch blocks, and the proper protection of exposed floor beams; floor girders and the details used in connecting them together. In dealing with exterior walls and piers, he shows that the practice of concealing the steel work behind ornamental terra cotta or other incombustible material is not carried out from artistic or æsthetic considerations only, but arises from the absolute necessity for thoroughly protecting steel from the possible action of fire.

The author points out the utter unreliability of cast iron columns, instancing a building in Maiden lane, New York, which was blown 11 inches out of plumb through the inability of cast iron columns to resist wind pressure. The formula used in proportioning cast iron columns is the one commonly called Gordon's or Treadgold's. The basis of this formula was a series of tests made by Hodgkinson somewhere about 1840, but the experiments were not such as to justify their use in any formula to be used in designing cast members for buildings. Up to 1899, however, Gordon's formula had practically been required by the New York building law. Modern tests on full sized sections have since been made, and among other things they show the complete unreliability of the formulæ commonly employed. In this chapter the whole subject of steel columns is very fully covered, with many specific examples and detail illustrations.

In the matter of wind bracing the author gives, as he does in the record of fires, the lessons to be drawn from wreck and disaster caused by hurricane and tornado. He manifests here, as indeed he does all through the work, his feeling of responsibility for what he writes. His desire is to show a rational reason for good, conservative practice where safety is a prime consideration. High buildings are, comparatively speaking, very modern structures, and their liability to stand indefinitely is a matter which can only be demonstrated by time. It should, therefore, be the architect's first endeavor to incorporate in his practice all that experience and the study of others' methods has shown will make most surely for endurance against the assaults of fire, hurricane and earthquake from without and resist the slower and more insidious attacks of corrosion from within; so that, having taken reasonable precautions, it may be said of his reputation and of his building, in the words of St. Paul, "and having all, to stand."

In the chapter on "Foundations," underpinning, grillage, masonry, rail and other footings, pile foundations, pipes, and pneumatic caissons are some of the subjects taken up in detail. The last chapter is on "Specifications and Inspection," under which head much valuable information is given. A warning note is sounded as to the dangers of cheap or restricted inspection of material and work. In this, as in other things, the old adage is true, "eternal vigilance is the price of safety."

This book should be of value to architects, engineers, draftsmen, builders, inspectors, students, and to those interested in building design and construction. It might also be helpful in courses of study in architectural or technical schools.

HOW TO FINISH CYPRESS.

A SHORT time ago there appeared in these columns several letters of correspondents dealing with the subject of cypress for outside and inside finish, and constituting a most interesting discussion of an important part of building construction. In some parts of the country there appear to be grave doubts in the minds of builders as to the adaptability of cypress for certain kinds of work, and it was out of these that the discussion developed. Bearing upon the question are some suggestive comments on the method of finishing cypress, which are found in a little pamphlet sent out by the A. T. Stearns Lumber Company. In regard to the matter they say that "cypress for interiors has now a conspicuous place in the favor of architects, builders and owners. The varied effects obtainable are sources of surprise to every one who is not familiar with it, and there are residences in which nearly every room is of an entirely different character, although finished in the same wood. Cypress is susceptible of a very high polish, and when finished in the natural color of the wood is very handsome. It is used by architects as a basis for the ivory white finish many people fancy, but in any event the wood when used for interiors possesses too much natural beauty to cover it with paint.

For exterior work the wood should possess great durability, although too little attention is often paid to this point. The exterior finish of a house, or for a wooden building, including shingles, clapboards, gutters, conductors, sills and piazza frame, together with columns, rails, balusters, finials, &c., constitute no small fraction of the cost of the structure, and, if decay is rapid, repairs and the accompanying expenses recur with a frequency not at all desirable. As cypress costs less than any other suitable wood for exterior work, it is not only more durable, but it will take paint better than other woods, and the paint will not peel off. We have seen buildings shingled with cypress upon both roof and walls upon which no stain or paint had been used. In time such buildings take on the beautiful gray color which is so greatly admired by many people, especially for a country or suburban residence. The natural qualities of the wood make it possible to use either shingles or clapboards in this way without paint, and there is probably no other wood upon which vines can be grown with so much safety from injurious effects.

Cypress, viewed from the standpoint of the finisher, is no less remarkable than when viewed from most every standpoint. There is no wood which can be finished more economically, or which is more susceptible to the finer handiwork of the finisher and polisher. If the work is properly done the result will be satisfactory in either case. It is true, notwithstanding, that the fine natural appearance of cypress is often greatly marred or even ruined by faulty methods of treatment, and for that reason we cannot refrain from making known our experience in the matter. We have discovered that the best results are obtained through the use of pure grain alcohol white shellac, which should be purchased of a thoroughly responsible dealer. In our opinion better results can be obtained from this quality of shellac than from the more expensive "refined shellac" so called.

Cypress requires no filling or sealing, and, if it is desired to permanently preserve the natural color of the wood, no oil or oily substance should be applied until the final rubbing down after the wood is well protected with shellac. We recommend three or more coats of shellac, as may be desired, each coat to be smoothed down with fine sandpaper, while the final coat may be rubbed down with pumice stone and oil to produce a dead finish, or what is sometimes termed "egg shell" finish. The final coat may be left bright, if preferred, or after rubbing down to a dead finish it may be given a French polish, according to the usual method, which we shall be glad to explain to those not familiar with the process.

The impression has gone abroad in some quarters that cypress will not take paint, but with the thousands of buildings now erected in New England alone, having cypress for exterior or interior work, and taking the paint and holding it better than any of the woods previously in use, we feel that to argue the question is unnecessary. We advise, however, for exterior work when it can be done as well as not, that the priming coat of paint should closely follow the carpenter. The carpenter can, in fact, apply this coat himself as he goes along, or near the close of his day's work. It costs no more when done in this way, and the final result is somewhat smoother work whatever the kind of wood used.

Cypress will take stains well, but we have never favored the staining of the wood or the use of any color whatever in the finish of it, for in our mind it is far too handsome to disguise in any way.

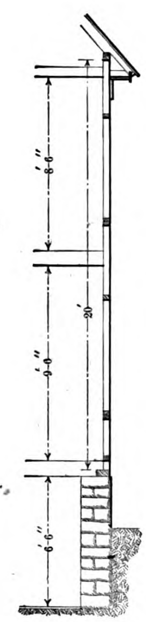
As showing the durability of cypress it is interesting to quote the following from the Richmond *Despatch* concerning an old colonial mansion in that section:

"This house, from a tablet over the front door, was built by Michael Braun (now spelled Brown) in 1776, and is still owned and occupied by his descendants. The fire place is 8 feet wide, 5 feet high and 5 feet deep—sufficiently large to roast an ox, and of sufficient size to contain over a cord of wood. The house is 40 x 30, two stories, and is built of granite obtained near by, windows arched with granite blocks about the size of bricks, laid in mortar, now so strong that it would require a sharp pick and a strong arm to remove it; walls 3 feet thick; doors and window facings of black walnut; and the house covered with cypress shingles, which were in such a state of preservation that they have only been removed since 1880 (104 years). These shingles must have been wagoned from or near Charleston, S. C., 180 to 200 miles. The house was built on the then greatly traveled road from James River to the trading fort on the Yadkin River by the Catawba Indians. This fort was the home of the Lapona Indians when Lawson, who was sent from England by the proprietors, visited it in 1700."

COMPETITION IN FARM HOUSES.

THIRD-PRIZE DESIGN.

WE take pleasure in presenting herewith the design receiving the third prize in the competition for farm houses, the author being H. S. Woodward of 51 Spring street, Carbondale, Pa. We give in connection with the floor plans, elevations and details, the full specifications as furnished by the author, together with his detailed estimate of cost. In commenting upon the subject of competitions, the author says: "It seems to me that the designers of some of the houses shown in former competitions have made a mistake in providing such expensive construction and finish for low cost houses, as the discomfort and inconvenience caused by the necessary cramming of the house to accommodate these things would amount to far more than any that could be caused by a little cheaper construction. Such things as dressed stone foundations, brick piers and partitions in cellars and under porches, yellow pine sheathing, hard wood finish and special designs of doors, trim, &c., are all very good, but I have found in my experience that few people care to pay for them at the sacrifice of 25 to 40 per cent. of floor space; though, of course, if the house is to be built in New York the building laws must be complied with. The construction I have specified is about the average for this class of house here, and appears to give very good satisfaction, while the finish, though inexpensive, is in keeping with the general character of the house.



Section.

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

Competition in Farm Houses—Third-Prize Design—H. S Woodward, Architect, Carbondale, Pa.

Excavation.

Excavate cellar under entire house to depth of 4½ feet at lowest point of grade and for outside cellar way. Leave cellar bottom flat and remove all stones, dirt to be piled up and used for filling and grading on completion of house. Contractor to grade and level off around house; all dirt not required for grading to be removed at contractor's expense.

Mason Work.

Foundation.—Foundation wall to be 18 inches thick, of good flat field stone, laid dry, well bonded with through stones and well chinked up with small stones, and all joints well pointed with good lime and cement mortar. Area wall to be 12 inches thick, laid same as cellar wall.

Cellar Floor.—Cellar to have concrete floor, made from 1 part Portland cement and 4 parts fine, soft coal ashes or cinders. Provide and set flat stone 6 inches thick and 2 feet square for chimney base; also stones 4 inches thick and 12 inches square for posts. Tops of these stones to be 1 inch above finished floor of cellar.

Chimney.—Chimney to be of good red brick, with joints neatly struck inside; clean out hole near bottom; top, ten courses, to be laid in cement mortar. Chimney to have blue stone cap, and brace of ¾ x 3 inch iron about 3 feet long, as shown on elevation. Brick to be kept thoroughly wet if laid in hot weather.

Lathing and Plastering.

Lathing.—Lath to be put on by plastering contractor. To be of best quality hemlock, with five nailings to each lath; joints broken every eighth course. No short pieces to be used and no lath to be laid vertically. Do not, under any circumstances, run lath through behind partitions.

Plastering.—Plastering to be two-coat Paragon work, put on according to manufacturer's directions. Plaster to be well clinched in lath and screeded up perfectly true and smooth, with all angles clean and sharp. Carry first coat of plaster down behind wainscotings and baseboards. Plasterer must take precautions not to soil finished floors or other wood work. Repair all breaks in plastering made by other tradesmen on completion of house, clean up and leave in thoroughly good shape.

Carpenter Work.

Framing.—House to be balloon frame construction; all framing lumber to be good, sound, well seasoned hemlock of the following sizes:

Sills, 4 x 8 inches; girders, 6 x 8 inches; joists, first floor, 2 x 10 inches; joists, second floor, 2 x 8 inches; joists, third floor, 2 x 6 inches; plates, 4 x 4 inches, for outside walls; plates, 2 x 4 inches, for partition; rafters, 2 x 6 inches; ridges, 1 x 10 inches, and valleys, 4 x 6 inches.

Headers and trimmers are to be double joists. Sills to be halved at corners and well bedded in good lime mortar and laid perfectly level. Girder and sill construction as per detail. Joists and studs to be 16 inches on centers; rafters, 20 inches on centers. Cut in 2 x 4 inches at foot of studs, directly over joists. Studs of main partition to be footed direct on girder; for other partitions, joists to be double and cross bridged on both sides. Put furring strips wherever needed for trim, wainscoting, veranda and balcony ceilings, &c. Build partition in cellar, where shown, of two thicknesses, 1 x 12 inch hemlock planks, with one layer of good building paper between. Build coal and vegetable bins as shown. All framing timbers around chimney to be kept 2 inches from brick work. Spike two studs together at all partition corners.

Sheathing, Roof Boards, &c.—Sheathing to be 1 x 6 inches, good, sound hemlock, surfaced on one side to uniform thickness, laid diagonal with close joints. Joints to be broken on studs only; use three nails to each stud. Roof boards to be sound ⅞ x 6 inch hemlock of uniform thickness, laid 2 inches apart, with two nails to each bearing. Break joints on bearings only.

Paper.—Put one thickness of best black Neponset building paper over sheathing, to have 1½-inch lap. Put the same paper under all flashings, valleys, &c.

Outside Finish.

Siding.—All siding to be best quality 6-inch white pine, laid 4½ inches to the weather: siding to have mitered corners on second story.

Shingles.—All shingles to be best quality cedar, 16 inches clear, and laid 5 inches to the weather, well nailed to the boards; no shingles under 3 inches wide to be used. Shingles on gables to be of uniform width, 5 or 6 inches, laid 4½ inches to the weather.

Cornices, Belt Courses, &c.—Main and porch cornices, belt courses, water table, &c., to be of No. 2 white pine, built as per details. Support cornices by 2 x 4 inch rough hemlock pieces, spaced 2 feet 8 inches and well nailed to frame. All window sills, frieze boards, aprons, &c., to be rabbeted to receive siding.

Outside Doors and Frames.—Frames to be built in the usual manner of selected second quality white pine: sills and frames, 1¾ inches thick; thresholds, ⅞ inch thick. Cellar door frame to be 1¾ x 6 inch white pine, rabbeted to receive door. All doors to be of sizes as marked on plans. Front door to be built as per elevation, of best quality white wood, and to have 22 x 30 inch best American plate glass. Side and balcony doors to be selected from stock patterns, with frosted glass, and costing not over $4.50 each.

Window Frames and Sash.—Window frames to be of selected second quality white pine, built in the usual manner, with box, stiles, &c. Frames to be 1¾ inches thick; sills, 1¾ inches; subsills, 2 inches, and stools, ⅞ inch. Cellar window frames to be 1¾ x 6 inch white pine, rabbeted to receive sash. Sash to be 1⅜-inch white

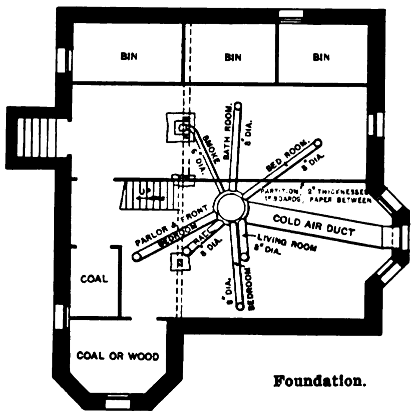
Competition in Farm Houses. ·Third-Prize Design —Side (Right) Elevation. · Scale, ⅛ Inch to the Foot pine, double hung in the usual manner, with pulleys and weights. All glass to be well puttied in, and sash to be primed before leaving the mill; first-floor sash to have two lights, 24 x 30 inch glass, and second-floor sash two lights, 24 x 28 inch glass, unless otherwise shown on plans. Parlor, first-story hall and living room windows to have best quality American glass: all other windows to be second-quality glass. Cellar sash to have three lights of 8 x 10 inch glass. All first-story windows to have good catches. Contractor must take all necessary precautions in setting sash and frames to avoid rattling and sticking, and to make a good, neat job. Ornamental windows to be built as per details.

x 6 inch joists, 2 x 4 inch rafters, placed 20 inches on centers, with open ceiling. Roof to be shingled same as main roof. Floor to be of ⅞ x 3 inch white pine, blind nailed, and well driven up. Side porch to be 4 feet wide; framing and roof same as back porch; roof to be supported on brackets, as shown; floor the same as back porch. Porch steps to be of white pine, with 1⅛-inch stringers, 1⅛-inch treads and ⅞-inch risers.

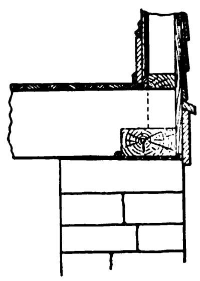
Inside Finish.

Stairs.—Main stairs to be of selected North Carolina pine, built as per details, in a good substantial manner. Cellar stairs to be built of best quality well seasoned hemlock, with 1½-inch stringers and 1½-inch treads, open risers. Attic stairs to be of selected No. 2 white pine, with 1⅛-inch stringers, 1⅛-inch treads and ⅞-inch risers.

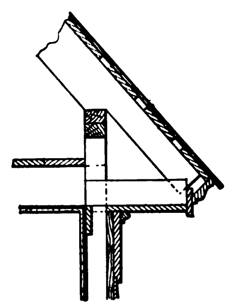
Door and Window Finish.—Inside finish of parlor,



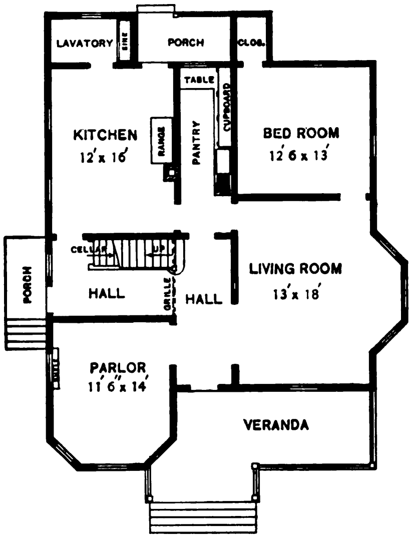
Foundation.



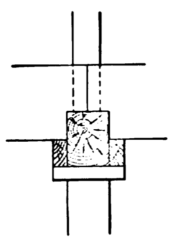
Detail at Water Table.



Detail of Main Cornice.

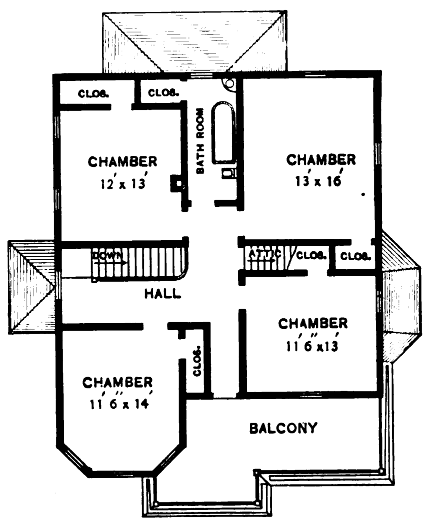


First Floor.



Girder Construction.

Detail of Belt Course.



Second Floor.

Competition in Farm Houses.—Third-Prize Design.—Floor Plans.—Scale, 1-16 Inch to the Foot.—Details.—Scale, ½ Inch to the Foot.

Floors.—First and second story floors, ⅞ x 3 inch T. & G. yellow pine. Kitchen, pantry and lavatory, No. 1 rift grain. Other rooms, No. 2. Attic floor, selected ⅞ x 6 inch hemlock, surfaced.

Veranda, Balcony and Porches.—Veranda, balcony and front and side porches to be constructed as per details, in a good substantial manner, all set on gas pipe columns. Veranda sills, 4 x 8 inches; joists, 2 x 6 inches; rafters, 2 x 6 inches. Floor of veranda to be 1¼ x 3 inch white pine, T. & G., to be laid in white lead in the best manner, and well driven up. All edges of veranda and porch floors to be neatly rounded. Veranda and balcony to be ceiled with ⅝-inch yellow pine ceiling, laid at right angles to building, and blind nailed. Steps of white pine, 1⅛-inch treads, ⅞-inch risers, 1⅛-inch stringers, paneled, and cove molding under treads.

Back Porch.—Back porch to have 4 x 6 inch sills, 2

living room and halls to be of best quality white wood. Kitchen, bathroom, pantry and lavatory to have wainscoting of ½ x 3 inch North Carolina pine ceiling, 4 feet high, with rail around top. All other rooms to be finished in best quality white pine. Door and window casings, baseboards, &c., to be made as per details, and put on in a good substantial manner. Inside finish must not be brought on the grounds until ready to be put in place. Closets to have plain 6-inch baseboards, and one shelf to each closet. Furnish neat picture mold in parlor, living room, halls and all bedrooms. Hall, parlor and living room molds of pressed wood, finished to match wood work. Furnish and set in place neat grille, where shown on plan in hall; same to cost not over $6.50.

Painting.

Outside Work.—All the exterior wood work, including porch floors and ceilings of side and back porch, cornices, window frames, &c., to have two good coats of best lead and oil paint; priming coat to be of right consistency to hold finished coat properly. Shingles of gables to have one coat of Cabot's creosote shingle stain. Veranda and balcony ceilings to be given one coat of raw linseed oil. All outside tin work to be carefully covered with mineral paint on both sides. Care must be taken to clean all the acids, &c., from tin before paint is applied.

Inside Work.—Inside trim of upstairs and downstairs halls, parlor, living room, downstairs bedroom

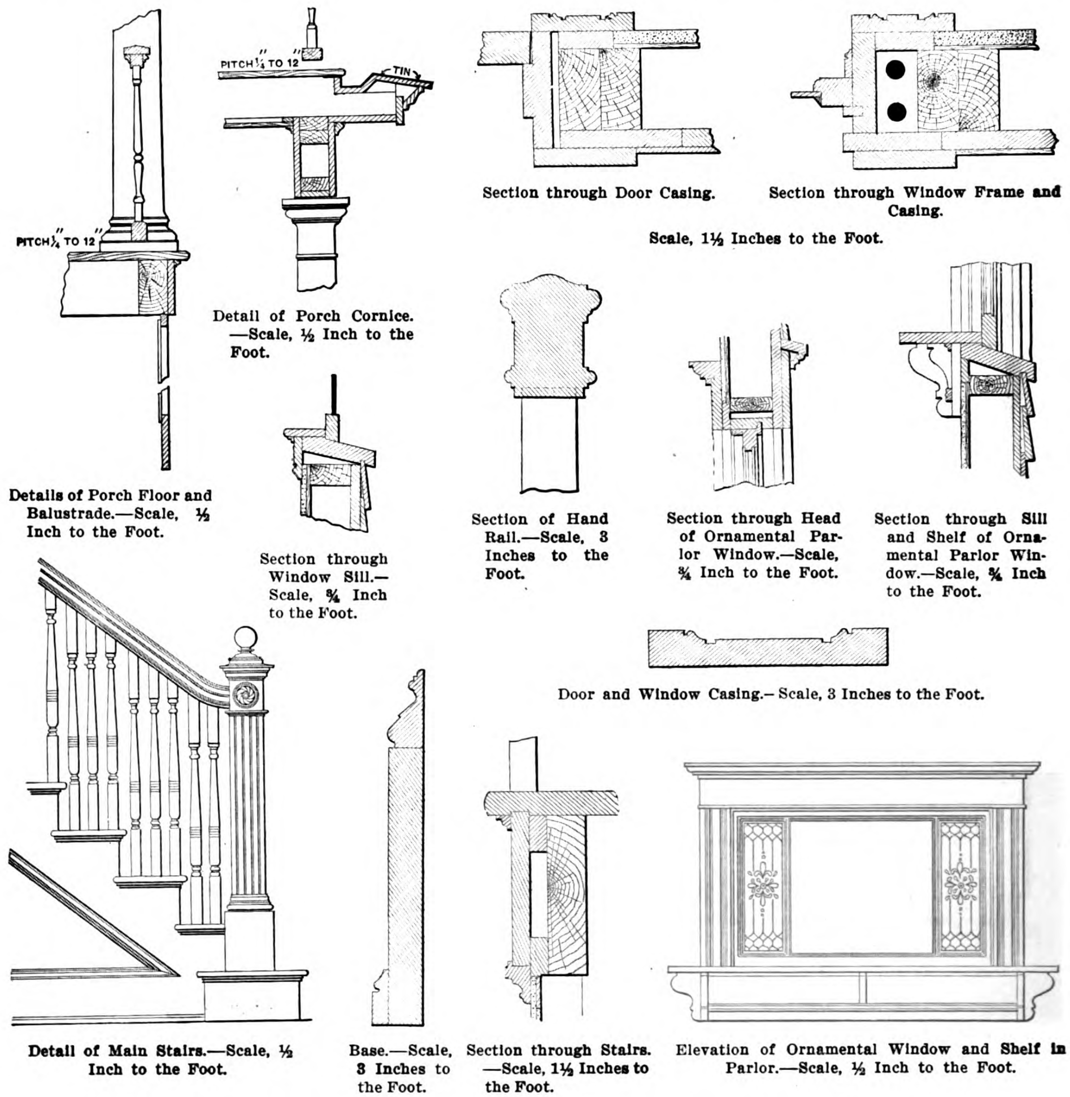
wide and to extend at least 5 inches under shingles. Place saddle back around chimney, to be carried up 12 inches under shingles.

Hardware.

The contractor to allow $50 for hardware, this to include all hardware except nails and work specified elsewhere. Finish of hardware to be selected by owner.

Plumbing.

Plumbing contractor to provide all necessary fixtures and piping, including bathtub, water closet, wash bowl



Details of Porch Floor and Balustrade.—Scale, ½ Inch to the Foot.

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

Section through Window Sill.—Scale, ¾ Inch to the Foot.

Section through Door Casing.

Section through Window Frame and Casing.

Scale, 1½ Inches to the Foot.

Section of Hand Rail.—Scale, 3 Inches to the Foot.

Section through Head of Ornamental Parlor Window.—Scale, ¾ Inch to the Foot.

Section through Sill and Shelf of Ornamental Parlor Window.—Scale, ¾ Inch to the Foot.

Door and Window Casing.—Scale, 3 Inches to the Foot.

Detail of Main Stairs.—Scale, ½ Inch to the Foot.

Base.—Scale, 3 Inches to the Foot.

Section through Stairs.—Scale, 1½ Inches to the Foot.

Elevation of Ornamental Window and Shelf in Parlor.—Scale, ½ Inch to the Foot.

Miscelllaneous Constructive Details of Third-Prize Design in Competition in Farm Houses.

and front bedroom upstairs to be given one coat of good filler and one coat of varnish or stain, as owner may direct. Main stairs to be filled and finished natural, or stained to imitate antique oak, as directed by owner. All wainscotings to be given one coat of raw linseed oil; balance of interior wood work to be given two coats of good lead and oil paint. Inside and outside colors to be selected by owner; only mineral colors should be used.

Tin Work.

Lay all valleys, flashings, gutters, &c., of N. & G. Taylor's IC tin; all to be painted with mineral paint on both sides. This includes lining of porch gutter and all necessary leaders; leaders to have troughs near ground if run to cistern. All flashings to be 14 inches

in bathroom, sinks in kitchen and lavatory, copper boiler, 30 gallons capacity, and water back, force pump; and line supply tank with 20-ounce copper, and make a good substantial job. Only first-class workmen to be employed on plumbing. All bathroom fixtures to be of the exposed type, faucets, &c., nickeled; tub to be 6-foot steel clad, with enameled inside and rim; to be provided with overflow, drain, stop and chain and hot and cold water faucets. Water closet to have good copper lined tank, with hard wood seat, back and tank and clean out bowl. Wash bowl to be white earthen ware, with marble top and back, and to have hot and cold water faucets. Kitchen and lavatory sinks to be 20 x 36 x 5 inch sheet iron, provided with drains and hot and cold water faucets. Carpenter to build and plumber to line with copper one 50-gallon capacity supply tank, same to be built in a good, substantial manner of 1½-inch white pine, to be placed in attic directly over bathroom; to be supported properly and to be provided with overflow and stop cock. Provide and set in place force pump to fill tank. In case overflow is not in sight of pump, furnish telltale pipe to show when tank is full. Sizes of all supply pipes to be ½ inch, galvanized iron. Run main supply pipe direct from tank to cellar, provide stop cock and run supply pipes over house, same as from city mains. Waste pipes from tub, bowl and sinks to be 1 inch, lead pipe. Main soil pipe, 4 inches, cast iron; suction pipe, cistern to pump, 1¼ inches; pump to tank, 1 inch. All exposed pipes and faucets in bathroom to be well nickeled and lead connections furnished to all bathroom fixtures. Provide suitable vent and trap with hand clean out to main soil pipe. Drain to cesspool to be 5-inch earthen pipe; to have at least ¼ inch to 1 foot fall, and start 2 feet below cellar at house, and well laid with cement, with bell ends toward house. Owner to provide cesspool and trench for drain pipe and to fill trench in afterward. Drain to be laid by plumber. Provide and set in kitchen one 30-gallon copper hot water boiler: to have all necessary couplings, stop cock and clean out and water back.

Furnace.

Provide and set in place one hot air furnace of standard make, with proper flues and registers. Manufacturer's guarantee must accompany furnace to heat all rooms furnished with registers to 70 degrees in zero weather. All hot air pipes in walls, or where near wood work, to be well wrapped with asbestos paper. Chimney to be furnished with iron thimble to receive smoke pipe. Furnace to have 12 x 24 inch galvanized iron cold air duct, to run from cellar window, where shown, direct to floor and thence to base of furnace. Inlet to cold air duct to have a strong wire cloth screen, ¼-inch mesh. Window to be well nailed up around cold air duct and casing of 1-inch boards built around same; also to have suitable damper. Elbows must be provided at turns of hot air flues. No square turns allowed.

Detailed Estimate of Cost.

The estimate of cost in detail is as follows:

EXCAVATION.		
250 yards at 20 cents		$50.00
MASON WORK.		
Foundation and area, 71 perch stone laid and pointed, at $2.50	$177.50	
Chimney, laid complete	26.00	
Post and chimney bases	3.00	
Cellar floor, 125 yards concrete at 60 cents	75.00	
		281.50
LATH AND PLASTER.		
987 yards at 22 cents		217.14
LUMBER AND MILL WORK.		
15,000 feet hemlock, including sheathing, roof boards and attic floor, at $15	$225.00	
150 feet hemlock in cellar and area stairs, at $18	2.70	
25 door frames and casings, average $1.50	37.50	
Front door	6.00	
Side and balcony doors, $4.50 each	9.00	
20 doors, average $1.50	30.00	
Cellar door and frame	5.00	
Area door and frame	4.00	
27 window frames and casings, at $1.75	47.25	
25 windows, average $1.75	43.75	
1 window (parlor)	3.75	
1 window (upstairs hall)	3.50	
3 gable windows and frames, at $7	21.00	
7 cellar windows and frames, at $1	7.00	
Sash cord, pulleys and weights	12.00	
3200 feet No. 1 clapboards, at $24	76.80	
19,000 roof shingles, at $3.75	71.25	
4000 gable shingles, at $4	16.00	
120 feet water table, at 3 cents	3.60	
100 feet belt course, at 4 cents	4.00	
Main cornice, complete	20.00	
Front porch cornice, complete	5.00	
50 feet lattice	3.00	
Front porch floor, 300 feet at $35 per M	10.50	
Porch and balcony ceilings, 280 feet at $20 per M.	5.60	
5 columns, at $2.50	12.50	
26 feet rail and balusters, at 20 cents	5.20	
36 feet rail and baluster (balcony), at 30 cents.	10.80	
Balcony floor, 200 feet at $25 per M	5.00	
125 feet cove	.65	
Side and back porch ceilings and cornices	10.00	
Side and back porch floors, 100 feet at $22 per M.	2.20	
Front steps	3.00	
Side and back steps	2.50	
Flooring (kitchen, lavatory and pantry), 490 feet at $28 per M	13.72	
Flooring, 2360 feet at $22	51.92	
300 feet 1 x 7 inch base, at $30 per M	9.00	
500 feet 2-inch base mold at 1 cent	5.00	
70 feet pine in closets, at $24 per M	1.68	
80 feet pine in pantry, at $24 per M	1.92	
Cupboard doors	6.50	
100 feet pine in attic stairs, at $28 per M	2.80	
Main stairs, material complete	23.00	
Grille	6.50	
Wainscoting and rail	10.50	
Total lumber and mill work	$857.59	
Tin, paper and nails	18.00	
Carpenter labor	550.00	
Total carpenter work		1,425.59
Painting	$140.00	
Plumbing, including tank	220.00	
Hardware	50.00	
Furnace, complete	110.00	
Total subcontracts		520.00
Total		$2,494.23

RECAPITULATION.

Excavation	$50.00
Mason work	281.50
Carpenter work	1,425.59
Lath and plaster	217.14
Subcontracts	520.00
Total	$2,494.23

The builder's certificate was signed by A. E. Tiffany, contractor and builder, Carbondale, Pa.

New England Clapboards.

In the New England and some of the Eastern States a clapboard is simply a short piece of bevel siding, 4 or 6 feet long, and is used just as long siding is used elsewhere. They are usually made in the same manner as long siding—first cut into strips and resawn. Within the past few years machinery has been placed on the market for manufacturing clapboards direct from the log. The operation is briefly as follows, says a writer in the *Southern Lumberman:* Logs from 16 to 20 inches in diameter are first cut into 4 and 6 foot lengths. These short logs are then placed in a lathe and turned. The most profitable logs for clapboards are those that will turn from 16 to 20 inches and of extra quality. After being turned the log is put on the "carriage," which is totally unlike the usual saw mill carriage. Instead of being laid upon head blocks the log is suspended from spindles, at the head and tail of the carriage, just as in a lathe, and the setting is done by turning the log the required distance for the thickness of the board. The center of the log is directly above the saw, and the carriage can be lowered to cut the desired width. After the boards are all cut off there remains a core containing the heart knots.

In the New England States clapboards are used almost exclusively for siding houses. It is claimed that more good lumber can be got from a tree cut into clapboards than by cutting long siding strips; that clapboards can be put on faster than long siding, especially where there are many openings; and that the house will look just as handsome. If these claims are true, there is no reason why all frame houses in any State should not be clapboarded, instead of being "long" weather boarded. The machine made clapboards are, of course, thicker on the outer than on the inner edge, and are exactly "quarter sawed" or "rift sawed," as many call it, which gives the minimum of shrinkage and warping. After the clapboards are dry they are dressed to an even thickness from the thick edge as far back as the board is to be exposed to the weather, and jointed on both edges, all done by one passing through the planer and jointer.

If there ever comes a brisk demand for clapboards from the hard wood section of the Central South it would permit the getting out of a great deal of poplar, cucumber and other suitable woods that cannot be got out of the rough, hilly and mountain sections in long lengths. It would also cause a saving of timber, as cutting logs in such short lengths would permit the cutting out of large surface knots and permit more of the bole of the tree to be used between them.

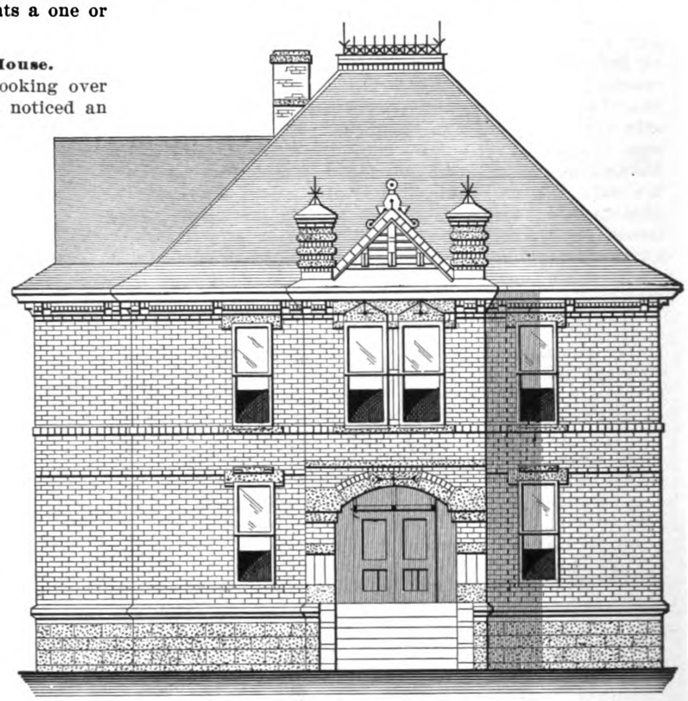
CORRESPONDENCE.

Plans for a Double House.

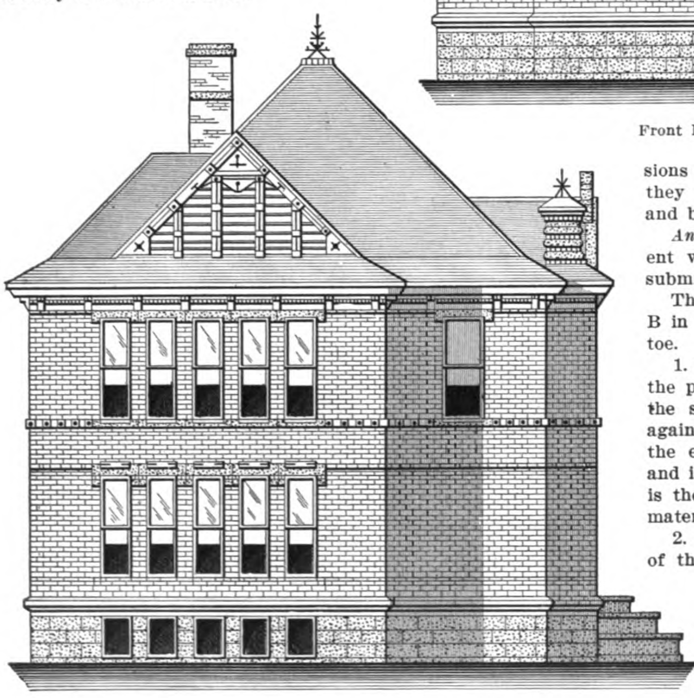
From W. N., *Toledo, Ohio.*—In regard to the inquiry of "H. H. G.," Sioux Falls, S. D., I would ask the correspondent to kindly give the size of the lot or property on which he desires to place the $2000 double house, and then the readers can perhaps supply his wants to better advantage. Of course, $2000 double houses are not very large in these times of high prices for materials, &c., but, nevertheless, let us hear from "H. H. G." with regard to the size of lot and whether he wants a one or two story house.

Design for Two-Story Brick School House.

From W. G. MUMMA, *Admire, Kan.*—In looking over the April issue of *Carpentry and Building* I noticed an inquiry from "O. A. G.," Dresden, Tenn., for plans of a two-story brick school house, and thinking they may be of interest in this connection, I send drawings of such a building herewith. The drawings speak for themselves to such an extent that comparatively little description is necessary. It will be seen from an inspection of the plans that there are two rooms to each floor, with wardrobes for teachers and pupils. Each school room is intended to accommodate about 50 scholars. The heating is to be accomplished by hot air, with pipes running to the different rooms and connected with registers; each room to have cold air ducts for purposes of ventilation. With ordinary inside finish, wooden floors, common plastering, &c., the structure should cost something like $5000, depending, of course, on the section of country in which it is built.



Front Elevation.—Scale, 1-16 Inch to the Foot.



Side (Left) Elevation.—Scale, 1-16 Inch to the Foot.

Design for Two-Story Brick School House.—W. G. Mumma, Architect, Admire, Kansas

Detail of Joint of Wooden Roof Trusses.

From ATOM, *New Jersey.*—In the excellent series of articles on "Proportioning Joints in Wooden Roof Trusses," by Mr. Kidder, there is one illustration which bothers me. In Fig. 17, the hight of the toe necessary to withstand the strain of 31,200 pounds in the tie beam is figured out 3½ inches. The lug B is marked 1¼ inches. Why should not this lug be just as deep as the toe? It has to deliver to the tie beam the same stress which the rafter brings down to the toe end of the casting. I refer to pages 114 and 115, in the May number of *Carpentry and Building.*

Mr. Kidder's work is very timely. There are many men who can plan out a good truss, as far as dimensions of main members are concerned, but they "fall down" in the details of joints and bearings.

Answer.—The inquiry of our correspondent was submitted to Mr. Kidder and he submits the following in reply:

Three reasons may be given why the lug B in Fig. 17 should not be as deep as the toe.

1. If there were any friction between the plate and the beam and none between the strut and the plate, the compression against both lugs would be the same, but the element of friction is always present and is greatest when the stress in the strut is the greatest, and this friction will very materially reduce the stress on the lug B.

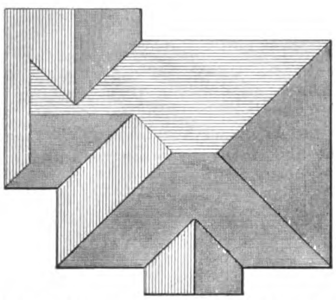
2. Lug B bears square on the end fibers of the tie and hence a greater unit stress may be permitted than in the case of the toe, where the pressure is at an angle with the fibers.

3. Too deep a cut at B would seriously affect the strength of the tie beam, so that it is desirable to make it as little as possible, while the toe can be made a little larger than might be absolutely necessary without doing any harm.

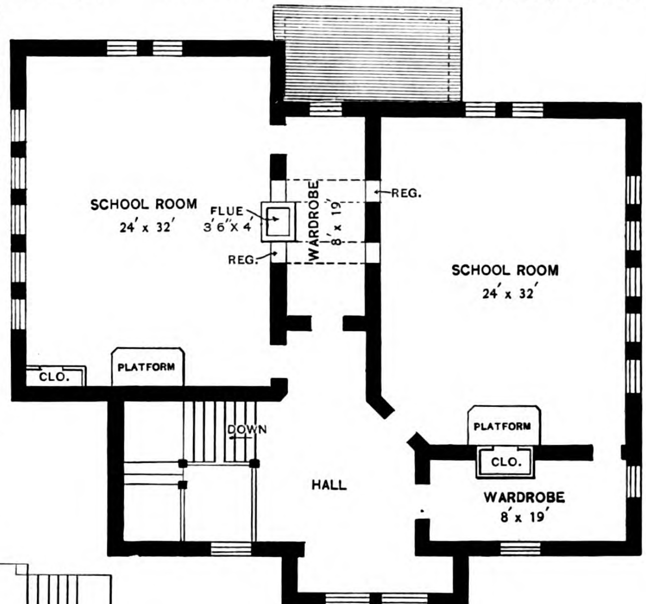
The writer is well aware that there are many points in these articles which, from a purely theoretical standpoint, are open to criticism, but when the practical elements are taken into account, he believes that the rules and examples given are well within the limits of safety. As a matter of fact, nine truss joints out of ten, if computed in the same way that they determine the size of a strut or a rod, would be pronounced unsafe, but the writer has endeavored to combine theory and practical observation in such a way as to meet all requirements of safety and economy.

What Constitutes a Day's Work for a Carpenter?

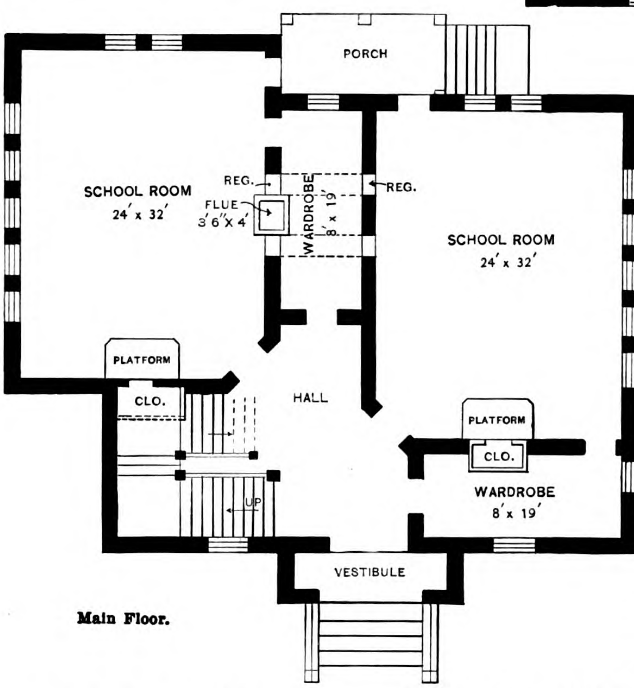
From B. L. C., *Barre, Vt.*—I should like very much to have the practical readers of the paper give their views as to what is considered a day's work for a carpenter in the various branches of his trade. For example, what is a day's work in making window frames, both single and weighted? How many feet of clapboards, or of siding, and how many thousand shingles should a journeyman be able to lay in a day? How many windows should a man case in soft wood, also in hard wood, and the same of doors? How many veneered doors should a man join and trim complete? How many 1½-inch pine doors? How many feet or squares of hard wood or soft wood floors should a man lay and smooth up, calling it ordinary work? How many windows should a man join, both plain and lip? I would say that all this has reference to a nine-hour day. I think a discussion of the various points would prove intensely interesting and result in bringing out valuable information.



Plan of Roof.—Scale, 1-32 Inch to the Foot.



Second Floor.



Main Floor.

Design for Two-Story Brick School House.—Floor Plans.—Scale, 1-16 Inch to the Foot

Cutting Out Circular Strings for Stairs.

From D. B. C., *Langenburg.*—Will some of the readers of the paper tell me how circular strings are made for open spiral stairs? I have been taking *Carpentry and Building* for some time and find in it many things of value to me, but have never seen the subject of circular strings considered.

Finding Back Cut of Jack Rafters on Octagon Roofs.

From F. C., *Grand Falls, N. B.*—In looking over the various issues of the paper for diagrams of an octagon roof, I found in the issue for December of last year, page 312, a description of a very good method of finding the lengths and bevels of rafters for such a roof, but it did not appear to me to be complete. I do not wish to offend "A. O. C.," neither do I claim I could do any better myself, but I would like to see the diagram completed. He says, to find the lengths and bevels of the jacks 1, 2, 3, that a bevel set at "8" will give the check cut. I think I have examined the diagram very carefully, but I fail to find any figure 8. Again, he says a bevel set at—but I fail again to find at what point to set this bevel. I would like to see the diagram completed.

Note.—In presenting the diagram with explanatory text from "A. O. C." a typographical error occurred, which was so obvious to even a casual reader that the correction was not made in a subsequent issue. Instead of a bevel being at "8," it should read "L," and in the second case if our correspondent had carefully read the descriptive text he would have seen that a bevel set at "J" would give the bottom cut.

The diagram of "A. O. C." was in error as regards the location of the jack rafters 1, 2, 3. If "F. C." will look on page 72 of the March issue of *Carpentry and Building* for this year he will find the correct explanation and diagram.

Design of Cabinet Wanted.

From C. C. D., *Rantoul, Ill.*—I would like some reader to furnish a design for a small cabinet suitable for curios, minerals, pictures, &c. Will W. A. Warren, West Liberty, Iowa, send a detail of the case shown back of the bed in the view, "Looking Into the Library," forming one of the half-tone supplemental plates accompanying the May issue of the paper? I have been taking *Carpentry and Building* for about six years and am well pleased with it.

Comments on Floor Plan Competition.

From C. A. WAGNER, *Port Jervis, N. Y.*—I have been much interested in reading the various comments on the Floor Plan Competition which appeared in the May issue of the paper. I quite agree with "Architect," Iowa, regarding the position of the bathroom—that is, to place it as conveniently as possible. In laying out or drafting a plan, as well as in studying up a design, I have always had the importance impressed upon me of placing the plumbing on the two floors as much as possible in line, so as to save expense.

I am somewhat amused at the letter of "O. K. W.," Minneapolis, but think he feels somewhat sore. He must have had that big feeling about his plans—that there was nothing better. I have met a good many physicians, and they all say "get away from the ground floor with sleeping rooms." As to the question of fire, I would ask where do we lose the most lives—in country homes or in the city? I think the correspondent should take all the facts into consideration before making such serious statements as appeared in his letter. I also note his strictures with regard to vestibules, but I guess he did not have on his eyeglasses when he examined No. 123; otherwise he would have seen one, as it is distinctly indicated on the plan. His comments about the kitchen being placed on the cold side of the house are all right, so far as they go, but for my part I cannot see how any one can tell from a set of published plans which way the house is to face unless it is so stated in connection with the drawing. I cannot therefore see how his criticism applies to No. 18, and so I say give No. 18 all the credit due, as it was one of the 12 selected for publication.

I think the remarks of "S. M. P." of Ouray, Col., are timely and worthy of due consideration in connection with future contests. The correspondent "T. K. W." of Lake Providence, La., should live in the Middle States. Then he would change his mind in regard to the closet question. Up this way closets are always wanted, and there cannot be too many in a house, as nearly everybody looks for closets as much as they do for rooms, and for my part I would feel lost in a house with no closets.

Perhaps "R. F." of St. Mary's, Ont., likes work, or possibly he has no idea of all it involves to put in newels and ramps for a fine stairway. As to geometry and high schools, my view is that better workmen are made by practical work than any school can turn out. I am only speaking of myself, however, and some of my brother chips may not agree with me. Platform stairs are the vogue in all localities, and in my opinion they are O. K. in all respects, making a finer looking pair of stairs than any other kind.

Design Wanted of Winding Stairs.

From C. W. B., *Reading, Pa.*—I would like to ask some of the readers of the paper to furnish for publication a drawing of a winding stairs so plain and clear that any one can understand it. The subject is one in which I am greatly interested, and I have no doubt that others would derive valuable suggestions from a presentation of the matter.

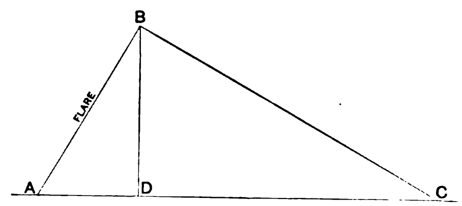
Correction of Hodgson's Method of Finding Cut of Hopper.

From YOUNG CHIP, *St. Paul, Minn.*—In the work entitled "The Steel Square and Its Uses," by F. T. Hodgson, Part I, page 55, is given the figure for finding out the cut of a hopper. In the explanation he says, "To find the bevel to cut across the face of the board, take A B on the blade and A D on the tongue; the bevel of the tongue is the bevel required." He also says, "To find the bevel for butt joint take B C on the blade and A D on the tongue and the bevel of the tongue is the bevel required."

In his second volume the author says, in regard to the bevel for butt joint, take D C on the blade and A D on the tongue and the line of tongue gives the joint. To find the bevel for miter joint he says take B C on the blade and D C on the tongue and the bevel of the tongue is the required bevel. In Volume II he says for miter joint take B C on the blade and A D on the tongue and the line of tongue gives the bevel. Now I considered Fig. 38 in Volume I all right until I saw Volume II, and the explanations were so conflicting that I was all at sea. Some time ago, in *Carpentry and Building*, I saw the same figure, but the explanation was again different from either of those above mentioned. I wish you would kindly refer this matter to Mr. Hodgson and have him unravel the tangle for us. I feel sure that others will be profited as well as myself if the answer is published in the paper.

Note.—We submitted the letter of our correspondent to Mr. Hodgson, who furnishes the following: In reply to your correspondent I submit a corrected explanation of the diagram Fig. 38 in "The Steel Square and Its Uses." I am thankful to him for calling my attention to the discrepancies existing between the reference letters in this figure and in Fig. 61 of Part II on the same subject. I promise to call the attention of the publishers to the matter, who will no doubt correct it at once. The corrected figure or diagram with the proper reference letters is presented herewith.

To find the proper cut or bevel across the face take A B on the blade and A D on the tongue and the line of



Correction of Hodgson's Method of Finding Cut of Hopper.

tongue gives the bevel. This varies, of course, from the flare as given in the diagram, and this part often puzzles beginners, as they cannot understand why the bevel across the board should be different from the angle required.

To obtain a miter joint we take B C on the blade of the square and D C on the tongue, and the line of tongue gives the bevel across the edge of the stuff to be worked. This bevel, of course, must be started from the face where the down cut strikes the corner of the stuff. It will be seen that the letter A was substituted for C in the explanation of Fig. 61, Volume II, which was a grievous error.

To obtain the butt joint take B C on the blade and A D on the tongue and the line of tongue gives the joint required. Here, again, I find that D C was substituted for B C in Volume II, a matter that would make considerable difference in the bevel.

In order to avoid confusion when using this rule, it is best to lay out the angles on the board before any cutting is done, and see that the proper lines are taken before application, as it is very easy to get them mixed, so to speak. The correspondent will find the diagram and explanation given for Fig. 38 in the first volume all right, as the errors he has pointed out occurred in the second volume.

Comments on Design of Odd Fellows' Hall.

From ATOM, *New Jersey.*—In *Carpentry and Building* for April there is an illustration of an Odd Fellows' Hall. The section drawing shows no column or partition in the first story, but a column with a 1½-inch rod through it in the second story. Above this column is some framing marked "truss for holding up floor." It is well the architect put this label upon it, for otherwise one could not understand the purpose of the bracing and rods. Such a truss is useless for supporting the second floor. If there were a post in the first story, under the column shown, the truss would support the upper ceiling all right, without the long 1½-inch rod. But the ceiling needs no truss for a 12½-foot span. When architects design trusses they ought to understand some of the elements of mechanics, and get some idea of resolution of forces and strength of materials.

Getting Side Cuts for Jack Rafters to Fit Against Hips or Valleys.

From C. S., *Oswego, Kan.*—I have been a reader of *Carpentry and Building* ever since the first number was published, having had 51 years' experience as carpenter and builder and being now 67 years of age. I have noticed from time to time the great number of questions which have been asked, some of them over and over again. Many of these I could have answered in my own way, but have refrained for one reason or another. Take, for example, the question how to get the side cut for jack rafters to fit against hip or valley rafters. There are various ways of obtaining the result, but the rule which governs is to take the hypotenuse on the blade of the square and the base or run on the tongue, and the blade gives the cut. In order to illustrate, suppose we have a roof to frame with a rise of 11 inches to the foot run. Take the hypotenuse, which, in this case, is in practical figures 1 foot 4¼ inches, which we take on the blade of the square and 12 inches for the run on the tongue—the blade gives the cut. The same rule applies in obtaining side cut of hip or valley to fit against deck or ridge or at the plate, using figures to correspond. For the above named rise, the hypotenuse is 1 foot 8¼ inches, which we take on the blade, and 17 for the run, which we take on the tongue of the square, and the blade gives the cut.

Criticism of Bridge Truss.

From F. R., *Coalville, Utah.*—In reply to the request of "J. M. B." of Monroeton, Pa., for criticism of the bridge truss, a sketch of which is presented in connection with his letter in the March issue, I would say that he does not state whether the structure is used for a wagon bridge, or simply as a foot bridge in the absence of something better. If the sketch does the subject justice, there is nothing in the way it is constructed worthy of much credit, and if it is a wagon bridge I hardly think it strong enough to support its own weight for any reasonable length of time. If "J. M. B." wants to erect a bridge, I could furnish sketches of what I consider would fill the bill, but he simply wants to know what some of the readers think of the sketches he has presented. There may be readers who think that "J. M. B." has a grudge against the man who constructed this bridge. I think, however, this kind of work will give a man a black eye soon enough without having it published. As to the merits of the structure I leave that for some other reader to present the details, but I think it is too weak by far for a bridge of 60-foot span.

Note.—It might be interesting to "J. M. B.," as well as others, if our correspondent, "F. R.," would forward sketches of the kind of bridge he considers adequate for the purpose.

Remedying Poor Chimney Draft.

From G. W. K., *Fort Recovery, Ohio.*—Will you kindly let me know what remedy to apply to overcome the following trouble? I have a chimney which is 4 x 8 inches inside measurement. There is but one stove connected with it, but that will not draw. If you light a paper and place it in the chimney the draft will draw it up. I would be glad to know what is the trouble.

Note.—I would seem, unless a very small stove was used, that the chimney is rather small, and it would be unreasonable to expect it to carry away the products of combustion from a large fire. Some experience is required to determine the character of draft from the use of a lighted paper in a chimney, and in the majority of cases when the test is employed it is misleading. We present the question of our correspondent and shall be glad to have our readers suggest a remedy for the trouble they would employ under similar circumstances.

Laying Out Curved Rafters.

From W. A. E., *East Waterford, Maine.*—In a recent issue of the paper I presented a method of mitering a rake and level mold, and at the same time showed how to strike a circle through any three given points together with the application of the method to a rake molding. In the diagrams which I present herewith the same method is shown applied to a curved roof. Referring to Fig. 1, let the line A B represent the run of the common rafter, and the line A E the rise. The line B C will then represent the length of the common rafter. Now mark off the swell or curve of the rafter as at D, and proceed to find the curves in the same manner as described in connection with Figs. 2 and 3 of my communication in the February issue. Now take the rise and run of the hip rafter, as shown in Fig. 2, and proceed as before, only the run of the hip will be longer, while the rise is the same. The curve of the hip will be longer, but it will have the same swell as the common rafter shown at D. This method is applicable to a roof of any number of curves as well as to a roof of one curve, as in the case of what is known as the mansard or French roof.

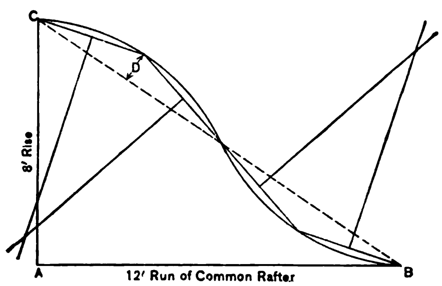


Fig. 1.—Laying Out Common Rafter for Curved Roof.

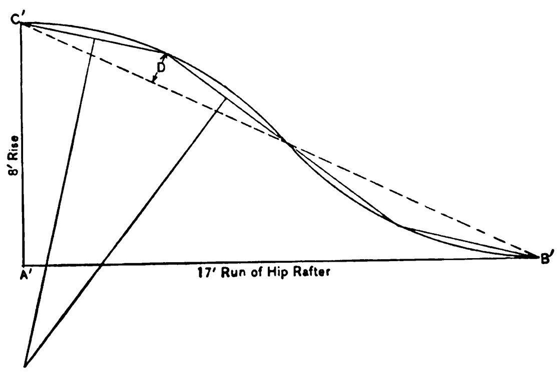


Fig. 2.—Laying Out Hip Rafter for Curved Roof.

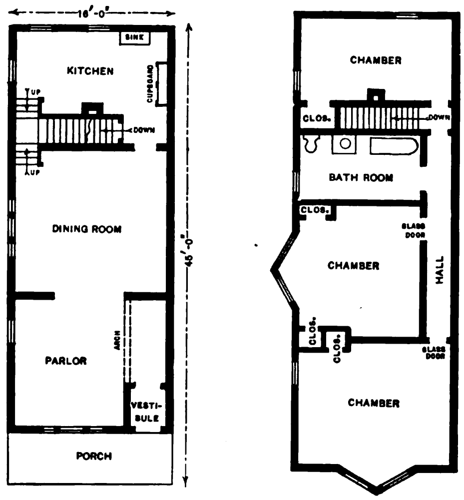
Laying Out Curved Rafters Scale, 3-16 Inch to the Foot

Rodding a Church.

From E. G. WASHBURNE, *New York City.*—Regarding the inquiry of "J. W. C." of Pine Hill, Pa., I would say that placing lightning rods on a building is not, as the correspondent claims, a part of the building business. It is as distinct a business as wiring for electric lighting, and should never be attempted by a person who has had no experience in this sort of work, unless it be under the direction of some one familiar with the proper method of protection. A lightning rod improperly put up is a menace instead of a protection. A church 72 x 52 feet in plan and having a steeple 93 feet high should have a point on the steeple with one line of rod to the ground "direct." Points should also be placed on each gable end and chimney, with the rod running along the ridge connecting all the points and forming a complete circuit over the building. This will "ground" all of the metal ridges and gutters, which constitute a very important part of the protection. There should be sufficient ground connections from roof to afford an easy path for an electric discharge to pass to the earth. The area of protection of a point is a radius of about 25 feet and a point placed on the steeple will not protect the rear of the church. Theory may claim that it does, but experience disproves it.

Plans Wanted for Small Brick Houses.

From J. M. R., *Morristown, Pa.*—I have been a reader of *Carpentry and Building* for more than five years and find much within its covers that is of value to me. I



First Floor. **Second Floor.**

Plans Wanted for Small Brick Houses.

wish now to ask a favor of some of the architectural friends of the paper, which is that they furnish for publication plans showing front and side elevations of two two-story brick houses to be erected on a small lot, 40 x 60 feet, the houses having a frontage of 15 or 16 feet each. There should be a front porch, and the second story should extend over the porch to the street line. What I want is something attractive and yet not expensive. Each house should contain six rooms and bath. I inclose rough sketch of first and second floor plans of such a house as I have in mind and which when worked out would prove roomy and something different from the ordinary. This is my fancy. I hope there will be criticism of this plan, which I think can be built pretty cheap, as the one stairway will answer for front and back.

How Many Shingles in a Bundle.

From E. W. B., *Auburndale, Mass.*—Will the readers who have had experience in purchasing shingles inform me why it is that the law allows 940 shingles to be considered a thousand, as is the case in this section of the country? The bundles of shingles received in this section consist of 23 courses on one side and 21 courses on the other, and in bundles 20 inches wide it will be seen that they contain but 235 shingles, instead of 250, as they should. This is a question which is of at least incidental interest to many readers, and I shall be very glad to have them discuss the matter in the light of their personal experience.

Relative Strength of Solid and Built Up Beams.

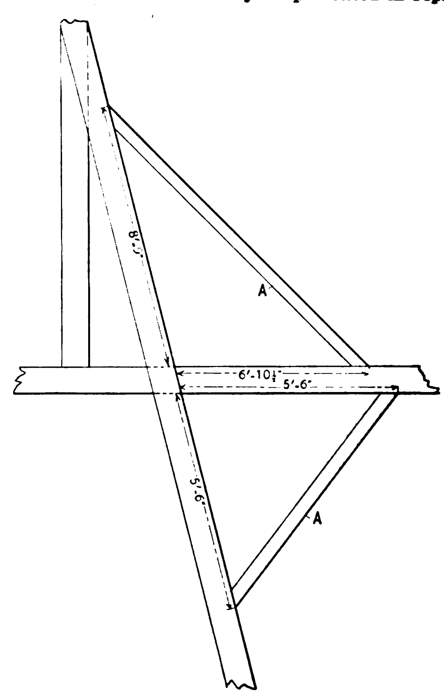
From C. W. B., *Reading, Pa.*—In reply to "J. L. S." of Goldfield, Iowa, who asked in the March issue with regard to the relative strength of a solid and built up beam 4 x 4 inches in cross section and 10 feet in length, I would say that I have discussed this question with different people, and the conclusion was reached that a built up beam of the dimensions named was about one-third stronger than a solid beam of the same size. I should be glad, however, to have the readers of the paper still further discuss the question.

From H. J. A., *Ostrander.*—In answer to "J. L. S." of Goldfield, Iowa, whose letter appears in the March issue of the paper, I would say that he is right regarding the relative strength of solid and built up beams. The solid beam is stronger than the built up beam. The reason for using built up beams is due to the fact that occasionally timbers or girders are required of a greater size than can conveniently be procured when needed, so the scheme of building up a beam must be resorted to. This question is discussed in the issue of *Carpentry and Building* for September, 1897, and in Kidder's "Building Construction and Superintendence," Vol. II, is given the results of experiments conducted by Prof. Edgar Kidwell of the Michigan Colleges of Mines. One of the most common forms of built up beams is the nailing on of pieces diagonally across on each side of the two timbers, one being placed on top of the other. Professor Kidwell's test on this style of beam resulted in the splitting of the pieces nailed on and the pulling out of the nails every time, and no amount of nailing would prevent it. Professor Kidwell placed the efficiency of built up beams at from 70 to 80 per cent. of the strength of the solid beam.

Obtaining Lengths of Braces.

From J. L. T., *Bremen, Ind.*—I inclose, under separate cover, a pencil sketch of a part of a timber frame which I would like to have submitted to the experts through the columns of the Correspondence department. What I want to know is the practical way of obtaining lengths of the two braces marked A A on the sketch. The run of the sloping timber is 3 inches to the foot.

Note.—With no intention of anticipating the comments which will undoubtedly be presented in reply to



Obtaining Lengths of Braces.

the above request, we would suggest to our correspondent that he lay out his drawing to a scale of 1-12 inch to the foot, and then calling inches feet and twelfths inches, the length can readily be obtained.

Sharpening a Hand Scraper.

From LEARNER, *Paterson, N. J.*—I should like to have some of the readers describe the best way to sharpen a hand scraper to be used on a hard wood floor made of oak and maple. Are there different ways of using the scraper in order to obtain the best results.

WHAT BUILDERS ARE DOING.

THE Master Builders' Exchange of Albany recently held its annual banquet at Keeler's Hotel, covers being laid for 66 members and their guests. President Richard Wickham was toastmaster by unanimous election and called upon various members for brief remarks, which were listened to with deep interest.

The organization is the result of the consolidation of the Master Carpenters' Association, Master Painters' Association, Master Plumbers' Association, Master Steam and Hot Water Fitters' Association and the Boss Masons' Association. These organizations still preserve their individuality and all meet in the rooms of the Master Builders' Exchange, each coming together on different nights. The exchange itself meets on the third Tuesday of each month for the transaction of general business, and daily meetings are held for consultation and the transaction of minor business. Each local association is represented on the official staff, and the Board of Trustees is made up of one representative from each local association, excepting the Steam Fitters' Association, which is a recent acquisition, but will probably be represented on the board ere long.

The Master Builders' Exchange is in a flourishing condition, and each allied branch appears to be greatly interested in the work that is being accomplished. The officers for the ensuing year are:

President, Richard Wickham.
Vice-president, Andrew S. Delehanty.
Secretary, Rufus K. Palmer.
Treasurer, John E. Dugan.
Sergeant-at-arms, Peter Blake.

TRUSTEES.

John H. Moran, Thomas A. Gallagher,
John Wallace, Peter Keeler.

The address of the secretary is 25 Washington avenue, Albany, N. Y.

Cleveland, Ohio.

The Builders' Exchange of Cleveland recently completed its first ten years of corporate existence and fittingly celebrated the event on the evening of April 28. Appropriate exercises were held in the rooms of the exchange in the Chamber of Commerce Building, at which a large and representative gathering was present. There was a reception in honor of former presidents of the exchange, and in the evening there were dancing and refreshments in the main auditorium.

The Cleveland Exchange is among the best organized and most successful in the country, and during its existence it has accomplished great good in connection with the building industry. The daily attendance at the rooms has shown a large average, clearly indicating the interest taken in its welfare and also indicating that the exchange is the center of a great deal of business activity. We understand that last year plans to the number of 98 were sent to the exchange by architects for figures, while invitations to members to call at architects' offices for the purpose of estimating plans numbered 97. The exhibits of building material in the rooms of the exchange are an important and valuable feature, and have clearly demonstrated the wisdom of the policy which inaugurated it.

Early in May an important meeting of employers connected with the building business was held in the rooms of the Builders' Exchange for the purpose of considering the "no card, no work" system which the labor union leaders threatened to enforce. We understand that the employers at this meeting represented nearly 500 firms, and give employment to a large proportion of all the men connected with the building industries in the city. After a discussion of the subject a committee of one member from each trade was appointed, and a report presented in the shape of a resolution to the effect that the "no card, no work" system is directly antagonistic to the absolute independence of man to work or not to work and to employ or not to employ. It was resolved that in case of the attempted enforcement of the system by the allied building trades organization the contractors would suspend all work.

Denver, Col

As compared with a year ago, there is a decided increase in building operations in and about the city. A large percentage of the work involves the erection of dwellings, although buildings intended for business purposes are not altogether neglected. During the month of April there were 194 permits issued, covering building improvements estimated to cost practically $600,000, these figures comparing with 145 permits, representing an investment of $374,000, in April of last year.

Duluth, Minn.

The leading builders and contractors of the city recently organized a Builders' Exchange, electing William A. Thomson president. In its scope it is similar to many others in the large cities in the country, the by-laws being patterned after those of the exchange at St. Paul. It is organized to bring the contractors and building material men together and to adjust labor troubles with the least possible friction to all concerned. The officials desire it distinctly understood that the exchange is not antagonistic to labor organizations, but they feel that they can handle labor troubles better as an association than as individuals. The main object, however, they point out, is to correct certain injustices at present existing in the building business. Since May 1 the headquarters of the new exchange have been in the Manhattan Building, where they enjoy better facilities for their purpose.

Holyoke, Mass.

The strike which was in progress in the building trades in Holyoke, Mass., for some time was recently settled, and there is now peace between the Master Builders' Association and the Building Trades Council. By means of the settlement the carpenters secure a minimum rate of $2.50 per day of eight hours, and the master builders agree to employ only union men who have a certificate of membership in the Building Trades Council, but not necessarily of Holyoke. An arbitration clause is provided by which if trouble arises on any work the business agent shall notify the contractor, and within 24 hours a committee of three from the Building Trades Council and three from the master builders shall meet to settle the trouble, work in the meanwhile to continue on the buildings affected. It is stated that great credit for the settlement is due to the efforts of Architect W. B. Reid, who has acted as arbitrator in the matter.

Johnstown, Pa.

Indications at present are such as to warrant the belief that Johnstown will witness this season a greater degree of activity in the building line than it has experienced for many years. Work has already been commenced on many residences in different parts of the city, and several business blocks are expected to be completed before cold weather again sets in. The demand for houses is such that the improvements contemplated will be carried through even though building materials are much higher than they have been for some time past. The apartment house does not appear to meet with very much favor, although efforts are being made to interest capitalists in this class of building. In the opinion of one of the leading architects a house of this kind, fitted with the modern conveniences, would be a good investment in that city.

Lowell, Mass.

The annual meeting of the Builders' Exchange occurred on the afternoon of Wednesday, April 16, when, in addition to the election of officers for the ensuing year, reports were presented showing the exchange to be in a flourishing condition. There has been a gain in membership during the year and the outlook for the future is very gratifying.

The directors selected were William H. Fuller, Col. R. S. Ripley, Frank L. Weaver, J. B. Varnum, Joseph L. Cushing, O. M. Pratt, Joseph Jalbert, Thomas E. O'Day and Charles P. Conant. The board organized by electing the following officers for the ensuing year:

President, William H. Fuller.
Vice-president, Col. R. S. Ripley.
Secretary, Frank L. Weaver.
Treasurer, J. B. Varnum.
Superintendent, A. J. Ryan.

The annual banquet was held at the St. Charles Hotel on the evening of the same day, covers being laid for over 125 members and guests. According to the cards of invitation no speeches were to be allowed; nevertheless several of those present gave brief talks which were well received. Acting Mayor Badger, Col. R. S. Ripley, the newly elected vice-president; Mr. Tracy of the Boston Exchange, F. L. Weaver and Alderman Barton were among those called upon by President Fuller for remarks. During the evening a full orchestra and the Temple Quartette furnished vocal and instrumental music, the final selection being a take off on members of the exchange.

Los Angeles, Cal.

The total amount of building permits filed during the month of April at Los Angeles was over $700,000, which brings the total for the first four months of 1902 up to nearly $2,250,000, or about half as much as the total for the year 1901. As in other parts of the coast, the building of the spring shows a marked tendency toward the construction of flats. Among the most important work undertaken during April were a number of buildings of this sort.

New York City.

Building matters move along about as last reported, with a very fair volume of business under way, although the total for April is far behind that of the same month last year. The strike of the plasterers' laborers to enforce the demand for an advance in wages from $3 to $3.50 per day and the lockout of plasterers which followed it were brought to a termination on May 3 through compromise, although the relations between employers and employed are still somewhat strained. The laborers were granted half the advance demanded and now get $3.25 per day, while the employers have gained the concession that the laborers will when necessary prepare the journeymen's material before 8 o'clock in the morning, in order that the latter may get to work on time. The main questions which the employers raised—namely, that the laborers' organization should place itself in control of the plasterers' association; that the plasterers should sign a two years' agreement with the employers, and that employers might either not be compelled to pay fares and board to their men on out of town jobs, or be permitted, as is now not the case, to employ local craftsmen—were not decided.

Since our last issue plans have been filed by J. L. Hardenbergh, architect, for a new 20-story fire proof office building at 2 and 4 Washington street and 1, 2 and 3 West street, which will occupy a site about 181 x 64 x 69 feet and is estimated to cost in the neighborhood of $1,000,000. There is also talk of erecting on the site of the Boreel Building, at Broadway, Thames and Cedar streets, a 25-story structure which will cost about $2,000,000. The George A. Fuller Company will probably have charge of the latter work.

Norwich, Conn.

The leading contractors and builders of Norwich, Conn., have recently organized what is known as the Master Builders' Association, with officers for the ensuing year as follows: President, H. G. Peck; vice-president, A. N. Carpenter; secretary, F. E. Beckwith; treasurer, Hugh Blackledge; Board of Directors, H. G. Peck, A. N. Carpenter, F. E. Beckwith, Hugh Blackledge, John McWilliams, V. S. Stetson and E. C. Lillibridge.

Philadelphia, Pa.

The figures issued by the Bureau of Building Inspection for the month of April, while indicating a fair average, show a considerable reduction as compared with the corresponding month of last year. A large number of two and three story dwellings were projected during the month, as well as a considerable amount of alterations and additions. One of the more notable operations inaugurated was that involving the erection of 52 two and three story houses in the Twenty-seventh Ward by Thomas Marshall at an estimated cost of something like $136,000. During April of the present year there were 885 building permits issued, covering 1359 operations estimated to cost $2,676,960, as against 953 permits, covering 1501 operations and involving an estimated outlay of $3,145,600, in April of last year. The contrast is also very striking when the figures for March of this year are considered, the amount of building then projected being of a record breaking nature, the amount involved aggregating nearly $6,000,000.

Taking the figures for the first four months of the current year, there is a marked increase over the corresponding period of 1901, there being 2229 permits issued for 3725 operations, estimated to cost $10,391,855, as against 2587 permits, covering 3965 operations, costing $8,920,655, in the first four months of last year.

A model tenement has recently been designed by Architects Duhring, Okie & Ziegler for the Octavia Hill Association, consisting of a four-story structure, with a roof garden 180 x 70 feet in size. It will be of brick laid in Flemish bond, with terra cotta trimmings. There will be suites of two and four rooms, with accommodations for ten families on each of the upper floors.

The members of the Master Builders' Exchange held their annual shad dinner at the Orchard, Essington, on Saturday, May 10, and the occasion was thoroughly enjoyable in every way. Pranks were played on each other, speeches were made and a feeling of general good fellowship prevailed. The toastmaster was President Shields, and the Entertainment Committee was composed of J. Lindsay Little, chairman; John R. Wiggins, William B. Carlile, John R. Huhn and William Collins.

Portland, Ore.

Building in Portland, which was greatly retarded during the early part of the spring by unfavorable weather, has now become more active. For the most part the work for the month of April has been largely the construction of the smaller class of dwellings, ranging in cost from $800 to $1500. Builders anticipate a considerable rush of smaller work as soon as the site for the Lewis & Clark Exposition is chosen. The uncertainty in the labor situation has caused contractors some uneasiness. The increased cost of building has also deterred many from putting up new structures. One novel feature in the building of this spring is the construction of flats. Heretofore these buildings have been very rare in Portland, but a number are now going up in various parts of the city. Plans are also being drawn for several large tenement houses. Among the larger buildings which will be begun in the near future are three school houses, to cost $45,000; the building of the Smith Factory Company, to cost $20,000; the new building for Studebaker Bros., to cost $30,000; the new warehouse of the Deere Implement Company, to cost $30,000; the Henry Weinhard five-story brick building, to cost $45,000, and the Patton Estate Building, to cost $11,000.

San Francisco, Cal.

Despite the congestion of the iron and steel market, the advance in lumber prices and the dissensions among carpenters, the building records furnish no evidence of relaxation in construction. Nevertheless many prospective builders of restricted means are being deterred from proceeding by the cost of material, architects and contractors reporting many building projects recently abandoned after the bids were received. The most serious feature in the trade is the extraordinary rise in the price of lumber, which has been so sudden that speculative builders are waiting on the supposition that prices are bound to fall before long.

Among the new buildings which have just been decided on are 31 flats, to be erected in various parts of the city. Some of these will in style be an innovation as far as San Francisco is concerned. The plans show that each apartment will have a separate marble entrance from the street and will contain nine rooms, a parlor, dining room, library, four bedrooms, kitchen and servants' room, with two bathrooms and a reception hall. The dining rooms will be oval, with heavy beam ceilings and high paneled wainscoting. Butlers' pantries will connect the dining rooms and kitchens. The libraries will be off the reception halls, will be divided by rows of columns and will have beam ceilings and side panels. Bookcases will be built into the libraries. Billiard rooms will be placed in the basement and in the attic. Maple, oak, Oregon pine and redwood in natural finish will be employed in the interior.

At a meeting of the Builders' Exchange held a few weeks ago the following officers were elected: President, S. H. Kent; vice-president, Richard Herring; secretary, James Wilson; financial secretary, J. A. Dunker; door keeper, Julius Kraus, and attorney, William Cobb.

Edward R. Swain, one of the best known architects on the coast, and designer of the Union Ferry Building, the Hobart Building, the H. S. Crocker Building and a number of the buildings at the San Francisco Midwinter Fair held here some years ago, died at the Lane Hospital, in this city, on April 10.

Sterling, Ill.

The differences existing between employers and employed in the building trades of the city and of Rock Falls were amicably adjusted in April through an agreement which went into effect April 1 and will remain in force for one year. The agreement calls for a ten-hour day, with the exception of Saturday, which shall be eight hours, with eight hours' pay. All overtime shall be paid for as time and one-half, and Sundays and legal holidays shall be regarded as double time. The rate of wages shall be 22½, 25, 27½ and 30 cents an hour. No less than 22½ cents per hour shall be paid to each journeyman carpenter, excepting men past 60 years of age and apprentices. There shall be one apprentice to five journeymen carpenters. It is further agreed to send out next year's scale by January 1.

It is expected that the adjustment of differences and the signing of the scale will result in increasing activity in the building line.

St. Louis, Mo.

While the anticipated "boom" in the building business has not yet struck the city, there is an activity which is exceedingly gratifying, and now that the great uncertainty is removed as to the year in which the World's Fair is to be held, it is expected that all branches of the trade will be kept busy. Owners are now ready to again bring forth their plans, and in many cases have ordered the architects to go ahead with the work of erection. The class of dwellings now projected shows a vast improvement on the cheap speculative houses that have been erected in the past few years. With strict inspection, such as that demanded by the Master Builders' Association of the city, the era of cheap houses will have passed away and a good class of dwellings assured. The cost of building material is higher than formerly and labor will be no cheaper, hence tenants are likely to have to pay more rent. Restrictions on buildings are harder, taxes are higher and capital must have assurances that an investment will net at least 6 per cent. before the average owner will put his money into improved real estate. With these assurances, however, building operations in St. Louis are likely to be conducted upon a much larger scale than heretofore.

According to Building Commissioner Longfellow 279 permits were issued in April for buildings and 155 for additions and alterations, involving an estimated outlay of $1,353,788, as compared with 244 permits for brick and frame buildings and 89 permits for additions and alterations, involving an outlay of $727,522, for April of last year.

Our correspondent, writing under date of May 10, states that no serious labor trouble has yet developed, but many of the different crafts have demanded higher wages, which have been granted in some instances by the employers. Since the organization of what is known as the Contractors' and Manufacturers' Protective League there have been very few serious sympathetic strikes and none are anticipated. It will be recalled that this league was formed the latter part of last year, the object being to eliminate the sympathetic strike and protect the rights and interests of all contractors, manufacturers and dealers interested in the building trades in the city of St. Louis from any and all unjust demands or attacks from organized labor. At a meeting held on April 16 of the present year a constitution and by-laws were adopted.

Notes.

We understand that steps have recently been taken in Honolulu, Hawaii, to organize a Builders' and Traders' Exchange.

Some of the leading contractors and builders of Canton, Ohio, have inaugurated a movement looking to the organization of a Builders' Exchange.

President John H. Short of the Builders' Exchange at Baltimore, Md., has appointed a Nominating Committee for the purpose of selecting a ticket to be voted on at the annual meeting, which will be held Tuesday evening, June 3.

The leading contractors and builders of Burlington, Vt., have recently formed a Builders' Exchange, with O. R. Mason, president; D. W. C. Clapp, vice-president; R. C. Cottam, secretary, and N. O. Speer, treasurer.

The estimated cost of the buildings for which permits were issued by the Bureau of Building Inspection in Scranton, Pa., during the month of April was about double that for the month of April last year.

Permanent quarters for the Master Carpenter Builders' Association, recently organized in Jersey City, N. J., have been secured at 592 Newark avenue, corner of Oakland avenue.

The carpenters in Framingham, Mass., have secured an eight-hour day, without any reduction in wages, the new arrangement going into effect April 7. We understand that the journeymen painters are now urging their employers to recognize the eight-hour day, and it is thought that many of them are favorable to the proposition.

After a three weeks' strike the carpenters in Paducah, Ky., secured an eight-hour day, with a minimum scale wage of 27 7-9 cents per hour. Under the new agreement the contractors are to hire none but union men, and all work after 6 p.m. is to be paid as time and a half. While the strike was in progress building operations were practically at a standstill, but now that the difficulty has been settled active operations are under way and the outlook is encouraging for a large amount of building.

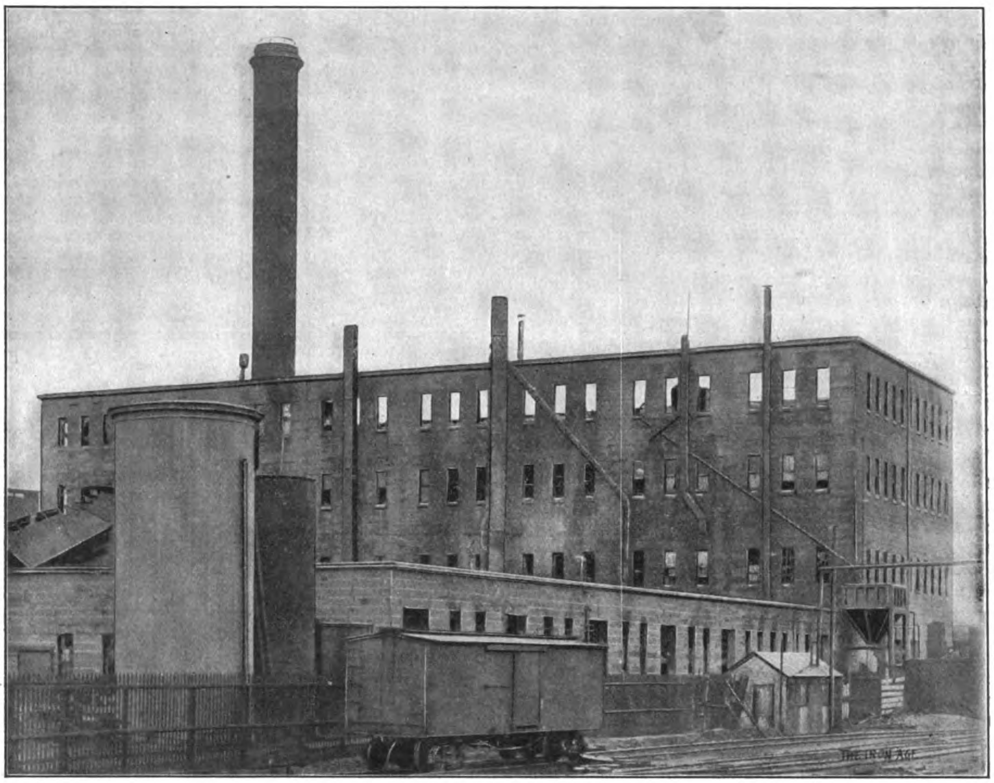
Severe Fire Test of Concrete Factory Construction.

The fire resisting qualities of concrete construction as employed in connection with buildings devoted to factory or other purposes was recently very successfully demonstrated in a fire which visited the works of the Pacific Coast Borax Company located at Bayonne, N. J. The test was very severe, owing to the intense heat generated by quantities of chemicals and combustible materials contained in the building and by the fact that the fire started from the bursting of an oil main. Some idea of the intense heat may be gathered from the fact that after the fire quantities of fused cast iron from the machinery and copper from the dynamos and motors were in evidence. Everything within the building was totally destroyed, and only such portions of it remained as were constructed of concrete. The illustration which we present herewith shows the appearance of the structure after the fire.

The factory occupied a site about 200 x 250 feet. The principal portion was four stories high and the remainder a single-story wing. All foundations, footings, walls and columns were built of concrete reinforced with twisted square steel rods, a construction known as the Ransome system. A number of heavy partitions and the roof were built of wood. The floors were composed of 6-inch concrete slabs, supported by concrete beams 4½ inches wide, 21 inches thick and 24 feet long. These were placed about 3 feet apart. Imbedded in the concrete floor directly over each beam was a ¾ x ¾ inch twisted bar of steel. Another square twisted bar 1½ inches in diameter was placed in the beam near the bottom. At intervals these two twisted bars were connected by a twisted U imbedded in the concrete. The floors were designed to maintain uniformly distributed loads of 500 pounds per square foot throughout. The floors, especially the fourth, were very much overloaded, however, at the time of the fire.

The columns are solid concrete, 17, 19 and 21 inches square in the third, second and first stories, respectively. The walls are 16 inches thick, with 10-inch hollow spaces in the center, thus leaving a 3-inch inner and outer concrete section, which are connected every 3 feet by a 3-inch concrete strip reinforced by a thin twisted steel strip. At each floor the walls are reinforced by a continuous horizontal twisted steel bar ¾ x ¾ inch and cross bars ¼ inch square every foot.

The concrete was made of Atlas Portland cement mixed with very fine unscreened basaltic rock, most of it broken to pass through a 1-inch ring, and mixed very wet with a chemical solution patented by Mr. Ransome, and intended to make it especially fire resisting. As the mixture contained considerable very fine stone, no sand was used. For the lower chords of the floor beams the concrete was made 1 to 6, the columns were made 1 to 5, and the balance of the work was done with concrete mixed 1 to 6½. When a week old the latter was tested, and it sustained a pressure of 1000 pounds per square inch on 3-inch tubes, without breaking. The factory was built about four years ago in the winter, when the temperature repeatedly fell below zero. During the extremely cold weather salt was used in the mixture.



Appearance of Building After the Fire.

Severe Fire Test of Concrete Factory Construction.

Besides the wooden partitions, roof, stairs, &c., the building contained much of an inflammable nature at the time of the fire. There were numerous wooden bins stored with combustibles; on the lower floor one room was completely filled with stacks of empty heavy wooden barrels reaching to the ceiling. After burning the combustible contents of the lower portion of the factory where the fire started and spreading to the steel structure, it burned through the wooden partition to the four-story structure. It swept through the first floors, up the elevator shaft and stair wells, and soon the entire building was a fire with the lower floor a pool of blazing oil. On the roof, supported by 10 x 10 inch pine stanchions, was a series of large tanks, three of which were of steel. They were supported 14 feet above the fourth floor. There was also a dust collector, a chamber built of concrete, 50 feet long and 6 feet wide and high. It weighed 45 tons.

Shortly after the fire reached the fourth floor all of the wooden beams supporting these tanks and the roof were burned through and the tanks crashed to the fourth floor, which, however, with one exception, sustained them without any injury. One of the long steel tanks fell with one corner foremost and directly upon a conveying machine. The force of the fall drove a portion of the conveying machinery through a small section of the floor. This tank was filled with liquid, and when it fell weighed about 83 tons. The other long steel tank fell flat, and did not so much as crack the concrete floor. The 45-ton concrete dust chamber also fell flat and was shattered to fragments in the fall, but did not affect the floor in the least.

As a result of the extreme heat the plaster on the walls was cracked off, and some damage was done to the filling on top of the main floor slabs. There was no damage incurred, however, which will necessitate the taking out or rebuilding of any portion of the concrete work. There was no damage or distortion to any of the walls or columns or any cracks, deflection or other injury to the floors with the one exception noted above.

Ernest L. Ransome of 11 Broadway, New York City, who designed and constructed the building, says that the damage done to the concrete can be repaired at a cost of less than $1000. The fire proved that one mistake made in construction was in building the roof and partition walls of wood. These are now being reconstructed of concrete.

A great quantity of cold water was thrown on the structure during the fire, and evidence that the floors were not cracked was found in the fact that a good deal of water remained for some depth on the floors without leaking through except at regular openings.

The Roofing Slate Trade.

The market for roofing slate is reported to be much more active than for a long time past. The demand from all parts of the country is of unusually large volume, while the available stocks at quarries are phenomenally light. Owing to a number of untoward conditions in the past winter, the mining of slate was interrupted to a wider extent than usual, and some of the quarries only recently got into full work again. As the stocks in hand at the close of last season were by no means large, the result has been a distinct shortage at the present time in the supply of certain kinds of roofing slate, say John Galt & Sons, manufacturers and dealers in roofing slate, of 253 Broadway, New York City. All the quarries are reported to be from three weeks to three months behind on their orders, and consumers, in some cases, are becoming inconvenienced through inability to obtain supplies.

In the Central West a number of buildings, which were started in the fall and work on which was stopped during the winter months, are now reaching the roofing stage, and as a large proportion of buildings in that district are roofed with slate, the demand from that quarter is especially pressing. The large bulk of roofing slate is used in the Central and Central Western States, but an increased demand for slates for roofing purposes is also noted in the eastern part of the country. The outlook indicates a very large increase in the consumption of this material during the present year, which promises to overtax the facilities of the manufacturers. Already orders are in hand which will entirely absorb the output of some of the quarries for the present year. Prices, in consequence, have stiffened materially and rule considerably higher than at this time last year. It is expected that a further advance will be made by July 1. Under the conditions above outlined it is not surprising to find that the exports of roofing slate have fallen off to an almost insignificant point. This is caused not so much by a lack of demand from abroad, but from the fact that practically the whole of this year's output of American roofing slate will be required at home.

Law in the Building Trades

WHEN CONTRACTORS CANNOT RECOVER FOR DELAY.

Building contractors cannot recover damages for being delayed in the execution of their work by the owner of the property if they have acquiesced in the manner of doing the work and consequent delay, without clear and satisfactory proof of the damages they have sustained. —Atl. & D. Ry. Co., *vs.* Del. Consta. Co., 57 S. E., 13.

LIQUIDATED DAMAGE CLAUSE A QUESTION FOR THE JURY.

Where in an action to recover damages detained for delay in completing a building under a clause of the contract providing for liquidated damages, the evidence puts in issue the intention of the parties in using such clause, the question of the intention of the parties is to be determined by the jury and not the court.—Kelley *vs.* Feejervary, 83 N. W., 791.

JOINT BUILDING ON SEPARATE LOTS.

Where the several owners of two contiguous lots jointly contract for their excavation, treating the lots as one parcel and jointly obligating themselves to pay for the work done at an agreed price per cubic yard, irrespective of the question of title, the contractors may treat the lots as one parcel in filing a notice and enforcing a lien against same and need not proceed against the lots separately.—Deegan *vs.* Kilpatrick, 66 N. Y. Supp., 628.

WHEN CONTRACTOR'S CERTIFICATE IS CONDITION PRECEDENT TO SUIT.

Where a building contract provided that, before any final estimate should be allowed by the architect, the contractor should be required to certify thereon that he would accept the sum in full settlement, and also that before final payment he should attest a statement that all claims for labor and material were paid, suit for the final payment cannot be maintained until such certificate and statement have been made.—Leverone *vs.* Arancio (Mass.), 61 N. E. Rep., 45.

CONTENTS

A "DUTCH COLONIAL" DWELLING ERECTED FOR MR. THOMAS A. SPERRY, AT CRANFORD, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, JUNE, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

JULY, 1902.

The Strike Epidemic.

The spirit of unrest which became manifest in various branches of labor early in the year has developed a situation which if not soon relieved may result in a serious check to the prevailing business prosperity. It must be apparent even to the casual observer that labor troubles are increasing, both in number and importance, and that their effects are being felt throughout the length and breadth of the land. That these troubles have in some instances come as a great surprise to many experienced in business affairs is probably not open to question. They probably reasoned that too many of the recent strikes had resulted unfavorably to labor to warrant any extensive disturbance to occur at this time, or that workingmen were too generally employed at good wages to feel sufficiently discontented to strike in any great number. When the anthracite coal miners' strike was threatened, the expressions of the oversanguine had far more weight with the public than the positive utterances of the miners. As a result, that strike came as an unpleasant surprise to the business world, and as it enters upon its sixth week there is little in the prospect to indicate an early settlement. Its effects have been widespread, for not only is it interfering seriously with manufacturing industries in the Eastern section of the country, but in a very marked degree with the comfort and convenience of the people at large. The scarcity of anthracite has resulted in the extensive use of soft coal in cities which heretofore have been practically free from the disagreeably smoke laden unhealthful atmosphere which the burning of bituminous coal creates. But it is not alone in this industry that labor troubles at present exist. They are to be found in a greater or lesser degree scattered all over the country in the building and allied trades, among machinists in several localities, teamsters, street railway workers and in other lines where differences exist between employers and employed.

Causes of Strikes.

The number and importance of the labor troubles now in progress prove most impressively the futility of all efforts by economical organizations or philanthropic individuals to bring about better relations between employers and workingmen. It seems inevitable that a conflict of interests resulting in a strike must develop at some time. In periods of depression strikes are caused by reductions in wages or by the enforcement of regulations designed to increase output or lower the cost of production. But in times like these they are caused by the aggressions of labor organizations, either seeking a greater share of the presumptive large profits or aiming at a reduction in the service to be rendered for the wages paid. But whatever may be the cause, no effective means has yet presented itself for a speedy settlement. Employers brook no outside interference, as they very properly claim that those not directly interested are not sufficiently qualified to judge fairly the merits of the issue involved. Workingmen, on the other hand, usually express themselves in favor of arbitration, as they know that arbitration in the great majority of cases means a compromise, thus giving them some advantage from which they can hope to attain further gains in the future. A most deplorable development of modern strikes in great industries is the complete breakdown of civil authority whenever employers attempt to continue their operations in defiance of their striking workmen. Few cities or communities can be found in this country in which the ordinary authorities are strong enough to protect life or to insure the liberty of an individual when a strike is in progress. Yet, in the words of Kipling, it seems that we must simply "muddle" along, hoping that something will happen to bring about a better state of affairs.

Architecture at Columbia University.

The collection of drawings executed by the students of the School of Architecture at Columbia University, which were on public exhibition in Havemeyer Hall the second week in June, was probably the most pretentious display of departmental work ever made by that institution, covering as it did the four years' course and including the 16 sets of drawings submitted in competition for the Columbia and the Perkins traveling scholarships. The main purpose of the display was to show the friends of the college as well as an interested public the various phases of graphical work from the time the student entered until he graduated, the four principal subjects embracing architectural, free hand, historical and technical drawing. The architectural drawings, beginning with elementary designs in India ink, ranged from copies of buildings, façades, lettering and statuary, up to a fully rendered façade drawn to large scale and made from accurately measured sketches of the buildings themselves. The free hand work, beginning with simple exercises, is followed by pencil work in outline and line shading. Historical drawing is introduced with tracings of historic forms of ancient art, including Egyptian, Assyrian, Phœnician, Greek and Roman, leading up to the application of the drawing for decorative purposes. In the work of technical drawing the three branches noted are united, the efforts being generally directed to the application of shading and shadows to the simpler forms and the classic orders. In the second and third years the student gives attention to free hand drawing and design, of which many excellent examples were to be found on the screens in the main corridor of the building. While the design work in the second year ranges from a mere detail to that of an entire house, the data for which are dictated by the instructors, the third year work is of a much more elaborate nature. One of the problems was a schoolhouse for which working drawings were prepared in connection with the regular corporate courses of building construction and architectural engineering, this, however, being only a single instance of the combination of theoretical training and practical application required during the four years. Undoubtedly the most important feature of the exhibit were the 16 sets of drawings for the fellowship competition, the problem this year being the planning of a summer hotel on a plot 200 x 400 feet overlooking Long Island Sound. A set of colored drawings, giving evidence of much ingenuity and good taste in the laying out of a country estate, with cottage, stable, garden, terrace, &c., was a feature of the display worthy of more than passing notice. Considered as a whole, the exhibition was of unusual interest, and the students and university are to be congratulated upon the fine showing made in this particular line of work.

Novelty in Window Construction.

The rapid increase in the number of magnificent business structures in this city is constantly developing novel and interesting features of construction clearly indicative of the progressive tendency of the times. One of the latest innovations in this direction is to be found in connection with the gigantic building now in progress on what is known as the "flat iron" site at Broadway, Fifth avenue and Twenty-second and Twenty-third streets. Those who have observed the work as it has progressed cannot have failed to notice that the frame work of the sky scraper at its northerly extremity, or apex, does not extend fully out to the line on Twenty-third street. Upon this space between the building proper and the street there will be constructed a display window which will possess the unique distinction of being the only one of its kind in the city. It will be a structure of glass and steel, about 13 feet high, with a roof of ornamental iron, and has been leased from the plans for a term of years by a firm of tobacconists. It is intended to make use of as large an expanse of glass as the construction problem will permit, and the contractors have arranged to supply the show window with 600 electric lights, while the lessees will put in as many more at their own expense. The structure will measure 15 feet at its base, where an entrance is to connect it with the "Cumberland," the name of the building now in progress, and will be 30 feet long and 4 feet wide at this northerly extremity. The area is approximately 285 square feet, and the cost of the construction will be in the neighborhood of $7000. This little corner is one of the most prominent in the city, and when the window is completed and in use will be one blaze of light.

Some Local Building Improvements.

An important building improvement in the financial district of this city is a 20-story structure to be erected on the property at Nos. 36 to 42 Broadway, running through to New street, having a frontage of 116 feet on the former and 115¼ feet on the latter street. The plans have been prepared by Henry Ives Cobb and the George A. Fuller Company have taken the contract for the erection of the new building, which is to be ready on the first of May of next year. The work of demolishing the old buildings on the site is now in progress. Not far away, at the northwest corner of Exchange place and Broad street, the caissons are being sunk for the foundations of a 16-story office building, from plans prepared by Carrere & Hastings of this city. The structure will cover an area of 76½ x 85 feet, will have a façade of white marble and will cost $650,000. On John street, not far from Broadway, a 16-story office building, having a frontage of nearly 46 feet, is to be erected. An improvement involving an investment of something over $600,000 is the 11-story loft building which has just been commenced at Fifth avenue and Fourteenth street, from plans by Robert Maynicke. It has a frontage of 102 feet on the avenue and 100 feet on Fourteenth street. The three lower stories will be faced with light limestone, while the others will be of light colored brick with terra cotta trimmings.

Some of the more important projects now under way further uptown include an 18-story apartment hotel at the corner of Fifth avenue and Fifty-fifth street, involving an investment of something over $3,000,000; a 12½-story apartment hotel of steel skeleton construction, with a front of Indiana limestone and terra cotta, on West Forty-fourth street, according to plans drawn by G. A. Schellenger, and a 9-story hotel to be erected at the corner of 103d street and Broadway, estimated to cost about $750,000. The erection of the latter, at one of the proposed rapid transit stations, has given rise to efforts to have the hotel connect with the subway. The style of architecture will be Louis XVI, and architect H. A. Jacobs expects that the building will be completed by the first of September of next year.

The Modern City House.

One of the tendencies of the times in connection with the equipment of the private residences of the wealthy is to have a bathroom for every sleeping room. A case which illustrates this very well is related of a prominent architect who some 15 years ago designed a city residence for a client in which there was one bathroom; seven years later he designed another house for the same man in which there were three bathrooms, and during the past year a modern residence was planned for this man in which there were 15 sleeping rooms and 15 bathrooms. In the thoroughly up to date city residence the telephone has taken the place of the speaking tube for inside use, and there is both a local and regular telephone service, which is installed in chambers, library and halls. Electric "push buttons" for servants and for lighting are now common features, while the electric automatic elevator is a necessary adjunct of the modern city house.

Licensing Architects in New Jersey.

Notice has recently been given through Hugh Roberts, secretary and treasurer of the New Jersey State Board of Architects, that all those practising the profession of architecture in the State should apply for a certificate at once, as the privilege extended to practising architects by Sections 9 and 10 of the law approved March 24, 1902, will expire on July 1 of the present year, after which another form of application for examination under the provisions of the act will be furnished when requested. All certificates issued on the present form of application and affidavit will be forwarded to the applicant after payment of the registration fee of $5, this amount being payable after notice of acceptance of application is received by the applicant from the secretary. The president of the State Board of Architects is Charles P. Baldwin, and the offices are at 1 Exchange place, Jersey City, N. J.

Emblem for St. Louis Fair.

The directorate of the Louisiana Purchase Exposition, to be held in St. Louis in 1904, being desirous of obtaining an emblem expressive of the importance of the event, have issued an invitation to artists to submit designs either in relief or in color, the final decision to be rendered by a jury, consisting of two painters, two sculptors, two architects and a historian. A prize of $2000 is offered for the best design submitted. The competition is open until November of the present year, and full information is obtainable from Walter B. Stevens, secretary, Louisiana Purchase Exposition, St. Louis, Mo.

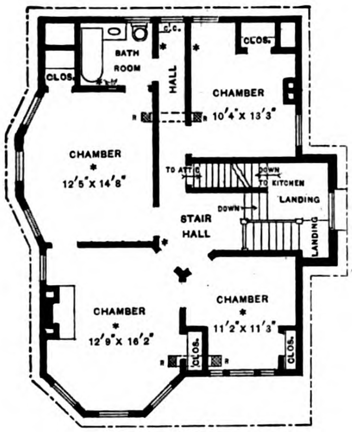
IT is well known that the demand for cold drinking water is great in office buildings, and especially in those of New York City, where the heat at times during the summer is almost unbearable, owing not alone to the high temperature, but chiefly to the moisture in the atmosphere. In order to supply this demand the proprietors of the Atlantic Building during the summer installed an extensive water cooling plant. The machine is not intended to make ice, but merely to cool the water to about 38 to 40 degrees F. for drinking purposes.

A BLOCK of granite weighing over 2000 tons has been blasted in a Devonshire quarry by a single charge, consisting of 40 pounds of powder.

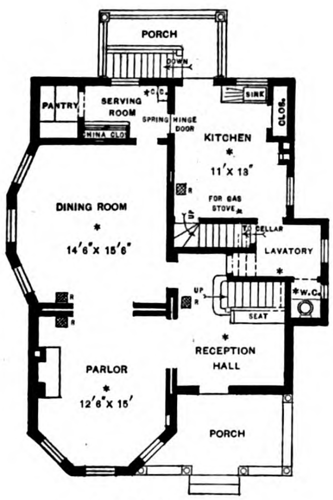
A FRAME AND STONE COTTAGE AT CINCINNATI.

THE subject of our half-tone supplemental plate this month is a frame and stone cottage pleasantly located in Ring place on Price Hill, a suburb of Cincinnati, Ohio, and erected not long since for Charles H. Hess. The treatment of the exterior of the building is clearly shown by means of the picture, which is a direct reproduction of a photograph taken especially for our purpose. The floor plans indicate the arrangement of the interior, while the details presented upon the pages which follow afford an idea of the general construction employed.

The foundation walls where exposed above grade are



Second Floor.



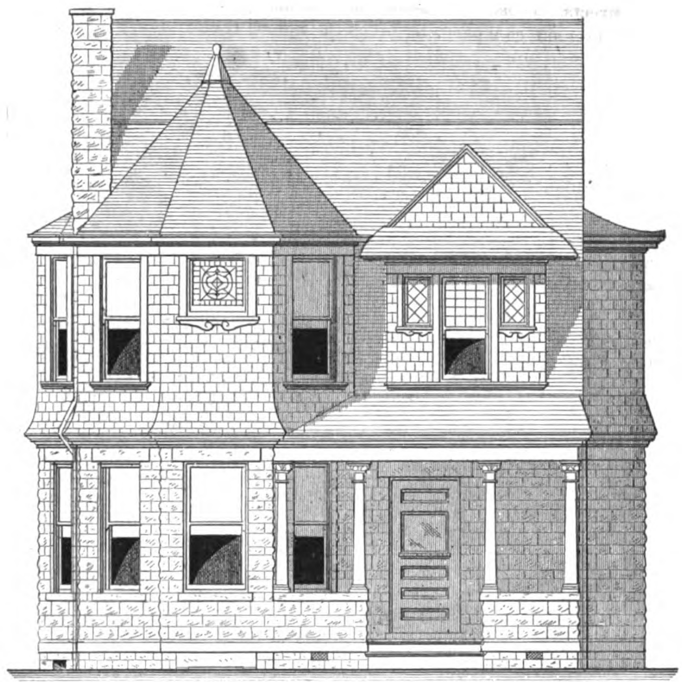
First Floor.

Scale, 1-16 Inch to the Foot.

of rubble work, with hammer dressed joints, both vertical and horizontal, and pointed with red colored cement mortar. In the cellar the laundry floor is composed of a 3-inch layer of cinders covered with 3 inches of concrete made up of 1 part of Atlas Portland cement, 2 parts sand and 5 parts coarse gravel thoroughly mixed together. The top coating or finish is ¾ inch thick, and composed of finely sifted sand and cement in the proportion of two of the former to one of the latter.

The exterior walls of the first story are of blue limestone, while the second story has the outside studding covered with shingles laid on tongued and grooved yellow pine sheathing boards. Before laying the shingles they were dipped in Cabot's creosote stain and afterward painted one good coat. The roof is covered with creosote stained shingles laid on yellow pine sheathing.

According to the specifications of the architect, John P. Striker, Room 1008, Neave Building, Cincinnati, Ohio, all rough lumber used in the construction of the house is yellow pine, except where otherwise mentioned. The first and second floor joist are 2 x 10 inches and the attic joist 2 x 8 inches, all placed 16 inches on centers and stiffened with rows of 1 x 3 inch cross bridging not more than 5 feet apart. The collar beams are 2 x 6 inches and the studs 2 x 4 inches, placed 16 inches on centers and doubled at openings. The wall plates are 2 x 8 inches, secured to the masonry by means of ¾ inch round iron anchors 3½ feet long and spaced 8 feet apart. The girder in the cellar is 8 x 10 inches, composed of 2 x 10 inch joist securely fastened together and resting on 8 x 8 inch posts. It is anchored at both ends with 1½ x 3 inch iron anchors 3 feet in length. The cap plate is 2 x 4 inches doubled; the rafters are 2 x 6 inches,



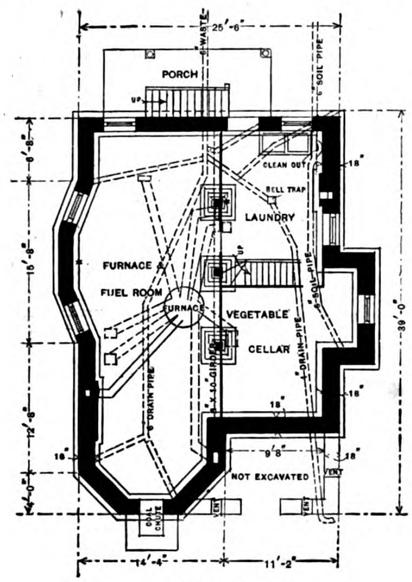
Front Elevation.—Scale, ⅛ Inch to the Foot.

A Frame and Stone Cottage at Cincinnati.—John P. Striker, Architect, Cincinnati, Ohio.

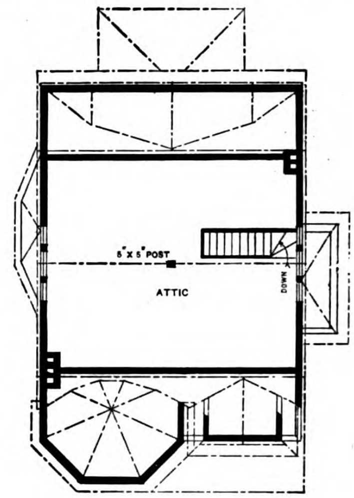
placed 16 inches on centers; the ridge rafters are 2 x 10 inches and the valley rafters 4 x 6 inches. The porches have 4 x 6 inch beams and 2 x 8 inch joist, placed 16 inches on centers. The floors are of ⅞-inch tongued and grooved cypress 3¼ inches wide, blind nailed and laid with white lead joints. The rafters and ceiling joist are 2 x 6 inches, placed 16 inches on centers. The porches are ceiled with ⅞-inch tongued and grooved beaded yellow pine and the columns are of yellow poplar. The moldings, cornice, casings and other mill work exposed to the weather are of cypress.

The floors throughout the first and second stories and attic are of ⅞ x 3¼ inch yellow pine, blind nailed. The outside door frames are of white pine, and all interior door frames of yellow pine. The doors on the first and second floors have stiles and bars of white pine and panels of yellow pine. The sliding doors are fitted with Coburn's improved ball bearing hangers. The inside finish throughout the first and second stories is of yellow pine, while the main stairs have newels, balusters and rails of oak, with wall strings of yellow pine. All inside yellow pine finish, as well as the interior mill work, is treated with three coats of Berry Brothers' varnish.

The bathroom is fitted with a white enameled iron roll rim Venus tub, 5 feet 6 inches in length, with nickel plated trimmings and combination compression bibs, plug, chain, &c. Also a stationary wash stand with porcelain oval bowl, having a countersunk top, marble apron and back, 15 inches high. There is also a Norwood siphon jet water closet, with copper lined hard-



Foundation.



Attic with Outline of Roof.

Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

A Frame and Stone Cottage at Cincinnati.—Floor Plans.—Scale, 1-16 Inch to the Foot.

wood tank and nickel plated flush and supply pipes. On the first floor is a Douglass low down siphon jet water closet on marble slab, all marble being Godfrey's gray Tennessee.

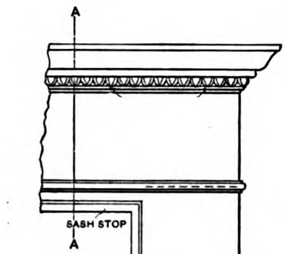
All exterior wood work is painted with two coats white lead and linseed oil.

Moistening Air.

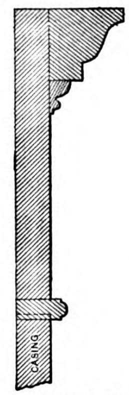
The process of contributing moisture, in quantities desired, to the moving air which is supplied to the modern public school houses in Rochester, N. Y., says the *Press* of that city, is claimed to contribute materially to the comfort and health of the teachers and pupils and is warmly approved by physicians. Under the new system the water is evaporated in the boilers and supplied to the moving air in the form of vapor, under conditions which insure automatic regulation. Standards differ somewhat, but the ideal English system is said to be air at a temperature of 50 degrees F., with 55 per cent. moisture.

The temperature of school rooms in Rochester varies from 60 to 65 degrees F., and the percentage of moisture is somewhat lower than in English practice. When the temperature is at 70, or above, the plentiful supply of moisture is said to make the atmosphere in the school rooms oppressively humid. Under modern conditions this humidity is under absolute control.

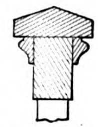
It is stated that 15,000,000 cubic feet of air is driven through the rooms and halls of the new No. 6 school building daily. To supply the desirable moisture requires as much horse-power as is required for supplying the pure air. It is held by physicians that the addition of moisture to the air supplied to the school rooms is absolutely necessary, in order to avoid catarrhal and other similar difficulties. The affinity of the air for moisture is so great that absorption of moisture from the system goes on very rapidly, with the bad effects referred to. So great is the amount of water added to the air furnished to the school rooms, that it is stated that the effect is equivalent to that of hanging cloth, saturated with water, on all of the walls and ceilings. When properly supplied, and not in excessive quantities, the moisture is said to materially improve conditions.



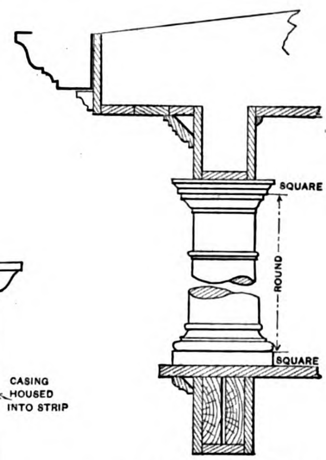
Detail of Head Casing for Openings in Main Hall, Parlor and Dining Room.—Scale, 1½ Inches to the Foot.



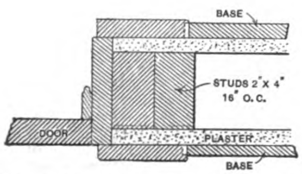
Section through Head Casing on Line A A. —Scale, 3 Inches to the Foot.



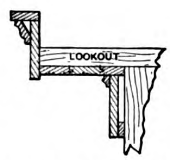
Section of Porch Rail. —Scale, 1½ Inches to the Foot.



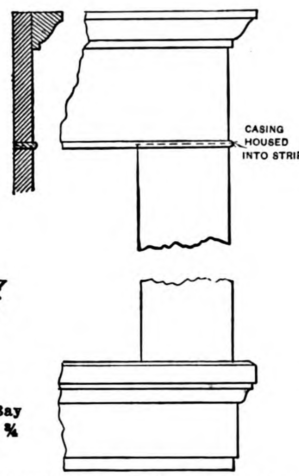
Details of Porch Cornice, Column and Floor Construction.—Scale, ¾ Inch to the Foot.



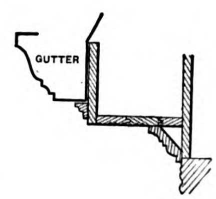
Horizontal Section through Door Frame. —Scale, 1½ Inches to the Foot.



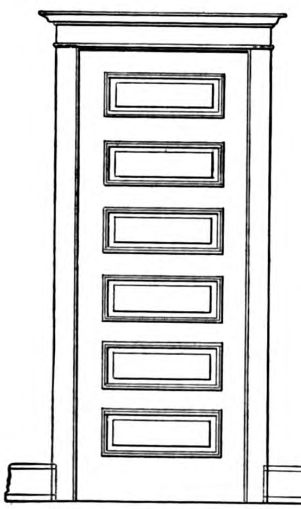
Cornice of Square Bay Window.—Scale, ¾ Inch to the Foot.



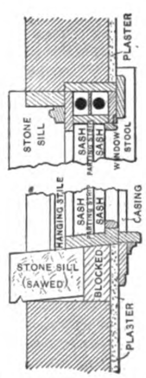
Detail of Inside Trim on First Floor Except Main Hall, Parlor and Dining Room.—Scale, 1½ Inches to the Foot.



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



Elevation of Doors on First Floor.— Scale, ⅝ Inch to the Foot.



Details of Window Construction. — Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of a Frame and Stone Cottage in a Cincinnati Suburb.

Increase in Labor Cost of Buildings.

At a time when building and business is fairly booming from one end of the city to the other, and when from all sides we hear reports to the effect that this or that labor organization is going to make, or has made, a demand upon the employers for an increase in pay, or for shorter working hours, or for both, it is of interest to cast a glance back along the records of the past 40 years and see to what an extent wages have increased during that period. In the accompanying table will be found the price per hour prevailing at different periods for various classes of skilled and unskilled labor employed in the building trades in this city, says the *Record and Guide*. An examination of these figures will show that wages have advanced out of all proportion to the cost of living, to which important matter the prices paid seem to bear but little relation. In some cases the advance since 1860 amounts to nearly 200 per cent., and in a number of the trades is the figure for that year more than doubled. The percentage of increase since 1869, the high water mark up to that time, even after the wages for the sake of comparison have been reduced to a gold basis, range from 47 per cent. in the case of carpenters, as high as 120 per cent. with the marble polishers. Between these extremes come in the other trades, the plumbers and gas fitters well up toward the top, with bricklayers, marble cutters and painters also showing a substantial increase.

The average increase for the 12 classes of labor considered is found to be 71 per cent. for the period. And this does not by any means show all the advances which have been made. Iron and steel workers have advanced in many cases 100 per cent. in the past three or four years, but there are, of course, no figures running back through a series of years with which they can be compared:

Variation in Prices per Hour of Labor from 1860 to 1902.

	1860.	*1869.	1879.	1902.	†Increase.
Bricklayers	$0.22	$0.34	$0.30	$0.60	76
Carpenters	.22	.34	.20	.50	47
Gas Fitters	.27	.25	.30	.50	100
Hod carriers and other laborers	.17	.21	.17	.33	57
Marble cutters	.28	.32	.25	.55	71
Marble polishers	.15	.20	.17	.44	120
Masons	.18	.34	.30	.55	61
Painters	.22	.27	.25	.44	63
Plasterers	.22	.39	.30	.62	59
Plumbers	.22	.27	.30	.50	85
Roofers	.20	.32	.25	.50	56
Stone cutters	.28	.34	.30	.54	59
Average per cent. of increase					71

* Wages reduced to gold basis.
† Per cent. of increase from 1869 to 1902.

With this increase in wages has come a reduction of 20 per cent. in the length of the working day. Even supposing that the average artisan accomplishes as much in an eight-hour day as was formerly done in ten hours, the employer has still to pay twice as much for having a thousand brick laid or a square of plastering put on, as would have been necessary to do the same work 20 years ago.

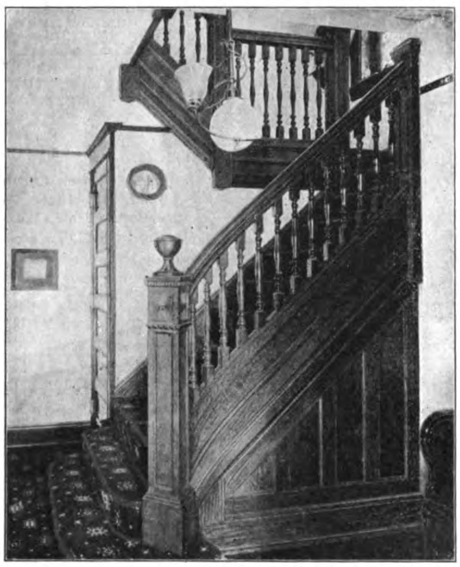
What is the result of this? Manifestly there can be but one—viz., to greatly increase the cost of each building erected. What with the high prices prevailing for lumber, structural iron and steel, and, in short, for almost all materials used in building, added to this great advance in the item of labor, the amount of capital necessary to put up a building of even moderate size is very considerable.

A prominent contractor expressed the opinion a few days ago that the portion of the cost of labor to that of materials was increasing very rapidly. About 40 per cent. of the money put into a building is now spent for labor after all materials have been delivered. Another builder, without having consulted with the first, named the same proportion, 40 per cent., as representing the cost of labor required in putting up a building. This percentage, he said, has been increasing with great rapidity of late years, and is already leading to the undoing of many contractors as well as owners. A man who buys a high priced piece of real estate, erects thereon an expensive building, upon all of which he is obliged to pay a high rate of taxes, has got to manage well and be fortunte in securing good tenants in order to make his investment pay.

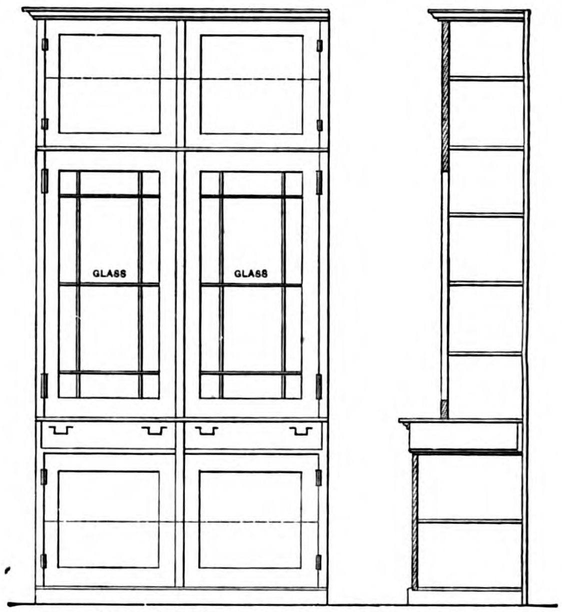
Not only is the labor cost of buildings very high at the present time, but there is every prospect that it will go higher in the near future. Carpenters, plumbers, painters and cement workers are demanding a further increase, and as the demand comes when the contractors are at a great disadvantage, in all probability the advance will be secured. Every year or two, when building is unusually brisk, the price is pushed up another notch, and is held there until another period of pressure comes, when again the operation is repeated. Small wonder is it then that builders are using labor and time saving machinery wherever possible. There must, of course, be a limit to the prices which builders can afford to pay, and at least one contractor interviewed gave it as his opinion that the top notch had been reached in several branches of the trade.

Conchology and Spiral Stairs.

One of the most remarkable architectural structures in existence is the left-handed spiral staircase in the Château de Blois, Touraine, built during the sixteenth century from designs by Leonardo da Vinci. In the May number of the *Monthly Review*, Theodore Cook shows that the design of this staircase corresponds so exactly with the spirals on the common Mediterranean shell known as *Voluta vespertilio* as to leave little doubt that the artist had that shell before him as his model. The spiral on the central column of the core of the staircase corresponds exactly, for instance, with the spiral ridges on the *columella* of the volute as seen in section. This of itself would be strong, although perhaps not absolutely convincing, evidence as to the origin of the design, says the *Building News*. But the staircase has also an exquisite outer balustrade, which shows a correspondence to the coils on the external spire of the shell as close as that which obtains between the interior of the staircase and the *columella* of the volute. Such a dual resemblance could scarcely be the result of coincidence, and the author seems justified in the view he has taken. It is remarkable, however, that the spirals in the staircase run in the reverse direction to those in normal examples of the shell, that of the central shaft being left handed instead of right handed. The spirals are, in fact, those of a "reversed," or dextral, example of the shell, of which, perhaps, one in a million occurs in nature. That Leonardo da Vinci had such a reversed shell from which to copy is unlikely; but it is known that he was left handed, and a left-handed man would naturally draw a reversed spiral. The author has in hand a work on natural spirals in general.



View of Staircase as Seen from the Front Door.



Elevation and Section of China Case in Serving Room.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of a Frame and Stone Cottage in a Cincinnati Suburb

CONSTRUCTING A GEOMETRICAL WINDING STAIRWAY.

BY MORRIS WILLIAMS.

IN presenting what follows to the attention of readers of *Carpentry and Building*, I desire to explain the meaning of lines, the conditions of plans and the general arrangement of construction, rather than to attempt extreme simplicity. It is very probable that some may consider my treatment of the subject too confusing and intricate, containing too many lines, reference letters, &c., but while there is no one who deprecates the necessity of using so many lines more than I do, the absolute necessity for them becomes apparent when it is considered for a moment that the science of hand railing is founded on and composed of solutions of purely geometrical problems. In my humble opinion the greatest barrier to the diffusion of scientific knowledge of hand railing among mechanics is the method too commonly employed of patching up a diagram "any way" and "any how" without the least regard to the principles underlying the construction. The authors of such diagrams usually pride themselves on having acquired an extra simple method, and often when a more scientific method is offered they jump to the conclusion that it ought to be "criticised." Such criticism betrays the motive, but for all that its injurious effect is to check ambition in young beginners and deter them from going ahead with the study of the science.

My advice to those who wish to understand the science of hand railing is to ignore these simple methods, at least until sufficient knowledge of the science has been acquired to enable them to satisfactorily analyze the so-called "simple methods" presented. The only way to acquire such knowledge is by studying the problems in solid geometry pertaining to oblique planes, and especially those dealing with sections of prisms and cylinders. One month of intelligent study ought ordinarily to be sufficient for this purpose. This is the only knowledge which will enable one to get over all the "difficulties" of the science, and once it is acquired its possessor is in a position to draw his molds and find his bevels with comparatively few lines, let the problem be as complicated as it may. In other words, such a knowledge eliminates all difficulties exactly on the principle that a knowledge of the alphabet eliminates the obstacles to reading, and that without it the attempt at drawing molds and finding bevels is analogous to an attempt at reading while ignorant of the alphabet. Undoubtedly this is the royal road to efficiency in the science of hand railing.

A winding stairway is considered by those standing on the first step of the science as the climax of intricacy and perplexity, but to those who have advanced a few steps higher this notion is materially modified. To them it appears only as a combination of a few simple problems connected in one construction.

In the sketches here presented the plan, Fig. 1, exhibits the center line of railing as composed of four arcs of a circle, the bottom arc having a radius, *n a*, and the other three having the radius *o c*. The joints of the rail being fixed at *c e g* and *j* determine the form of the four blocks to be those known as obtuse angle blocks. Being thus composed of the same angular kind, it is evident that a knowledge of how to manage this single and simple block surmounts all the apparent intricacy.

To draw the face mold and obtain the bevels for block No. 1 in the diagram involves nothing more than is met in the management of the rail for the stretchout stringer. The same may be said of blocks Nos. 2, 3 and 4, upon considering them separately, but as shown in the diagram they form the plan of a winding stairway. This feature of the problem will be treated more fully when we come to demonstrate the method of drawing the face molds for the portions of rails between the joints, as indicated in the figure.

We will now proceed to demonstrate Fig. 1, in which the inside curve represents the center of the rail, the dotted curve the line of travel, which is drawn at a distance of 14 inches from the center of the rail, and upon which curve is measured the widths of the treads, while from the points indicating the widths radial lines are drawn to the center *o*, thus determining the form of the winders. The outside circle represents the wall string. The dotted straight lines drawn across the winders represent the plans of the carriage timbers. In this figure we have 20 winders, all of equal form and size, except the first four, which are slightly curved for the purpose of adding to the ornamentation of the stairway.

There are two essential things that should always be

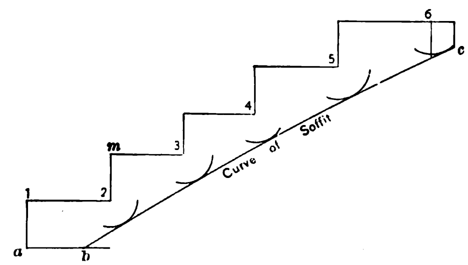


Fig. 2.—Finding Form of Carriage Timbers.

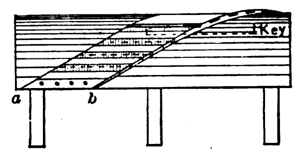


Fig. 5.—Bending Stringer on Drum.

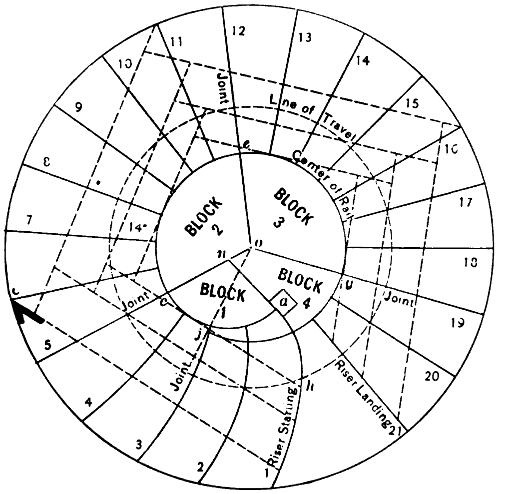
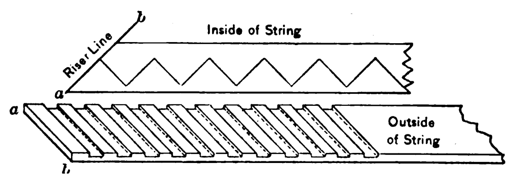


Fig. 1.—Plan of Winding Stairway.



Figs. 3 and 4.—Inside and Outside Strings.

Constructing a Geometrical Winding Stairway.

considered in planning a winding stairway. First, equal widths of winders, especially at the end connecting with the inside stringer, and, second, a curve of less radius for the bottom wreath than the curve of the remainder of the rail. In Fig. 1 we have the radius *o c* for blocks Nos. 2, 3 and 4 and the radius *n c* for block No. 1. This arrangement of the curve is necessary, owing to the easement of the bottom wreath. Without this it would be almost impossible to work an easement where the wreath connects with the newel. Equal widths of the winders is necessary owing to the fact that it is the only condition of plan that will guarantee equal pitch for the rail all along from the bottom to the very top and therefore equal lengths for all the balusters. This feature of the problem will also be treated more fully further on.

Referring to the carriage timbers it will suffice to explain only one, as the others will be similar. Let it be required to find the form of the timber marked 1, 2, 3, 4, 5, 6 in the diagram. Proceed as shown in Fig. 2. Draw the line *a b*, and upon *a* erect *a* 1, making it equal in length to the hight of the riser. From 1 draw 1 2 equal to 1 2 of Fig. 1. From 2 erect 2 *m* equal in hight to that of the riser and draw *m* 3 equal to the length of 2 3 in Fig. 1. Continue this operation the full length of the carriage timber from 1 to 6, and then from the points 2, 3, 4, 5 and 6 describe arcs with a radii equal to the depth of the timber. Trace a curve touching the arcs, as shown, and this curve will form the soffit of the carriage timber. Similar treatment of all the other timbers will give the soffit of the stairway.

The stringers may be prepared as illustrated in Figs. 3, 4 and 5. In Fig. 3 is represented the inside of the wall stringer with the steps and risers marked upon it, while Fig. 4 represents the outside of the stringer, showing the grooves worked out to the pitch of the risers. These grooves may be worked with a dado plane to a sufficient depth to secure an easy bending of the stringer around a drum prepared for the bending process, as shown in Fig. 5, where the line *a b* represents the line of the riser. The stringer is bent tightly to the drum, as shown, after which keys are snugly fitted to the grooves and glued in place. When the glue has hardened the keys are planed flush with the stringer and a thin board or veneer is glued over the whole surface and left to dry hard, after which the stringer may be taken from the drum for the housing of the treads and risers, which may be done by boring with a suitable brace bit. In this connection it might be mentioned that there are various other methods of doing this part of the work, such, for example, as laminating, veneering, &c., filling the veneer up after bending on the drum.

(To be continued.)

ARCHITECTURE OF COUNTRY HOUSES.

SOME rather interesting comments on the above subject were presented in a paper by James M. White, Professor of Architecture at the University of Illinois, and read before the Domestic Science Section of the Illinois Farmers' Institute. There were many points of general interest to readers of this paper and we therefore present the following for their perusal:

It is impossible to ignore the influence of so unarchitectural an element as money in the development of American architecture, and that it is present, as a fundamental factor, is one of the facts to be noticed in the present discussion. If our prosperous farmers made their homes on their farms instead of in cities, if they felt under obligations to maintain an interest in the welfare of the communities in which they have made their successes, and to remain there and erect dwellings commensurate with their means, instead of building small tenant houses, disproportionate in size to the other farm buildings, then would the farmhouse be more a matter of art. Nevertheless, it is in the design of country homes that American architecture has achieved one of its greatest successes, because out of town architecture is almost wholly free from the restrictions and limitations which make the application of architecture in our cities so difficult and complex.

In order to systematize the investigation of the country homestead, the following topics will be briefly considered in order:

Site, Aspect, Exterior, Effect, Planning, Heating, Lighting and Sanitation.

In the first place the house must be adapted to the site. A plan may be admirable in itself, and yet unsuited to a particular spot, or out of harmony with the surrounding scenery. If a building's sole claim to artistic approval rests on its correct relation to the landscape around, that fact alone insures its builder a very honorable place among modern architects. In moderate sized buildings, a clear space of from 100 to 200 feet between the house and the highway, with width equal to or exceeding the length, will give room for a few shade trees and an ample grass plot. The site must be well drained, and the house should be, if possible, on higher ground than the barn, so that no wash or seepage may tend toward it. One hundred feet is the minimum distance which should intervene between these structures except in a very cold climate, where the house and barn may be connected by a covered way, which, however, should be so constructed that it can be pulled down in a few minutes in case of fire.

First, the aspect due north is apt to be gloomy, because no sunshine ever cheers a room so placed. Second, the aspect due east is not much better, because the front rooms are not usually the ones occupied during the morning hours. Third, the aspect due west is intolerable from the excess of sun dazzling the eye in the room where one's afternoon leisure is spent, but if we face our house to the south, we have the most desirable aspect for the principal rooms; the dining room can be located on the east, where it will receive the morning sun, and thus but few rooms will be left to receive only west or north light. An added advantage might be obtained by fronting toward the southeast, which would let sunlight into all windows at some time during the day. It would also admit a front porch sheltered from the evening rays of the sun.

Of common forms adopted in house building, the square is the most economical in point of outside wall, allows the most compact arrangement of rooms, and is most readily heated; but it cannot easily be made picturesque, an advantage which the winged form in its various modifications possesses. Story and a half houses are usually the most picturesque, and they furnish at a minimum expense the maximum amount of bedroom, but they are too uncomfortable in hot weather to be tolerable in this latitude. All apartments should have a well ventilated attic between them and the roof.

It is economy in first cost of building material to build a house of two or more stories, because roofs and foundations are expensive items. But it is bad enough for people who live in cities to suffer from the disadvantage of stairs without inflicting the same evil on people who live in the country, where economy of ground counts for nothing. I am well satisfied that a properly constructed one-story house with a good cellar underneath, and on dry soil, is just as healthful for lodgings on its lower floor as a higher house is upon its upper floor. The economy is only in first cost of building material, and through all after years there is a serious waste of effort to all in the family who are compelled daily or, perhaps, hourly to ascend to an upper story to perform necessary household duties. Those are the practical considerations that tend to produce the comfort which, after all, is the essential quality of home.

But it is not enough that a house should possess this material comfort; it must also appear comfortable, and the eye must be soothed and satisfied as well as the body. The simplicity, repose and absence of all straining after effect, which mark good work, are rarely to be met, and they are often replaced by a striving for originality —for the new thing of to-day, which to-morrow will be hopelessly out of date.

(To be continued.)

A SMALL COLD STORAGE HOUSE.

THE correspondent who recently made inquiry through the columns of the paper for plans of a cold storage house suitable for keeping eggs may obtain some valuable suggestions from the following particulars and illustrations relating to a building of this character. It is of modern construction and is intended especially for keeping eggs, although, of course, it is also applicable for other purposes. The data is from an article by Eugene T. Skinkle in the *Country Gentleman*. According to the author "the best material to use in the construction of a small cold storage house is dry lumber, first-class saturated water proof insulating paper and possibly a filling of one or more of the dead air spaces with clean, dry mill shavings packed in snug and firm." He recommends wooden construction for small cold storage houses because it is cheaper than brick and stone, and the wooden construction will not absorb and hold heat comparatively as much as stone or brick walls.

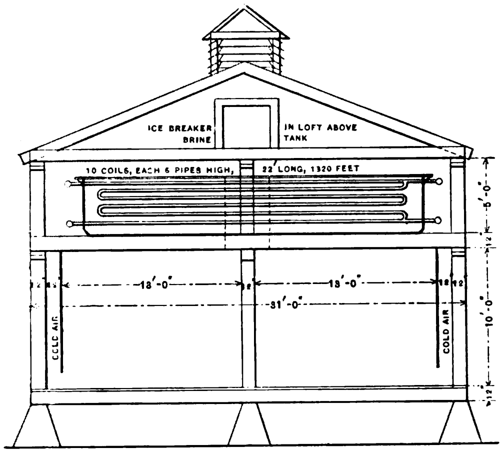


Fig. 1.—Cross Section of Building.

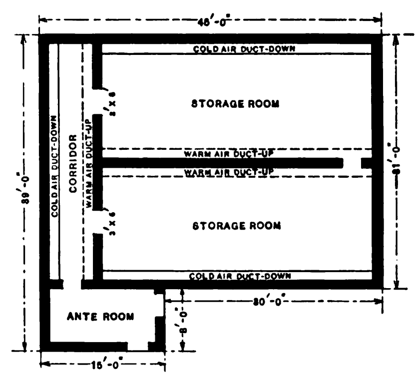


Fig. 2.—Ground Plan.

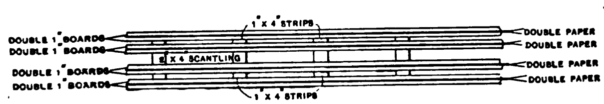


Fig. 3.—Detail Showing Wall and Partition Construction.

A Small Cold Storage House.

All walls and partitions should contain at least three dead air spaces with double boards and double insulating paper between the boards on both sides of each individual air space, the paper to be laid one-half lap and carefully turned around all corners, as well as into the floor and ceiling construction. Where the walls are exposed to the direct rays of the sun, it is well, in addition to the three dead air spaces, to nail furring strips to the outside of the walls and cover the strips with rough boards and double insulating paper, finishing on the outside of the paper with ship lap siding, leaving an open space at the top and bottom of this outer sheathing to permit of a free circulation of the air.

A cold storage house should be built with special reference to excluding outside heat, and to accomplish this the more obstruction offered to the transmission or radiation of heat through the walls, doorways, windows, floors, ceiling, &c., the better will be the results obtained and the more economically the refrigeration will be accomplished. If various products are to be stored, the building should be divided into separate rooms or apartments, more especially if the articles are eggs, butter, cheese, meats, vegetables, fruit, poultry, &c. In this case the room should be arranged so that the different classes of goods of the same general character can be stored together. A hallway should extend across the building or down the center, opening into each room with a well insulated air tight door. At the end of the hallway, or corridor, a double door vestibule should be provided, so that in opening from the outside to take in or carry out goods the least possible leakage of cold air out and warm air in would occur. The goods should be placed in the vestibule and one door closed tight before the other is opened, thereby reducing leakage to a minimum.

Provision should be made for constant gravity air circulation in all the rooms. The refrigerating agent, whether it be natural ice or artificial refrigeration, should be located above the rooms in a loft constructed for the purpose, and should be connected with the storage rooms proper by a system of warm air ducts leading from the highest points in the storage rooms to the points above the refrigerant in the lofts, while the cold air ducts should lead from the lowest points in the lofts below the refrigerant and open near the floor line of the storage rooms. The cold air ducts should be provided with adjustable shutters, so that the cold air may be directed to any point in the rooms and the temperature regulated and controlled by the adjustment of them.

Ventilation is best accomplished by providing adjustable ventilating openings from the highest points in the refrigerator loft to the roof loft above, and these ventilators should be opened only at such times as gases or odors are apparent in the storage rooms. The roof loft should be provided with an open louvered ventilator the full length of the building, in order to carry off the hot air, which will accumulate in the roof loft from the direct rays of the sun beating on the roof. The lower side of the roof joists should be sheathed in such a way as to leave spaces between the joists, open to the eaves and to the louvered ventilator shaft, thus making an air circulation in the roof construction. Open louvered windows should also be placed at both ends of the roof loft in order to assist in ventilation.

In the accompanying illustrations Fig. 1 represents a cross section of a small cold storage house, showing the position of the ice breaker in the loft above the brine tank, the various coils of pipe above the storage rooms and the cold air ducts at the sides. Fig. 2 is a ground plan, showing the cold and warm air ducts, corridor, &c.; Fig. 3 is a detail of wall and partition construction, indicating the combination of boards, paper and air spaces, while Fig. 4 is a longitudinal section of a building having a capacity for storing 3000 cases of eggs. It also shows the louvered ventilator extending the entire length of the roof, together with the pipe coils and tank.

The author states that the temperature at which the eggs should be kept in cold storage is a mooted question, and one which can be answered by a range of temperatures varying as widely as the complexions of the experts in the business. From his own observation and experience he is convinced that with pure air in circulation in the egg rooms, first-class results can be obtained at temperatures anywhere from 32 to 38 degrees; possibly a mean average between these points would represent the average the country over. The modern practice is to pipe the refrigerator lofts above the cold storage rooms with sufficient pipe to provide the requisite cooling surfaces and then circulate a solution of ice and salt through the pipe, producing a brine that will approach close to zero Fahrenheit. The circulation of this extremely cold brine through the pipes cools the surrounding air, thus rendering it heavier, and causes it to fall down the cold air ducts to the storage rooms below, forcing out the warmer air which ascends to the lofts and circulates over the piping, in this manner keeping up a constant gravity circulation in the storage rooms. The circulation of the brine can be accomplished by means of a small brine pump, or if the tank is located at a level above the pipe the ice and salt can be mixed in the tank and the circulation accomplished by gravity alone, taking the coldest brine from the bottom of the tank and returning same from the coils to the top of the tank. The mere change in temperature in the brine tends to keep it in constant circulation so long as ice and salt are kept in the tank. This system, however, necessitates having a separate ice storage house on the premises and daily withdrawing as much ice as may be necessary to form the ice and salt solution in the tank. It

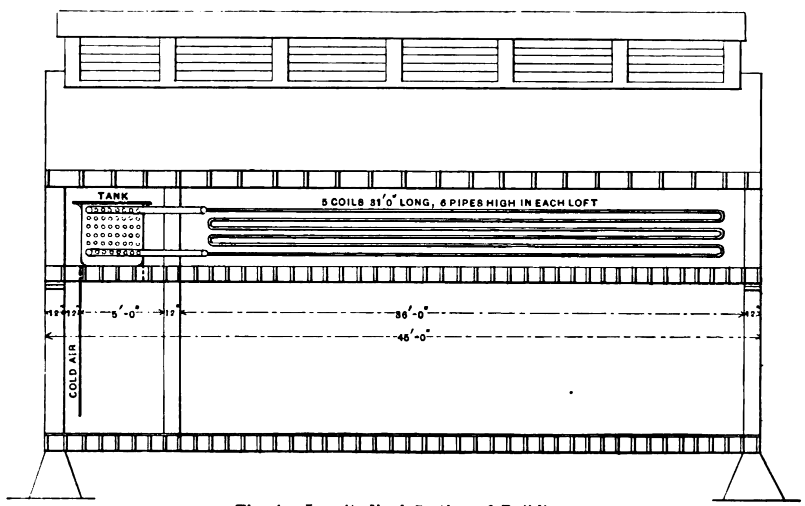


Fig. 4.—Longitudinal Section of Building.

A Small Cold Storage House.

can be safely estimated, says Mr. Skinkle, that 1 ton of ice mixed with 500 pounds of salt will refrigerate a space containing 12,000 cubic feet for 24 hours.

What the author regards as the most practical and satisfactory of any system in vogue is an inclosed circulating system brought out by Madison Cooper of Minneapolis, Minn. In the brine tank is located a system of cooling coils connected with the coils in the refrigerator lofts for cooling the rooms. He surrounds the coils in the tank with an ice and salt solution, and fills the circulating coils with a solution of chloride of calcium brine. The ice and salt cools the calcium brine, which, in turn, is circulated through the cooling coils and then returned by gravity circulation to the coils in the ice and salt brine tank. The cooling pipes in the refrigerator lofts are kept free from frost by dripping chloride of calcium solution over the outside of the pipes, thereby securing the maximum refrigerating effect of every foot of refrigerating surface in the lofts.

IF present plans are carried to a successful issue an apartment hotel, 12 stories in hight and of skeleton frame construction, will be erected on Clinton street, Brooklyn, N. Y., to cost about $325,000. The plans and specifications have been prepared by Frank S. Lowe and call for a building containing 100 suites of apartments, ranging from one to three rooms and bath. The structure will be equipped with all the modern conveniences and will have an ice and electric plant of its own. The work will be done by the Thompson-Starrett Company of New York City, who agree to have the hotel completed by February 1 of next year.

Making Veneered Doors.

A short time ago we presented some comments on the making of veneered doors, in the shape of a letter of a correspondent which appeared in a recent issue of the *Woodworker*. Another contributor to that journal takes up the subject by describing his method of doing this kind of work, as follows:

We run in several loads of core lumber, or No. 4 grade pine, to the planer and dress it two sides to full 7/8 inch; or, in other words, four pieces to make a 3⅝-inch bundle in thickness and ripped to whatever it will make, 4, 6 or 8 inches wide. Then it is cut into stock lengths, 7 feet 2 inches, 7 feet 8 inches, 8 feet 2 inches, &c., and what comes off of the ends is bundled also.

When a bill of doors comes in we get out as much oak or whatever the door calls for as will be needed, surface it one side and rip it the same width the bundles have been ripped, but none of this is scratched, nor the veneer either. Then the oak is glued on the bundles and when dry taken to the jointer and the edge straightened up. It is then taken to the planer and the other edge dressed as wide as it will go. Then it is taken to the band resaw and sawed to the thickness wanted. We use all scraps of all kinds of wood not good enough for anything else to fill in with, using several long pieces to hold them in place in the rail bundles, it being sawed to even thickness the same as the other. It also goes through the same process as the others.

Now for the veneer. The lumber is run in by the wagon load and dressed one side as thick as it will go. It is then ripped into the required width for veneer, resawed into four thicknesses and surfaced on the poorest side to ⅛ full. The best side is left rough for the sander to smooth up after the door is made. The stile and rail cores go to the jointer after they are resawed, and are faced and run through the pony planer to 1⅛ full, to receive the veneer. The rails and stiles are then sent to the jointer to be straightened edgewise, then ripped to the required size, laid out, mortised, tenoned and stuck. We don't pin them, as we mortise with a New Britain chain mortiser. They are not mortised through, thereby doing away with the pins and wedges. After being clamped and glued they are run through the sander and the roughness taken off.

TREATMENT OF PLUMBING NOT USED IN SUMMER.

WHAT to do to the ordinary plumbing system in order to guard the residence against the entrance of sewer gases during the summer months, while the family are sojourning in the mountains or at the seashore, is a problem that will probably never have a solution specific enough to admit of universal application. The condition sought is always the same, but the construction of buildings, installation of plumbing, type of fixtures, &c., vary so much that the precautions which prove effective in one job are futile in another. And the question is often made more perplexing by the owner insisting on leaving part of the job in operation and in the care of servants, who, no matter how good their intentions, seldom follow instructions. As the time is now at hand when plumbers will again be called upon to perform such work, the experience of one of them will be welcomed by many, says a correspondent of *The Metal Worker* in a recent issue.

The most general method is to empty the traps and fill them with something that will not evaporate or dry up so quickly as water. This is cheap and quickly done, and, as a rule, the plumber is not called again when the family returns, because the fillings can be "flushed" out with water, which is one reason why the plan is more or less unreliable, according to circumstances, and is never so safe as when sewer air is excluded from the house entirely. Glycerine, kerosene, castor oil or lard oil is used. Glycerine is best, and kerosene is a good second choice where there is no danger of it being either sucked or waved out by vacuum or pressure, as is sometimes done by storm water when the house drainage and storm water are carried by the same pipe and the relief vents poorly arranged or proportioned.

When any of the above seals are depended upon water must not be dumped nor drawn into the fixtures. Every trap, except water closet traps, has, or ought to have, a drain screw or top cap through which the water seal can be drawn or soaked out with a sponge or rag. Water closet traps always have to be soaked out. Only the upper trap of double trap closets need be filled, but the air pipe must be fitted with a blind washer to keep sewer air from coming out through the tank. The contents of each trap should be noted when the water seals are being taken out, as the amount of water removed gives a fair idea of how much glycerine should be put in. Before emptying, the traps should be flushed well to cleanse them and to make sure that the seal is as deep as the trap will permit. The trap should be well wiped with a swab, and examined before filling to see that there are no strings, hair or lint hanging over into the waste pipe. These, if present, will rob the trap of the filling by capillary attraction.

When none of the fixtures are to be used during the summer months, the writer has found it a good plan to insert a test plug through the clean out where the main soil pipe leaves the house and expand it so as to prevent air from the sewer from entering the house at all. The handle of the plug should be in far enough to permit screwing on the clean out cover. This plan leaves only the foul surface of the house system to deal with, and if the fresh air inlet is in proper condition it will keep the system filled with fresh air at all times, and the job would be comparatively safe without further work.

If no clean out exists, as shown in Fig. 1, the clean out of the intercepting trap may be removed and a short handle test plug dropped in and expanded in the out leg of the trap and the trap cover replaced air tight. When the plug is set with the handle upright, it will do no harm to pour in enough glycerine to cover the ring and plate.

If the intercepting trap is outside of the house, plugging the pipe through a clean out also cuts off the ingress of air to the house system through the regular fresh air inlet. This may be gotten over by providing a temporary inlet from the outside, connecting the same with the clean out opening.

On two occasions the writer has left off the clean out cap, thus allowing the vent stack to draw air from the cellar. No complaint was heard, and nothing discovered that would deter him from doing so again, but he does not recommend the practice. Where no clean out exists through which the pipe may be plugged, the writer would not hesitate to break the line and put one in, full size, with brass screw cap. The clean out will not only be serviceable on sundry occasions otherwise, but also serves from year to year as a means of plugging the pipe for this special purpose.

The writer was called to put the plumbing in order after a family had returned from the country and found their regular plumber had died. In the sewer side hand hole of the intercepting trap he found a wad of paper over which was a layer of hydraulic cement, covered by ¾ inch of asphalt varnish. The trap had two hand holes, and there was no fresh air inlet in the job. The house side hand hole was open, and the sewer side closed, the loose cover being wired to the trap. This proved that more than one plumber was working along the same line of thought, though unknown to each other.

In Fig. 2 is shown a soil pipe, where it passes out through the wall, in which the owner, a florist, had placed a peculiar form of greenhouse heating pipe valve. The valve, although of favorable design, was somewhat of an obstruction, but it accomplished the idea of shutting sewer air out of the house during the summer while the family were away.

Plugging the soil pipe makes it necessary to stop the supply to the fixtures, either shutting off the faucets tight and leaving them so, or by shutting off the water

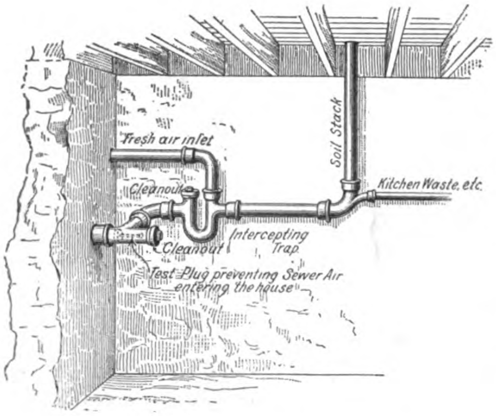


Fig. 1.—A Positive Seal of Sewer Pipe.

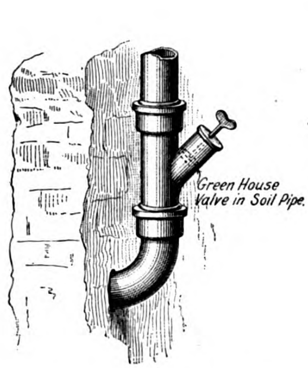


Fig. 2.—An Improvised Valve.

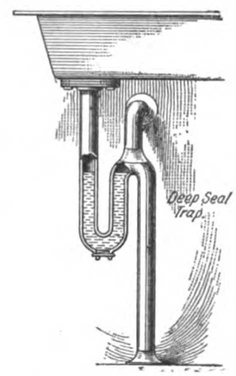


Fig. 3.—A Deep Seal Trap.

Treatment of Plumbing Not Used in Summer.

and draining the pipes. If the boiler is also emptied, the sediment cock should be closed again. The writer prefers to leave the boiler filled. If emptied, there is some danger of injuring the water back by having a fire started while it is empty. If left filled, the boiler must be emptied and thoroughly cleansed before the work is again put in operation. When the supplies are drained the faucet washers dry out, get hard and give trouble when the water is again turned on, and one must watch all unions that have washers in them. In fact, it is safer to rewasher all unions and faucets to begin with, if the supply has been empty during the summer.

If the soil pipe has been plugged as described, the next thing to do toward making the work perfectly safe is to choke the waste pipes of all the fixtures above the traps. If this is not done, the air current through the pipes soon evaporates the seals and leaves the traps open for the passage of whatever gases there are in the pipes. The deep water seal trap shown in Fig. 3 is not a barrier to be depended upon during the warm summer months. It is excellent for rented houses where people are moving in and out at all times of the year, and where the fixtures are out of use but a few weeks at a time. Glycerine is not too expensive to seal traps against evaporation. but it may be displaced by some one inadvertently dumping water into the fixture.

Baths may be choked by lifting out the standing waste stem and plugging the bottom of it tightly with a cork. On lavatories with lead traps the traps can be bent down and choked with a cork and made air tight by melting cement over the top of the cork as indicated by Fig. 4, or a blind washer of sheet lead may be soldered over the top. Sink traps can be treated the same as lavatory traps. Slop sinks can be choked effectively by screwing a blind plate down in putty in place of the regular strainer. Brass lavatory traps can be loosened from the metal bowl plug or standing waste and a blind metal washer put in on top of the ring washer and again tightened up, as indicated by Fig. 5.

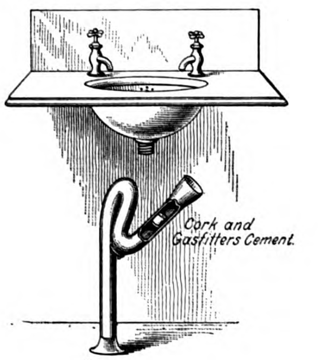


Fig. 4.—Lavatory Trap Disconnected and Corked.

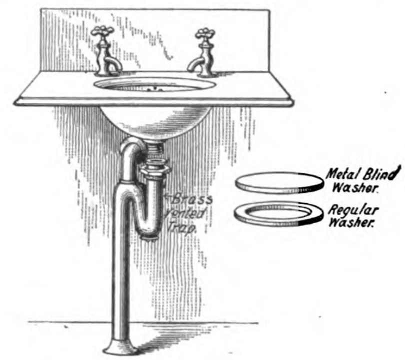


Fig. 5.—Brass Trap Sealed with Blank Washer.

Treatment of Plumbing Not Used in Summer.

The variety of traps, fixtures and conditions are too numerous to be covered in a single article, but what has been said, together with some general directions and the exercise of common sense, will fit any plumber for reliable service in the line of work in question.

An accurate memorandum of what is done to a job should be made when it is finished, because the plumber doing the work may get sick while the work is being done or he may not be available when, in the fall, the job is to be made ready for use again. Or he may have forgotten what he did, and an overflow or other needless trouble and damage may be caused unless there is a guide to work by.

Leather flush washers shrink, crack and sometimes draw entirely out of place when work is not in use. Rubber washers that are not pure are often found cracked and worthless, too. So all washers should be examined before water is turned on or into the fixtures. Putting a job in order again after a summer's idleness is simple enough when it is remembered that it should be put in the same condition in which it was found in the spring. Any repairs found necessary should be done, whether caused by natural wear and tear or as a result of the work in hand.

When some of the fixtures are left in operation for the convenience of servants, the servants must be held responsible for the regular use of those fixtures, and the servants should be made acquainted with the condition of the balance of the plumbing. If the whole job is left normal, the servants should flush each fixture every day. If not, a sign of warning should be placed on every fixture having the waste choked. The toilet rooms should be properly aired, as usual, and the doors locked between times, if servants are left in the house at all.

Water closets are the most difficult to choke up safely. The trap can be "soaked" out and sealed with glycerine and the seat fastened down; but perhaps the safest plan is to turn off the supply, drain the tank and remove the closet from the floor and solder the end of trap or bend tightly to the floor.

Prof. Moore's Cooling Machine.

A device which is intended to keep buildings cool on hot days has just been invented by Prof. Willis L. Moore, chief of the United States Weather Bureau at Washington, D. C. The device consists of a cylinder 8 feet high and 2½ feet in diameter, capable of taking and discharging 200 feet of cubic air a minute. The air which is discharged is free from dust and moisture and is at a temperature of 28 to 30 degrees. The air enters through a tube or pipe which extends from the room to the exterior of the building and begins to freeze when it reaches about the center of the cylinder, and becomes steadily colder as it descends to the bottom, at which point it is at its lowest temperature. The statement is made that the machine has a capacity of cooling about 20,000 cubic feet of space during the hottest weather, and that it will keep the temperature at 60 degrees when the thermometer outside marks 100. The apparatus works automatically and operates on the principle of gravity.

THE fire loss of the United States and Canada in the month of May, as compiled from the records of the New York *Journal of Commerce*, shows a total of $14,866,000, as compared with $13,894,000 in the preceding month and $22,380,000 in May, 1901, which last sum was swollen by the Jacksonville conflagration. The total fire loss for the five months ended May 31 is placed at $76,860,500, which is about $2,500,000 less than in the corresponding period of 1901 and $5,000,000 less than 1900.

WITH nearly $3,000,000,000 worth of property destroyed by fire in the United States during the last quarter of a century, the need of an increased supply of fire proof building material and more stringent laws enforcing its use would appear to be in order.

DESIGN FOR SEASIDE OR MOUNTAIN COTTAGE.

THOSE readers who have in the past made inquiries through the columns of the Correspondence Department for designs of cottages suitable for erection at the seaside or the mountains will probably find much that is interesting and suggestive in the illustrations which are presented herewith. The subject of the article is a gambrel roof building treated with shingles over its entire exterior and having a broad veranda extending across one-half of the front and around on the side as far as the stone chimney. The main floor shows a living room, extending the entire depth of the house, a dining room and kitchen, with a well arranged pantry between. There is also direct communication between the kitchen and the front hall. The disposition of the main stairs is a noticeable feature, landing on the second floor in the center of the house and amply lighted by means of a high, circular head window running partially through two stories. On the upper floor are four sleeping rooms and bath, with capacious closets connected with each and a linen closet conveniently placed with regard to the other rooms.

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

Design for Seaside or Mountain Cottage.—Walter P. Crabtree, Architect, New Britain, Conn.

According to the specifications of the architect, Walter P. Crabtree, of 218 Chestnut street, New Britain, Conn., the foundation walls are of rubble stone laid up in Rosendale cement, with underpinning of field stone, care being taken to select those at least partially covered with moss and laid up in mortar. The frame of the building may be of spruce or hemlock, the girders in the cellar to be 6 x 8 inches, the first and second floor joist 2 x 8 inches, the studding 2 x 4 inches, placed 16 inches on centers, the rafters 2 x 6 inches, and the collar beams 2 x 4 inches, placed 20 inches on centers. The girders for the veranda are to be 4 x 6 inches, the joist 2 x 6 inches, placed 16 inches on centers, and the rafters 2 x 4 inches, placed 20 inches on centers. Both the house and veranda sills are to be 4 x 6 inches, halved at the angles. All joist and studding are to have 2 x 2 inch cross bridging.

The outside walls of the house are to be covered with sheathing boards, on which red cedar shingles are to be laid 4½ inches to the weather. Between the shingles and boarding is to be placed a good quality of building paper. The rafters are to be covered with ⅞ x 6 inch spruce roofing cleats laid with open joints, and these, in turn, covered with red cedar shingles laid 4½ inches to the weather.

The first and second floors are to be of ⅞ x 10 inch square edge hemlock boards, on which are laid finished floors of ⅞ x 3½ inch spruce, except in the kitchen and pantry, where they are to be of ⅞ x 3 inch Georgia pine, face matched and blind nailed.

The interior trim throughout the building may be of white wood or Georgia pine, left ready for staining or painting. All casings are to be ⅞ x 4½ inches, molded, and base board ⅞ x 8 inches. The kitchen, back hall and bathroom are to be wainscoted 3 feet high with No. 1 yellow pine. The front stairs are to be of Georgia pine, with hand rails 3 x 4 inches, turned with balusters of 1⅛-inch stock; the newel posts, 4½ x 4½ inches, with turned caps, and the bottom newel to have a composition ornament as indicated in the details.

The house is intended to be heated by means of a furnace connected with the outside air. The outside mill work is to be painted two coats of white lead and oil, the color being white. All shingles are to be left in their natural state.

The house here illustrated is estimated by the architect to cost practically $2500; the principal amounts being $622 for mason work, $432.50 for dimension timber, rough floors, siding and roof boards, $203 for shingle and outside mill work, $374 for doors and windows hung and trimmed complete, $196.50 for stairs, sheathing, base, chair rail and picture molding, $168 for finished floors and fine lumber, $100 for painting, $175 for hardware and heating and $225 for plumbing and tin work.

A Hospital of Novel Construction.

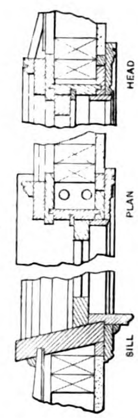
The new clinic which has recently been completed on East Forty-second street, New York City, and which will be maintained by St. Bartholomew's Church, embodies in its construction many interesting and novel features. The architects have made a special study of hospital construction and have succeeded in devising several important improvements conducive to aseptic conditions. There are no angles or projections in the building above the basement; the intersections of all surfaces meet with a uniform curve, this being carried out in all details. The sash and doors are so constructed that there are no moldings or broken surfaces between the frames and glass or panels. The surface of the frame meets the glass with a feather edge, and the corners of the sash and door panels are rounded so that there can be no lodging place for dirt or foreign matter.

In the finished building no wood work appears to the naked eye. The window and exterior door frames are covered with copper, and the sash and interior doors with kalameined iron, while the interior frames are of

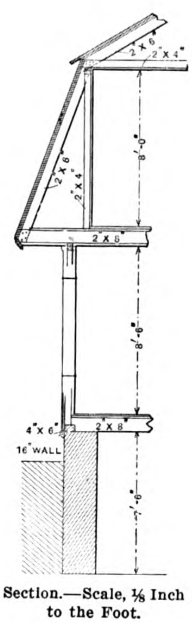
In the wall space between the skylights, but not showing in the operating room, steam coils are placed which are governed by thermostats.

The ventilating plant is calculated to provide 30 cubic feet of fresh air per capita on a maximum rating, regardless of outside temperature, and this fresh air supply will be provided summer and winter without causing drafts on the occupants of any of the rooms. The fresh air is taken from a large court and passed through fine screens to remove dust and dirt, thence

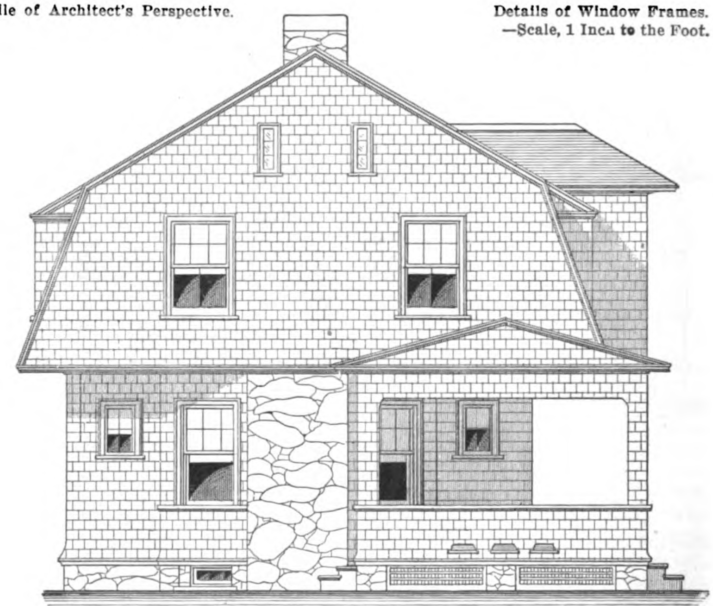
Reduced Fac-simile of Architect's Perspective.



Details of Window Frames. —Scale, 1 Inch to the Foot.



Section.—Scale, 1/8 Inch to the Foot.



Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.

Design for Seaside or Mountain Cottage.

cast iron. The shelving, table tops and counters are of stone or steel, supported on iron standards.

Great care has been taken in the construction of the operating rooms, the important one being located on the fifth floor and is considered the most perfect ever built. The corners of the room are rounded to a large radius and the ceiling is in the form of a dome. All plumbing, sterilizing and other apparatus is arranged in the sterilizing room adjoining, and all operating tables, cabinets and apparatus are portable.

In order to preserve a uniform temperature in the operating rooms and counteract the cooling effect of the large glass surface of the skylights, the latter are made double, with a space of 2½ feet between them.

through a large tempering coil and fan, and delivered through fresh air ducts and registers to the various rooms. A different set of ducts convey the vitiated air from the rooms to the deck houses, whence two fans discharge it through the roof. The air entering the rooms in cold weather will be warmed to about 68 or 70 degrees F., and in warm weather it will be the same as the outside temperature. The tempering coil is controlled automatically by thermostatic valves, so the temperature of air entering the rooms is maintained at the desired degree.

The heating plant consists of radiators of the plainest and simplest patterns, set in widow recesses throughout the building and controlled by thermostatic valves placed in the rooms, so that the temperature of one room is entirely independent of another. The radiators are hung from walls on brackets, in order to do away with the radiator legs on floors and their obstruction to cleaning.

All furniture used in the building is of steel, finished in white enamel to correspond with the walls and ceilings of the interior.

Rules for Electrical Wiring.

In discussing the question of safe rules in wiring for electrical work a writer in a recent issue of *Electricity* presents the following:

A workman should thoroughly familiarize himself with the rules and requirements of the National Board of Fire Underwriters before attempting to do any electrical construction. The rules are all based on good engineering practice, and are a necessity for the prevention of unreliable and dangerous work. A few of the more important suggestions given in the code and applicable to all electric light, heat or power construction are as follows:

In all electric work, conductors, however well insulated, should be treated as bare, to the end that under no conditions, existing or likely to exist, can a grounding or short circuit occur; and so that all leakage from conductor to conductor, or between conductor and ground, may be reduced to the minimum.

In all wiring special attention must be paid to the mechanical execution of the work. Careful and neat running, connecting, soldering, taping of conductors and securing and attaching of fittings, are specially conducive to security and efficiency, and will be strongly insisted upon.

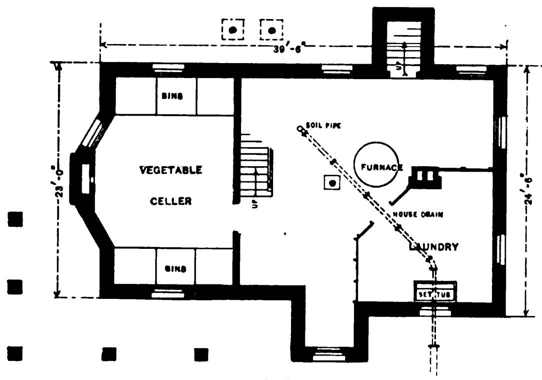
Wires must not be of smaller size than No. 14 B. & S., except when used for wiring fixtures or by special permission. Wires must be separated from contact with walls, floors, timbers, or partitions through which they may pass by noncombustibe, nonabsorptive insulating tubes, such as glass or porcelain. Bushings must be long enough to bush the entire length of the hole in one continuous piece.

Transformers must not be placed inside of any building, excepting central stations, unless by special permission of the inspection department having jurisdiction. They must not be attached to the outside walls of buildings, unless separated therefrom by substantial supports.

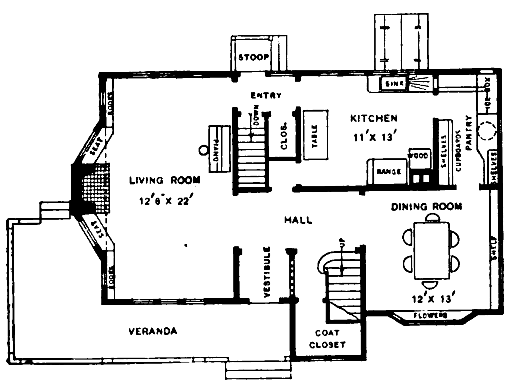
Switches must be placed on all service wires, either overhead or underground, in a readily accessible place, as nearly as possible to the point where the wires enter the building, and arranged to cut off the entire current. Knife switches must be so placed that gravity will tend to open rather than close the switch. They must not be single pole, except where the circuits which they control supply not more than six 16 candle power lamps, or their equivalent.

Automatic fuse cut outs must be placed on all service wires, either overhead or underground, as nearly as possible to the point where they enter the building and inside the walls, and arranged to cut off the entire current from the building. They must be placed at every point throughout a system, where a change is made in the size of wire (unless the cut out in the larger wire will protect the smaller). All cut outs must be in plain sight, or inclosed in an approved box, and readily accessible. They must not be placed in the canopies or shells of fixtures.

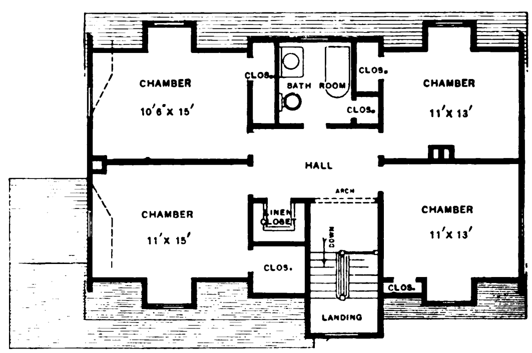
Circuits or groups of incandescent lamps requiring more than 660 watts must not be dependent on one cut out. Special permission may be secured for departure from this rule in case of large chandeliers, stage borders and illuminated signs.



Foundation.



First Floor.



Second Floor.

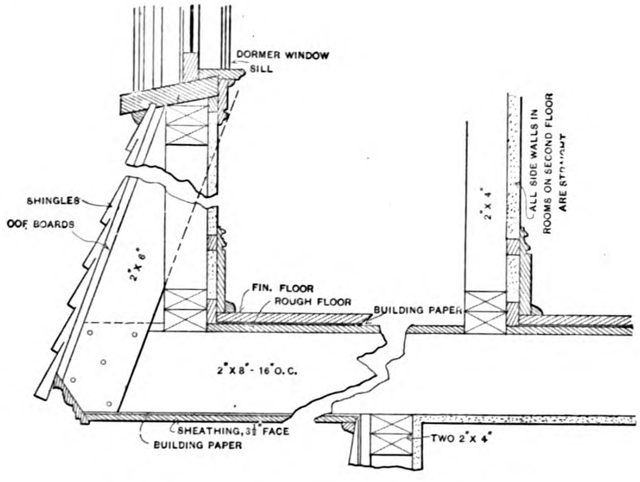
Design for Seaside or Mountain Cottage.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

The following is a table showing the safe carrying capacity of conductors of different sizes in B. & S. gauge as given in the rules:

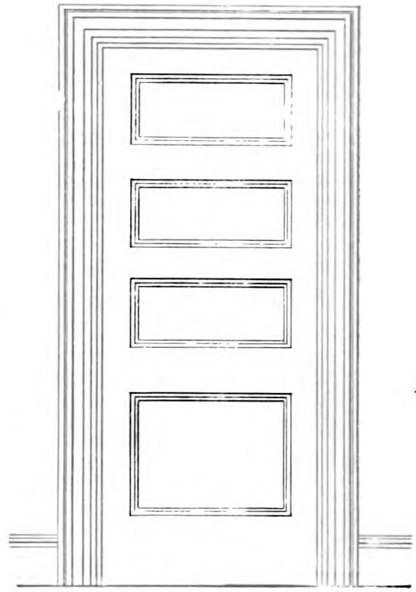
B. & S. gauge.	Rubber covered wires. Amperes.	Weather proof wires. Amperes.	Circular Mils.
18	3	5	1,624
16	6	8	2,583
14	12	16	4,107
12	17	23	6,530
10	24	32	10,380
8	33	46	16,510
6	46	65	26,250
5	54	77	33,100
4	65	92	41,740
3	76	110	52,630
2	90	131	66,370
1	107	156	83,690
0	127	185	105,500
00	150	220	133,100
000	177	262	167,800
0000	210	312	211,600

No fuse must have a rated capacity exceeding the allowable carrying capacity of the wire it protects.

In open work wiring supports must be placed at no greater distance than 4½ feet apart.

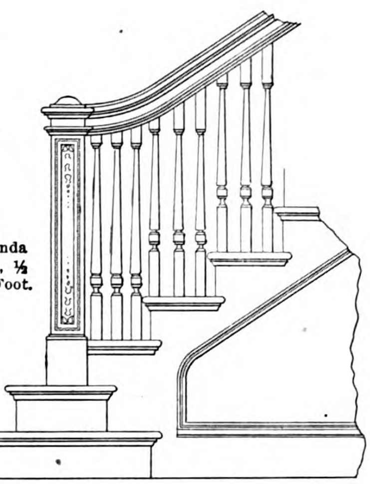


Section at Second Story.—Scale, ¾ Inch to the Foot.

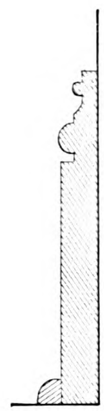


Elevation Showing Style of Doors.—Scale, ½ Inch to the Foot.

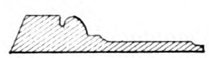
Detail of Veranda Rail.—Scale, ½ Inch to the Foot.



Detail of Main Stairs.—Scale, ½ Inch to the Foot.



Base Board.—Scale, 3 Inches to the Foot.



Chair Rail.—Scale, 3 Inches to the Foot.

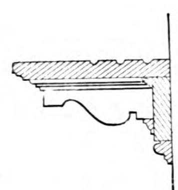
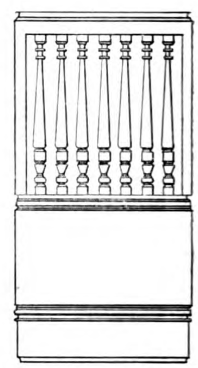
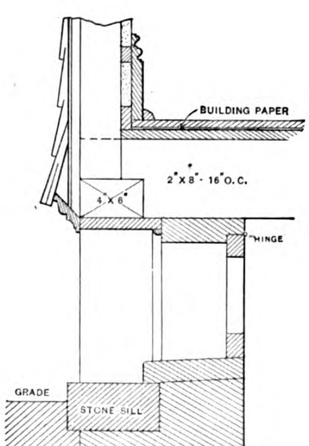


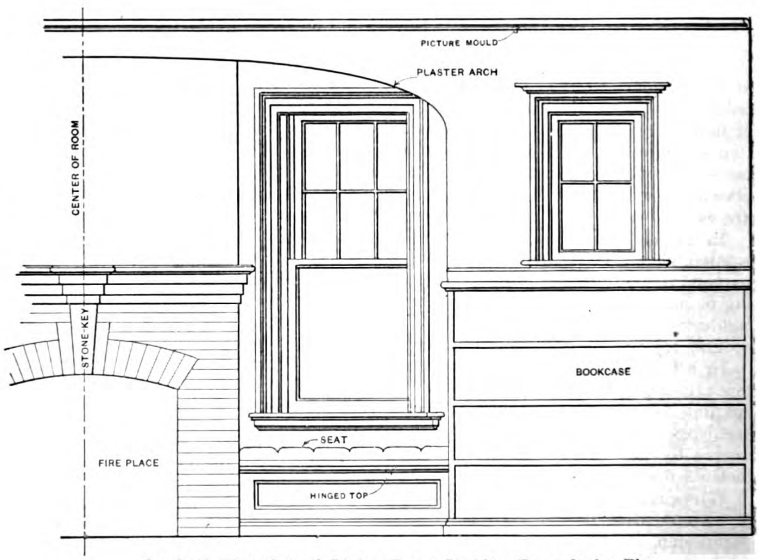
Plate Shelf in Dining Room. Scale, 1½ Inches to the Foot.



Screen Between Vestibule and Stairs.—Scale, ¼ Inch to the Foot.



Section at Water Table.—Scale, ¾ Inch to the Foot.



One-half Elevation of Living Room Looking Toward the Fire Place.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of a Seaside or Mountain Cottage.

WHAT BUILDERS ARE DOING.

THE Aurora Builders' Association, which was organized on April 16 of the present year at Aurora, Ill., was formally incorporated on May 15, with L. Sylvester, president; J. A. Tolman, vice-president; James Little, secretary, and E. D. Briggs, treasurer.

The Board of Directors consists of E. D. Briggs, J. H. Tolman, N. Frisch, A. King, John MacKinnie, G. G. Harmon and L. O. Hill.

The association was created for mutual benefit and protection, being largely the result of the formation of the labor unions which organized since the first of the year. The membership embraces over 90 per cent. of the builders of the city and the outlook is considered very encouraging for the association.

The recent agitation of labor questions has had the effect of disturbing to some extent the building business in the city and has prevented much work from being done that was anticipated earlier in the season. The immediate building outlook is not particularly encouraging, and the opinion prevails among some of the employers that had it not been for the labor disturbances the city would have enjoyed the most prosperous building season for many years.

Baltimore, Md.

The annual meeting of the Builders' Exchange, which was held in the rooms at Charles and Lexington streets on the evening of Tuesday, June 3, brought together many of the prominent builders and architects of the city. The occasion was the celebration of the fourteenth anniversary of the organization, as well as the election of officers for the ensuing year. The regular ticket was elected as follows:

John H. Short..............President.
Joseph H. Hellen...........First vice-president.
John J. Kelly..............Second vice-president.
Henry Smith................Third vice-president.
John M. Hering.............Secretary.
B. F. Bennett..............Treasurer.

DIRECTORS:

H. L. Black,	Israel Griffith,
Benj. Wallis,	Louis F. Young,
Jno. T. Buckley,	L. A. Winder,
Chas. F. Macklin,	Theo. F. Krug,
F. H. Davidson,	H. H. Duker,
D. A. Leonard,	J. Frederick Brumshagen.

President John H. Short read his annual report, showing the exchange to be in better condition financially and otherwise than it has been for many years. Nine new firms were added to the membership, this being the largest number in any one year since May 31, 1896. President Short expressed gratification at the interest taken in the exchange by architects, who daily visited the rooms, and stated that the attendance at the last quarterly meeting was the largest for many years. Two architects have expressed a willingness to give the members lectures on topics likely to prove interesting. Of the 33 sets of plans and specifications upon the tables of the exchange during the year, a number were made and loaned by local architects. Inspector of Buildings E. D. Preston contributed very generously to this feature of the exchange by the loan of plans of city buildings.

The operations from June 1, 1901, to June 1, 1902, showed 162 contracts to have been reported upon, aggregating an estimated value of $9,156,000. While less than one-third of these contracts were awarded to builders within the exchange, their valuation was 60 per cent. of the gross amount, showing that members have received the benefit of the larger operations.

President Short also called attention to the fact that the organization has ever striven to preserve a position in the front rank of progressive business and commercial bodies, and its more than usual activity for the past six months has demonstrated it to be an important factor in public affairs. "What grander victory," he said, "can any like organization boast than that to which we proudly point, Maryland granite for Baltimore's Custom House?"

Following the address of President Short the reports of Secretary Hering and Treasurer Bennett were read, showing the affairs of the exchange to be in excellent condition. After the transaction of other routine business a delightful *menu* was served in the banquet room to about 75 members and guests. President Short was made toastmaster, and after some remarks by him, Second Vice-President Kelly and Ex-President S. B. Sexton, Jr., and several others were called upon for short talks.

Birmingham, Ala.

The Master Builders' Association of Birmingham have recently filed a declaration of incorporation, with a membership of 29 of the leading contractors. The incorporation is for mutual protection of the members, for the advancement of the building business and the discussion of architectural and building matters.

The officers are: President, Allen J. Krebs; vice-president, T. C. Thompson; secretary and treasurer, J. F. Evans. The directors are A. Stockmar, H. I. Jeffers, Theodore Poull, I. H. Hamilton and R. K. Edwards.

Chattanooga, Tenn.

The Secretary of State granted a charter on June 2 to the Chattanooga Builders' Exchange of Chattanooga, Tenn., the incorporators being Russell L. Westcott, J. J. Mahony, E. C. Schneider, William W. Raht, R. C. Whitice, John Heibeck and George A. Collins, all of Hamilton County. The object of the exchange is to promote and encourage the building interests of the city and further its growth and progress by promoting the erection of well planned and properly constructed public and private buildings. It is also the purpose to inculcate just and equitable principles of business dealing between members of the exchange; to promote the educational and general welfare of the artisans of the community; to avoid and adjust, so far as practicable, controversies and misunderstandings which may arise among those engaged in the building trades, and to acquire, preserve and disseminate business information among the members of the exchange.

Cleveland, Ohio.

The Entertainment Committee of the Builders' Exchange met on the evening of June 6 and decided to hold the annual outing of the local body in conjunction with the convention of the Ohio State Association of Builders' Exchanges, at Put-in Bay, Wednesday and Thursday, July 30 and 31. There will probably be a number of side trips from the island by boat, athletic contests and good music. Indications are not wanting that the affair will be well attended, not only from Cleveland, but all over the State, and efforts will be made to render the occasion memorable in the history of the organization. Recent visitors to the rooms of the exchange have included representatives of kindred bodies in Toledo, Youngstown, Milwaukee and other cities.

The Cleveland offices of the Ohio State Association of Builders' Exchanges held a meeting on Friday, June 6, for the purpose of discussing the question of receiving into association membership individual builders and contracting firms from towns and cities throughout the State where no exchanges have been organized. A form of invitation was agreed upon to be sent to builders throughout Ohio, and we understand that the large firms in Cleveland doing business throughout the State will assist in distributing the invitation to their correspondents.

Derby, Conn.

The leading building contractors of Derby, Ansonia and Shelton, Conn., recently held conferences looking to the formation of an organization, and on June 4 their efforts resulted in what is known as the Ansonia, Derby and Shelton Master Builders' Association.

The following are the officers for the ensuing year: President, M. A. Durschmidt; vice-president, G. W. Beardsley; treasurer, William Hotchkiss, and secretary, C. Y. Woodruff.

There is a very gratifying amount of building in progress in the city, and the opinion is expressed that the number of new structures now under way is greater than has been the case at any one time for many years past. Operations are being pushed as rapidly as possible, but there seems to be more or less difficulty in securing competent carpenters and bricklayers, more especially to do small jobs about the city, as the larger contracts absorb practically the entire available supply.

Lincoln, Neb.

The present season has been one of unusual activity in building circles, and there is now a large number of attractive dwellings in process of erection and in contemplation. The residence building is largely in the colonial style and many fine specimens are being designed by local architects, of whom there are some half dozen or more, all of whom are enjoying an excellent practice. Taken as a whole, the general building situation is regarded as very satisfactory and the outlook promising.

According to Secretary Frank G. Odell, the first public act of the Lincoln Contractors' Exchange was to establish a nine-hour day without solicitation on the part of the employees, and to make it apply impartially to all classes of workmen, whether union or nonunion. This has been greatly appreciated by the men and the best of feeling prevails. It may be remarked, however, that the nine-hour day is confined to the members of the exchange, comprising some 25 of the leading firms of general building contractors. The change in hours applies to all employees of whatsoever class working for members of the exchange, with the wage scale remaining practically the same as formerly paid for ten hours, although the right is reserved by each individual contractor to determine for himself what he will pay. The general result has been to maintain wages at the former level of 25 to 30 cents per hour. The new system has been in effect so short a time that the result can only be prophesied. Thus far it appears to give general satisfaction. The change will probably affect three-fourths of the carpenters employed in the city and a considerable percentage of common laborers. Masons and plasterers have had a nine-hour day for several years and the plumbers and painters who are not employed by union shops work nine hours generally, while union men work eight hours. The Carpenters' Union has a comparatively small organization, although the membership is growing and are on excellent terms with the exchange.

The Lincoln Contractors' Exchange was formed this last spring under some discouragements growing out of former failures along the same line. Previous organizations took into membership all the affiliated trades, with the result that the general contractors had to stand the brunt of the fight when labor troubles arose in any branch of the business. The present organization has been confined to general contractors and the results have been very satisfactory.

The present officers of the exchange are F. A. Mason, president; J. M. Graff, vice-president; C. A. Schaaf, treasurer, and Frank G. Odell, secretary, with office at 1335 North Twenty-fourth street.

Los Angeles, Cal.

The building permits issued in this city during May, 1902, have exceeded those issued in any previous month in the history of the city. The total valuation was $846,584, exceeding the best previous months by over $220,000. Of a total of 373 permits issued 146 were for one-story frame residences, with a total value of $165,000. There were permits for 63 two-story frame residences, to cost $209,000. The other permits were chiefly for flats and brick business buildings. Apparently the high cost of lumber has had no effect on the erection of frame buildings. The only inconvenience that seems to be seriously felt is a scarcity of carpenters. It is claimed that several hundred more competent workmen could at once be put to work in the city if they could be found. Many practically unskilled workmen are now drawing carpenters' wages.

The annual meeting of the Builders' Exchange of Los Angeles was held on May 19 for the purpose of electing officers for the ensuing year, with the following result: President, Wm. S. Daubenspeck; vice-president, J. F. Hall; second vice-president, Godfrey Fretz; third vice-president, W. A. Winn, and treasurer, E. O. Simons. The Board of Directors is composed of F. J. Spaulding, F. A. Jay, James Smith, John Spiers, John Frankland, T. W. McLeod, C. Specht, K. R. Bradley, J. Hayes and W. E. Thornton.

Louisville, Ky.

In the April issue we presented a brief description of the new quarters in the Tyler Building to be occupied about May 1 by the Building Contractors' Exchange and at the same time gave a list of the officers for the ensuing year. On the evening of May 15 the exchange held its formal opening with appropriate ceremonies, the affair being a most delightful success. The rooms were handsomely decorated with palms, smilax, &c., giving a decidedly tropical effect. There was music and a vaudeville entertainment, after which a bountiful lunch was served to the members and their guests. President A. N. Struck made the address of welcome in his usual delightful and humorous vein, and there were informal talks by many others who were present.

The new quarters were carefully inspected by the guests, by special invitation, and pronounced as handsome and convenient as could be secured. A feature of the arrangement is an innovation by Secretary Beckmann in the shape of a huge cabinet, matching the wood work of the offices, which extends across one side of the hall, containing private letter boxes, one for each member of the association.

The exchange is in a flourishing condition, and the membership, now numbering 140, has recently shown a large percentage of increase, with bright prospects for the future.

During the month of May there were 548 registrations during 'change hour at the Building Contractors' Exchange, clearly demonstrating the fact that the members are awake to the importance of these daily conferences. Beginning Saturday, June 14, and continuing every Saturday, a lunch will be served to members of the exchange during 'change hour. This no doubt will tend to greatly increase the attendance, while at the same time it will prove a most convenient and agreeable feature, for it is well known that as a general thing building contractors have pretty good appetites.

A number of important building improvements are under way in the city, and general contractors report the subletting of numerous contracts for work which is likely to keep all hands busy for some time to come. The work of wrecking the old buildings on the site to be occupied by the Weissinger-Gaulbert flats at Third street and Broadway is rapidly nearing completion, and active operations on the new structure will be commenced immediately thereafter. This will be one of the largest and finest flat buildings in that section of the country. Among some of the other important improvements are the new plant of the Louisville Lead & Color Works at Fifteenth street and Portland avenue; the addition to the power house of the Citizens' Lighting Company, at Tenth and Rowen streets; a new warehouse for the Kentucky Refining Company, a new power plant and storage room for the Louisville Soap Company, and a veterinary hospital and blacksmith shop at the Bourbon stock yards.

Lowell, Mass.

While business in the building line is comparatively good at present, with all trades fairly well engaged, there is no particularly large work under way outside of the Textile School buildings, which, when completed, will architecturally and constructively be the finest in the country, if not in the world, devoted to textile instruction. Progress upon the buildings has been more or less interrupted by labor troubles, and as an example it may be stated that a short time ago about 100 men quit work because a few nonunion painters were engaged after the painting contractor had made every effort to find union men to do the job. When the injustice of the affair was given publicity the men returned to work, but not until more or less delay had been occasioned. Thus far the present year harmony has not been a conspicuous feature of the relations existing between employers and employed. Hopes are expressed that an important industry, which is now considering the matter, will locate in Lowell, as this would guarantee an unusual amount of building construction. It is now thought that the sum total of work going on will make a fair average for the year.

The annual outing of the Builders' Exchange will occur some time in June, but the exact date and destination have not been announced, as the matter in still in the hands of the Entertainment Committee.

Minneapolis, Minn.

All branches of the building business are showing a gratifying degree of activity and the outlook for the immediate future is most encouraging, except that the demand for nearly every line of materials is considerably ahead of the immediate supply. The members of the Builders' and Traders' Exchange are busily engaged and the association is in a flourishing condition. The organization practically dates from April 1 of the present year, when it took the place, in a measure, of the Master Builders' Association, but added thereto other contractors and material supply men.

The officers are H. N. Leighton, president; B. W. Smith, first vice-president; Geo. W. Higgins, second vice-president; John M. Norris, secretary, and Harry B. Cramer, treasurer.

We understand that the aim for the coming year is to establish business relations between the various branches of the building trades which will enable them to stand together when circumstances require. During the ensuing year it is the expectation of the officials of the exchange to largely increase the membership. At present the exchange has pleasant quarters in Kasota Block, which is located at the corner of Hennepin avenue and Fourth street, North. At present the membership includes representatives of the leading branches of the building and allied trades, and the list is constantly growing, a number of new members having been elected at the meetings held on May 6 and May 22.

Portland, Ore.

In the hight of a busy season which seemed destined to break the building record in Portland, Ore., a strike occurred on May 22, which on June 6 was still in force and which effectively put a stop to almost all building in the city. Contractors freely admit that many proposed buildings and improvements have been put off indefinitely, while work has been stopped on the great majority of buildings already under way. Our correspondent says under date of June 6 that last week a few contractors secured men and are now proceeding with some of their work. At the present time there is no prospect of a settlement of the difficulty. The lateness of the season has caused a scarcity of building brick in this city. Brick manufacturers are now about four or five weeks behind last season and are far behind in their orders. The stoppage of work due to the strike will, it is supposed, enable brick manufacturers to catch up with the demand.

Providence, R. I.

At a recent meeting a permanent organization of the Master Carpenters' Association was effected by electing James Clary, president; E. E. Manchester, vice-president; E. Marsden, secretary, and W. A. Phillips, treasurer.

At this meeting it was decided that during the months of June, July and August carpenters and cabinet workers should have a half holiday on Saturday and that eight hours should constitute a day's work.

San Francisco, Cal.

The reaction which has been expected for some time in the building situation is now becoming more apparent, says our correspondent, writing under date of June 6. The extraordinarily high prices and scarcity of all building materials, as well as of labor, are being felt, and it is estimated that many hundreds of small buildings which were earlier contemplated have been deferred indefinitely on this account. As yet the builders of the city are rushed with business, but the work now on hand is largely that contracted for many weeks ago. The labor situation is not entirely satisfactory, although it is much better than the conditions which prevail in many other cities and towns of the coast. There is a factional war on among the union carpenters which threatens to result in trouble at any time. A truce was, however, agreed upon last Monday, which, it is expected, will postpone any trouble until after July 1. In the meantime with all the carpenters employed there are not enough men to keep all the contracts moving. There is also a scarcity of lathers and plasterers.

The tendencies of the more expensive class of buildings are still running to fire proof hotels and high-class flats and apartment houses. Contracts to the value of several hundred thousand dollars were let a few weeks ago for the Crocker Hotel Building on Union square. The Fairmount Hotel, which it was rumored would not be built immediately, because of the scarcity of structural steel and stone, will, it is claimed, now be built at once. Five thousand tons of steel for the structure were purchased a week or two ago in Belgium. This building, to be erected by the Fair heirs, will be five stories high and will occupy nearly a whole block. As a type of the new apartment houses now going up the Bowes Building on Pacific avenue may be given. The building will contain seven flats and will cost $40,000. Each flat will contain a living room, a reception hall, a dining room and a kitchen on the lower floor, with chambers and bathroom on the upper floor. All the principal rooms of the structure will be provided with wainscoted walls and beam ceilings. The bathrooms will be tiled. The building will be constructed of klinker brick, stock brick and frame. The wood work will be faced with shingles. Among the other large buildings now being constructed in San Francisco and the suburbs may be mentioned El Monterey, a five-story and basement house, costing $125,000; the Luchsinger Building, on Eddy street, San Francisco, to cost $75,000; the Carnegie Library Building, in Alameda, Cal., to cost $30,000, and the Twenty-third Avenue Baptist Church, in Oakland, Cal., to cost $10,000.

CORRESPONDENCE.

Address of "Young Chip" Wanted.

If the correspondent from Lindsborg, Kan., signing himself "Young Chip," will send the editor his name and address his communication will receive attention in due course.

We would emphasize at this time the importance of all correspondents signing their letters with full name and address, so that in case of necessity the editor may correspond with them direct, as it very often happens that further information is essential before publishing the matter in the columns of the paper. In all cases, however, communications will be presented under the writer's initials only, unless he specifically request that his name be used.

Designs of Church Trusses.

From J. L. H., *Bessemer, Ala.*—I have two churches for which I am obliged to design trusses and want the cheapest and best than can be produced. Will Mr. Kidder or some one else help me? One church has an auditorium 60 x 78 feet, with transept 32 feet wide. What is the best manner of trussing over the transept, the ceiling being coved? The other church has an auditorium 48 x 56 feet with a Sunday school room on the side at the back 30 x 30 feet. What is the best manner of trussing over the opening to the Sunday school room, which has no post?

Answer.—The above inquiries were submitted to Mr. Kidder, who furnishes sketches from which the accompanying engravings were prepared, together with the following particulars:

Assuming that the auditorium in the first church has a general plan similar to that indicated in Fig. 1, the problem is how to support the roof between the transepts and at the same time have a coved ceiling in both. The cheapest and simplest way is to support the main roof by two longtitudinal Howe trusses, set about 15 feet in from the side walls and coming between the ceiling and roof, as indicated by the sectional view, Fig. 2. These trusses being above the ceiling can extend over the crossing just as though there were no transepts.

The transept roof and ceiling should be supported in the same way—that is, by longitudinal trusses, the inner ends of which are supported by the main truss, A A, and the outer ends by the gable walls.

The cove should have the same sweep in both the main room and the transepts, the two coming together directly under the valley rafters, the valley rib being supported by the tie beam of the short trusses. The main roof between the Howe truss should be supported by king rod trusses, one of these being placed over each upper joint of the Howe truss. The ceiling can be suspended from the king rods, either where shown in Fig. 2 or at any point below the tie beam of the king rod trusses.

In laying out the Howe truss A A there must be a rod close to each of the small trusses B B to transmit the load from the latter to the top of the truss. Assuming that the transept is located as shown in Fig. 1, the Howe truss should be divided as indicated by the dotted lines in Fig. 3, which represents a section through the transept roof.

The size of the cove and the position of the trusses

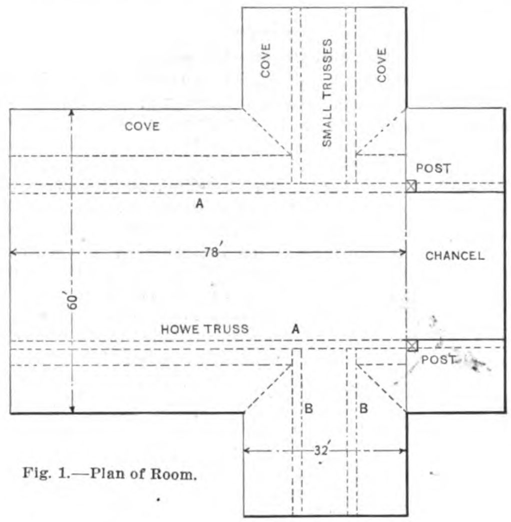


Fig. 1.—Plan of Room.

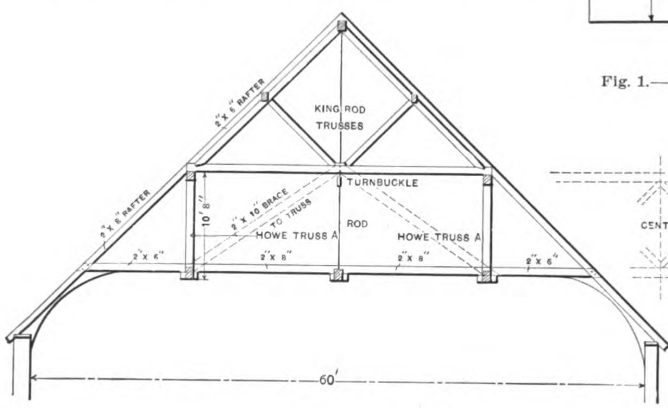


Fig. 2.—Section through Main Roof.

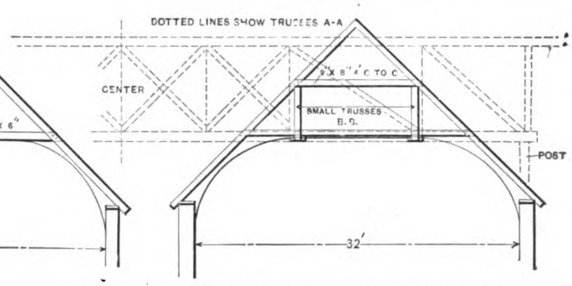


Fig. 3.—Section through Transept Roof.

Designs of Church Trusses.—Scale, 1-16 Inch to the Foot.

may be varied as desired, provided the hight of the Howe truss, measured from center to center of the chords, is at least one-eighth of the span. There is no objection, however, to a greater hight. The advantages of this method of roofing are that it is simple and economical and does not exert an outward thrust on the wall. It also permits bringing the cove close under the rafters. Several examples of this method of roofing churches are given in the writer's book entitled "Churches and Chapels," copies of which can be obtained from the publishers of *Carpentry and Building*.

For trussing over the opening to the Sunday school room in the second church a truss with a horizontal tie beam should be used. The top of the tie beam should be placed at the proper hight to receive the trusses supporting the main roof. For a 30-foot opening a queen rod truss will probably be as good as any. Where a truss supports other trusses, as in both of these examples, the stresses should be accurately determined and the truss members and joints proportioned accordingly.

Plans Wanted for a Lime Kiln.

From T. G. J., *Nassau, New Providence.*—I have been subscribing this year to *Carpentry and Building*, and from what I have read in its columns I venture to ask some of the readers to grant me a favor by sending to the editor for publication the drawings of a kiln, such as is used in the United States for burning lime. With the plans I would also like to see published a specification of the work. Kindly give sizes of material to be used and what size building would suit me in this country. I have noticed how liberally the builders contributed to the columns of the paper, and it makes me feel confident that some of them will kindly give me the information required without unnecessary delay.

Note.—We shall be very glad to have those experienced in the construction of lime kilns send us drawings showing their method of arrangement, together with such descriptive particulars as will serve the purpose of the correspondent in New Providence.

Balloon Frames for Barns.

From G. M., *Breckenridge, Mich.*—I send sketches showing three methods of balloon frames for barns, as in my opinion there will be more balloon frame barns built as timber becomes scarce, and I think it would interest a good many to see illustrations of various styles of balloon frames published. The sketches which I send represent inside bents placed 10 or 12 feet apart and filled out between with 2 x 6 placed 2 feet apart. The rafters are hooked together at the points indicated by the breaks in Figs. 1 and 2. Boards are nailed over the joints on both sides and also at the top, but the cut of the rafter at the top is straight. A truss should be put on the gable ends to keep the frame from springing out. All braces should be well nailed and spiked. The bent indicated in Fig. 2 is made of two pieces of 2 x 6, with a 2-inch space between. Braces are put in between and spiked. The rafters are also double with braces between. Boards are nailed across the rafter joint and at the top. The bent shown in Fig. 3 is made of two pieces of 2 x 6 with a 2-inch space between them and braces put in as shown.

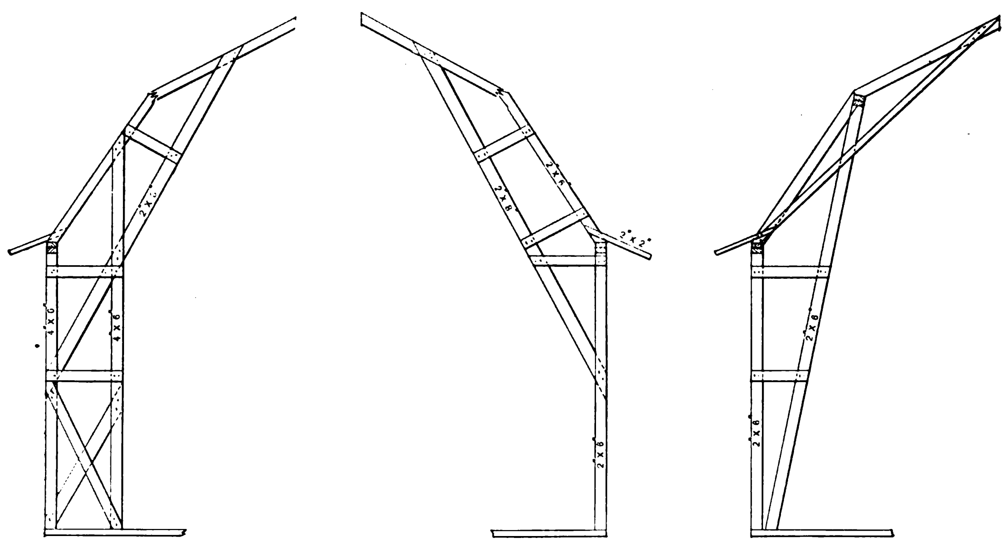


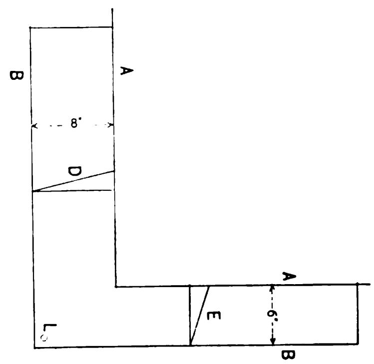
Fig. 1. Fig. 2. Fig. 3.

Various Forms of Balloon Frames For Barns.—Contributed by "G. M." of Breckenridge, Mich.

It has a purlin made of two pieces of 2 x 6. The rafters are 2 x 6, ingle. Boards are nailed across at the top, and a 1 x 6 inch board could be nailed on every set of rafters under the purlin. If any of the readers have better methods of framing I would like to hear from them, as I think a discussion of the subject would be profitable.

Question in Veranda Roof Construction.

From H. C., *Pike River, Canada.*—I am in need of a little information regarding the construction of a porch roof, and come to the readers of *Carpentry and Building* for such aid as I feel sure many of them are able to give me. The porch or veranda in question extends partly across the front and around a portion of the side of the house, as indicated by the diagram inclosed herewith. The hight is to be the same all the way around, which, however, will make the two roofs of different pitch, as the veranda at the front is 8 feet wide, while at the



Question in Veranda Roof Construction.

side it is only 6 feet. How can I build the roof at the corner L so that the change in the pitch will not be very noticeable? Referring to the diagram, A A represents the outer line of the house, B B the plate of the veranda, D the pitch of the roof at the front and E the pitch on the side.

Regarding Public Trade Schools.

From G. L. McM., *Tacoma, Wash.*—In reply to the screed of "H. K. R." in the May issue, let me say that I fail utterly to see any connection between "M.'s" comments on roof pitches and my protest against Superintendent Maxwell's scheme for public trade schools for boys from 12 to 14 years old; nor can I see any very close connection between "M.'s" advice to carpenters to study the square and my protest. The situation is this: Superintendent Maxwell advises establishing public trade schools for boys of 12 years of age, with a view to making skilled mechanics of them at 14 years of age. I protested on the ground, first, that the boys are too young; secondly, that at 12 years of age they have not sufficient education to master the trade, but should, if possible, complete at least the high school course first. Then "H. K. R." comes to the front on a "two to one bet" that I do not believe in education. Now let me advise "H. K. R." to turn back to the issue of *Carpentry and Building* for March, 1901, and carefully read, or get some ten year old boy to read to him, the editorial comments on Superintendent Maxwell's idea, and then again read carefully what I said on the subject, and let him explain, if he can, what relation "M.'s" remarks on roof pitches have to either. His idea that the establishment of trade schools will force the master carpenters or employers in any other branch of mechanics to establish an efficient apprentice system shows the absence of a proper conception of the subject. The employers would be only too glad to have trade schools established to relieve them of the bother of teaching apprentices.

Now let me further call the attention of "H. K. R." and your other readers to the fact that I have nowhere said one word against the trade schools as such, but only against the project to place boys into them too young, and with a view of turning them out of school to become wage earners when they ought still to be acquiring an education that would make them men, not tools and drudges.

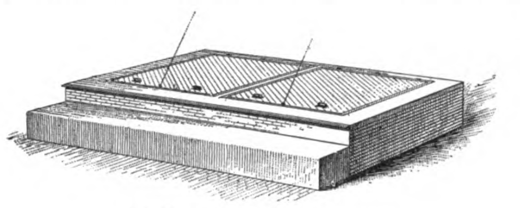


Fig. 1.—General View of Ice Box.

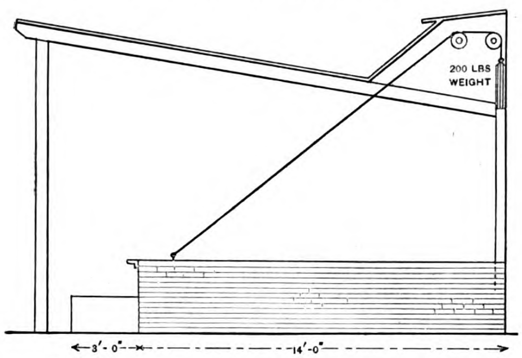


Fig. 2.—Side View, Showing Position Under Shed.

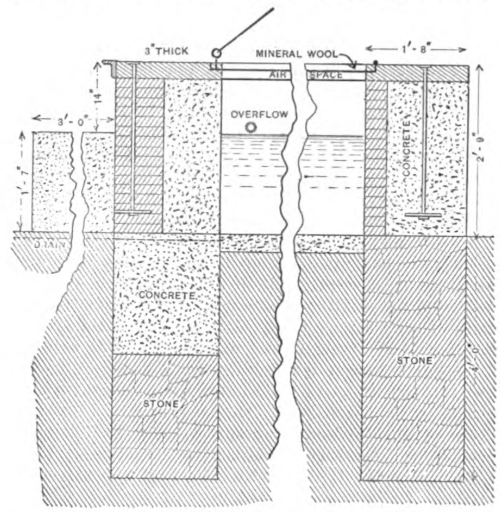


Fig. 3.—Vertical Section, Showing Construction.

Construction of a Dairy Ice Box.—Contributed by J. J. Brown

Hanging Doors.

From A. P. R., *Meshanticut, R. I.*—In reply to "Carpenter," whose inquiry appears in the May issue of the paper, I would say that on a cheap job a man will hang, fit and trim 15 doors in eight hours' work, and on a good job 12 doors is the limit, according to my experience. I know men who can do more for one day, but cannot keep it up.

Diagonal vs. Horizontal Sheathing.

From G. & O., *Clarksburg, W. Va.*—In reply to "G. L. McM.," Tacoma, Wash., whose inquiry appeared in the May issue of the paper, we would say as architects and builders of 25 years' experience, we have made many tests of horizontal and diagonal sheathing and have long since abandoned the use of the latter method. There is nothing practical in the use of it. A building boarded solid horizontally will give equal results to that of a building with the sheathing placed diagonally. We have had brick veneered walls on horizontal sheathed frame factory buildings, four stories high, with machinery on the fourth floor, and not a defect visible in ten years' use. As a rule, we are all too much inclined to follow custom and adopt impractical methods because some one used them. Some time ago there was a lengthy discussion in *Carpentry and Building* on this subject which showed 75 per cent. or more in favor of horizontal sheathing. In our judgment the factory of "G. L. McM." is simply burning money.

A Question in Floor Construction.

From J. R., *Potsdam, N. Y.*—I have had some discussion with regard to flooring, and would like very much to have the views of the practical readers of the paper. The question is this: Is flooring buckled out on the underside any better than flooring as ordinarily laid, and, if so, what are its advantages? The size of the flooring is 7/8 x 2½ inches laid on sheathing felt.

Construction of a Dairy Ice Box.

From J. J. BROWN, *Germantown, Philadelphia, Pa.*—Thinking the matter may be of interest to readers of *Carpentry and Building*, I inclose sketches of a dairy ice box that I am building for a customer from drawings made by Architect T. Frank Brown of this place. The foundations are sunk 4 feet below grade and the work is built up 2 feet in dry wall, above which it is in cement. All the brick work inside and out is of Pompeiian brick. The wall at the party line is of stone and up to grade is 20 inches wide, while from grade to finish it is 16 inches wide. The inside has 4 inches of brick work. The front wall is 20 inches wide to grade, finishing with a 9-inch brick wall. The upper and lower walls are 20 inches all the way, with a 9-inch party wall in the box. Each box has a separate drain or waste pipe. One box is filled with cold water up to the hight of 19 inches, where there is an overflow to the next box, which is filled with ice. The cover of each box is constructed with an air space, above which is a packing of mineral wool, the under side of the air space being covered with zinc. The churn of milk is set in the water chamber and a few hundred pounds of ice put in, which raises the water within 3 inches of the top of the churn, thus keeping the milk in good condition. In fact, it amounts to moving the country spring house right into the city. Both chambers have a cement floor and a capacity of keeping in cool condition for 24 hours 1200 quarts of milk by the use of 400 pounds of ice. The chambers are air tight and the idea of the heavy walls is to retain the cold air within, thus saving several hundred pounds of ice in the hot months. The whole affair is covered by a large shed, so arranged that the wagons drive under and load directly from the top of the cement platform. Fig. 1 of the illustrations represents a general view of the box, Fig. 2 a side view of the box as it appears under the shed, while Fig. 3 is a sectional view, clearly indicating the construction. I would say that the top of the box is framed of yellow pine 3 inches thick and anchored to the walls by means of rods 2 feet 6 inches in length. The lids or covers are raised by means of the rope contrivance shown, there being attached to the end of the rope a 200-pound weight to partially balance the weight of the covers or lids.

Steam vs. Gas and Gasoline Engines for Small Shops.

From C. J. G., *Pittsfield, Mass.*—Having seen several queries in *Carpentry and Building* regarding various powers to run light wood working machinery, and there evidently being few readers ready to respond, I take the liberty of giving a little experience I have bought in this line. In the first place, allow me to say that, being naturally very fond of machinery, I experimented more than was wise from a financial standpoint. My first successful steam engine was about ½ horse-power, nominally, and so small that one could put about one-quarter dozen of them into a good sized tool chest. However, I had lots of sport with it, running it to drive a small lathe and circular saw in a chamber under my parental roof until the solicitude of my dear mother was slightly disturbed, fearing the concussion was too much for the good condition of her nerves and the plaster in the front room. I belted directly from the engine onto the saw pulley and ran the engine so fast one could not begin to count the revolutions. I could do light sawing quite well, but as there was no governor on the engine I had to persuade it by feeding the lumber faster or slower, as the case might be. Next I bought a full 1 horse-power Scotch yoke pattern engine. This, being larger and fitted with a governor, worked much better.

I next purchased a double-cylinder marine type of engine of nearly 2 horse-power. Now I had three engines, which I arranged so that I could run any one, two or all three connectedly. After this I secured a new 2 horse-power automatic steam engine, with which I could do light wood working fairly well; at least I thought so then. However, I soon found more power was wanted, so I bought a new 4 horse-power engine, which I converted into a two-valve automatic steam engine and a very nice little motor, too. This would run a jointing machine or buzz planer, band saw, turning lathe, emery grinder, boring machine, 24-inch pony planer or surfacer and circular saw. It would run the first five machines working at the same time, or either of the last named, doing light surfacing or sawing.

The great drawback, however, with the steam rig in a small jobbing shop, where the machines are not operated the greater part of the time, is in getting up steam for a short run. It often happens that one wants to run a machine for a few minutes or an hour or two and then stop. Of course with a good water tube boiler it does not require one-half the time to start that it does with the comomn type of boiler. But right here is where the gas or gasoline engine has the advantage. As engines of this type are coming more and more into prominence, being made by the thousands and by scores of different builders, each trying to improve upon the product of his predecessors, their perfection is rapidly being brought to completion, and their practicability being assured, it is fitting that we should learn of their merits and demerits and further that knowledge to those interested in modern motive power.

In the issue of the paper for January, 1901, "J. E. D." of Chicago stated that he had a 2½ horse-power Raymond gas engine and asked some questions regarding these machines. I would say that 15 to 20 cubic feet of gas is usually allowed per horse-power per hour. Most engines are now built so that either gas or gasoline can be used by a slight change in attachments. An engine running on gas requires a gas bag which holds a reservoir of gas near the engine, while one running on gasoline requires a gasoline pump and vaporizer. Engines are sometimes so made that one can substitute either for the other without stopping.

Manufacturers of gasoline engines usually claim their engines to develop 1 horse-power to every pint of gasoline used per hour. For instance, a 2 horse-power engine will develop its rated power with the consumption of 1 quart of gasoline per hour, or 1 gallon per day of eight hours per horse-power, and a 20 horse-power engine 20 gallons per eight-hour day. While this may be safe figuring on large engines of 25 to 100 horse-power under most favorable conditions, I believe on small sizes a little margin should be given, as all mechanics versed in motive power know a large plant will develop power at a less cost per horse-power than a small one.

As to the actual cost of running an engine, much, of course, depends upon the cost of gasoline. In this city it nets from 10 to 11 cents per gallon by the barrel. One pointer right here regarding the economical running of a gasoline engine is that while the cylinder must be jacketed with water to prevent its getting so hot as to seriously affect the cylinder lubrication as well as blistering the paint, it should very nearly reach this point, as the gasoline vaporizes more readily; hence less is consumed in giving the same results. It is therefore wise to consider how best to supply the water for this purpose. There are several ways to accomplish this. When one has a water service or can get running water a very good method is to allow a stream of just sufficient size to pass through the water jacket to give the desired temperature—that is, about 160 to 180 degrees.

The common way is to have a tank—its barrel capacity equal to the horse-power of the engine—connected from near the bottom to the under side of the engine cylinder; also a return pipe from the top of the cylinder to just below the water line in the tank, allowing the difference in temperature of water to form a current. A better way, however, than this is to use a circulating pump for the purpose of creating a positive flow adjustable to the requirements of the case. This permits the tank to be located below the engine room out of the way. In my own case I used a tank or cistern set in the ground, which should be below the frost line, and run a small circulating pump, by means of which I obtained a positive current. When the engine stops the water drains from the jacket automatically; hence there is no danger in cold weather from forgetting it, which would likely mean a cracked cylinder. All the water returns to the cistern to be used again.

It may be interesting to some of the readers to know that an engine will give more power if operated with gasoline as a fuel than with gas, owing to the fact that gasoline vapor is stronger or has more explosive force. Again, natural gas is better than manufactured or illuminating gas, and where natural gas can be had it is by far the cheapest reliable power known, unless possibly it be water power under favorable circumstances.

It might not be known by all that there are several explosive engines made to run on kerosene oil and crude petroleum, and while these can be run with still greater economy than gasoline and are held in greater esteem by insurance companies, they are much more expensive in first cost, although they may be more economical in the long run where they are used continuously every day. For the average small shop, however, where the engine is only operated a small portion of the time, the extra outlay would hardly be warranted. In speaking of the relative economy of explosive engines and steam outfits, it is worth while to consider that with the former no licensed engineer is required to run them; in fact, they require but little attention save oiling, starting and stopping them, so that no extra help is needed. This is a big item and is often sufficient to pay for all the fuel used.

I have been using an 8 horse-power Olds gasoline engine for upward of two years. This engine is of the "hit or miss" type, which is considered the most economical, as it only takes a charge of gasoline when necessary to keep the speed normal and is also easy on the valve and igniter mechanism. At the same time, it draws less upon the battery if one is used, and this is now considered preferable to the "hot tube" igniter. However, the throttling governor will give a more even speed and is used for electric lighting, &c., where the most exacting speed is required.

Allow me to say right here that the Olds engine has many good points not found in all others. It is made without any gears whatever, can quickly be adjusted to run in the opposite direction from what it is set to be run, and the pulley can be used on either or both sides without an extended shaft, which is more or less in the way and is dangerous.

A gas or gasoline engine is one of the nicest powers known when it runs all right, but when it does not, it doesn't run at all. Like some animate objects, they will have their times of mulishness, and that seemingly without any provocation. To the novice it is often difficult to know how to doctor them. I have paid a good price for my experience, some of which I will give away. If you are troubled to start your engine, see that there is no water in the gasoline; water, being the heavier, will settle and you can easily see and separate it. Next, be sure that the gasoline gets into the mixer or vaporizer. This means that the pump must work properly and that the strainer in the gasoline chamber attached to the engine is not clogged, so that the fluid cannot enter even when the needle valve is open. See that the valves shut tight. If the compression is good you may know that they do, but if you can keep turning the fly wheel by hand easily you may believe the valves leak. Be sure the battery is strong, that the sparking points in the cylinder are reasonably clean and that all connections between the two are perfect. Sometimes the packing between the cylinder and the head is injured, being partially blown out, which will allow the water to enter the cylinder from the water jacket. This will surely stop the engine. In short, make yourself familiar with the working parts of the engine; then use good, hard common sense. The beauty of these motors when they are all right is that one can start up in a minute instead of an hour, as with the steam rig. Besides, they require less room and much less time to attend them, and no space inside the building for fuel. Last, but not least, the fire risk is less; hence the insurance is reduced.

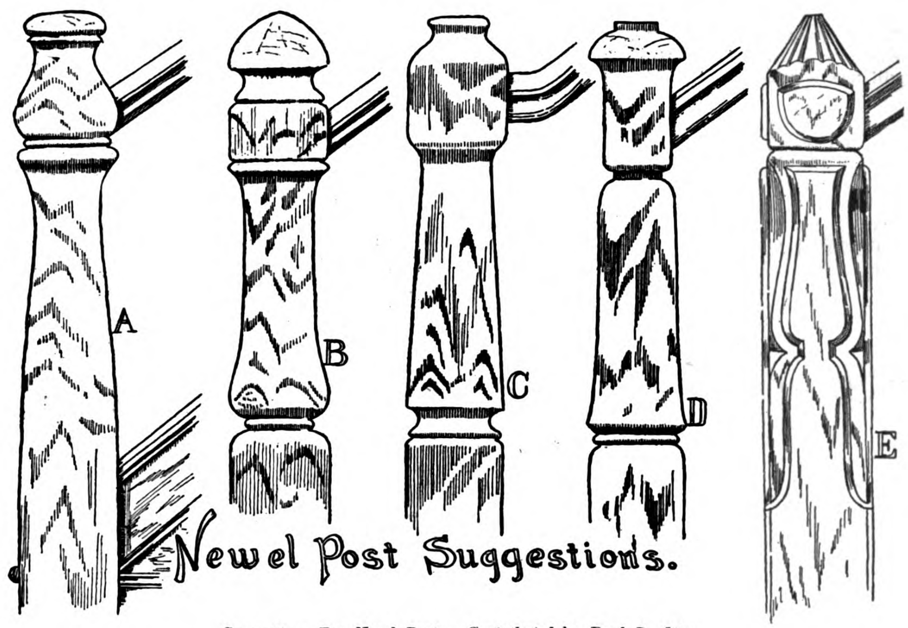
Now, Mr. Editor, allow me to say right here that I think *Carpentry and Building* is indispensable to the young, progressive carpenter and builder. I have taken it for years, have over 20 years' numbers—in fact, all ever published save the first two years, and I would like to find those unbound. I have two years' numbers bound together in uniform board covers, with title and owner's name printed on the back in gilt. These books I keep for reference.

What Constitutes a Day's Work for a Carpenter?

From WANDERING WOOD BUTCHER, *Alexandria, La.*—I would say for the benefit of "B. L. C." of Barre, Vt., that an average day's work for a carpenter depends on the State or country in which he has had the good fortune or misfortune to be born, raised and educated. For example, a person born and raised in a white man's country will lay from 2500 to 3500 shingles in ten hours, while in Louisiana 500 to 1000 is a big day's work, all other work corresponding, both as regards quality and quantity. Not long ago I timed a crew of carpenters and they did not average 500 shingles in ten hours, and all other work throughout the building was on the same average. Any observant carpenter can soon acquire information in this way on which to base calculations and estimates, which will be of more value than that acquired from books or the views of other people.

Suggestions for Newel Posts.

From PAUL D. OTTER, *Chicago, Ill.*—In the May issue of the paper a correspondent, "S. F. L.," of Ellinger, Texas, presented a request for some designs of newel posts such as a carpenter could build himself without the necessity of going to a planing mill for certain parts and without using a turning lathe. I inclose herewith some suggestions in this line which may possibly be of interest to the correspondent in question. The sketches show posts produced without the aid of a lathe or other machinery, and which permit of the display of character and workmanship, all being from squared timbers. The posts A, B, C, and D are intended to be cut from square surfaced pieces, the divisions of the outline being set in on each side to the proper depth by sawing with a hand saw. The hollows, such as appear under the caps of A, B and C and at the lower part of C, are bored with a large augur and then by means of gouges to reduce quickly and flat chisels may be cut away to a point where a rabbet plane can be used to bring the beads and short rounds to a finished outline. The pattern of the post selected should at first be secured in a thin piece of hard wood, as a templet, by which the outline of the post may be marked on both sides of one face, and this to be used in the manner of a gauge as the work proceeds in the roughing out process. The long sweeps on the main portions of the posts can be adzed very nearly to line and in some places finished with a smooth plane or spoke shave and scraper. In the sketch E represents a solid post with beveled panels, the head of the post tapered and beaded and the corners chamfered to correspond with the raised panels.



Suggestions For Newel Posts.—Contributed by Paul D. Otter.

Finding the Number of Brick in a Chimney.

From S. G. H., *Atlantic City, N. J.*—Referring to the inquiry of "O. A. G.," Dresden, Tenn., in the May issue, I think the easiest way for a person not versed in estimating the number of bricks required for chimneys of different sizes is to lay out the flue the right size and then space the bricks around it. He can do it on paper by means of a diagram, or he can build a sample chimney 1 foot in hight and ascertain just how many are required. I would say that he should multiply by five for every foot in hight.

Cuts of Valley Rafters in Roof Having Two Pitches.

From W. N. H., *Newport*.—In the recent past there have been a number of answers to the question of valley rafters in a roof having two pitches, and while all were instructive, it seems to me the writers have not seated the valley rafter where it belongs. In 1882 this question came up, with good answers published in reply thereto; again in 1885 and once or twice since, but in Volume VII, No. 2, being that for February, 1885, is the best answer I have seen, as it locates the seat of the valley rafter where it belongs, also the proper places for the plates of the gables. I think if the editor would reprint the article it would be a help to many learners. It is too good to be a back number.

Note.—In compliance with the suggestion of our correspondent we take pleasure in republishing the article in question, together with the diagrams accompanying it.

From P. W., *Branchport, N. Y.*—Answering the question proposed by "J. S. D." in a recent number of the paper, I will use ½ and ¼ inch pitch, as shown in the accompanying illustrations. Fig. 1 shows a plan of the roof to which it is supposed the rafters belong. Fig. 2 shows a section through the wall plates of the roofs, and indicates the difference in pitch between the two sets of rafters. Fig. 3 shows the angle of plates and cornices. Fig. 1 is to a scale of ¼ inch to the foot, and Figs. 2 and 3 to a scale of 1½ inches to the foot. E E in Fig. 1 and Fig. 3 indicate the outside of the plate. L M and N O show one-half of the width of each roof. The rafter at A is ½ pitch and the rafter at B is ¼ pitch, or, in other words, it has a base of 8 feet and an altitude of 4 feet. M R in Fig. 1 is the ridge line of the roof made ¼ pitch, and O P is the ridge of the roof ½ pitch. M R will intersect the steeper roof at the point R, and this point will be 4 feet from the outside of the plate at E. Suppose the projection to be 12 inches, as shown in Fig. 2 and at F F in Fig. 1 and Fig. 3. Draw a line from R to T, Fig. 1, the latter being the angle of cornice, which will give the seat of the valley rafter. It will cross the plate X L, as shown, from S to T. In Fig. 2 the rafter A is at ½ pitch and the rafter B at ¼ pitch. In order to have the cornices intersect level in angle at T it will be necessary to construct pitch of rafters A and B at T, which represents the outside of cornice, and crossing plumb line in Fig. 2 at the points 2 and 3. In this case it will lower the plate D 6 inches. Fig. 3 shows where a valley rafter crosses the plate X E. From T, Fig. 1, to center of gable on line M R in this example is 9 feet, and from T, Fig. 1, to line Y R is 5 feet. A line drawn from R to T will cross the plate X L in the point S, which is 5.336 inches from the angle X. If the rafter B was 8 x 12 feet pitch the plate D, Fig. 2, would be 4 inches lower than the plte C, and would cross the plumb line at the point 7, as indicated by the dotted lines.

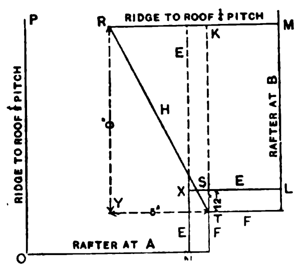


Fig. 1.—Plan of Portion of Roof.

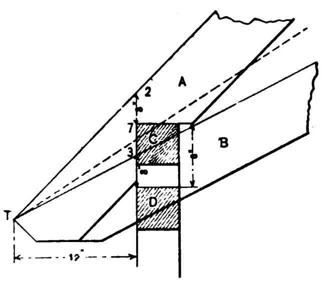


Fig. 2.—Vertical Section, Showing Rafters and Plates.

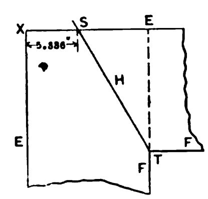


Fig. 3.—Enlarged Plan of Projection of Cornice.

Cuts of Valley Rafters in Roof Having Two Pitches.

Architects and the Roofing Question.

From J. L., *Peterstown, W. Va.*—It seems to me that architects nowadays, with their pretty plans and beautiful pictures of houses, have little or no regard for the roofs of the buildings which they design. The roof of a house is certainly admitted to be, next to the foundation, the most important part of the structure. Now, with the complicated plans of attractive buildings, it seems to me that the rafters of the roof might be fixed so that the bulk of the rain will not run to the front of the house. Water barrels in such a location are unsightly and a cistern entirely out of place. The writer was recently called to do a job of spouting on such a building as described, and in order to make the work satisfactory he had to put in more unsightly outlets and downfalls in front of the house than he would have done if the roof had been properly constructed.

Design of Cottage Wanted.

From C. C. D., *Rantoul, Ill.*—Will some of the readers of the paper give plans for a cottage complying as nearly as possible with the following conditions: Lot, 50 feet frontage. A parlor, sitting room, dining room, kitchen, pantry, built in refrigerator and one bedroom on the main floor; two bedrooms on the second floor, bathroom either upstairs or down. I want something suitable for families of moderate means who keep no servants. There is a class of buildings on which architects do not care to spend their time for the small amount this class of builders would wish to pay in the way of commissions, and I should like to see more space if possible devoted to it.

Framing a Deck Roof.

From C. W. F., *Annapolis, Cal.*—I have been a constant reader of *Carpentry and Building* for several years, and must say that without it I would not amount to much as a carpenter, living as I do in the backwoods—far from any town or person to instruct me in any way. I am free to confess, however, that I have done some good work and mastered some very knotty problems, which I could not have done without *Carpentry and Building*, so I say, "Long live *Carpentry and Building*." I wish some reader would furnish a design of the frame work for a deck roof, clearly showing how the deck is framed and covered.

How Many Shingles in a Bundle?

From E. W. B., *Auburndale, Mass.*—In looking over the June issue of the paper, immediately upon its receipt, I found a slight error in the figures in the article entitled "How Many Shingles in a Bundle." In the sentence, "The bundles of shingles received in this section consist of 23 courses on one side and 21 courses on the other," it should read "23 courses on the one side and 24 on the other," thus making a total of 47 courses, 20 inches wide, or five shingles to the course, thus making the total 235, as stated. In order to be full measure a 20-inch bundle should contain 25 courses at each end. Can any of the readers tell why the bundles are not full measure?

Damp Proofing of Foundation Walls.

One of the questions constantly confronting the builder in connection with the construction of the foundation walls of a dwelling is that of preventing dampness penetrating to the interior. The successful accomplishment of this means a dry cellar and a building which is much more healthful and durable as a place of abode. There are several methods of preventing dampness in buildings, some of which have been illustrated and described in previous issues of the paper, but a short account of how the work is to be done in connection with new buildings erected in New York City, under the provisions of what is known as the "Tenement House act," may prove interesting. The Tenement House Department has recently issued through Robert W. De Forrest, commissioner, a circular calling the attention of owners, architects and builders to the provisions of the act in question in regard to the damp proofing and water proofing of foundation walls and cellar floors of new buildings. After quoting the particular section of the act referred to, the circular says:

In order to enable those who so desire to proceed with the construction of foundation walls and cellar floors without application to the Tenement House Department, in regard to damp proofing, the following general regulations on this subject have been adopted:

The walls and cellar or lower floors of tenement houses shall be made damp proof and water proof by the following method, unless application be made, in writing, to the Department for a special examination of the soil, and the Department decides, after said special examination, that the soil condition is such that this method of damp proofing and water proofing is not necessary. This decision will be evidenced by a certificate to that effect.

FOUNDATION WALLS.

There shall be built in with the foundation walls, at a level of 6 inches below the finished floor level, a course of damp proofing consisting of not less than two ply of tarred felt (not less than 15 pounds weight per 100 square feet), and one ply of burlap, laid in alternate layers, having the burlap placed between the felt, and all laid in hot, heavy coal tar pitch, or liquid asphalt, and projecting 6 inches inside and 6 inches outside of the walls.

There shall be constructed on the outside surface of the walls a water proofing lapping on to the damp proof course in the foundation walls and extending up to the soil level. This water proofing shall consist of not less than two ply of tarred felt (of weight specified above), laid in hot, heavy coal tar pitch, or liquid asphalt, finished with a flow of hot pitch of the same character. This water proofing to be well stuck to the damp course in the foundation walls. The layers of felt must break joints.

CELLAR FLOORS.

There shall be laid, above a suitable bed of rough concrete, a course of water proofing consisting of not less than three ply of tarred felt (not less than 15 pounds weight per 100 square feet), laid in hot, heavy coar tar pitch, or liquid asphalt, finished with a flow of hot pitch of the same character. The felt is to be laid so that each layer laps two-thirds of its width over the layer immediately below, the contact surface being thoroughly coated with the hot pitch over its entire area before placing the upper layer. The water proofing course must be properly lapped on and secured to the damp course in the foundation walls.

The method illustrated in Fig. 1 is what is required by the Department in the case of brick walls. The method shown in Fig. 2 will be accepted in the case of stone walls, and in the case of brick walls under special circumstances.

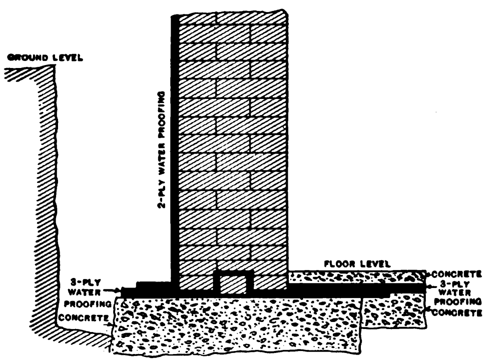


Fig. 1.—Method Employed in Connection with Brick Walls.

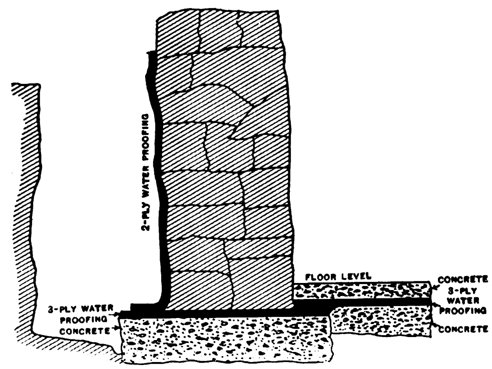


Fig. 2.—Damp Proofing in Connection with Stone Walls.

Damp Proofing of Foundation Walls in New Tenements in New York City.

How to Select and Use Oil Stones.

It is generally conceded that one of the most important articles in a carpenter's kit of tools is a thoroughly reliable oil stone, for it is well known that in order to do good work a mechanic must have keen edged tools and must keep them in that condition. It is not every mechanic, however, who fully understands how to select the best stone for the purpose, or, after securing one, how to employ it in a way to produce the most satisfactory results. Bearing upon these points are some very timely suggestions contained in a little pamphlet recently issued by the Pike Mfg. Company of Pike Station, N. H. It contains so much of value along the line indicated that we reproduce herewith their comments on the question of selecting oil stones and also what they have to say in regard to the proper method of using them:

The first point to be considered in selecting an oil stone is the purpose for which it is required. Many mechanics make the common mistake of expecting one oil stone to answer all purposes. It would be just as reasonable for a carpenter to use a coarse tooth saw on fine cabinet work as to expect a coarse grained, fast cutting oil stone to impart a fine razor edge.

The kind of an edge imparted by a stone depends upon the size of its grains of grit, or crystals. In a coarse grit stone these grains are large, and cut deep, far apart furrows in the tool, leaving a coarse, rough edge. Such stones cut away steel faster than a fine grained stone (as a coarse tooth saw cuts faster than a fine tooth). The coarse edge left by such a stone is all right for working pine or soft woods in which the cells are large, but for working hard wood, or for any kind of fine work, the tool should be finished on a finer grained stone.

It is therefore safe to lay down the rule that a good mechanic should have at least two oil stones, one for grinding down dull tools or imparting a coarse edge and another for finishing. There are some stones of medium grit which answer well for many purposes, but they cannot cut as rapidly as the coarse stone nor impart so smooth an edge as the fine. A carefully selected Washitá stone is the best general purpose oil stone for all around use.

The hardness of an oil stone is also an important factor in determining its cutting qualities. For sharpening ordinary tools with broad blades or edges a medium soft, fast wearing stone should be chosen. For sharpening narrow chisels, engravers' tools or pointed instruments, however, it is necessary to use a very hard stone, as otherwise the stone will soon be cut full of grooves or furrows.

Regarding the proper use of oil stones, the pamphlet contains the following:

In the first place, it should be borne in mind that a good oil stone can be ruined by improper usage or lack of care. Many stone are condemned when the fault lies either in not having selected the right stone for the work or in not having taken proper care of it. The mechanic who expects one oil stone to grind down his dull nicked tools and at the same time impart a keen, razor edge, using any kind of oil that happens to be at hand, leaving the dirty oil on the stone to dry in, leaving his stone around in the dust and dirt of the shop, will never have a good oil stone and does not deserve one.

No sensible carpenter will think of using other tools in this way, yet many of them treat their oil stones in just this manner. Many times have we seen oil stones returned to dealers with the complaint that they would not "cut," when, as a matter of fact, they were completely coated or varnished with dried, dirty oil and steel dust, in such a manner that the tool could not possibly come in contact with the grit or "teeth" of the stone.

There are three objects to be attained in using and caring for an oil stone: First, to retain the original life and sharpness of its grit; second, to keep its surface flat and even; third, to prevent its glazing.

To retain the original freshness of a stone, it should be kept clean and moist. To let an oil stone remain dry a long time or expose it to the air tends to harden it. A new stone should be soaked in oil for several days before using, and if kept in a dry place (most of them are) it should be kept in a box with closed cover and a few drops of fresh, clean oil left on it.

To keep the surface of an oil stone flat and even simply requires care in using. Tools should be sharpened on the edge of the stone, as well as in the middle, to prevent wearing a trough shaped depression. It is impossible to prevent a stone becoming slightly hollowed with long usage, but this can be remedied by grinding the stone on the side of a grindstone, or rubbing it down with sandstone or an emery brick.

To prevent an oil stone glazing the user must first understand what causes a stone to glaze. This can best be explained by showing why oil and water are used on sharpening stones and how they should be used.

The words "oil stone" have come to be applied to all stones used for sharpening mechanics' tools, from the fact that it is necessary to use oil on most of them for two purposes: First, to prevent the stone from heating the tool, which draws its temper and ruins the best tool instantly; second, to keep the particles of steel ground off the tool from entering the pores of the stone, which would soon fill them up and cause a glazed surface.

Most coarse grained and all soft stones can be used successfully with water, although they may be generally termed oil stones. On such stones water should be used plentifully to carry off the powder rubbed up by the tool. Most water stones are quick cutting and leave a coarse edge, but a much finer edge can be procured on the same stone by using just enough water or oil to rub up a paste. This paste when kept on the stone will give a finishing edge, but should be thoroughly cleaned off before putting the stone away.

Fine grained, hard stones, like the Washita, Arkansas and Turkey, should always be used with oil, as water is not thick enough to keep the steel out of the pores. The dirty oil should always be wiped off the stone thoroughly as soon as possible after using it. This is very important, for if left on the stone the oil dries in, carrying the steel dust with it, and thus soon causes the stone to glaze. Cotton waste is one of the best things to clean a stone with and is nearly always to be found in a shop. Some carpenters use shavings, but they are very apt to leave the stone full of dust. A common clean rag would be better.

The Summer Porch.

The piazza should have a thoroughly practical way for illuminating it on dark nights, says the July *Delineator*, with special care paid to entrance steps. If gas or electricity cannot be introduced in a substantial wrought iron lantern, a picturesque brass lamp to hold oil may be substituted. The better made Japanese paper lanterns may always be turned to for festive occasions and for a decorative feature. The privavy of the porch should be insured by the early planting of annual vines until hardy ones can be depended upon for shade. The Japanese screens and awnings are further means for inclosing the sides of piazzas. The former have proved so helpful that they are now made in colors to match the house, instead of being confined to the original varnish of the bamboo. Special colored flower holders may be selected.

CONTENTS.

STONE AND FRAME COTTAGE OF MR. CHARLES H. HESS, ON PRICE HILL, CINCINNATI, OHIO.

JOHN P. STRIKER, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JULY, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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AUGUST, 1902.

The Rights of Employers.

An interesting and important decision bearing on the rights of employers and employees was recently handed down by the Supreme Court of Wisconsin. The decision declares that a State law which prohibits any employer from discharging anybody because he belongs to a labor organization is contrary to the employer's constitutional rights and is therefore void. The Wisconsin Court recognizes the right of the workman to combine in a labor organization, and also his right to refrain from joining such an organization. In other words, the workman is regarded as master of his own labor, and he may sell it to whom and under what conditions he pleases. The same doctrine, however, is held to apply to the employer, and the Court points out that if any employer's liberty as to whom he will hire, and under what conditions he will hire him, be curtailed by legislation, the similar fundamental liberty of the laborer can likewise be curtailed and he may be compelled to work against his will for persons, or under conditions, unsatisfactory to him. If an employer can be punished for refusing to employ union labor, the union employee can logically be punished for leaving work in obedience to his union. The right to employ, or be employed, the Court holds, is equal, and neither is subject to legislative restriction. Therefore, the law forbidding an employer to follow his own will in the choice of workmen and employ union or nonunion men at his pleasure, is set aside as violating his primary rights under the Constitution. This decision is of peculiar interest, as several States have such laws on their statute books. For example, in the New York Penal Code there is a law which makes it a misdemeanor, punishable by not more than six months' imprisonment and $200 fine, to compel any person to agree not to join a labor organization as a condition of securing or continuing employment. It is not unlikely that the constitutionality of this law may now be tested. Several similar laws have been set aside in New York State within the past few years, and the section of the code making it a misdemeanor to dismiss employees for membership in a labor union, or to make nonunionism a condition of employment, is not unlikely to meet a similar fate, as it appears that its constitutionality has never been passed upon by a Court of Appeals.

A Half Year's Fire Loss.

The fire loss of the United States and Canada in the first half of the present year continues the heavy record which has characterized it during the last two or three years, amounting to no less than $87,105,850, or an average of over $14,000,000 per month. The losses for the corresponding period of 1901 amounted to $88,926,150, and in the first six months of 1900 to $103,298,900. While the figures for 1902, so far, are slightly better than those for the corresponding period of last year, when the total was materially swollen by the great conflagration at Jacksonville, as the record for the preceding year was enlarged by the Hoboken disaster and several unusually great fires which occurred in that period, the present year's losses are deplorably great. The continuance of such heavy losses, in spite of all the efforts of the fire departments, with their modern equipment, is a fact to be lamented. That between $150,000,000 and $200,000,000 worth of property is wiped out annually by fires, many of which must have been preventable, should secure some action by the city authorities and the fire insurance companies, with a view to the stricter enforcement of building laws and the encouragement of a more extended use of fire proof materials in the construction of new buildings. The past few years have been disastrous ones for the fire insurance interests, and it would seem to be time for those companies to exercise a stricter supervision, not only in their own interests, but also in the interests of the different communities in which they do business. A number of the weaker fire insurance concerns have gone under in the past two or three years by reason of their heavy losses; but those that are left are surely strong enough to carry out any salutary measures that may be decided upon in the interests of more effective fire protection in American cities and towns.

Plan for Government Arbitration.

Instigated thereto by the present strike in the coal mining industry, Representative McDermott of New Jersey introduced at the late session of Congress a bill to authorize the appointment of boards of investigation and arbitration, for the purpose of adjusting labor disputes. The bill authorizes the President, when informed by petition or otherwise of the existence of a strike, to appoint a board of investigation and arbitration, to be composed of seven members, of whom one shall be selected by the employers and one by the employees. The commission is empowered to investigate and obtain a comprehensive account of the matters in dispute, and it is provided that the report of each member of the board upon the justice of the demand of each party to the dispute shall be made to the President. Upon submission of any matter in dispute, as authorized by the bill, the board will consider the testimony offered by the parties and give judgment upon all matters submitted. Every such board will terminate its life upon the filing of its report upon the matter referred to it. Under the Constitution the Federal Government has no power to cause arbitration of purely local labor disputes in the different States; but Mr. McDermott believes that the Constitution is broad enough in the delegation of authority to Congress and the Executive to permit of investigation and to provide a court of arbitration in any matter that affects commerce between the States, such as the present coal strike, which seriously affects business interests in all parts of the country.

Acetylene Gas for Lighting Houses.

The adaptability of acetylene gas for lighting dwellings and other buildings so situated as to render its use more convenient or economical than other forms of illumination has drawn to it a great deal of serious attention on the part of house owners, particularly in the rural districts, as well as manufacturers of apparatus for generating the gas. In fact the results accomplished in this field hav... en such as to appreciably stimulate the production of acetylene gas apparatus with a view to meeting all reasonable requirements. Leading manufacturers have from time to time met for the consideration of matters pertaining to their line of business and for the discussion of papers prepared by different members, covering not only scientific construction and operation, but also methods for extending the sale of apparatus for generating acetylene gas for illuminating buildings from the small suburban cottage to the largest hotel. At the convention of manufacturers of acetylene goods to be held in Chicago the middle of August increased interest will doubtless attend the discussion of the lighting by this medium of small towns and villages. Reports indicate that not only has the carbide from which the acetylene is generated been produced in larger quantities, but also that the demand has shown a magnificent increase. This is largely due to the satisfactory operation of acetylene apparatus, whether small lamps for reading tables or generators and systems for residences and hotels, as well as the more extensive plants for lighting whole villages. The simplicity of operation, the ease of management and the satisfactory character of the illuminant have been so fully demonstrated that the period of introduction seems to be practically past and the natural demand, due to the excellence of acetylene gas, is repaying all who have expended effort and shown enterprise in this branch of industry.

Membership in the National Association of Builders.

The secretary of the National Association of Builders, William H. Sayward of 166 Devonshire street, Boston, Mass., has recently issued the following announcement to all constituent bodies and to all organized bodies of builders throughout the United States:

The National Association of Builders has decided to revive its annual conventions.

At a preliminary meeting, held at Washington, D. C., in the month of March, the Executive Committee was instructed to issue a call for a convention, to occur during the month of October of the present year, in the city of Washington.

In anticipation of this event, advance notice is hereby given, not only to all constituent bodies of the National, but also to all organized bodies of builders throughout the country, in the hope that many of them may wish to become connected with the National body.

Following the ideas embodied in the resolutions adopted at the last convention (held in Milwaukee, Wis., in February, 1899), a change is made in the method of representation in the National Association—to wit.:

Any local association of builders which comes within the requirement of our constitution, and is, or desires to become, a constituent body of this association, may be represented at conventions and other meetings in the following manner: Each such body may authorize as its representatives in the conventions and other meetings of the National Association, such of its members as may be willing to pay a yearly assessment of five dollars ($5) into the treasury of the National Association to defray running expenses; such group of representatives having the right to cast the votes to which the local body may be entitled under the constitution of the National Association.

A copy of the constitution of this association is herewith enclosed.

Should your association desire to be represented at the coming convention I should like to know of the fact as soon as practicable, in order that I may proceed with preliminary arrangements understandingly.

THE Board of Supervision appointed by Governor Nash of Ohio to have charge of the grouping of Cleveland's public buildings consists of John M. Carrere of New York, D. H. Burnham of Chicago and Arnold W. Bruner of Washington. The Cleveland Chamber of Commerce recommended to the City Council the appointment of these men and the council unanimously passed the resolution asking Governor Nash to name them.

The Manufactures and Textiles Buildings at the St. Louis Fair.

The design of the Manufactures Building at the Louisiana Purchase Exposition, to be held at St. Louis in 1904, is Corinthian in style, with a frontage to the north of 1200 feet and a depth of 525 feet on the main boulevard. The architects, Carrere & Hastings of New York City, have designed imposing entrances at the centers of the main façades and have placed a tower 400 feet high at the angle of the main elevation facing north. The roof has been so designed as to give ample light and ventilation and at the same time avoid the extensive and troublesome skylights frequently used on structures of this size and kind. Each *façade* of the building presents an open colonnade, affording a passageway for visitors and at the same time there is a shadow relief that will increase the beauty of the design. The interior of the building has been laid out with courts of simple and pleasing proportions, with sufficient decoration to relieve the uniformity of the inclosing walls. The cost of the building is placed at $850,000, and it will be one of the main structures situated at the entrance to the Central Boulevard of the Exposition.

While not the largest in area, the Textiles Building will be one of the most spacious structures in what has been called the main picture of the exposition. It covers an area 525 x 758 feet and will cost $375,000. The principal entrances to the building are on its axis, and somewhat resemble the form of a triumphal arch. The four elevations are harmonious in character, being varied only as required to accommodate the design to the general ground plan. The design is of the Corinthian order, the liberal use of architectural sculpture lending a festal character to the otherwise somewhat simple classical *façades*. The screen wall back of the colonnades gives opportunity for a liberal display of color as a background for the classic outlines of the Corinthian columns, which opportunity is effectively improved by the mural decorator. The architects of this building are Eames & Young of St. Louis.

Building in Chicago.

The high prices of building materials are said to be the cause of lack of work by Chicago architects, who state that much work is being deferred until prices are lower. From every indication it would appear that the time of beginning construction is very remote, says the *Construction News*. It is not believed that prices will be lower for maybe years to come. Good evidence of this is to be found in the present active state of the steel market. Notwithstanding the activity of the market last year, when it was thought it had reached the highest point, so far as output was concerned, the output for the first half of this year has been stupendous, and there is not the slightest indication that there will be any let up for many months to come. Construction is going on at an unprecedented rate in all parts of the country, and as one class of buildings makes a demand for another class it is believed that it will continue for many years. Prosperity is not an unknown thing in this country, but it is simply that the memory of the people is so short that they soon forget a long period of depression or a long period of prosperity, and taking the immense development of this country into consideration, there is no reason why any one should express amazement at the present prosperous condition of the building trade or doubt for a minute that it will continue for a long time.

THE new 12-story hotel which is to be erected at the corner of Seventieth street and Broadway, New York City, was designed by Harry B. Mulliken and is of the modern French Renaissance style of architecture. It will be constructed of red brick and limestone, and will contain 110 suites, it being intended both for family and transient purposes. It will be equipped with heating, lighting and power plants, and will cost about $650,000. It will occupy a plot 100 x 100 feet, and is expected to be ready for occupancy by the first of next February.

DESIGN FOR A SOUTHERN RESIDENCE.

WE present herewith illustrations showing elevations, floor plans and constructive details of a frame residence erected not long since at Hopkinsville, Ky. Typical of the Southern home, a broad hall extends through the center of the building, with rooms at the right and left, and on the first floor is a sleeping room opening directly from the living or family room. An examination of the floor plans shows on the main floor parlor, dining room, kitchen, family room and bedroom, with capacious hall at the front of the house of such size as to readily adapt it for use as a reception room. On the second floor are three sleeping rooms, with hall extending the entire depth of the building, lighted at one end by a window and at the front a door opens upon a small balcony. The hall of this floor at the front of the house is of such size as to be utilized for a sewing room if desired.

According to the specifications of Architect James L. Long of Hopkinsville, Ky., the foundations are of stone, laid in mortar composed of one part Louisville cement and two parts sand. All main walls are 14 inches thick and the porch piers 12 inches thick. The framing timbers are of oak. The sills and girders are 6 x 10 inches; the posts, 4 x 6 inches; the studding, 2 x 4 inches, placed 16 inches on centers; hip and valley rafters, 2 x 8 inches; first and second floor joist, 2 x 10 inches, also placed 16 inches on centers; porch sills, 4 x 8 inches; porch joist, 2 x 8 inches; porch roofs, 2 x 4 inches, placed 24 inches on centers; collar beams and ceiling joist, 2 x 6 inches. The frame of the house is covered with pine sheathing, on which is placed yellow poplar bevel edge weather boarding laid 4½ inches to the weather. The entire roof is covered with Cortright Metal Roofing Company's 10 x 14 shingles, while the front and rear porches are covered with Taylor's Old Style flat seam roofing. The porch floor joist have a pitch of ¼ inch to the foot from the building, the flooring being of yellow pine, tongued and grooved and secret nailed. The front porch has a 5 x 10 inch boxed lintel, with turned fluted columns and caps with neat balustrade. The porch is ceiled with 3¼-inch strips of poplar. The floors of all the rooms on the first and second floors are covered with pine flooring not over 3¼ inches wide, and laid with close joints.

All inside finish is of oak and pine, the base for the first floor being 10 inches and for second floor 8 inches, with quarter round at the floor. The parlor, dining room, hall and family room have parquet floors of oak, while pine is used for the finish in the kitchen and the bedroom on the first floor. The walls of the bathroom and kitchen are wainscoted 5 feet high with ⅝-inch pine ceiling, finishing with a molded cap. All exposed parts of the main stairway are of oak. The landing newels are 5 x 5, and the treads and risers are housed into the wall string. All interior wood work has one coat of hardwood paste filler and two coats of Berry Bros.' hard oil finish.

The walls and ceilings of the house are covered with O. K. cement plaster mixed in the proportion of 100 pounds, or one sack, of cement to seven buckets of clean, sharp Ohio River sand. The second coat was composed of equal parts of cement and sand, troweled to a smooth surface, all plastering being finished to the floor.

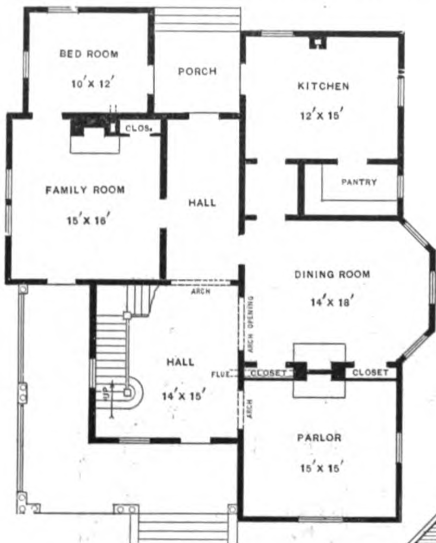
All exterior wood work, including porches, floors and ceilings, is treated with three coats of linseed oil and white lead, while the tin roofing, gutters, valleys, porch cap and cresting have one coat.

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

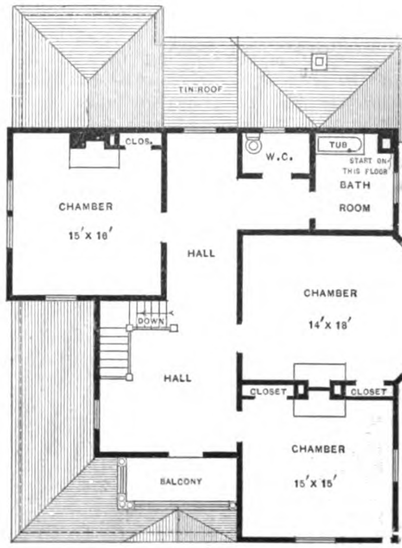
Design for a Southern Residence.—James L. Long, Architect, Hopkinsville, Ky.

The bathroom is equipped with a 5½-foot white enamel roll rim tub of French pattern, with nickel plated fixtures.

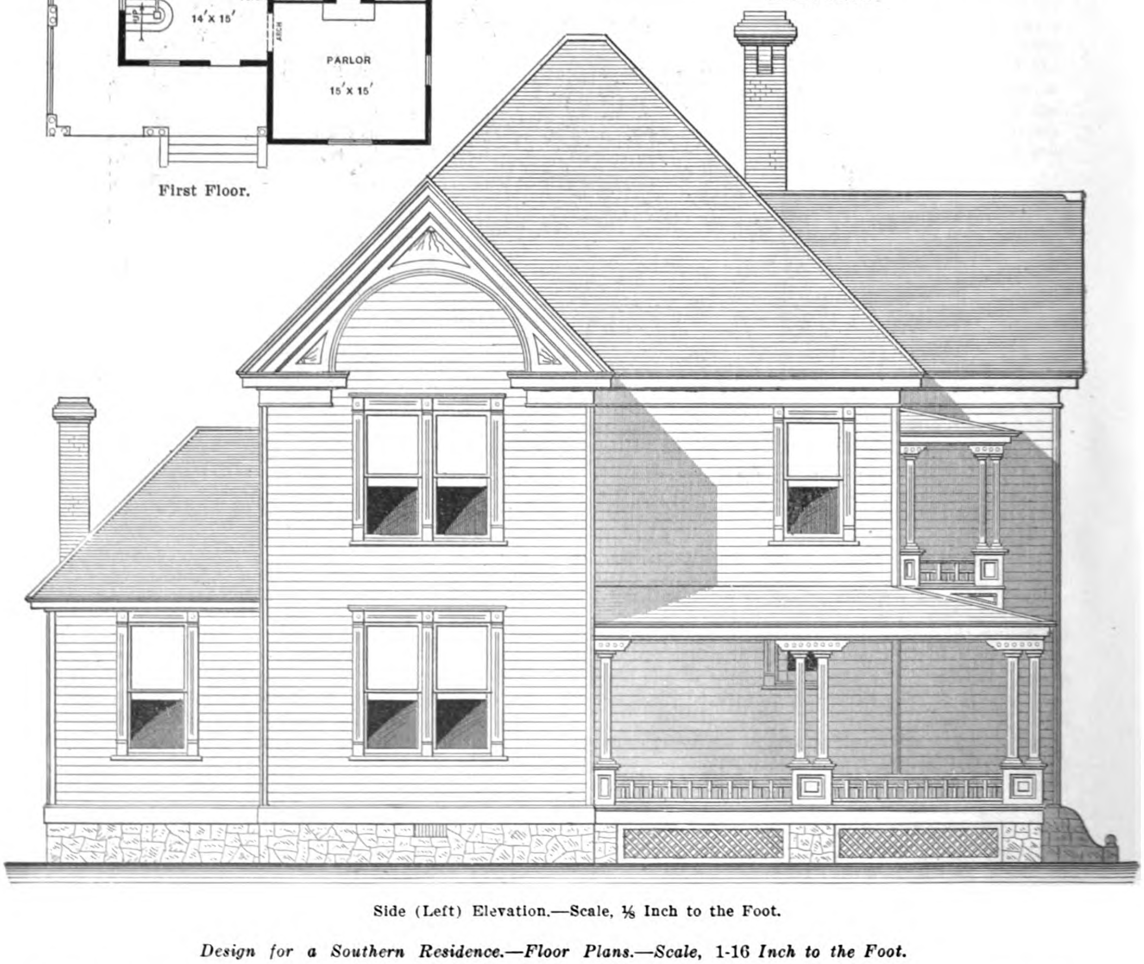
The contract for erecting the house was executed by the Dagg Planing Mill Company of Hopkinsville, Ky., for the sum of $2500.



First Floor.



Second Floor.



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

Design for a Southern Residence.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

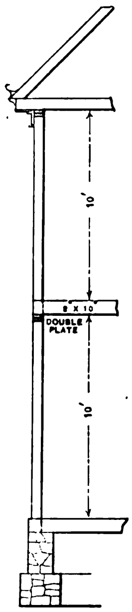
New Hospital for Pittsburgh.

The new hospital which is to be erected in Pittsburgh, Pa., by the trustees of the Jewish Hospital Association will occupy a plot fronting 200 feet on Reed street and having a depth of 127 feet. The structure will be of brick, with stone trimmings, and will be three stories, with basement and attic, in hight. It will be arranged in three divisions, the two wings connecting with the administration building in the center by means of corridors. The structure has been planned with a view to future addition of two more wings whenever circumstances require. The main hospital entrance leads into a large rotunda facing the main stairs and passenger and bed elevators. At one side are located rooms for the superintendent and trustees, while on the other side is the doctor's office and a reception room.

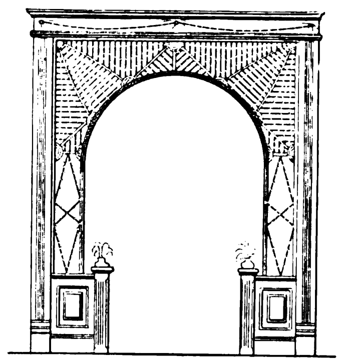
The first-story wings are devoted to the male and female medical wards respectively, each facing south, with windows on all three sides and having a solarium at the ends of each. At the north ends of the wards are the various bath and toilet rooms. Each ward is equipped with separate diet kitchens for local preparations, and also each with a nurse's or caretaker's room, all directly accessible from the wards. Each ward is approached by a short corridor with doors, so as to form a small vestibule before entering the ward proper. This is for the purpose of insuring isolation and consequent perfect quiet for the patients. At one side of these vestibules are located linen closets and dumb waiters for bringing up food and also separate enameled metal lined chutes for soiled linen and for dust, thus permitting of direct transmission to receptacles in the basement. The second and third floors are arranged much the same as the one just described.

In the front half of the administration or center building is located the main operating room, with large bay window and skylight, and with an etherizing and recovering room at one side and an antiseptic room at the other. In the basement one wing is entirely devoted to a public dispensary, containing large waiting room and four doctors' clinic rooms for medical, surgical, eye and ear, and nose and throat cases respectively. In connection with the dispensary department there is an emergency operating room. The other wing of the basement is devoted exclusively to the culinary department and directly connecting with the kitchen is a large serving room, this communicating directly with the dumb waiters for conveying food to the various wards.

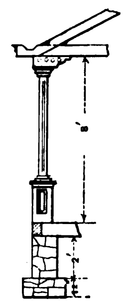
The interior finish of the building will be of hard wood, with plain, smooth surface, to avoid crevices for dust and bacteria and to be reduced to the minimum in extent. All corridors, bathrooms, operating rooms, &c., are to have vitreous tile floors and glass tile wainscoting, and all plastered walls and ceilings in all wards are to have porcelite or similar enameled white walls to enable thorough cleansing with antiseptic liquid at regular intervals. The architect of the building, Simeon B. Eisendrath of New York City and Chicago, has had wide experience in the erecting of public institutious in various parts of the country.



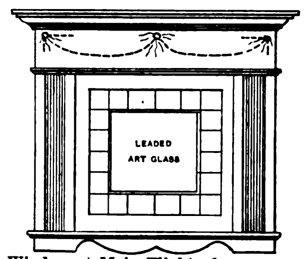
Section Showing Hight of Stories.—Scale, ⅛ Inch to the Foot.



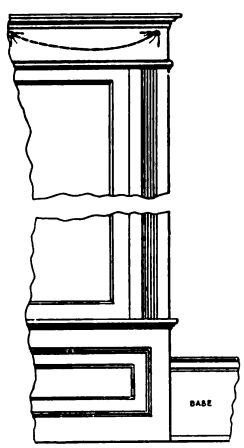
Elevation of Grille Work Between Main Hall and Dining Room.—Scale, ⅜ Inch to the Foot.



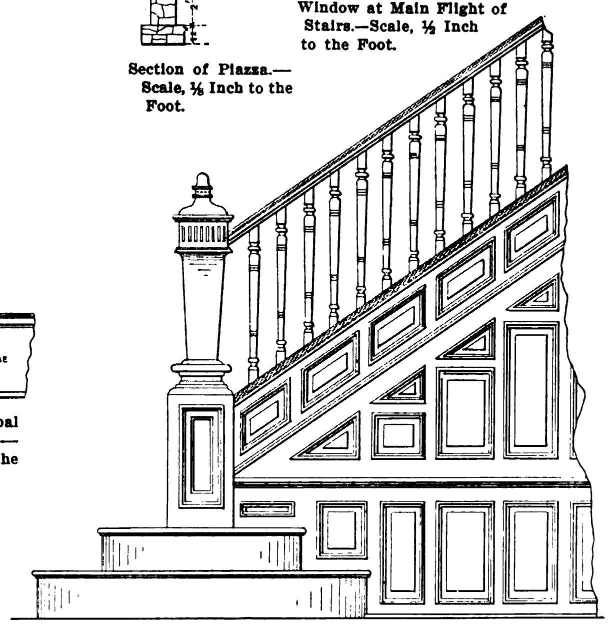
Section of Piazza.—Scale, ⅛ Inch to the Foot.



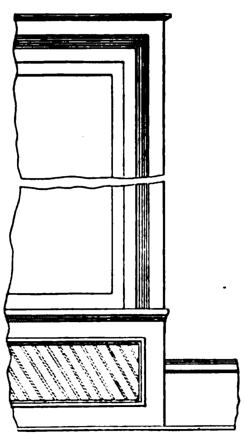
Window at Main Flight of Stairs.—Scale, ½ Inch to the Foot.



Detail of Trim in Principal Rooms on Main Floor.—Scale, ½ Inch to the Foot.



Elevation of Main Stairs.—Scale, ½ Inch to the Foot.



Detail of Window Trim and Base in Kitchen, Bedroom and Second Floor.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of a Southern Residence.

New Buildings at West Point

Before the recent adjournment of Congress an appropriation of $5,500,000 was made for important improvements at the United States Military Academy at West Point. It is intended to remove the dilapidated buildings at that place and erect in their stead modern structures of attractive architecture and suitable equipment, and worthy in every way of the important functions which they are to subserve. The tentative plans have already been prepared by Prof. Charles W. Larned, after a study of the needs of the academy covering a period of four years, and it is now thought likely that they will be formally approved by the commission which is to superintend the construction of the work.

DOME OF THE NEW CHICAGO POST OFFICE.

(WITH SUPPLEMENTAL PLATE.)

THE building now rapidly approaching completion in the city of Chicago, which is to be used for post office and other purposes of the United States Government, is of a totally different design from the conventional Government structure to be found in the larger cities of the country. The main building is in the form of a Greek cross, each of the four arms being six stories high, the corners being filled to the hight of two stories. The structure consists of a steel frame work with a facing of granite. It fills an entire block, and from the center of the pile rises a dome of imposing proportions. A noteworthy point in the construction of the building was reached a short time ago when the frame work of the dome attained its full hight. This is the stage reached at the time the photograph was taken from which was made the half-tone engraving forming our supplemental plate this month.

The total quantity of steel used in the construction of this building was about 10,000 tons, of which the approximate quantity used in the dome was 1200 tons. The frame of the dome is of truss construction, each truss carrying three floors. Four trusses of 20 tons each and eight plate girders of 10 tons each were utilized. The size of the beams used in the dome ranged from 5 to 24 inches. The hight of the dome above the roof of the main building is 167 feet 9 inches. The perpendicular hight of the arch line is 76 feet 6 inches. The distance from the ground to the top of the dome is 295 feet 4 inches. The diameter of the dome at the widest part is 94 feet 2 inches. A flag pole 50 feet in hight extends above the dome. In hoisting the material for the construction of the dome a steam crane at the top was used, all material being hoisted through the center. The arches were raised in sections and assembled at the top. The dome will present a striking appearance not only by reason of its great size, but also because of its ornamentation. It will be covered with tile overlaid with gold leaf. Huge copper eagles will be used as a frieze at the base of the arch, each of which will be 16 to 18 feet high, with 23 feet spread between the tips of the wings.

The contractors for the erection of the frame work were originally the Hansell-Elcock Foundry Company of Chicago, Ill., and the J. G. Wagner Company of Milwaukee, Wis., who worked in co-operation with each other until the absorption of the latter company by the American Bridge Company, after which time the Hansell-Elcock Foundry Company had exclusive control of the steel construction.

The architect of the building is Henry Ives Cobb, recently of Washington, D. C., but now with offices in the Boreel Building, New York City.

CONSTRUCTING A GEOMETRICAL WINDING STAIRWAY.

BY MORRIS WILLIAMS.

WE will next take up the demonstration of the method of drawing the face molds and finding the bevels for each wreath piece, having reference to Fig. 6, which represents a plan of the center of the rail, the plan of the tangents and the elevation and pitch line of tangents. The pitch line of tangents in the figure indicates the same inclination to all the tangents, except the bottom and top ones, both of which are level—the one to connect at right angles with the newel, so as to form an easement, and the other to connect with the level rail of the landing. The bottom tangent is also shown at *b'* X to have an inclination equal to the other tangents, thus dispensing with the easement. We propose to demonstrate the method of constructing the wreath with and also without an easement. The uniform inclination of the raking tangents, as already mentioned, is essential to a correct management of the winding stairway, owing to the fact that it is the only arrangement which will guarantee a true helical curve for the rail and consequently equal lengths of the balusters. The plan in Fig. 6 indicates that the face molds for four pieces of wreaths are required—namely, for Blocks Nos. 1, 2, 3 and 4.

Let *n a b c* of Fig. 7 represent the outline, or plan, of Block No. 1, as shown in Fig. 6, and the curve *a c* represent the center line of rail for the bottom wreath. The tangent *a b* in Fig. 7 is a level tangent, while the tangent *b c* inclines, as shown at *b c'*. The elevation of these tangents is shown at *a' b'* and *b' c'*, in Fig. 6. To draw the face mold, proceed as follows: From *a* and square with *b c* draw the dotted line *a w*, and from *w* draw the dotted line *w a'* square to the raking tangent *b c'*. Now revolve the level tangent *a b* to *a'*, as shown by the dotted arc *a* Y *a'*. Connect *a' b*, which line represents the bottom tangent of the face mold, *b c'* representing the upper tangent. From *n* draw the dotted line *n d* parallel to the level tangent *a b*. Upon *d* erect the dotted line *d t*. From *t* draw the dotted line *t g* parallel to the level tangent *b a'*, and make it equal in length to *n d* of the plan. The line *t g* will be the minor axis.

Note here that the simple process of finding the minor axis consists in drawing a level line from the point *n* of the plan, which is the center from which the curve of the plan of rail is described, and erecting upon *d* the perpendicular *d t*, and drawing *t g* parallel to the level tangent *b a'*.

The line *d n* in the plan is a level line, because it is parallel to the level tangent of the plan *a b*, and the line *t g*, or the minor axis, is a level line, because it is drawn parallel to the level tangent *b a'* of the section. If the section in this figure is folded on the raking tangent *b c*, so as to cause the point *a'* of the face mold to rest or coincide with the point *a* of the plan, the minor axis would be over and above the line *n d* of the plan, thus proving that *n d* is the plan of the minor axis, and that both lines are level lines—the one of the plan and the other of the section. All points contained in the line *n d* will therefore have their elevation in the minor axis. Through *g* and square to the minor axis draw the major axis *g a'*. Make the joint *c'* square to the tangent *b c*, and the joint at *a'* square to the tangent *b a'*. The width of the mold at the joint *a'* is found at *x* X of bevel 2, and the width of the joint *c'* will be equal to the width of the plan rail as shown at the minor axis. This last feature is due to the minor axis being a level line. It should be borne in mind that owing to this fact the mold in every case is the same width as the plan at the minor axis. The curves of the inside and outside of the mold may now be described, either by means of string and pins, straight edge or trammel.

To find the bevels proceed as follows: With *w* for center, extend to touch the raking tangent *b c'*. Turn over to the ground line X Y, and connect with *a*. The bevel shown at *w* is to be applied to the end *c'* of the face mold. Again make *c* X equal to *d t* and connect X *n*. The bevel at 2 is to be applied at the end *a'* of the face mold.

In Fig. 8 is shown a method of developing the face mold when it is determined to run the rail without an easement to the newel. It will be noticed that *a b* and *b c* are the same plan tangents as shown at *a b* and *b c* in Fig. 6; also that the plan centers of rail in both figures coincide. It will be seen by reference to Figs. 1 and 6 that the bottom wreath covers a portion of the stairway containing the first five risers—namely, from the newel to the joint at *c*. Therefore the wreath in this

Continued from page 163 of July issue.

construction will follow the nosing of five risers, as shown from c' to x in the elevation of Block 1 in Fig. 6. This determines the hight of c' in Fig. 8 to be equal to the hight of four risers. From c' thus found draw the pitch line of tangents, as shown at c' b' X. It will equal in length and inclination the portion of the pitch line of tangents indicated in the elevation of Fig. 6 at c' b' x, where it is shown to have the same inclination as the remainder of the rail. Now, in Fig. 8, connect X a, which line represents the horizontal trace of the oblique plane, where the rail is assumed to rest, and the pitch line of the tangents c' b' X represents the vertical trace of the same. Note that the line in Fig. 7 corresponding to the line X a in Fig. 8 is represented by the bottom plan tangent b a and that this is due to the fact that the bottom tangent in Fig. 7 is a level tangent, whereas in Fig. 8 it inclines. In both figures the lines under consideration are level lines—that is, horizontal—and as all lines drawn parallel to these lines will also be level, they are usually designated as the directing ordinates of the plan, and are considered the primary lines in the development of sections of solids as applied to the science of handrailing.

The next line in importance in Fig. 8 is n b, which is a level line drawn parallel to the directing ordinate a X from the point n. The importance of this line is based on its being the plan of the minor axis of the ellipse, a angles to the minor. Make n' 1 2 3 on the minor equal to n 1 2 3 of the plan. The points 1 and 3 represent the width of the face mold on the minor axis. To find the width of the mold at the ends c' and a' it is necessary to find the bevel. Place one leg of the dividers at w and extend to k; revolve to d and connect d with a. The bevel is shown at d for both ends of the mold. Let it be remembered that this is always the case where the two tangents are equal in length and inclination. Draw the line z across the bevel at a distance from the ground line X Y equal to half the width of the rail. Now take the length d z and place it on both sides of c' and a' of the face mold, as shown at z a' z and z c' z. We have now found the width of the mold at both ends and at the minor axis.

To describe the inside and outside curves of the mold take a flexible piece of wood, which will bend to touch the points z 1 z for the inside curve and z 3 z for the outside curve. Make the joints at c' and a' square to the tangents c' b' and a' c' respectively. At the end c' it is also made square to the face of the plank; but as the end a' connects with the newel at an angle equal to the pitch of the tangents, it is evident that a bevel must be found for and applied to this end, which will secure a plumb butt joint with the newel. This bevel is shown at x in the elevation of Block No. 1 in Fig. 6. This condition of the tangents calls for an addition to the length of the wreath sufficient to work the joint so as to butt plumb with the newel. The additional length is regulated by the thickness of the rail.

This completes the development of the face mold, and right here it may not be out of place to emphasize

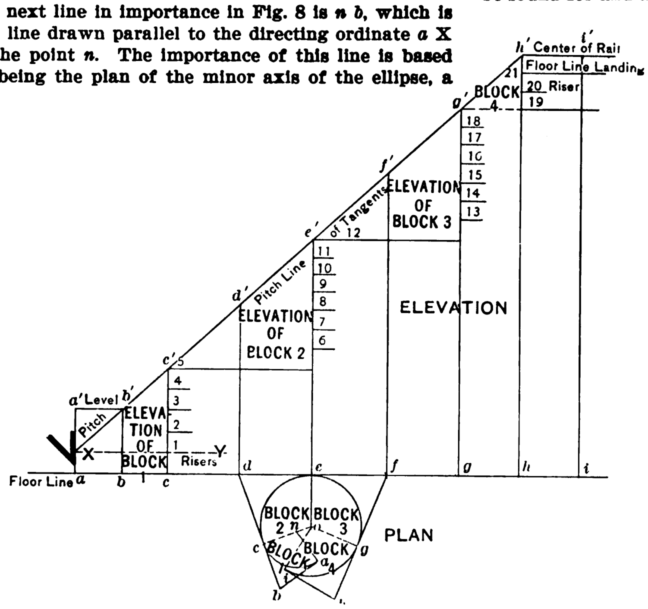


Fig. 6.—Showing Plan of Center Line of Rail, the Tangents Unfolded and the Pitch Line of Tangents.

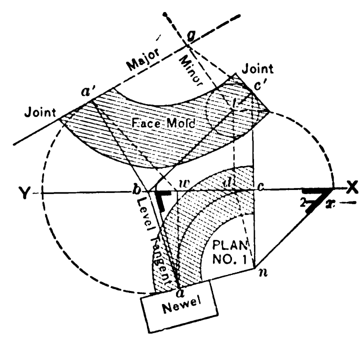


Fig. 7.—Bottom Face Mold of Block No. 1.

Constructing a Geometrical Winding Stairway.

portion of which ellipse constitutes the face mold. In this example it takes the position of a diagonal line of the base block, which is due to the raking tangents being of the same length and inclination. The same line, as shown at n d in Fig. 7, is shown to deviate considerably from being a diagonal of the base block, owing to the variation in the inclinations of the tangents, the bottom one being level and the upper one inclining. The rule in all cases, whatever position the tangents may assume, is to draw a line from the center of the plan parallel to the directing ordinate; the line thus drawn will in every case be the plan of the minor axis.

We will now proceed to find the minor axis, and let it be remembered that it is found on exactly the same principle as was its plan. First find a directing ordinate for the section which will stand over and above the directing ordinate of the base. To do this, draw a line from a in the plan to w. This line is always drawn square to the plan tangent b c. From w draw the dotted line w a' square to the raking tangents c', b', X. Revolve the bottom tangent b' X to a', as shown by the dotted arc X p a'. Connect a X, which will be the directing ordinate of the section. Now draw b' n' parallel to a' X, and make it equal in length to n b of the plan. The line b' n' will be the minor axis. Draw the major axis at right the importance to those who study the science of hand railing to thoroughly grasp the principles demonstrated in Figs. 7 and 8, the first being a demonstration of the method to develop a face mold for a wreath over and above a stretchout stringer containing an easement, and the second for a wreath connecting with the newel without an easement.

As an additional help to the understanding of every line in Figs. 7 and 8 we present two isometrical views, Figs. 9 and 10 respectively. By comparing Fig. 7 and Fig. 10 it will be an easy matter to understand the lines in Fig. 7 and the manner in which the easement is constructed in the wreath. The level tangent a b in Fig. 7 is shown to be also level in Fig. 10, as at a b, while in Fig. 9 the same tangent—that is, the bottom tangent a b' of the wreath—is shown to have the same inclination as the upper tangent, b' c'. In Fig. 10 the bottom tangent is shown to have been raised from y to a, while in Fig. 9 the bottom tangent is shown to incline to the point a from b', equal to the distance a n. The line b' n of Fig. 9 is a level line, and corresponds with the level tangent b a of Fig. 10.

The wreath in Fig. 9 will strictly follow the nosing of the four winders contained in the plan, while in Fig. 10 it will follow the nosing of only two winders, when it will take a level course to the newel, and therefore when joining the newel it will be the hight of two risers higher than if continued parallel with the nosing. This will necessitate an addition in the length of the newel equal to the hight of two risers.

In Figs. 9 and 10 every point and line is represented in its actual respective position. For instance, the raking tangents *c′ b′* and *b′ a* in Fig. 9 are shown over and above their respective plans, *c b* and *b a;* so also is the center line of rail *c′ a* over and above its plan *c a*. Again, the minor axis *b′ o′* is over and above its plan *b o*. The same is true of every line in Fig. 10. These figures should be carefully studied by the reader, as they contain the ground work of the science, and when once mastered the goal of the tangent system of handrailing is reached.

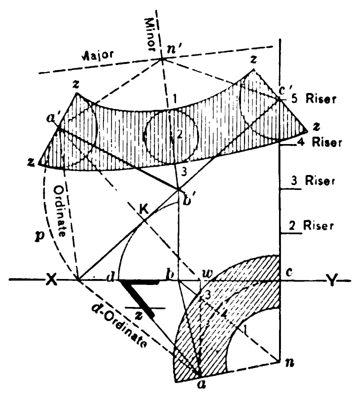


Fig. 8.—Method of Developing Face Mold when Rail Runs to Newel without an Easement.

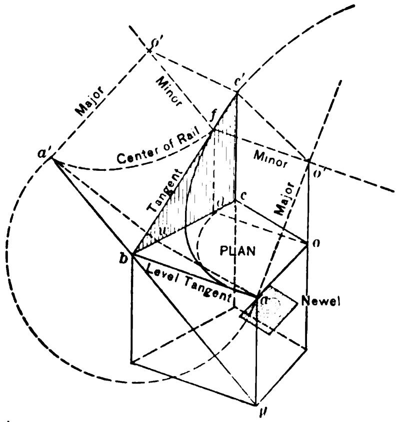


Fig. 10.—Isometrical View of Fig. 7.

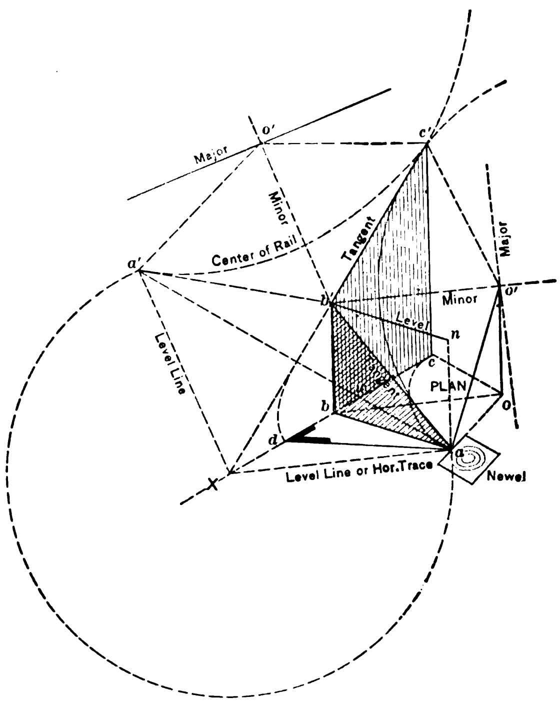


Fig. 9.—Isometrical View of Fig. 8.

Constructing a Geometrical Winding Stairway.

Saxon Building.

Our Saxon ancestors undoubtedly were far less skilled in architecture than those of succeeding ages; but it would be a mistake to suppose that their churches, even after the general adoption of stone and lime masonry, were mere rude, unadorned structures, says an English writer. Those specimens of their workmanship which remain to the present day evince that they certainly paid some attention not only to ornament in general, but even to sculpture: witness the tower of Barnack Church, Northamptonshire, and Sompting Church, Sussex. We can scarcely imagine that while much intercourse was maintained with the Continent, which assuredly was the case, art as then known and practiced there was less cultivated in this country than at the same period in Ireland, and the researches of Petrie have sufficiently established the fact that many of the ruins remaining in his country date much earlier than the Norman invasion of England, those edifices even now exhibiting much constructive skill and in many instances proving the care and labor employed upon their adornment. But in addition to any inferences we may draw, ancient writers actually bear testimony both to the opinion formed in their day of the early ecclesiastical edifices, and also to the attention and expense bestowed upon supplying them with whatever was considered necessary and appropriate for their sacred purposes.

Greek Craftsmen.

Throughout the history of art in every age its greatest workmen have, with very few exceptions, not been highly educated, but, according to our modern standard, ignorant, uncultivated men. The special excellence by which each workingman was individually known was art in workmanship; and thus in ancient Greece the very names of architects and artists indicate their artisan ability. The mythic centaur-artist Chiron was, in English, "Mr. Handy;" Cheirisophus, a carver of repute, was "clever handed." Then there were Eucheir and Eupalamus, each "good handed;" and the artist Chersiphron, the "handy minded," was one of the master workmen at the Ephesian temple of Artemis. These Greek names derived from handicraft are interesting in their difference from our own, which are all simple names, like Mason, Carpenter and Smith, Paynter and Wright, and in the second generation, like Benhadad, Mr. Smithson. There is no quality or excellence denoted; but in Greece the quality is most considered, not the trade.

The town of Altenberg, which is near Cologne, possesses a Cistercian abbey which, according to Schimmel, represents the same system of design that has been admired in the cathedral of Cologne. The severity of Cistercian treatment could not be overcome even in Germany, where at all times, owing to the plenitude of carvers, there was a tendency toward redundance of ornamentation. The building was commenced in 1255, and the beautiful choir was completed in the course of ten years.

A RAKING CIRCULAR CEILING.

WE have had the raking ceiling square in plan, showing the most difficult parts met with in the working of the several stones, and in the present problem we change it to the circular plan. The methods of laying out, making the patterns and working the stones are entirely different, requiring greater care on account of the curved and twisted surfaces. To enable the reader to thoroughly understand this problem it is necessary to know how to find a straight line equal in length to a curved one; also to construct a helix, as the soffit lines are helixes, and the coursing joints or beds helicoidal surfaces.

To find a straight line equal or nearly so to a curved line, we will suppose that it is required to find a line equal to A B C of Fig. 1. From O erect a perpendicular, touching the curve at B. Parallel to A C draw a line through B; then with A and C as centers and A C and C A as radii strike the intersecting arcs at X. From X draw a line through A and C, touching the line F H; then F H will be the line equal to A B C.

A helix is a line generated by a point moving over the plan of a cylinder, which is divided into the same number of parts as the hight, or, in short, it is a spiral around a cylinder. In order to more fully explain this, examine the plan and elevation. As the point moves from *o* to *l* in plan it raises from *o* to *l* in the elevation, and so on until it reaches the top. If we square over from the different points in elevation, raising lines from the plan to intersect them, and then draw a curve through the intersections, we have the helix. That is the way the coursing joint lines are drawn, taking care that the several divisions are properly placed.

To find the development of the concave and convex side of the course shown in elevation proceed as follows: In Fig. 2 make O 8 equal to O 8 of the plan by the method shown and explained in Fig. 1. Erect a perpendicular square with 8 O. Make 8 Y equal to W 7 of the elevation, as this distance is the drop or fall; connect O Y; make O I equal to W O of the elevation and the same with Y J; connect I J, and divide into convenient lengths. This represents the convex side development. In Fig. 3 make *a i* equal to the stretchout of the concave side *a i* in plan; let *i* K equal 8 Y of Fig. 2, then connect *a* K, and draw a line parallel to it, the width of Fig. 2. We have found how to raise a helix to enable us to reach the elevation and the stretchout and developments of both sides of the curve.

We will take one of the stones to cut as an example, as all the stones are worked by the same methods, except the springer and newel courses. In the plan let *b o e d* represent the plan of the stone marked L in elevation. The solid lines are the top arrises and the dotted the bottom. If we raise lines from *b*, *c*, *e*, *d*, &c., of the plan to cut the helixes in elevation, the joints can be located. The corresponding patterns for the sides are marked L in Figs. 2 and 3. It will also be noticed that the arch stone course P is inclosed by square lines, the reason being to reduce the stone to such a shape that the patterns can be applied and to scribe the coursing lines after the stone is cut to receive them, as shown in Figs. 2 and 3. In Figs. 4 and 5 are shown enlarged parts of the plan and elevation.

To find the back mold, or, as it is sometimes called, a face mold, the operation is as follows: Inclose *b*, *c*, *e*, *d* of Fig. 5 with the lines 1, 2, 3, 4; also inclose L of Fig. 4, as shown, by 5, 6, 7, 8. Draw 9 10 parallel to 5 7. From 9 and 10 raise lines as shown, making 10 11 and 9 12 equal to 3 2 of Fig. 5. Connect 11 with 12, thus giving the rectangle which contains the back mold. Now raise lines from *o*, *o*, *o*, &c., of Fig. 5 to touch the

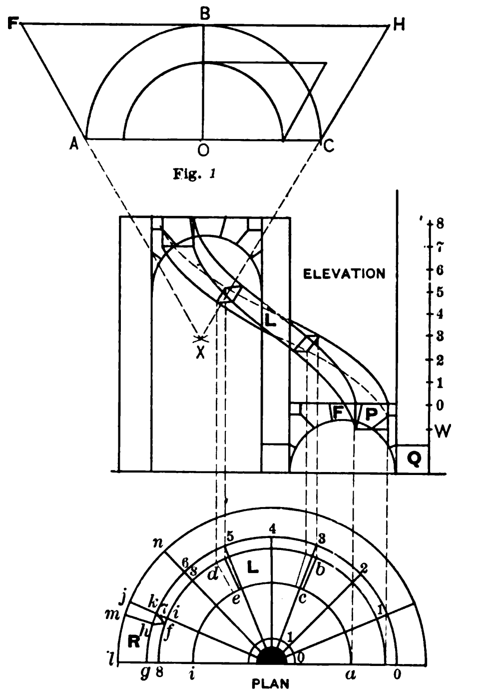
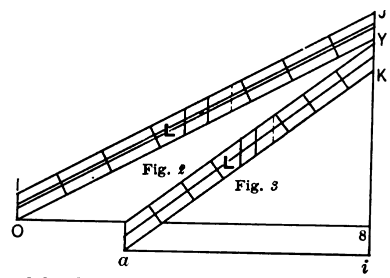
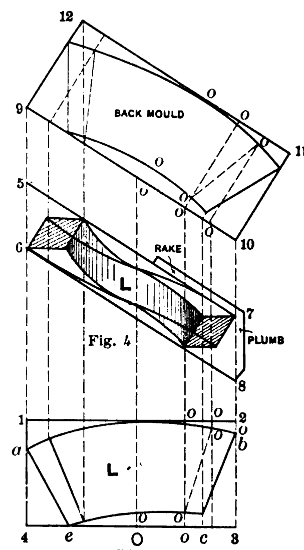


Fig. 1.—Plan and Elevation, Showing Method of Finding Length of Curved Line.



Figs. 2 and 3.—Concave and Convex Development of Course P of the Elevation.



Figs. 4 and 5.—Method of Making Back Mold and Rake Bevel.

A Raking Circular Ceiling.

line 9 10, as shown, and from these points erect perpendiculars. Transfer from Fig. 5 the several hights to these lines and draw a curve between them. The more points taken the truer will be the pattern

Cutting the Stone.

The size required equals the back mold and 5, 6, 7 and 8 of Fig. 4 have been transferred to Fig. 6 for convenience. First work one side if the stone is rough, as 9 10 11 12, which must be perfectly true. Apply the back mold; next work part of the edge 5 6 7 8 so that you can draw on the plumb line with a rake bevel taken from Fig. 4 and applied as shown in Fig. 6. When this is done apply the back mold on the opposite side, at the points Z, Z, after which we can cut the curved sides, which must be in plumb drafts, as shown by the dotted lines. After this is done apply the part of the developed pattern for each side taken from Figs. 2 and 3, the top and bottom being worked with radiating drafts. It would be well to have on the developed patterns numerous plumb lines. The stone can now be finished by trammeling the different joint lines and cutting to the required shape. The soffit can be worked with part of the curve taken from the joint at P. The stone when done will have the appearance shown in the elevation marked L.

To Cut the Springer Stones.

Let Q in elevation and R in plan represent the stone. It will be seen that the plan Q has been moved over

all the intermediate springing stones, as shown in Fig. 16.

These are obtained by taking the width from the plan, as *j i*, and the hights from the development in Fig. 7, as W O for *j m* in the enlarged section Y, Fig. 16, and W O^1 for *i f*, the letters on the pattern corresponding with the letters on plan. The pattern for X is Q on the elevation. After the molds are applied work the top by drafts across the ends, Fig. 9; then connect 6 9 by a line drawn with a flexible edge and work a draft to it. Finish by working it off in drafts that radiate to the center, holding the large blade plumb on the convex side. It would be well to mark on the plan pattern several radiating lines. Next trammel the width of the top, as *h m* of Fig. 16, which will give the line to cut the coursing joint, which can be reduced to its shape by using a bevel taken from Fig. 16 at *m h f*. After this has been done cut the ashlar marked U of Fig. 9 and the soffit last.

For the intermediate stones the pattern of the plan *m h f n s* will give the size, and it would be well to mark every line on it. The stone next to S, in Fig. 7, will give an idea of the shape.

To make the patterns for the newel stones requires

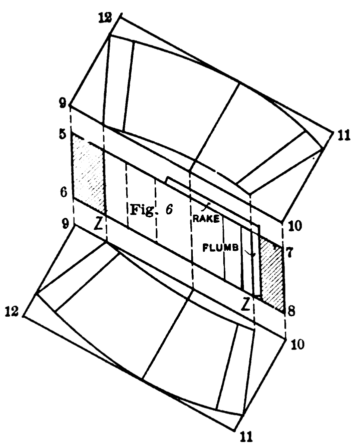


Fig. 6.—Diagram Showing Application of Back Mold and Rake Bevel.

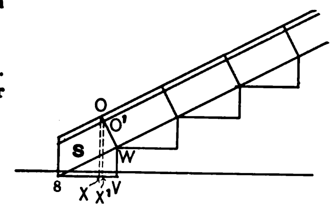


Fig. 7.—Development of Wall Springing Course.

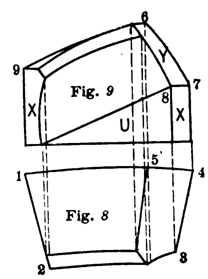
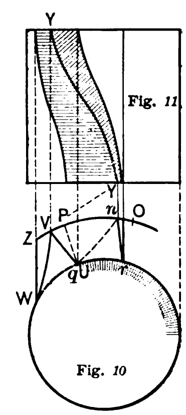


Fig. 8.—Pattern of Springer S of Fig. 7 and Q of the Elevation, Fig. 1.
Fig. 9.—Elevation of Springer S.



Figs. 10 and 11.—Plan and Elevation of Newel.

Raking Circular Ceiling.

to the right, so as to avoid a confusion of lines. Fig. 7 is part of the stretchout of the convex springer course and is necessary, so that the course can be divided into several lengths, in order to break joints with the other courses. On account of the numerous lines in plan in a piece of work of this kind, lay out every course separate in order to obtain the patterns.

Referring to Fig. 7, drop lines from O, O^1, as O X and O X^1; transfer the distances 8 X and 8 X^1 to the plan, as 8 *f*, *g h;* from *h* draw a line parallel to *i j*, and connect *h f* with a straight line and *f k* with a curved one; then 8 *f k j l* will be the plan pattern. Fig. 8 is an enlarged plan of the stone, which gives the length and breadth of the piece required, the hight being obtained from the highest point of S in Fig. 7. Work the bottom of Fig. 9 true, then apply the pattern, Fig. 8. Next work joints 1 2 and 3 4, as shown by X X, then the joint Y. There are three ways of cutting the joint.

1. Set the bevel to O W V of Fig. 7 and cut the angle.
2. By making a convex pattern to fit outside face.
3. Square a line up from the plan, as 5 6, then mark the hight; connect 6 7; work drafts from 6 to 7 and 7 to 8, then lock the joint out of wind from 6 7 or 7 8, and finish. It is required to have patterns for the joints Y and X. The pattern for Y will answer for the joints of

a different way than the others. Let Fig. 10 be the plan of one course, Fig. 11 the elevation, and *a b c d* of Fig. 12 the developed pattern. In Fig. 13 is the elevation of the front of the arch, it being necessary to find the lines for the soffit pattern of the level *c d* or *a b* of Fig. 12, also for the square section, Fig. 14.

Draw the circumference of the newel with the projection of the soffit, as shown in Fig. 10. Next mark on the size of one of the divisions taken from the plan at O 1, the size being increased four-fold for clearness. Next find the development of the newel around the projection, being careful to make the hight correct. Divide it into the hights of the courses taken from Q in elevation. Divide the soffit, Fig. 13, into any number of parts, as X, X, X, and connect *e* O. From X X X draw lines square to *e* O, as 1, 1, 1. Draw lines across from 1, 1, 1 to touch *a o* at 2, 2, 2. From these points draw lines parallel to *a o*, as shown.

In Fig. 14 make *f g* and *i j* equal to the projection of the soffit *o k* of Fig. 13. Connect *h i* and *h f*, and where the lines drawn from 2, 2, 2 intersect *f h* erect perpendiculars equal to the hight X 1, X 1, X 1, taken from Fig. 13, as *o* 1, *o* 1, &c. Draw a curve through the points thus established, and *i h g f* will be the square section.

To find the section through *c d*, or, in other words,

the shape for the top and bottom beds of the springing part of the newel, proceed as follows: From *c* and *d*, Fig. 15, erect lines from the different parts, as shown, and carry the corresponding hights from Fig. 14 to Fig. 15, drawing a curve through the points thus established. This being the shape of the pattern at a level in Fig. 10, transfer it to the plan, one of the divisions being equal to O 1 of plan. From *l* and *b* of Fig. 12 drop lines, as shown; then transfer the distance V *n* from Fig. 12 to Fig. 10, as shown by corresponding letters. Take the distance *s t* from Fig. 15 and carry it to Fig. 10; then from *n* as center mark a point on the solid line of newel, as *q*, and connect with the curve; then *n q r* will be the line for the level section of the bottom. Now drop lines from *c* and *s*, Fig. 15, and carry distance P V to the plan, as shown. From P draw to the center a line to touch the solid line at U; connect U V, making V W equal to *n g*. Then V W U will be the location on the top bed.

To cut the stone we first work a bed clean and apply Fig. 10; next work the hight of the course, and apply the pattern as before; reduce the stone to the shape of the plan, as inclosed by the heavy lines, as these take in all that is required. Now take *a b c d* of Figs. 12

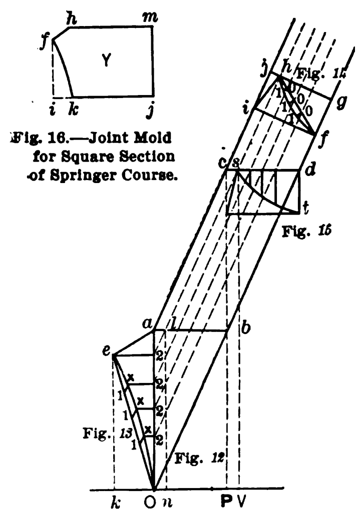


Fig. 16.—Joint Mold for Square Section of Springer Course.

Fig. 12.—Development of Newel.
Fig. 13.—Mold for Face of Newel on Elevation.
Fig. 14.—Level Joint Mold.
Fig. 15.—Square Section Mold.

Raking Circular Ceiling.

and 15 and apply it on the side O Z; then draw the nose line Y Y of Fig. 11. Now work the joint with a bevel taken from *g h i* of Fig. 14. This will clear the way to finish the soffit with curve taken from Fig. 14. The stone when finished will have the appearance of Fig. 11. The starting newel is worked the same way, *a b c* being the developed part and Fig. 13 the face pattern. The mold for the top is *o r n q* of Fig. 10.

After having followed the instructions herein presented, it will be found that a back mold and developed part are all that is necessary for the stones between the springer and newel. A base pattern and developed part for the springer course and the same for the newel course. Lay out carefully one stone of each course, inclosed in square lines in plan and elevation, putting every point at its proper place, and the rake is good and true. With the stone in the hands of a careful workman he will have no trouble to make a good job.

IN the design of an Episcopal church in process of erection in Philadelphia, Pa., the front is of a style of architecture which may be described as Venetian Romanesque, while the porch at the front was evidently inspired by the porch of the Church of Sainte Trophime at Arles in France. The interior was suggested by a number of features which may be called Sicilian, with arches and columns similar to those found in the Palatine Chapel and Mon Reale Cathedral at Palermo.

High Buildings Liable for Peculiar Damages.

The New York Court of Appeals has recently rendered a decision of interest to all who maintain or contemplate the erection of steel structures in the form of towers or high buildings. The case that has brought forth this interesting and important decision had its origin at Niagara Falls, and was instituted by Charles Davis against the Niagara Falls Tower Company. The latter company have an observation tower about 300 feet high, located on the Riverway, opposite Prospect Park, a section of the New York State Reservation. The site of the tower is not many hundred feet from the American Fall. Mr. Davis is one of the proprietors of the museum adjoining the tower, and the museum building has a glass roof or section.

In winter the spray from the falls fell upon the tower steel work, where it congealed, and in times of thaw plunged down upon the museum, doing damage. It was this that led to the lawsuit, and the Court of Appeals decides that a responsibility confronting owners of tall buildings is the need of guarding against the formation of ice which in falling may damage property beneath. In this case it was decided that one who has erected a building at so great a hight above an adjacent building as to cause the ice which accumulates upon its sides and top each winter to fall upon and injure his neighbor's building and endanger the safety of its occupants, may be restrained, as for private nuisance, from maintaining such a condition. In the Niagara instance the ice formation was caused by spray drifting from the falls, but the court holds that rain is just as much a natural cause, and to all purposes the same.

The action in question was brought to recover damages and for an injunction to restrain the defendant from so maintaining the tower as to suffer ice to fall therefrom on the plaintiff's property. The trial court had found that the injury to plaintiff's building and the accumulation and fall of ice from the tower on the plaintiff's property recurred each winter during periods of thaw. It further found that the tower was a safe, substantial and suitable structure for the purpose for which it was used. On these facts it decided, as a matter of law, that the maintenance and construction of the tower was a private nuisance, and that the plaintiffs were entitled to a perpetual injunction restraining the defendant from so maintaining the structure that ice would form thereon and fall on the building and premises of the plaintiffs. A reference was ordered to ascertain the plaintiff's damages. On the report of the referee final judgment was entered for an injunction and damages. This judgment was affirmed by the Appellate Division and an appeal taken. In dismissing the matter, in his opinion, Judge Cullen says:

"The law with reference to rainfall seems well settled. So long as the owner of land leaves it in its natural condition he is not required to adopt any measures to prevent the flowing of surface waters from his premises on the adjoining land, but when he puts a structure on the land a contrary rule prevails. Then he must take care of the water that falls on his premises, except in the case of extraordinary storms. It is to be observed that the structure of the tower is not on the division line between the land of the plaintiff and that of the defendants, and, therefore, the ice that is formed on the posts, beams and girders is accumulated wholly on the defendants' land. If the shape of the tower were such that rain falling on the defendants' premises would run down the posts and then be cast on the plaintiff's building, plainly, under the authorities cited, the defendants would be liable. It can make no difference on the question of the defendants' liability that the water, instead of being precipitated on the plaintiff's land, is allowed to congeal and freeze and fall in the form of ice. Nor is it material on the question of liability whether the ice proceeds from the fall of rain or from the spray and mist of Niagara Falls. The latter is just as much a natural cause as the former."

ARCHITECTURE OF COUNTRY HOUSES.

THE cry for an American style of architecture, in any proper sense, can never be satisfied. The fundamental principles which enter into the different styles possible are already known; not that to-day ideas are lacking in our work, but simply that the possible ways of building and ornamenting are limited and their essential features are already known. The best we can hope to do is to take some of the older styles and adapt them to the requirements of our American environment. Absolute originality is not the chiefest of architectural virtues, and can only be obtained by absolutely disregarding historical precedent. Because style is the outcome of the genius and study of great minds, the result of the best intellects and the best thought of periods when certain standards were lived up to and made lasting should be sufficient reason for young architects to lay aside the striving for absolute originality. An author has humorously characterized one of the results of the Eclectic School of Design as a "kaleidoscopic house in which are assembled a Queen Anne stoop, a Dutch gable, a Tudor window, a Gothic capital, a Flemish dormer, a Hanseatic carved impost, a zigzag Norman arch, a Venetian lion, a Byzantine dome ceiling and a pierced Moorish screen from the Alhambra." He concludes with the remark, "Behold the science of clustered bits, assembled by bands of brass or brazen effrontery to image the new house of modern times." Outside a fancy dress ball, no one dreams of masquerading as a Tudor or a Plantagenet, or even as a gentleman of the time of Queen Anne. We are men of to-day. Our houses should be houses of to-day. We need not ignore the past, but let us catch the spirit of the best old days, and let the letter go—that "letter" which is so dear to many who have never felt the spirit, and who make in architecture the mistake that Browning's duke made in life: "All that the old dukes had been without knowing it, this duke would fain know he was without being it." Seek first construction, and if it be the only factor considered, the result will often be not unsatisfactory. An experienced architect will give you first a sanitary, substantial and comfortable house, and in doing so, with no extra expense, but often with a most unusual economy, will manage to make a really artistic building at the same time. In such houses you can discover that there is neither Gothic nor classic architecture, but house building pure and simple.

Planning.

But it is not alone to the outward embellishment of the country home that art and taste should be directed. The influence of these should be shown as well in the internal arrangement and adornment. Two unfortunate characteristics of modern planning are multiplication of rooms and isolation of the several parts. It is questionable, however, whether such a multiplication of the number of rooms all free to the family and visitors adds anything to the true comfort of life. We can, after all, only be in one place at a time. Empty rooms make a dreary house; nor do a great number of public rooms contribute to privacy, so it is better with the increase of the household to increase the size rather than the number of public rooms. If one examine the average modern house it will be found to consist of a series of rectangular boxes. These are the parlor, dining room, sitting room, &c., and when the house is small these rooms are correspondingly contracted, till the minimum size and maximum of discomfort are reached, and one often finds all the family crowded into one of these rooms. The logical reversal of this is to have as the dominant feature of the plan a central hall or living room, which should have as much floor space and be as large and airy as funds permit. Such a room would meet a real and substantial need, and with it as the keynote of a home, it follows naturally that one must group round this the various other rooms which may be required by the family, and these may be regarded as mere appendages and dependencies of the living room, not pretending to compete with it as rooms, but rather becoming merely recesses, each specially modified for its particular function in domestic economy. Some of these may, indeed, be left quite open to the living room without any more substantial division than a curtain; but others from the nature of their uses may demand a more effectual screen from sound and sight. These, however, will not necessarily be so large as if they formed units in a series of small rooms. The obvious adaptability of this large room to festive occasions must be recognized, for it, with its grouped dependencies, exactly meets the requirements of the case.

(Continued from page 164 July issue.)

Public and Private Parts of House.

Careful consideration should be given to the relation of the public and private parts of the house. Perhaps the most important of these questions is the due relation in the house of the family rooms to the servants' rooms. Under ordinary conditions of modern life these two separate communities must be accommodated under the same roof, with due regard for the comfort and privacy of each. The following quotation from Kerr's "The Gentleman's House" applies equally to farm hands and servants. He says: "The sleeping rooms of the domestics have to be separated from those of the family, and, indeed, separately approached. The idea which underlies all is simply this: The family constitutes one community, the servants another; whatever may be their mutual regard and confidence as dwellers under the same roof, each class is entitled to shut its door upon the other and be alone."

In this connection it is not enough to consider the position of the rooms alone, but it is equally important that the various routes taken by the family and the servants should be an object of study and should be kept as distinct as possible. The study of routes, indeed, forms one of the most essential features in planning a house; but it is only in large plans that a complete separation is possible. In a city house, the serving pantry isolates the kitchen from the rest of the house, and a servants' staircase adds to the privacy of the front hall. I never have been able to see why these necessities in a city house are not decided advantages in a farmhouse.

Eight rules for guidance in planning were published over 30 years ago in an English book, entitled "The Grammar of House Planning," and I agree with the author so fully that I quote them here:

"1. Let the kitchen (the most important apartment) always be on a level with the principal floor—and for strong light and free ventilation it should have, if possible, windows on opposite or nearly opposite sides.

"2. The pantry or dish closet should be between the kitchen and dining room and easily accessible from both.

"3. There should be a set of easy stairs from the kitchen to the cellar, and also an outer set into the cellar for admitting barrels, &c.

"4. More attention should be given to the arrangement and disposition of such rooms as are in constant use than those but occasionally occupied. Hence, the kitchen and living room should receive more attention on the ground of convenience than the parlor.

"5. Every entrance except to the kitchen should be through some entry or hall, to prevent the abrupt ingress of cold air and for proper seclusion.

"6. Let the entry or hall be near the center of the house so that ready and convenient access may be had from it to the different rooms, and to prevent the too common evil of passing through one room to enter another.

"7. Place the stairs so that the landing shall be as near the center of the house as may be practicable, for the reason given for the preceding rule.

"8. Let the partitions of the second floor stand over those of the lower, as nearly as may be, to secure firmness and solidity."

(To be continued.)

A METHODIST EPISCOPAL CHURCH AND PARSONAGE is to be erected at Morgantown, W. Va., in accordance with plans prepared by F. R. Comstock, architect, of 20 East Forty-second street, New York City. The church edifice is to be 85 x 116 feet, with a tower in the center of the building 100 feet in hight. Adjoining the church and connected with it will be the parsonage, 30 x 51 feet in area and two and a half stories high. Rock face stone will be used for the exterior of both buildings, while the interior will be finished in quartered oak.

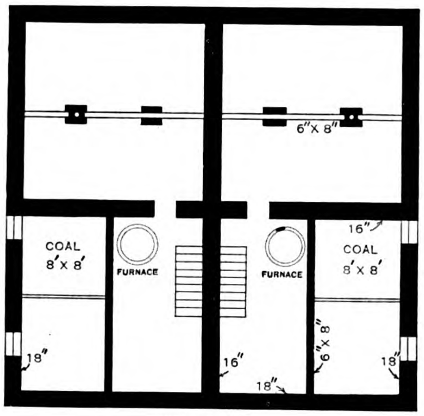
CORRESPONDENCE.

Framing a Gambrel Roof.

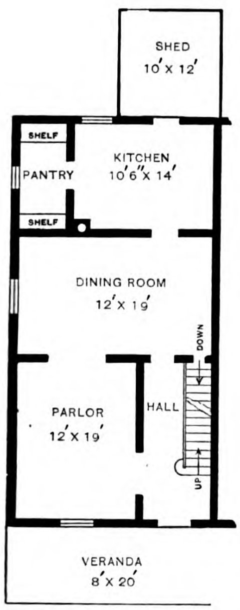
From A. R. V., *Akron, Ohio*.—I am an interested reader of *Carpentry and Building* and would be much pleased to have some of the many readers explain, with diagrams, the easiest way to frame a gambrel roof. I would be glad to have clearly indicated how all cuts are obtained.

Design for a Double House.

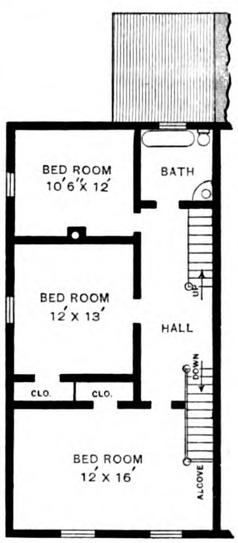
From W. R. GRAHAM, *Sault Ste. Marie, Ontario*.—In answer to the inquiry of "H. H. G.," Sioux Falls, S. D., which appeared on page 122 of the May issue of *Carpentry and Building*, I send tracings showing elevations and floor plans of a double house. An inspection of the drawings will show foundation plan and the first and second floors of half of the house, the other half of course being a duplicate of that shown. In this section of the country the cost of the building, including heating and plumbing, wiring, &c., will probably be in the neighborhood of $3200, and without heating and plumbing $2600.



Foundation.



Half of First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

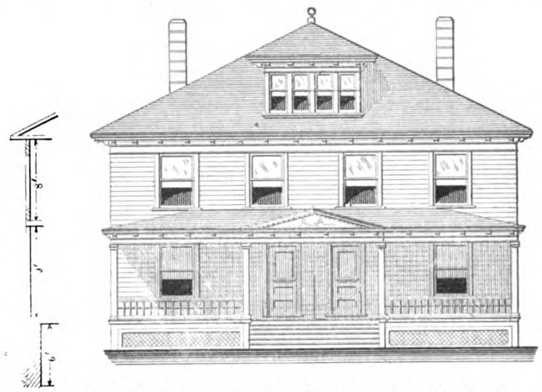
Papering a Ceiling.

From DOWN SOUTH, *North Carolina*.—I desire to ask a little advice from some one who knows. I have an old house that is ceiled inside; the ceiling has shrunken badly, and I am thinking of papering it. It is common in such cases to first tack thin cotton cloth on the ceiling and then paper. Would it be as well or better to use the common, cheap building paper or felt in place of the cotton, and if so should it be tacked or pasted to the ceiling? If any of the brethren can give me information on this point I will greatly appreciate it.

Architects and the Roofing Question.

From FRANK K. THOMSON, *Raleigh, N. C*.—I cannot agree with "J. L." of Peterstown, W. Va., whose letter appeared in the July number of *Carpentry and Building*, that architects pay too little attention to the roofs of buildings they design. If the foundation is the most important part of the building structurally, so is the roof of the modern residence the most important feature architecturally. The roof is designed to fit the house, not the house to fit the roof. If the latter was the case it would be an easy matter to carry the roof water to the rear of the building and do away with "J. L.'s" water barrel, which he seems to think an unavoidable necessity.

I do agree, however, with "J. L." that more judgment might be used in locating the leaders from the roof,


Section and Front Elevation.—Scale, 1-16 Inch to the Foot.

Design for a Double House.—W. R. Graham, Architect, Sault Ste. Marie, Ontario, Canada.

particularly in residence work. I have seen leaders fastened to the face of an Ionic veranda column, when they could just as well be run in the angle against the main building and thus have been comparatively out of sight. The wrong location of the leaders may have been the fault of the tinner, in which case it could be easily remedied. Such mistakes can be avoided if the architect in making his roof plan will mark on it the location of the necessary leaders and see that they are run in the positions indicated.

A residence with all main roof surfaces of equal pitch gives the best appearance, consequently the rain water will be more or less conveniently distributed to the front or sides, depending on the shape of the building. If the structure is large the water cannot be carried for too great a distance. It is generally possible, however, to grade gutters so that leaders can be run in angles of the building or in positions least exposed to sight. If this cannot be done a twisted polygon or corrugated leader, with ornamental conductor head and shoe, can be made to add to rather than detract from the appearance of the building.

From T. BUCKLEY GHEQUIER, *Baltimore, Md*.—A correspondent in the July issue calls attention, under the above caption, to the fact that some roofs are so badly designed as to throw most of the water to the front of the house. I do not understand why, if such is the case, provision cannot be made for leading the water away instead of collecting it in the primitive manner mentioned. In my own practice as an architect I have never seen the hogshead or barrel system resorted to in either country or suburban work. It may be true that, considering the multiplicity of more important matters, architects are sometimes careless in this particular, but I am quite sure that with a little study the spouter could generally so arrange matters as to lead the water to a more sightly and convenient place than the front. I beg the correspondent to carefully consider the next piece of work of the kind that comes into his hands and see if he cannot devise some scheme to obviate the difficulty.

Plans Wanted for House Suitable for Africa.

From R. G. M., *Benguella, West Central Africa.*—Having enjoyed reading *Carpentry and Building* for over two years, receiving many helpful suggestions from time to time, and believing that some of the many readers may be able to instruct me in the line in which I desire information at present, I ask that they furnish for publication a plan of a house suitable for erection in Africa. In this part of the tropical world we build one-story houses with adobe (dried brick) and with thatched roofs. Timber is scarce and so we cannot have upper rooms; neither can we have wooden floors, because of this scarcity and the prevalence of white ants. I desire, therefore, a plan for a tropical house having kitchen, pantry, dining room, study, sitting room, three bedrooms with closets, bathroom and washroom. I do not, however, wish the architectural friends of the paper to be bound by this enumeration, as I simply name the number of rooms usually required and likely to be wanted by myself. I shall be very glad if some one will give me a plan, together with any suggestions in regard to the floors, which here are of dirt covered with mats. Very often the white ants give us no end of trouble. Cement would perhaps be the most satisfactory floor, but would it not be expensive, remembering that goods double the first cost when laid down here? We also build our fences of adobe, and as this has been an unusually wet season some of them have fallen down. Limestone is not plentiful and necessitates a great deal of work to trim what there is, which is of a poor quality.

Note.—Here is an excellent opportunity for some of our architectural friends to solve a most interesting problem in house construction. While it is probable very few have had experience in this particular line, there are many no doubt who can offer valuable suggestions and whose views would be greatly appreciated, not alone by the correspondent making the inquiry, but by other readers of *Carpentry and Building* living in tropical climates. The columns are open to all, and we trust the subject will receive the thoughtful consideration of our readers.

What Constitutes a Day's Work for a Carpenter?

From G. L. McM., *Tacoma, Wash.*—In reply to "B. L. C.'s" request for opinions as to what constitutes a day's work at various kinds of carpentry, let me suggest that such opinions to be of much value should be accompanied by a statement of the kind of material and the kind of workmanship required. The methods of doing work vary so much in different parts of the country that a fair day's work in one section could not be compared with a day's work on the same class in another. For instance, I judge from "B. L. C.'s" remarks that they still lay common floors in Vermont as they used to 30 years ago—that is, of 1 x 6 and 1 x 8 square edged boards, sized one side and two edges and laid over a lining floor with joints broken, the floor boards being keyed up and nailed, with the nails "set" and the joints smoothed off. Such work used to be largely done by regular "floor layers," while west of the Mississippi I have never seen anything but matched flooring used; and that blind nailed and no smoothing done unless the floor was to be polished, when, of course, it was traversed down even, smoothed, scraped and sandpapered. Of course, a day's work measured in "squares" of the one kind could not be compared with a day's work of the other.

Again in Vermont, and I suppose in New England generally, they use mostly "machine siding" or clapboards, made as described on page 147 of the June issue of the paper. I wonder where the editor picked up that piece, for it says "within the past few years." Why, they were making clapboards in that manner in New England 30 years ago. "Out West"—that is, in the Mississippi Valley, and on the coast here—they use long drop siding or "lap siding," made by first surfacing 1 x 4 and 1 x 6 boards four sides and then resawing diagonally. It is made in lengths from 8 feet upward, 8 feet being considered "short." On the coast here we also use a considerable quantity of "rustic," made like shiplap, with the joints V'd.

Again, the material used makes a great difference in the amount of work a man can do in a day. While white pine, cedar, redwood and Washington fir are used on the same grade of work in different localities, there is much difference in the amount of work a man can do in them. White pine is easiest to work, and cedar, while fully as soft, is more "punky" under the plane and more brittle under the block plane, thus making it very difficult to keep an edge on either plane or chisel so as to make a clean, smooth cut. Redwood is a little better, while fir is nearly or quite as hard to work as oak. If such conditions as these are kept in mind such opinions as are asked for by "B. L. C." will be both interesting and instructive.

Remedying Poor Chimney Draft.

From R. J. O., *Worcester, Mass.*—I have read the letter of "G. W. K.," in the June issue, and regret that he is so unfortunate as to have a chimney of the dimensions given—namely, 4 x 8 inches inside measure. It will be a good thing for all people living in houses when the building laws of every State are made so that no house can be built with a chimney less than 8 inches square, inside measurement. It is a very easy matter to check a draft, but in many instances it is both difficult and expensive to improve or create one. It is only necessary to watch the burning of a pile of trash in a back yard to learn that smoke and heated air ascend by a spiral movement, and when the spiral current is limited in dimensions to but 4 inches it will be readily seen that its velocity will not be very great, that the friction will be excessive, and that a flue of only 4 inches in dimensions cannot carry away the smoke from anything but the smallest kind of a stove in which wood is burned or, under some conditions, a small coal fire is maintained. The testing of a chimney with lighted paper, to be of any conclusive value, should be conducted in a certain way. One or more sheets of newspaper should be crumpled so as to form a good sized ball, this being pushed into the chimney opening for the stove pipe and lighted at the bottom. If the draft of the chimney is strong enough to pull the smoke in so that the edges of the smoke pipe hole will not be discolored as the ball is inserted, but be burned in the chimney and carried out at the top, then the newspaper test is one that is reasonably accurate in its conclusions. Any other chimney test with a newspaper is of no practical value, unless applied by a chimney expert, who may derive some knowledge of the strength of the draft in a chimney from his previous experience.

From S. G. H., *Atlantic City, N. J.*—In the issue of the paper for June I notice "G. W. K." of Fort Recovery, Ohio, asks for a remedy for his chimney. From what he says the chimney appears to have a good draft, although the cause of his trouble may be on account of having too large a stove. It may be that the top of the oven comes too close to the top of the stove and thus prevents a good draft. If the correspondent will light a piece of paper and try it in the fire place, and then put it in the flue of the stove running over the top of the oven, he can readily ascertain the difference, if there is any, in the draft. I was once puzzled the same way.

Construction of Butchers' Refrigerator.

From T. K., *Cazenovia, Wis.*—Will some of the experienced readers furnish for publication drawings and description of a butchers' refrigerator about 8 x 10 x 10 feet in size, and embodying some of the latest improvements in this kind of work? We live here in the country, away from cities and railroads, and have no opportunity of seeing anything new in this line. It would therefore be a favor to the writer, as doubtless it would be to many other readers, if those practiced in the work will respond.

Design for Carpenters' Tool Chest.

From DOWN SOUTH, *N. C.*—After long delay, I am sending my promised contribution on the subject of tool chests. The three main points I had in view were strength, lightness and convenience, and I will say I like my "combination" better than any I have ever seen, and that is a good many—no two alike. I once had a trunk made for the purpose with the assurance that it would be the "very thing, you know," but a trip or two proved it a fallacy. The makers put on a good set of trimmings and lock, which I took off and replaced with one of my own construction. It is still in the ring and not much the worse for wear. This is designed more especially for the traveling wood butcher, but is handy in most any situation. I send some rough drawings, which I trust will help to make the matter clear. They will also make it clear that I am a very poor draftsman.

The sides, ends and top are made of clear poplar board ¾-inch thick, mitered at the corners and well nailed both ways. The bottom is of yellow pine 3-inch matched flooring, with oak cleats put on with wood screws. The top of my chest is slightly rounded, like a trunk, though I have not shown it in the drawing, as it is hardly necessary. The outside is covered with heavy canvas, tacked on and painted three or four coats; then slats and trimmings as on a trunk. I would advise gluing the canvas if it were well done, and special care should be taken to stretch it well.

The plan, Fig. 1, shows the partitions, which are of ½-inch poplar, joined into the ends of the chest for greater strength. The long partition is placed far enough from the back of the chest to take a bead or rabbet, hollows, rounds, &c. The cross partition can be placed to suit the fancy of the owner. A wooden bit box is shown in one front corner and a strip for holding the lower ends of chisels. This is screwed on the inside, running from end to end and at such hight that the bit box will set on it and come flush with the side of the box. Notches are cut to admit the blades of the chisels, as shown in the cross section, Fig. 3. Another strip is screwed on about 4 inches down from the top of the side, and holes must be cut in this for the round part of chisel, as well as blade. These holes should be trimmed till the top of the chisel handle will not stand above the side of the chest. A whole set of 12 chisels can be provided for and room left for a large screw driver and other things. The chisels are thus kept in place, edges protected, and after a little use one will know just where to put his hand for any size chisel.

The fitting up of the interior of the lid of the chest is pretty clearly indicated in Fig. 2 of the sketches. The two cleats in the corners are cut just long enough for the level to fit snugly between. Enough is cut out of the back of the cleat to receive the end of the tongue of the steel square, which is held by a button screwed in the center at the other side of the lid. Two squares can be carried just as well, putting one at the other end and allowing the blades to lap at the button in the middle. The frame for holding saws is hinged to the side of the lid, as indicated in the cross section, Fig. 3, and slits are cut in the cross bars with compass saw. Hand saws are then run into these slits from the ends. I usually carry four; one coarse and one fine cut off, one rip and a back saw. This is as many as the average man need take on the road at least. All these, if properly put in, are secure from injury by hitting each other, as men sometimes do. The strip forming the upper side of this frame should be as long as the inside of the chest, so that when shut down and fastened it comes on top of the chisel handles and keeps them in place. To hold this frame in position I use spring window bolts, one of which is shown near the saw handle in Fig. 2.

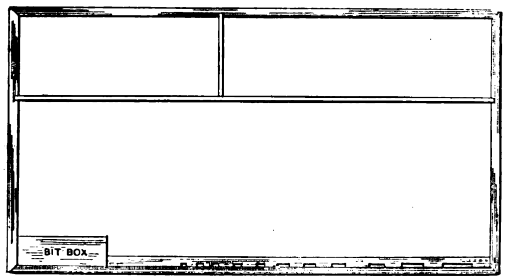


Fig. 1.—Plan of Chest, Showing Bit Box and Part of Chisel Rack.

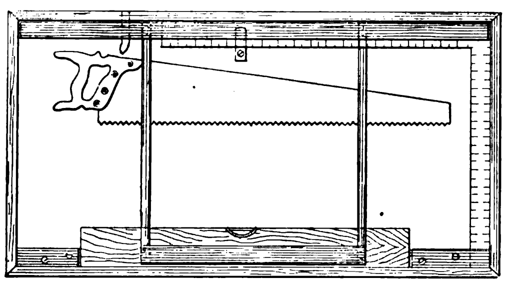


Fig. 2.—Interior of Lid, Showing Arrangement of Saws, Square and Level.

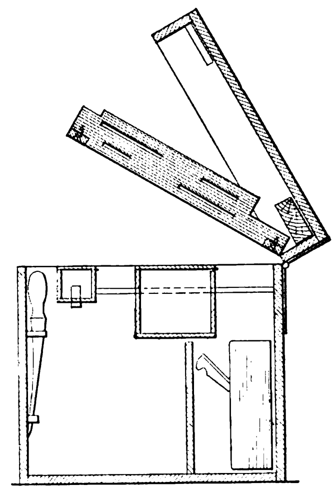


Fig. 3.—Cross Section, Showing Construction and Arrangement of Interior.

Design for Carpenters' Tool Chest.—Scale, 1 Inch to the Foot.

In Fig. 3 is shown two large trays, one at the back being made to slide on strips of hard wood screwed to the ends of the chest, a groove being cut in the ends of the tray. These strips are put near the top of the tray, as it will run smoother. This tray is made just the width of the compartment in the back of the chest, but I have shown it drawn forward to make it more clearly understood. It is rather deep, and I expect if I were making another chest I would divide it into two. At the front is shown a small tray resting on cleats and made to lift out when necessary, in order to reach tools underneath. Although small, it is very handy for drill bits, files and the hundred things of that kind. Both trays have hinged covers and, as will be seen, the bars holding the saws come down on top of them when the chest is closed, thus holding them shut and to their place. They have various cross partitions, but this is best left to the fancy of the owner.

The larger and heavier tools will, of course, go in the large space in the front of the chest, and I do not find it necessary to dump them all out on the floor at any time, as the Detroit correspondent remarked some time since. By lifting out the small tray they can be reached without much tumbling of things about; by drawing the large tray forward, those in the back are readily accessible. Bits, chisels, saws, square and level are each in place and kept there out of harm's way.

To possess a good chest of good tools should be the pride of every mechanic, but I would say by way of suggestion, do not spend time and money on fine outside work on your kit. To begin with, it does not pay, and if the baggage smasher and the freight handlers get a few chances at it, well, it is probably done for. I find one little disadvantage in my arrangement of saws. As they must be put in and drawn out of their places endways, there must be room for this at the ends of the chest; hence it will not do to put them in the corner with end to the wall or other obstacle. This can be overcome, however, by making the bars of three pieces and hinging them together so as to open where the saws are put in.

Size of Engine for Operating Wood Working Shop.

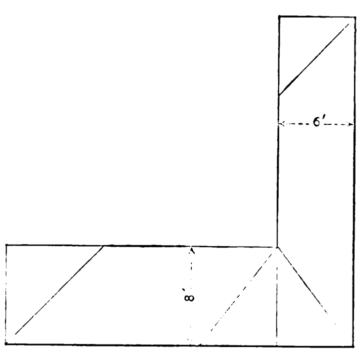
From A BUILDER IN THE NORTH CLIMATE.—I have been very much interested in the articles in *Carpentry and Building* regarding power for small wood working shops and would like to ask the readers a few questions on the subject. What size steam plant or gas or gasoline engine would be required to successfully run the following wood working machines?

One 24-inch pony planer, matcher and molder (combined machine), with capacity of 1500 linear feet per hour.
One combination rip and cut off saw.
One variety rip and cut off saw.
One 36-inch band saw.
One 16-inch buzz planer or jointer.
One turning lathe.
One emery grinder.
One shaper.
One sandpaper drum.
One doweling and boring machine.

After the power is installed which would be the best, cheapest and handiest, as well as the most suitable, assuming that in any case not more than three of the largest machines will be used simultaneously? The machines will not be run steadily and the time the machines would be running, all told, would not exceed four months of the year. The power plant is to be strictly up to date and of modern type. I shall feel under many obligations to any readers who will express their views in regard to this matter.

Question in Veranda Roof Construction

From F. N. W., *Spokane, Wash.*—In reply to "H. C.," Pike River, Canada, whose inquiry appears in the July issue of the paper, I would say by cutting in a gable, as



Question in Veranda Roof Construction.

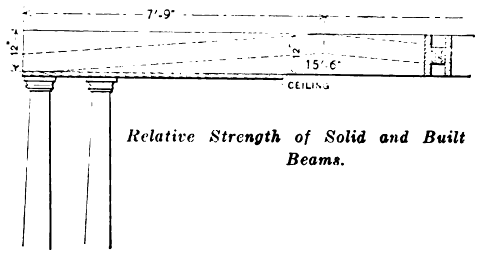
shown in the sketch inclosed, it will answer a double purpose and will shed the water from the front steps.

Constructing a Violin.

From G. W. F., *Annapolis.*—Will some reader of the paper, who has had experience, tell me how to make a violin, and name the tools required to do the work?

Relative Strength of Solid and Built Up Beams.

From C. C. E., *Forestport, N. Y.*—As there has been considerable discussion of the question of built up beams, I inclose a drawing of a beam which I have built and which has so far proven satisfactory. In a matter of this kind stiffness is as important a factor as



Relative Strength of Solid and Built Up Beams.

mere strength. The sides of the beam are 2 x 12 inch hemlock, and the diagonals ⅞ x 6 inch spruce, well nailed in position, as indicated by the dotted lines of the sketch inclosed. I would be pleased to read the comments of brother chips in a future issue of the paper.

Mitering Crown Mold and Fascia.

From C. C. H., *Brookville, Pa.*—I have a question to ask the readers and shall be pleased to have my brother chips describe their way of doing the work. It relates to that part of the cornice of a house where it is joined by an ell or extension, the roof being half pitch. The projections of the rafters on the main part of the house all around are to be cut off square and the lookouts on the gables will be run out on a level and also cut off square. In one case the crown mold and the fascia are on an angle of 45 degrees and in the latter case they stand plumb. Now what I want to know is how would my brother chips make the connection of fascia and crown mold without cutting the lower ends of the rafters on the ell plumb? For my part I would rather have the heel of the rafters cut square, for the reason that the crown mold and fascia are much more out of the way of the spouting.

The Proper Way to File a Saw.

From YOUNG CHIP, *Lindsborg, Kan.*—I have been an interested reader of *Carpentry and Building* since last December and come to the readers for information regarding the right way to file a saw. It may seem to the veterans a simple thing to explain, but so far as I can learn there is a great difference of opinion as to how the filing should be done. The way I file a saw is explained by the sketch which I inclose, but the older chips say it is wrong and that I should reverse the file, as indicated by the dotted lines. Now which is the right way and why is it right?

Note.—The sketch submitted by our correspondent shows a saw with a file in position for filing, the handle pointing toward the heel of the saw. The dotted lines indicate the file with the handle toward the point of the saw. We lay the letter before our readers for their discussion, as it is well known that a great diversity of opinion exists among mechanics regarding the way in which a saw should be filed. We have in the past presented many interesting comments on the subject, but it is by no means exhausted and we shall be glad to have the views of our expert saw filers.

Perspective of a Two-Gable House.

From A. H. D., *Monson, Mass.*—I have on file in my office a copy of every issue of *Carpentry and Building*, from January, 1879, to July, 1902, and I desire to say that the article on Perspective by "E. I. F." of Deering Center, Maine, in answer to "D. E. P.," of River, Ind., which appeared in the May number for the present year, is worth ten years' subscription to any one trying to learn how to make perspectives of buildings. The article in question clearly elucidates a point which to many is exceedingly blind.

EASY LESSONS IN ROOF MEASUREMENTS.

WHILE some mechanics understand thoroughly the methods of laying the various kinds of roofing, there are some, however, who do not understand how to figure from architects' or scale drawings the amount of material required to cover a given surface in a flat, hipped or irregular shaped roof. For the benefit of the readers who are interested in this subject, says William Neubecker, the writer will in this article give 12 easy lessons on estimating roof surfaces, which will cover rules for obtaining the true amount of material required when covering flat or hipped roofs and square, octagonal and conical towers; also the methods of obtaining the true lengths of the hips and valleys on pitched roofs. The diagrams shown herewith are not drawn to a scale as architects' drawings will be, but the measurements on the diagrams are assumed, which will clearly show the principles which must be applied when figuring from scale drawings. Assuming that the plans from which we are figuring are drawn to a ¼-inch scale, then when measurements are taken every ¼ inch represents 1 foot, ⅛ inch equals 6 inches, and so on. If the drawings were drawn to a ½-inch scale, then would ½ inch equal 12 inches, ¼ inch equal 6 inches, ⅛ inch equal 3 inches, 1-16 inch equal 1½ inches, &c. A small scale rule 6 inches in length is usually caried in one's pocket with pencil and note book, and some loose pads. The title of the items which we propose to take off the plans is usually written as follows:

Estimate to .... (Mention name) for .... (What kind)
roofing for building number .... (Number, street and city) Mr.
.... (Name), owner; .... (Name) and .... (Name)
architects; number .... (Number, street and city)

We now read the specifications carefully, and note what material is to be used for the covering; if tin, note what brand is required and its thickness, IC or IX; is it to be laid on paper or will it be painted underneath before laying, and how many coats will it be painted on top. What size sheets will be used, and how many pounds of solder used to the square (which means a surface covering a space of 10 x 10 feet), and will the tin be laid flat or standing seam. All these points are important to know; and, knowing them, the quantities are taken off the plans. Is the roof to be covered with slate, note what size and how thick the slates are to be; are they to be nailed on sheathing, or porous fire proof blocks; with black, galvanized or brass nails; are the slates to be laid on paper or not; are the flashing and valleys to be of tin, galvanized iron or copper.

Knowing all this we can make our estimate accordingly. Now, if the specifications call for a tile roof, note if they call for shingle tile or Spanish or any other form of tile; are they to be laid as mentioned in connection with slate roofing or are they to be fastened to the purlin with copper or galvanized wire. All this is necessary to know in arriving at a close bid. If a felt roof is required, and assuming that the tinner is to look out for the flashing, note how many layers of felt are required; is each layer of felt to be thoroughly saturated with hot asphalt cement or just coal tar; is gravel or slag to be placed over the top layers. If the roof is to be covered with shingles, and assuming that the tin roofer looks after the flashing, note what kind and size shingles are to be used, how much will they be laid to the weather and what kind of nails are to be used, &c. Knowing all this we will know exactly what we are figuring for. Our first three lessons, Figs. 1 to 3, inclusive, are supposed to be covered with flat seam tin or felt roofing; while Figs. 4 to 12, inclusive, can be covered with either slate, tin, tile or shingle. Our first lesson will be to figure the amount of material required on a flat roof, shown in Fig. 1 by A B C D, and which measures 20 x 20 feet. Now, multiply 20 x 20 feet equals 400 square feet, minus the chimney, which measures 1 x 2 feet, and equals 2 square feet; deduct this from 400 square feet. Then will 398 square feet be the true amount of surface to be covered on the roof shown in Fig. 1. Allowance should be made for the flashings turning up against and into the wall at the sides. Our next lesson, shown in Fig. 2, is a little more difficult, and shows a plan having air shafts at the sides. A B C D represents the general plan view of the roof and measures 22 x 84 feet, as shown. In a roof of this kind we will figure it as if there were no air shafts at all, and then deduct the shafts and chimneys later. Thus 84 × 22 feet equals 1848 square feet.

The shafts at each side are cut at an angle of 45 de-

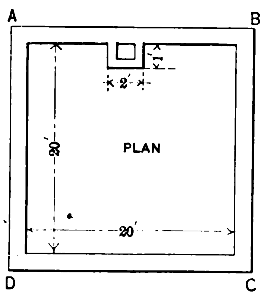


Fig. 1.—Plan of Square Roof.

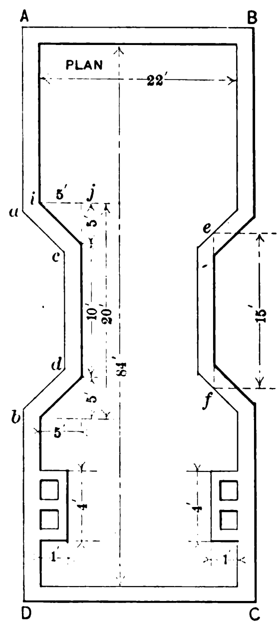


Fig. 2.—Roof of Building with Air Shafts at the Sides.

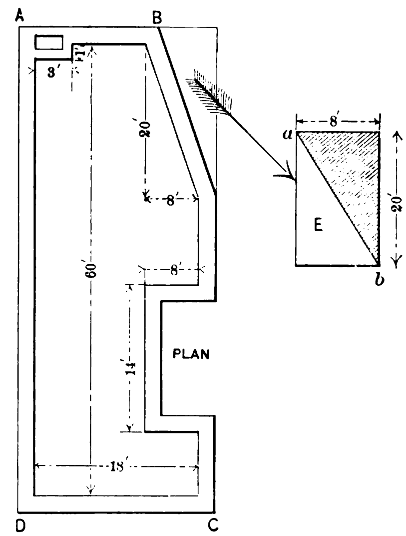


Fig. 3.—Another Shape of Flat Roof.

Easy Lessons in Roof Measurements.

grees, and measure from the inner corners from *a* to *b* 20 feet, and from the inner corner *c* to *d* 10 feet. Now, as the angles are 45 degrees, we must average the distance between 10 and 20 feet, which will measure 15 feet, as shown from *e* to *f*. As the distance from *i* to *j* on a horizontal line is 5 feet, then multiply 5 × 15 feet, which will equal 75 square feet; double this for the two shafts will make it 150 square feet.

Two chimneys are shown, each 1 x 4 feet, equals 4 × 2 feet equals 8, plus 150 feet equals 158 square feet. Now deduct 158 square feet from 1848 square feet, which leaves 1690 square feet of roof surface in a roof of the dimensions in Fig. 2, minus the flashings.

The third lesson gives another form of flat roof which may arise, and is shown by A B C D in Fig. 3. In this case the same rule is employed as that given in connection with Fig. 2. Multiply the width by the length in Fig. 3 thus: 18 × 60 feet equals 1080 square feet if the roof had no breaks. Now deduct the chimney of 1 x 3 feet, which equals 3 square feet; deduct the shaft of 8 x 14 feet, which equals 112 square feet. The angle at the rear of the building measures 8 x 20 feet, which equals 160 square feet; from this deduct one-half, which leaves 80 square feet. Now then we have 3 + 112 + 80 feet equals 195 square feet to be deducted from 1080 square feet, which leaves 885 square feet of material required to cover a surface of the size given.

In diagram E is shown the principle which is applied when figuring the deduction of angles. The size of the square is 8 x 20 feet and equals 160 square feet, as above mentioned. Now by drawing the diagonal *a b* we cut this amount in half, as shown by the shaded lines, and will make it 80 square feet, as above noted.

In our fourth lesson we begin with the simpler forms of pitched roofs, shown in Fig. 4, in which A B C shows the front view of the building and D E F G the side. The length of the rafter measures 12 feet, as shown from A to B in front view, and the length from G to F on the side view measures 66 feet. Now 12 × 66 feet equals 792 square feet for one side. Double this and we have 1584 square feet. Now deduct the chimney, which is 6 feet wide by 2 feet, shown on the rake; 2 × 6 feet equals 12 square feet, which deduct from 1584 square feet, and leaves 1572 square feet for a plain pitched roof shown in Fig. 4.

We now advance a little further in our fifth lesson, shown in Fig. 5, in which A B C shows the elevation of a pitched roof having four hips, and D E F G the plan of the hipped roof. The diagonal lines shown from D to F and E to G show the hip lines in plan. While it may appear difficult to some to figure the quantities in a hipped roof, it is very simple, if the rule is understood. The length of the rafter shown from A to C in elevation is 10 feet and the width of the building at the eaves of the roof is 16 feet on each side, as shown in plan. As the hipped roof runs to an apex in the center, then will the distance between the eave line D E and apex *a* in plan measure one-half of 16 feet, or 8 feet, as shown. Now multiply 8 × 10 feet equals 80 feet by 4 sides equals 320 square feet of roofing required on a building of the dimensions given. As the hips must be covered with a metal capping to avoid leakage on roofs, it becomes necessary to learn how to obtain the true length of the hip. This is accomplished by dropping a line from the apex A in elevation, cutting the line C B at *a'*. Now extend the line C B as C E¹. Now take the distance of the diagonal *a* E in plan, and place it as shown from *a'* to E¹ in elevation, and draw a line from E¹ to A, which will represent the true length of the hip. Multiply this amount by 4, which will give us the amount of capping or ridge roll required on a hipped roof of the size given. The method of estimating hipped roofs when the sides are of unequal pitch is explained in connection with Fig. 6. A B C D shows the plan of the roof, the ends measuring 14 feet and the sides 24 feet. The side view is indicated by E F G, showing the rafters of 14 feet

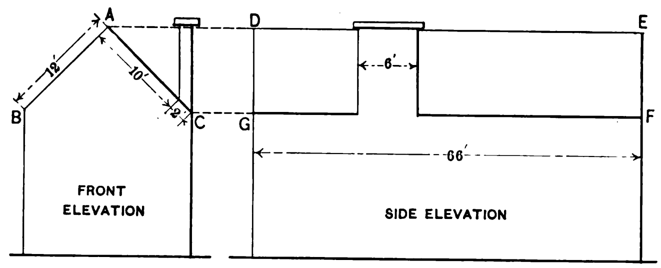


Fig. 4.—Simple Form of Pitch Roof.

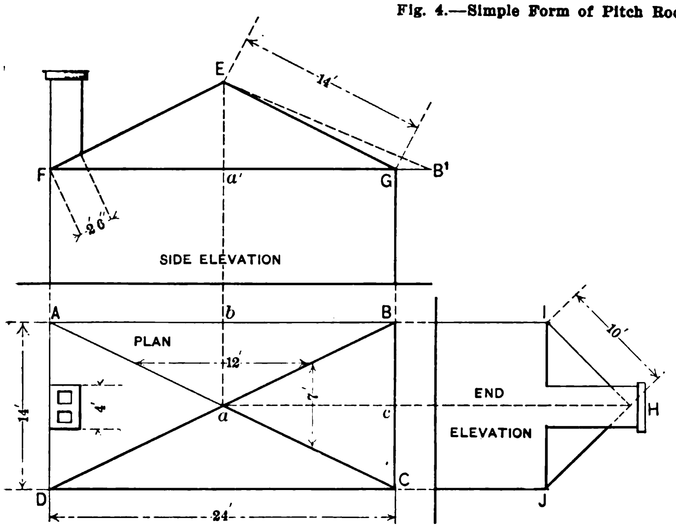


Fig. 6.—Diagram Showing Method of Estimating Hip Roofs of Unequal Pitch.

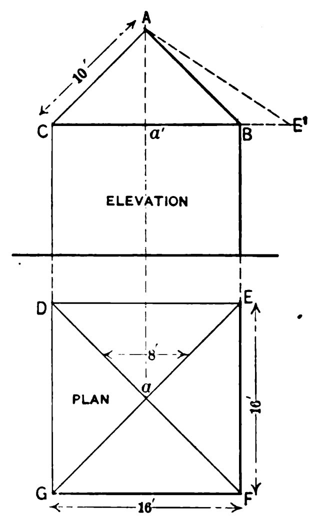
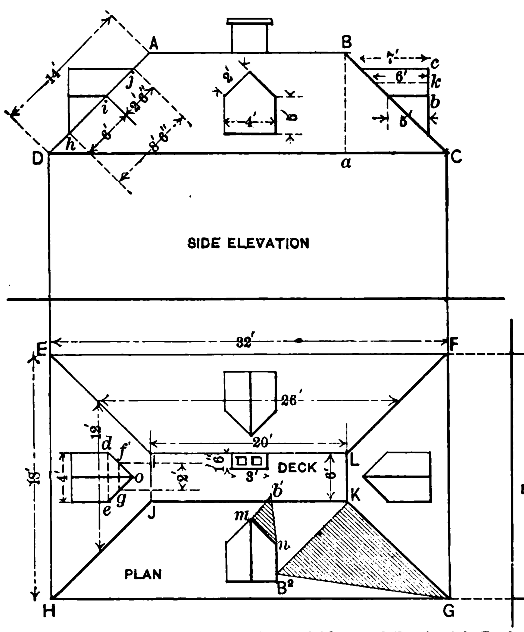


Fig. 5.—Pitched Roof with Four Hips.

Easy Lessons in Roof Measurements.

lengths, and the end view by H I J, with rafters of 10-foot lengths. As the length of D C in plan is 24 feet, then will the averaged distance between *a* and *b* be 12 feet, while using the same rule the averaged distance between *a* and *c* is 7 feet. Now multiply the length of the rafter I H in end view, which is 10 x 12 feet in plan, which equals 120 feet; twice this is 240 feet. In similar manner multiply the length of the rafter E G in side view, which is 14 x 7 feet in plan, which equals 98 feet; twice this equals 196 feet, plus 240 feet equals 436 square feet. Deduct the chimney, which measures 2 feet 6 inches in side elevation by 4 feet in plan and equals 10 feet; deduct this from 436 square feet, which leaves 426 square feet of covering required for an unequal pitched roof, as shown in Fig. 6. For the length of the hip take the distance from A to B in plan and place it on the line F G extended in side view from *a'* to B^1. Then draw a line from B^1 to E, which is the true length of the hip for one corner.

Our seventh lesson shows a more difficult problem



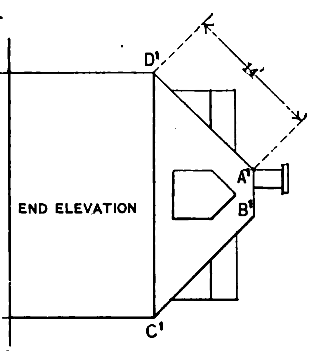


Fig. 7.—Plan and Elevations of Mansard Roof with Deck and Dormers.

Easy Lessons in Roof Measurements.

in roof measurements, and is shown in Fig. 7, in which a deck and mansard roof is shown, with intersecting dormers. A B C D shows the side view and A^1 B^1 C^1 D^1 the end view. The plan of the mansard and deck roof is shown by E F G H and I J K L, the dormers being indicated in the views, as shown. Now let us see how much roofing material will be required to cover the mansard and deck roofs, also the tops and the cheeks of the dormers; also how much hip ridge for the roofs and valleys for the dormers will be needed. The roof measures at the eaves 18 x 32 feet, and at the deck 6 x 20 feet. Now multiply 6 × 20 feet equals 120 square feet; the chimney is 3 feet by 1 foot 6 inches, and equals 4 feet 6 inches. Deduct this, which will leave 115½ square feet of surface on the deck roof. Now average the distances between the eave lines E F and E H and deck lines L I and I J, as follows: 32 — 20 feet equals 12 feet, divided by 2 equals 6 feet. Now either add 6 feet to 20 feet or deduct 6 feet from 32 feet, which will leave 26 feet, as shown. In similar manner average the end, obtaining the amount of 12 feet, as shown. As the length of the rafters in both end and side views measures 14 feet, then multiply 14 × 26 feet equals 364 feet, multiplied by 2 sides equals 728 square feet. Then again 14 × 12 feet equals 168 × 2 ends equals 336 square feet, making a total of 1064 square feet. We now deduct the dormers; the length of the dormer cutting into the main roof from *h* to *j* in side view is 8 feet 6 inches. The length of the cheek from *h* to *i* is 6 feet; the width of the dormer in plan is 4 feet. Now multiply 4 × 6 feet equals 24 feet by 4 dormers equals 96 square feet. The width of the pitched roof of the dormer cutting onto the mansard roof on the rake is 2 feet 6 inches, as shown in side view, while the averaged distance in the plan view of the dormer, between the line *d e* and the apex *o*, as shown from *f* to *g*, is 2 feet. Then 2 × 2 feet 6 inches equals 5 feet multiplied by 4 dormers equals 20 feet. Now add 96 feet and 20 feet equals 116 square feet to be deducted from 1064 feet and leaves 948 square feet in the mansard roof, minus the dormers. The covering for the cheeks and dormers is as follows: The hight of the cheek is 5 feet and the width of the cheek is 5 feet; 5 × 5 feet equals 25 feet multiplied by 4 dormers equals 100 square feet. The pitch on the roof of the dormer equals 2 feet, as shown, while the averaged distance between the eave line *b* of the dormer and the ridge line *c* is shown by *k*, which is 6 feet. Then 6 × 2 feet equals 12 feet multiplied by 8 roofs of dormers equals 96 square feet. We then have:

115½ square feet in deck roof,
948 square feet in mansard roof,
100 square feet in cheeks of dormers,
96 square feet in roofs of dormers, making a total of

1259½ square feet of material required for the mansard and deck shown. In previous problems the length of the hip was obtained from the elevation; in this one we will show how it is obtained from the plan, either method being desirable. From the point B in side view drop the vertical line B *a*, intersecting the line D C, as shown. Now take the distance *a* B and place it at right angles to K G in plan, as shown by K B^2. Draw a line from B^2 to G, which will be the true length of the hipped ridge or rafter. In similar manner the length of the valley behind the dormer is obtained. Take the hight of the roof of the dormer *b c* in side view and place it at right angles to the valley line of the dormer *m n* in plan, as shown by *m b'*. Draw a line from *b'* to *n*, which is the true length of the valley, eight times this amount being required, made of either tin, zinc, galvanized iron or copper.

(To be continued.)

New Publication.

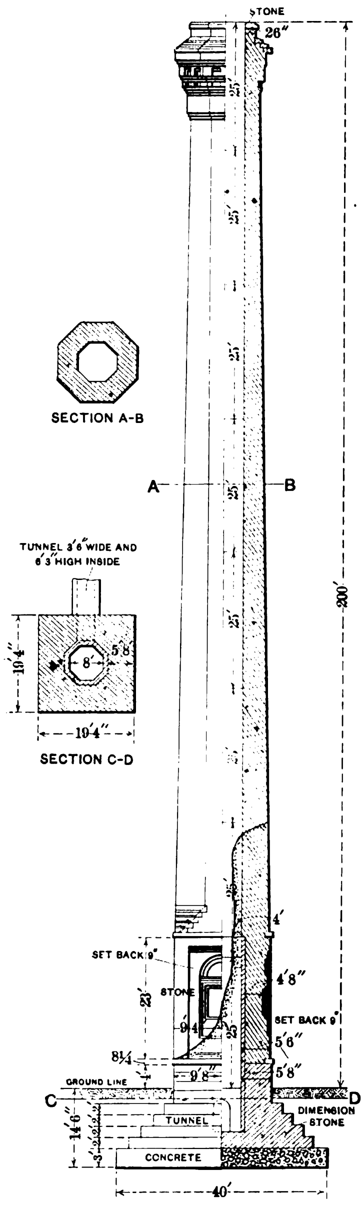
PRACTICAL LESSONS IN ARCHITECTURAL DRAWING. By William B. Tuthill. Size, 11½ x 7½ inches; 62 pages. Illustrated by 33 figures and 33 full page plates. Bound in board covers. Published by William T. Comstock. Price, $2.50, postpaid.

This is the eleventh edition of a work well known to the trade and embraces within its covers directions for making working drawings and writing specifications for buildings. The author states that as the work is intended for students seeking information as to general methods of construction and the proper way to represent them, the changes in the new edition have been made for the most part in the text, the plates being the same as in the original edition. The work embraces scale drawings of plans, elevations, sections and details of frame, brick and stone buildings, with accompanying text, together with a specification showing the various forms of writing the same for different kinds of buildings. There is also a chapter containing extracts from the building laws of New York City.

A Chimney Failure.

The following article, by William W. Christie, we take from the *Railroad Gazette:*

In November, 1899, the Hoepfner Refining Company, Hamilton, Ont., began building an octagonal red brick chimney 200 feet high with an octagonal flue 8 feet in diameter of the inscribed circle, this diameter being the same from top to bottom. It was a single shell and at the pedestal the outside was square. The wall thickness



at the top was 26 inches, and at the bottom 66 inches at the thinnest part of the octagonal flats. The building of the chimney continued through the winter, and the brick was laid in lime mortar. From freezing and thawing, variations in vertical alignment were found and reported and additional work was lined up to correct these changes. Another feature of the work that should be mentioned is the use of some large round boulders in the pedestal walls, some of which were laid bare within 4 inches of the outer faces of the wall when finally the chimney collapsed and the brick work slid off of these boulders. Early in April, 1900, when the spring thaw came, the chimney indicated collapse and the failure came at 1 o'clock a.m., April 18, 1900.

The chimney walls had no offsets such as are commonly used in similar structures. The collapse, by sliding down of the masonry, as shown in the ragged line of the illustration, did little damage to the subfoundation and the limestone base, which extended about 4 feet above the ground. The flue inlet was below ground and the shaft had therefore not been weakened by it. It was dcided to rebuild the chimney at once, and the writer of this article designed the new chimney, and its erection was begun in June of the same year. The subsoil was reported as blue clay, and the foundation and limestone work being in good condition, it was decided to repair the limestone base and build the new shaft upon it. The cross section of the new chimney is circular, and thus, with the same outside diameter at the base as the outside dimensions of the original square base, and a smaller outside diameter at the top, a much thinner wall is used and a safe design obtained with a much smaller quantity of brick.

The exterior of the new shaft has three tapers, and the masonry is of common red brick, laid up in Portland cement mortar. At every 6 feet in hight an endless band of wrought iron is built in the wall to bind it together, and the whole is capped with cast iron, in six sections, upon which are secured six lightning rods connected to a band about the cap, and to a copper tape leading down the side to a charcoal bed in the ground. The fire brick lining was laid up 35 feet above the ground, 4½ inches thick, 8 feet inside diameter, and entirely independent of the shaft.

Comparing the original design with that of the new chimney we have:

Chimney.	Tons per square foot on earth. bearing.	Pounds per square inch at base of brick work.	Wall thickness. At top. Inches.	Wall thickness. At bottom. Inches.
Original	1.94	117	26	66
New	1.164	89.3	13	42

120 pounds per cubic foot was used in calculations.

The new chimney was completed early in the fall of 1900. From the tabulation it is seen that by judiciously placing material much may be saved in careful designing.

Roman Plastering.

The houses of the Romans or semi-Greeks (as those of Pompeii were) had the natural color of the pavements altogether carried off and subdued by the most vivid artificial colors that can be imagined. The walls and columns were covered with the beautifully delicate white crystalline plaster which surpassed the very marble itself in absolute purity of whiteness. And this plaster was then marked out and divided into panels, and covered with delicate ornament in the most brilliant and powerful colors that have ever been used; colors used not as mere auxiliaries to highten the general effect of a more quiet, general tint, but in large, broad masses, edged round with borders of tints deeper, but just as bold, and where the mansion or the room was of a more ornate class, set off with a border or a center piece, which embodied the dreams of their elegant but licentious theology in forms of very loveliness. But all this was very superficial and fading—a damp wall, a piece of imperfect plaster, could wreck the finest fresco—and the ancients then brought to bear upon their wall decoration the same kind of work which they used more coarsely though effectively in their pavements.

In consequence of the alleged high price of materials architects in many parts of the country are called upon to do double duty, at least so far as the preparation of plans is concerned. After securing the ideas of a prospective builder in regard to a structure and working out the plans in accordance therewith they find that the cost of the building is, as a rule, far in excess of what it was intended it should be and accordingly the plans have to go through a process of elimination in order to reduce the cost to the attenuated condition of the owner's pocketbook. This has happened in a great many instances and in a vast number it has resulted in deferring construction indefinitely.

WHAT BUILDERS ARE DOING.

THE outlook for an active building season in Buffalo and vicinity is at the present time of a most encouraging nature, but it is the general complaint of contractors that good mechanics are difficult to obtain, this applying more particularly to bricklayers. The class of work being done is of a higher grade, and operations are about equally divided between dwellings and business structures. The figures for June and for the first six months of the present year show a decided increase over the corresponding periods of 1901, the gain in June being very marked.

According to the figures of Deputy Building Commissioner Rumrill, there were 146 permits issued in June, 1902, for new buildings and alterations, estimated to cost $285,441, while for the same month of last year only 47 permits were issued for buildings, estimated to cost $82,117. For the half year ending June 30, 1902, 3965 permits were issued for improvements estimated to cost $1,936,370, as against 618 permits for building improvements, costing $1,592,754, in the corresponding months of last year.

The strike of the journeymen carpenters, which was in progress for some time, has been amicably settled, and there is at present no interference with building operations. A valued correspondent furnishes the following data concerning the cause and progress of the strike, which may not be without interest. It appears that on May 1 the journeyman carpenters demanded an advance in wages from 30 to 37½ cents per hour, which demand was refused, and the carpenters went out on strike. Previous to this, however, the master carpenters had offered the men 32½ cents an hour, which the men refused. Finally, after having been out for five weeks, the journeymen returned to work on the basis of a scale of 33 cents per hour, and an agreement between the union bodies and the Carpenter Contractors' Association was signed based upon this scale. The agreement also provides for a wage scale for the year ending May 1, 1904, the wages for that year to be 35 cents per hour. The contract allows employers to hire either union on nonunion men, according to circumstances. The plumbers of Buffalo were out on strike for five weeks, owing to the refusal of their demand for an increase in wages of 50 cents per day, the existing rate being $3 a day for eight hours' work. The trouble was finally adjusted by a compromise of $3.25 per day.

The strikes did not seriously disturb building operations, as most of the master carpenters made use of nonunion men during this period. These nonunion men, we are informed, still continue to work. A contract was also made with the Bricklayers' Union on July 1, whereby the agreement will extend for a year from that date. Bricklayers are now receiving 50 cents per hour, plasterers 50 cents per hour and the stone masons 45 cents per hour.

Boston, Mass.

A compromise agreement has recently been reached between the Mason Builders' Association and the Building Laborers' Union whereby members of the latter have received an increase in wages of 3 cents per hour, the rate now being 28 cents, as against 25 cents previous to July 14. This agreement practically assures the builders at Boston immunity from strikes on the part of laborers for another year, as it runs until July 1, 1903. The agreement was signed by L. F. Woodbury for the Mason Builders' committee and John Keohane for the Building Laborers' committee.

Creston, Iowa.

Judging from the amount of work in progress and in contemplation the city is likely to experience one of the greatest booms in the building line which has occurred for 20 years. The contract for a Government building, to cost $100,000, has been signed, and a $75,000 Masonic Temple and opera house is expected to be completed before cold weather. The Chicago, Burlington & Quincy Railroad will make extensive repairs and additions to the monster roundhouse at that place, and the two new building additions to the city, which have been laid out and planned, will involve a great deal of work in the building line. One entire business block has already been erected, and many others are in contemplation. About 30 new residences, ranging in price from $600 to $8000 each, are under construction. The most important improvement is regarded as likely to develop along the line of the Creston-Winterset Electric Railway, which is being rapidly pushed to completion.

The improvements are being held back to some extent by reason of the scarcity of carpenters, painters and builders, while even day laborers are at more or less of a premium.

Detroit, Mich.

The building situation in the city is comparatively quiet just at present, although a fair amount of business in the aggregate is in progress. There are no serious labor troubles, and matters are moving along in the even tenor of their way. According to Permit Clerk C. W. Brand, there were 240 permits issued in June for building improvements, estimated to cost $524,700, as compared with 243 permits for building improvements, involving an estimated outlay of $836,400, in the same month of last year.

For the first half of the present year 1371 permits were issued for improvements, aggregating a cost of $2,859,200, while in the corresponding months of last year there were 1367 permits issued for buildings, costing $2,832,000.

Honolulu, H. I.

Contractors and builders at Honolulu are now moving for a reform in building. The recent falling down of a large section of an extensive brick structure, which was being built by Japanese builders, has served to call public attention to the instability and dangerous character of buildings being erected by Orientals. The Builders' Exchange has taken the matter in hand, and on June 16 a committee, consisting of A. Gartley, president of the Builders' Exchange, and L. E. Pinkham of the Legislative Committee of that body, tendered to the Board of Public Works the services of the exchange in the matter of securing the erection of buildings which shall be at least reasonably safe. It is probable that a building inspector will be appointed. The Builders' Exchange will also propose a series of building laws to be submitted to the next Legislature of the islands. At present the only regulations, in the nature of building laws, are the sanitary regulations of the Board of Health.

Kansas City, Mo.

The present outlook for the building business is regarded as very encouraging by members of the trade, and the volume of operations is showing a very gratifying increase over last year. A large number of dwellings are being erected, and it is estimated that they probably constitute two-thirds of the work of the past six months. The labor situation is free from disturbance, and matters are moving without undue friction.

According to Superintendent of Buildings McTernan there were 2037 permits issued for building improvements during the first six months of the present year, involving an estimated outlay of $3,381,411, which while slightly less as regards the number of permits issued for the corresponding months of last year, shows an increase of $305,321 in the amount of capital involved. The figures for the first six months of 1901 show 2205 permits to have been issued for building improvements, estimated to cost $3,076,090.

Lowell, Mass.

The annual outing of the Builders' Exchange, which occurred on Friday, June 27, at the New Relay House, Bass Point, Nahant, was a great success in every way. Nearly 100 builders and contractors, with their friends, laid aside the cares incident to business routine and became boys again. The party left Lowell early in the morning on a special car attached to the Boston train, and arriving at Lincoln Wharf at 9.30 they embarked on the steamer "Frederick De Barry" for Bass Point. Landlord Bramm informed the visitors on their arrival that the hotel and grounds were at their disposal for the day. Two baseball nines early in the day battled for supremacy, one being known as the "Master Builders" and the other as the "Lobsters," the latter winning by a score of 58 to 49. The shooting galleries reaped a harvest and there was no little competition in the matter of marksmanship. An excellent dinner, made up largely of sea products, was served at 1 o'clock, which was a credit to Landlord Bramm and to which full justice was done by the hungry visitors. The occasion was one long to be remembered, and the annual outing of the exchange is now an event to which the members look forward with anticipations of the keenest pleasure.

It is noticeable how such events tend to break down the barriers between many who have "crossed swords," so to speak, in competition in the business arena. Many fanciful grievances and misunderstandings are wiped out through the social intercourse incident to a well spread table with competitors within speaking distance of each other. The outing was managed by a committee consisting of Frank L. Weaver, chairman; James Whittet and Charles F. Varnum, with Superintendent A. J. Ryan looking closely after the details.

The exchange is at present in a very prosperous condition, with the membership showing a steady growth, the additions being drawn from the conservative and practical class in the contracting trades and from among the supply dealers. Quality is more to be preferred than quantity in the membership of a body of this kind, and it applies with equal force to all associations. The exchange as a body has not as yet taken action on the proposed revival of the National Association, as it is intended to wait for some of the older exchanges to take the initiative. It is quite certain, however, that a goodly portion of the membership will substantially support the parent body as soon as the machinery is set in motion.

The otherwise tranquil labor conditions have been marred somewhat by the demands of the laborers for an advance of 3 cents per hour in wages. As yet nothing but correspondence has been exchanged between the parties in interest.

Milwaukee, Wis.

The present situation is such as to warrant a most hopeful feeling among architects, contractors and builders as to the future in their line of business. The projects under way cover all classes of buildings, with particular activity in the way of dwellings. According to the figures of Building Inspector Dunn permits were issued during June to the number of 179 for building improvements, estimated to cost $365,408. This is an advance over the corresponding month of last year, when 119 permits were issued for buildings, involving an estimated outlay of $331,445. Taking the figures for the first half of the present year, we find that 1070 permits were issued for building improvements, estimated to cost $705,072, as against 733 permits for buildings, costing $2,485,428, in the first six months of 1901. While there have been some labor troubles in the building branch of industry, they have not been of sufficient magnitude to seriously interfere with active operations.

Minneapolis, Minn.

The building record for the first half of the year shows a gratifying increase in the number of permits, as well as in number and aggregate cost of dwellings erected, although there is a small falling off in the figures showing the total cost of all classes of buildings when compared with the corresponding period of 1901. A specially noticeable feature of the record for the first six months of the present year is the increase in the matter of residence construction. There were 365 permits issued for dwellings of all classes, costing $670,000, as against 275 permits for dwellings, costing $626,500, for the same period last year. Every ward in the city, with the exception of the Third and Eleventh, shows an increase, that in the Tenth Ward being very nearly 200 per cent., as compared with a year ago.

The total cost of the building improvements for the first six months of the current year was $3,166,505, as compared with $3,492,547 for the first half of 1901, the decrease being chiefly in the line of elevator construction, of which a considerable amount was executed a year ago.

New Bedford, Mass.

The semiannual report of the Inspector of Buildings shows that operations have been conducted during the past six months upon a scale which breaks all previous records. The estimated cost of the building improvements reaches a figure more than double that of the corresponding period of 1901 and exceeds the total of that entire year by something like $200,000. The entire number of permits granted during the first half of the present year for new buildings, additions, alterations and repairs was 267, estimated to cost $1,293,092. Of this total 19 permits were for buildings and additions for manufacturing purposes, involving an estimated outlay of $1,015,500. The indications are that the building operations for 1902 will exceed those for any year since a record has been kept. The new mills that are in process of construction will call for many new dwellings, stores, &c., which will bring the total amount invested up to a very creditable sum. During the 12 months of 1901 the total amount invested in building improvements was $1,099,102.

Philadelphia, Pa.

New building operations continue to be the order of the day, and the aggregate is a volume of business which makes a gratifying showing when compared with corresponding periods of last year. While the number of the undertakings does not in every case exceed those of a year ago. yet the capital involved is greater. During June there were 810 permits issued, covering 1076 operations and estimated to cost $2,324,430, as compared with 814 permits, covering 1199 operations and involving an outlay of $2,301,860, in June of last year. One of the most notable operations of the month is that of H. P. Schneider, who began work on 21 two-story houses and one two-story store and dwelling in the Twenty-eighth Ward. Another operation soon to be commenced in West Philadelphia involves the erection of 140 two-story houses, to cost $230,000. A classification of the buildings erected in June shows over 300 dwellings to have been projected and 383 miscellaneous structures. The Ninth Ward heads the list with improvements costing $302,570.

The figures for the first half of the present year show 3866 permits to have been issued, covering 6154 operations and costing $15,552,340, while in the corresponding months of last year there were 4323 permits issued, covering 6836 operations and involving an expenditure of $15,099,840.

San Francisco, Cal.

The reaction in building reported last month has not as yet become very serious, although the scarcity of structural steel is still acutely felt in many instances. After a long delay the steel frame work of the big Flood Building on Market street is going up, and it is announced that the Fairmont Hotel, the construction of which was supposed to have been abandoned, is now to be built at once. Work has also begun on one of the large new buildings at the State University at Berkeley. The steel for this structure had been ordered from Belgium, but it is understood that the Belgium steel was tested by order of the architect and found too soft for the purpose.

With the advent of hot weather and the departure of many people to their suburban homes, country and seaside resorts, &c., the pressure for dwelling houses has somewhat relaxed. This fact, together with the high price of lumber and building hardware, leads builders to expect a falling off in the demand for frame dwelling houses and flats. As a matter of fact, however, the record of building contracts let, as well as the demand for lumber, &c., do not show any particular signs of a serious drop.

The building contractors connected with the Builders' Exchange gave a banquet on June 21 to S. H. Kent, president of the exchange. James A. Wilson officiated as toastmaster of the occasion, and speeches were made by Robert McKilliken, Chas. Day, A. McPhee and Mat. Kelleher.

After nearly two years the amended fire and building code has been favorably recommended to the Board of Supervisors by the Joint Committee having the matter in charge.

Scranton, Pa

The first six months of the present year have shown a marked increase in activity in the building line in Scranton, Pa., as compared with the corresponding period of 1901. According to Inspector of Buildings Colvin there were 422 permits issued in the first half of 1902, involving an estimated outlay of $892,818, as against 223 permits for building improvements costing $459,813 for the first half of last year.

Seattle, Wash.

While the number and amount of building permits issued during the past few months has been larger than during the corresponding months of preceding years, there have been but very few large buildings undertaken this season. Aside from the steel frame Arcade Building, which is under construction by the Moore Investment Company, there is hardly another large office or business block under construction in the city. A few smaller brick buildings are going up, and a number of less important frame business buildings, but no large undertakings are in progress. So far this year almost the entire attention of builders has been given to frame dwelling houses. The prospects now are, however, that a number of large buildings will be undertaken in the near future. Mr. Moore of the Moore Investment Company, who has just returned from the East, states that the Lumber Exchange Building will be begun at once. Another large business block on Second avenue will be undertaken, and it is generally understood that some extensive building will occur on Madison street.

Spokane, Wash.

The building trade of Spokane is much stronger at the present time than it has been at any previous date this year. Very little building is being done for investment. In this line high prices and scarcity of materials seemed to have formed an effective check. The falling off in investment building has, however, been more than offset by the increase in residence building. A veritable boom in cottages seems to be in progress. A number of residences, costing in the neighborhood of $10,000, are being built, but by far the greater number are of the smaller and less expensive type. Contractors are figuring the cost of ordinary buildings from 15 to 20 per cent. higher than last year.

St. Louis, Mo.

The building situation in and about the city contains much that is of an encouraging nature, and the outlook is regarded with satisfaction by architects, contractors and builders. There are a number of projects under way, including hotels, mercantile structures, flats, &c., and while the permits issued have been about equally divided between dwellings and business buildings the cost of the latter has, of course, been much the greater of the two. This refers to brick buildings, as those of frame constitute a mixture of sheds, stables, dwellings, billboards, &c. Building materials are high, yet this fact does not to any large extent appear to act as a deterring factor in the operations under way and in prospect.

According to the figures of Commissioner Longfellow of the Department of Public Buildings the permits for June included 121 for new brick buildings and 81 for additions, repairs and alterations, calling for an expenditure of $1,560,835, with 170 permits for new frame buildings and 61 for additions and alterations, costing $54,067, making the aggregate cost of the building improvements for the month $1,614,902. These figures compare with 179 permits for new brick buildings and alterations, costing $1,318,663, and 167 permits for new frame buildings, with additions and alterations, costing $23,441, the whole aggregating $1,342,104, for the corresponding month of last year. Taking the figures for the first six months of the year, the records show 2091 permits to have been issued for brick and frame structures, with additions and alterations, aggregating a cost of $6,531,439.50, as compared with 1776 permits for building improvements, aggregating a cost of $6,259,825, for the first six months of last year.

DESIGN FOR KITCHEN OR PANTRY DRESSER.

THE dresser which we illustrate herewith is intended as an example for suggestion in the general arrangement of compartments in a good grade of work. The doors are shown glazed with leaded glass, but common sheet glass may be substituted for cheaper work, and instead of panels at the back of the counter shelf, as shown, ⅞-inch matched and beaded boards may be used; or, if the pantry or kitchen has wainscoting to a hight of 4 or more feet, the wainscot will show.

Shelves are provided in the upper and lower parts of the dresser, as indicated by the dotted lines on the side elevation. These shelves may be fixed in place or made adjustable on ratchets, as preferred. Turned posts may be used instead of the four brackets between the upper and lower parts of dresser, but this change would necessitate the introduction of four pilasters at the wall directly back of the posts.

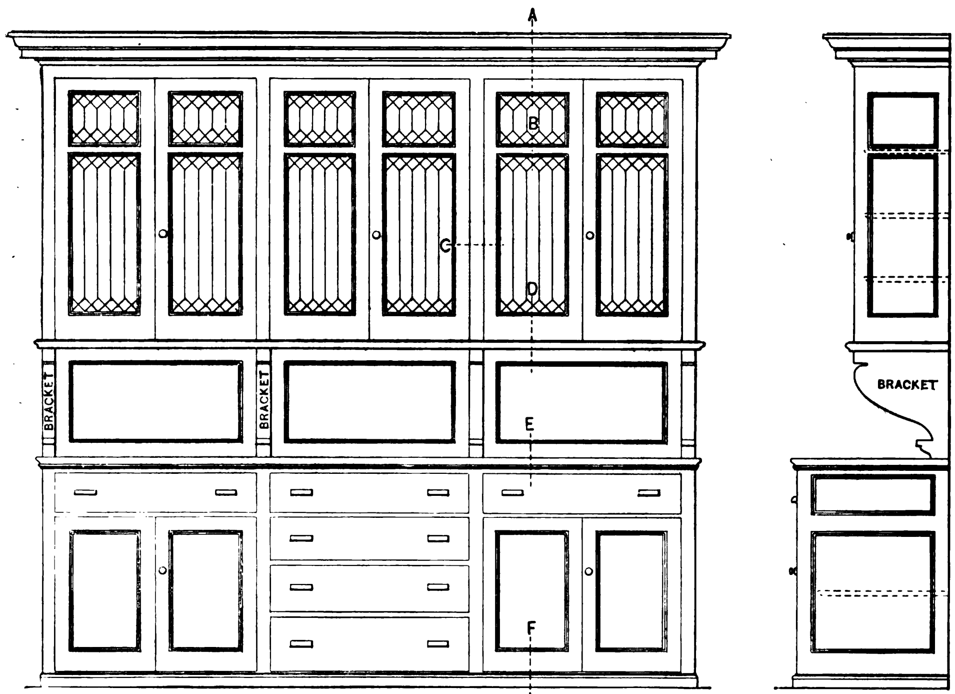
In designing and constructing dressers, special attention should be given to the requirements for kitchen utensils, cutlery, silver, china, table linen, food stuffs, &c. The arrangement of compartments and drawers in the lower part of a dresser is so varied that it can seldom be determined satisfactorily without consultation with those who are to use them.

A good hight for dressers is from 8 feet to 8 feet 6 inches, but in rooms 9 feet high or less they should extend to the ceiling. A good hight for the lower part of dresser is 2 feet 10 inches, but it may be from 2 feet 6 inches to 3 feet if necessary.

Care should be taken when constructing or designing to have the panels on the side elevation line with those on the front, as a much better effect is secured than if they did not line.

The detail at A shows the cornice and top of dresser. In this case the cornice is secured at the top with a wooden strap, but instead of this, blocking may be used. The wood lining at the back is often omitted, and, if it be required, should be carefully specified. It is usually of ⅞-inch matched and beaded or V'd boards.

The detail at E shows a section through the counter shelf and drawer, a good depth for the former being about 2 feet. The detail at F shows a section through the lower part of the cupboard. Strips of 2-inch stuff are set upon the floor of the room, as shown, and to this the floor of the dresser is nailed. A 2-inch molded base breaks around dresser at the floor line. The material used in construction is commonly white pine, with North Carolina pine for medium grade work and ash for the best grade.



Front and End Elevations.—Scale, ⅛ Inch to the Foot.

Design for Kitchen or Pantry Dresser.

Some Comments on Finishing Floors.

In the course of a series of articles which, under the title of "Talks with the Veteran Painter," are now running in the *Painters' Magazine*, some very interesting comments are presented on the subject of finishing floors. The information is given in the form of questions and answers and contains so much that is suggestive that we lay the following extracts before our readers:

"I want to ask you what you would suggest as the best treatment for a floor?"

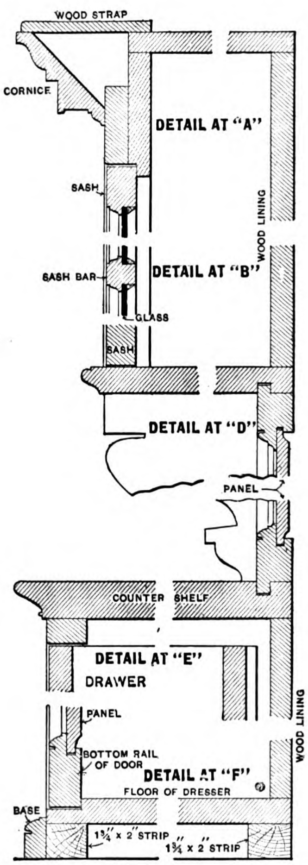
"Well, my suggestion, if it is a hard wood floor, is to fill it first with a paste filler, and then put your wax on top of the filler. If you use a coat of shellac before waxing, as a good many do, then you are sure to have trouble, for your floor will get scratches that you cannot get rid of."

"Why, a good many people advocate using nothing but shellac on a floor."

"Shellac may be good enough if you want to walk on the floor an hour after it is finished, but it will scratch, and there is no way to renovate it unless you use ammonia or an alkali of some kind to get it off. Then if you let a drop of water fall on a shellacked floor it will show as a white spot. I have no use for shellac on floors."

"Yet the parquet floor men finish their work with shellac. Can't you give it another coat when it begins to show scratches?"

"Yes, I know they finish it that way, and I have often wondered why they do. As for giving it another coat, you can easily get too much of a good thing. You want your floor finish to be as thin as possible. The trouble with a waxed floor is that people are constantly putting more wax on, and before they know it, it gets so overloaded with wax that you can't do anything with it but take the whole thing off and begin over again. You can get too many coats of paint or floor wax on, and it doesn't do to put on another coat until the first one wears off, unless you remove it. Now with a wax floor, you want to go over it now and then with a weighted brush to polish it up, and just put a very little wax where the most wear comes. Then you will keep it in good condition."



Vertical Cross Section through Dresser, Showing Details of Construction.—Scale, 1½ Inches to the Foot

And they can be kept in order just as well as a hard wood varnished floor. The places that a floor wears out first are at the doors, and they ought to protect them there with rugs. In fact, they ought to use rugs wherever there is any hard wear on a wood floor."

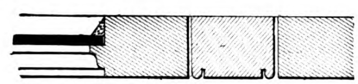
"Yes, you can keep floors in good condition for a long while if you will rub them with floor oil as soon as they begin to show scratches. It's one of the best things for rubbing up furniture with I know of. It seems to revive the varnish and renew its elasticity. It will take all the scratches out of a piece of furniture."

"What is floor oil?" asked the reporter.

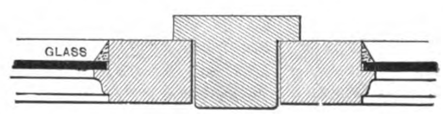
"I don't know exactly what it is. A good many of the lubricating oil manufacturers are putting out floor oils, and I imagine they must be made of petroleum or paraffine wax, probably varying a little in their composition, but they are all about the same thing. By the way, crude petroleum is about as good as anything for use on a floor or to renovate old varnish. I cleaned the chancel and the pew backs of St. John's Church with it. It cuts all the grease and takes it off. You want to put it on and then rub it off perfectly dry with cheesecloth, or some soft material that has no lint."

Lumber and Timber Products.

In the census report on the "Utilization of Wastes and By-products," H. T. Kittredge says that "nearly all of the formerly waste products of lumber and timber are now turned to some utility, and some of the new products thus formed are of considerable value. Of this latter class may be mentioned sawdust, which was formerly considered an absolute waste material, and was allowed to float down the stream or was thrown into a heap where it could be most conveniently disposed of. French cabinet makers have found a way of preparing this material which gives it a value far above that of solid timber by a process that has been in vogue for at least 25 or 30 years, combining the use of the hydraulic



Section through "C" of Elevation, Showing Plain Construction.



Section through "C," Showing a Better Form of Construction. Scale, 3 Inches to the Foot.

Design for Kitchen or Pantry Dresser.

"But that presupposes an intelligent servant girl. Do you furnish them along with the floors you wax?"

"If I had to, I'd send along a wooden Indian from a cigar store. It would have just about as much sense as the servant girls we get nowadays. No, I won't guarantee that any servant girl will keep a floor in good condition."

"What's the matter with a varnished floor?"

"The trouble is that the gum in the varnish will get hard and brittle and show cracks after the oil has dried out. I know lots of varnish makers claim to have floor varnishes that will not show heel marks, but after a time all that I have have seen will scratch, even the best of 'em."

"What do you think of a painted floor?" asked the reporter.

"Well, for my own part, I'd rather have a good, well planed floor that has been painted, grained and varnished than the best hard wood floor you can get. It will wear a great deal better, and then you can change it as you like. You can have an oak floor until you get tired of it, then you can change it to a maple or a mahogany floor.

press and the application of intense heat. By this process the particles of sawdust are formed into a solid mass capable of being molded into any shape and of receiving a brilliant polish, and possessing a durability and a beauty of appearance not found in ebony, rosewood or mahogany. This product is known as '*bois durci*.' Artificial wood work, therefore, seems to have a promising future. Alum, glue and sawdust, kneaded with boiling water into a dough and pressed into molds, when dried is hard and capable of taking on a fine polish. Ornaments of great beauty can be made from it very closely resembling carved wood work. The production of acetic acid, wood naphtha and tar from sawdust is one of the latest enterprises in Norway. A factory has been started at Fredrikstad capable of distilling 10,000 tons of sawdust in a year. It also manufactures charcoal briquettes, which are exported to the Netherlands. The acids are chiefly placed on the German market, while the tar is mostly consumed at home. The factory is said to be the first of its kind erected in that country. According to an English patent of 1897, sawdust may be so prepared as to be noninflammable, and then applied to jacketing of boilers and other purposes."

Veneering Round and Tapering Columns.

Occasions often arise where it is desirable to veneer columns of varying size and shape, and just how to do the work to the best advantage is a question not always readily determined by the workman. In commenting upon this matter a writer in one of our exchanges offers the following suggestions concerning tapering columns:

The success of this work depends entirely on the proper cauls. The sponging and gluing is the same as the work in my previous article. Take a circular column of 3 or 4 inches in diameter, the core to be made of any suitable material. Pass a piece of paper around the core and make a straight joint through the center and we have the exact size of the veneer. A caul of tin with a cleat on each end for the purchase of the hand screws is to be made as Fig. 1, leaving the top open for an inch or more to give the glue a chance to escape. Apply the glue to the core and pass the veneer around it, not forgetting, however, to sponge the veneer before doing so. After screwing together, put the whole in the steam box to warm up the stiffened glue. After the work has become thoroughly warm take it out and give the hand screws a few turns, then lay it aside until the glue is set. Take off the hand screws and dispense with the tin cauls. The ends may then be brought together, as shown in Fig. 2, only the caul on the joint is to be heated.

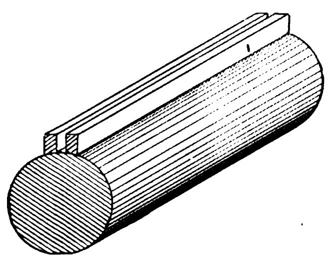


Fig. 1.—Tin Caul.

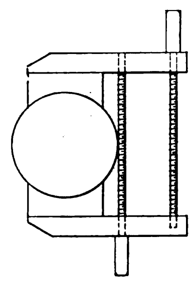


Fig. 2.—Hand Screws.

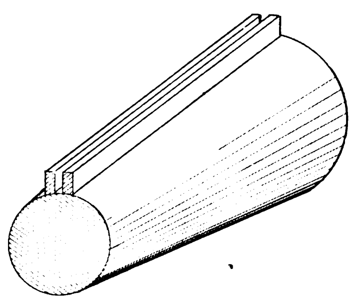


Fig. 3.—Tapering Column.

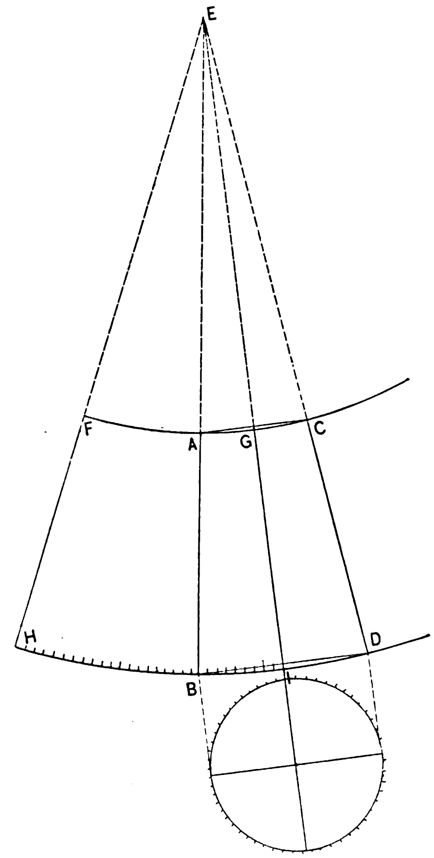


Fig. 4.—Laying Out Shape of the Veneer.

Veneering Round and Tapering Columns.

Fig. 3 is a tapering column. The work is the same as above described, only the shape of the veneer is different, which may be got either by passing paper around, trimming on both ends and making a straight joint in center of column, or by laying out the diagram, as Fig. 4. In explanation thereof, let A, B, C, D represent the column in question. To find the shape of a veneer to pass around this column extend A B and C D to E. With the radius E C and E D, describe the arcs C F and C H, which will be the required shape, and the distance A F and I H will pass half way around, and the veneer requires to be cut as large again to pass all around the column. Under no circumstances make more than one joint. By following the instruction herein given any fair mechanic will be enabled to execute a creditable piece of work.

A GOOD formula for concrete is said to be one barrel cement, one and a half barrels sand and four barrels broken stone, this combination producing four and eight one-hundredths barrels. Watertown Arsenal tests of this formula are said to have shown a crushing resistance in seven months of over 150 tons per square foot.

Old Wood Carvings.

Although in the Priory at Christ Church, Hants, at Westminster Abbey, Salisbury Cathedral, and in a few other of our ancient minsters, there may be seen to-day miserere seats and (as at Salisbury) other small portions of stalls dating from the middle of the thirteenth century, the oak in each of which is as sound now as it was in the days when the respective monarchs of the forest bowed their sturdy heads to the woodman's axe, the palm, as regards seniority, is claimed, and justly so, by Exeter Cathedral, says a writer in the London *Woodman*. Therein, in the choir, may be seen 50 miserere seats, every one different, cleverly carved and enriched by figure and by foliage, the oak in each and every one of them perfectly hard and solid, and altogether innocent of the least indication of rot or decay, carved under the direction of Bishop Bruere (tenth Bishop of Exeter), who ruled over this diocese from the year 1224 to that of 1244. Taken as a whole, they are not only the most perfect examples of the early thirteenth century work in this country, but also in any cathedral or church in the world. Bruere (or William Briwere, as he is sometimes called in ancient manuscripts) was for nearly five years in the Holy Land. This accounts, no doubt, for the altogether Eastern character of some of the figure carvings upon these superb misereres. One of them represents an elephant and is of exceptional interest, in that it is the earliest carved representation of that quadruped in existence in England. It is curious, too, in that its carver, apparently never having seen such an animal, has represented it with the hind legs of a dog, although, as we all know now, an elephant's hind legs possess hocks precisely the same as do the fore ones, and hence its ability to kneel down like a Christian. But, after all, we are but a new people; and what with us appears to be ancient history is very modern indeed, when we come to compare ourselves with some other countries—Egypt, for instance. The most ancient carved wood figure—it is of sycamore—known to exist may be seen in the Museum of Gizeh, at Cairo. It dates from B. C. 3900, so is very nearly 6000 years old, and still the wood is sound and good. This precious old statuette was found at Sakkarah, and is supposed to represent one of the overseers of the workmen engaged in building the pyramids which abound in that immediate neighborhood, and, by comparatively recent discoveries, have been proved to be the oldest of all the pyramids of Egypt. The statue is known as the "Sheikh-el-Beled," or "Sheikh of the Village," a name given it by the Arabs who found it, because its features represented very closely those of the man who was then their own sheikh. In this we get a wonderful instance of how human nature, through the roll of thousands of years, keeps on repeating itself. The statue is distinctly a portrait, showing a jolly, well fed, closely shaven man of 50 summers or thereabout, altogether nude, save for a cloth bound by a leather girdle about his lusty loins and reaching down to his knees. He stands erect, and in the right hand grasps a staff, but I do not think the latter is part of the original. The exact hight of the statuette is 3 feet 8½ inches. A careful cast in plaster of Paris of this wonderful old carving was made early in 1894, and may now be seen in one of the Egyptian Galleries of the British Museum. This, then, is the oldest known existing example of the wood carver's craft.

Law in the Building Trades.

CONTRACT AN ENTIRETY THOUGH DIVIDED.

Where a contract for a government building divides the work into three distinct parts, for each of which a specified sum is to be paid, so as to conform to appropriations, such contract is an entirety and the contractor's right to recover for the performance of one part of the work must be determined from the whole contract.—McGowan *vs.* United States, 35 Ct. Claims, 606.

WHEN OWNER COMPLETES CONTRACT.

Where a building contract provided that on the default of the contractor the owner could complete the work, "the expense thereof to be deducted from the amount of the contract," the owner, in the absence of a showing of negligence, was entitled to deduct the actual amount paid by him for such completion, notwithstanding expert testimony that it might have been finished for a smaller sum.—Riley *vs.* Kenney, 67 N. Y. Supp. Rep., 584.

RESTRICTION AS TO THE BUILDING NOT A RESTRICTION ON ITS USE.

A covenant in a deed that the first building erected on the land conveyed should be a private dwelling of brick and stone, adapted for residence of private families, &c., and that a flat or apartment was not such a building, did not restrict the use to which a building conforming to the covenant should be put after its erection.—Kurtz *vs.* Potter, 60 N. Y. Supp. Rep., 764.

PARTIES SHOULD EXAMINE PLANS IN MAKING ESTIMATES

Where one contracted to furnish for a lump sum all the sand necessary for the brick work of a building, basing his estimate on the statement of the builder as to the number of brick to be used, and without looking at the plans, which the builder told him he could examine, there was no such fraud as rendered the contract invalid because a greater number of brick were necessary than stated by the builder.—Williams *vs.* Dalker, 68 N Y. Supp. Rep., 348.

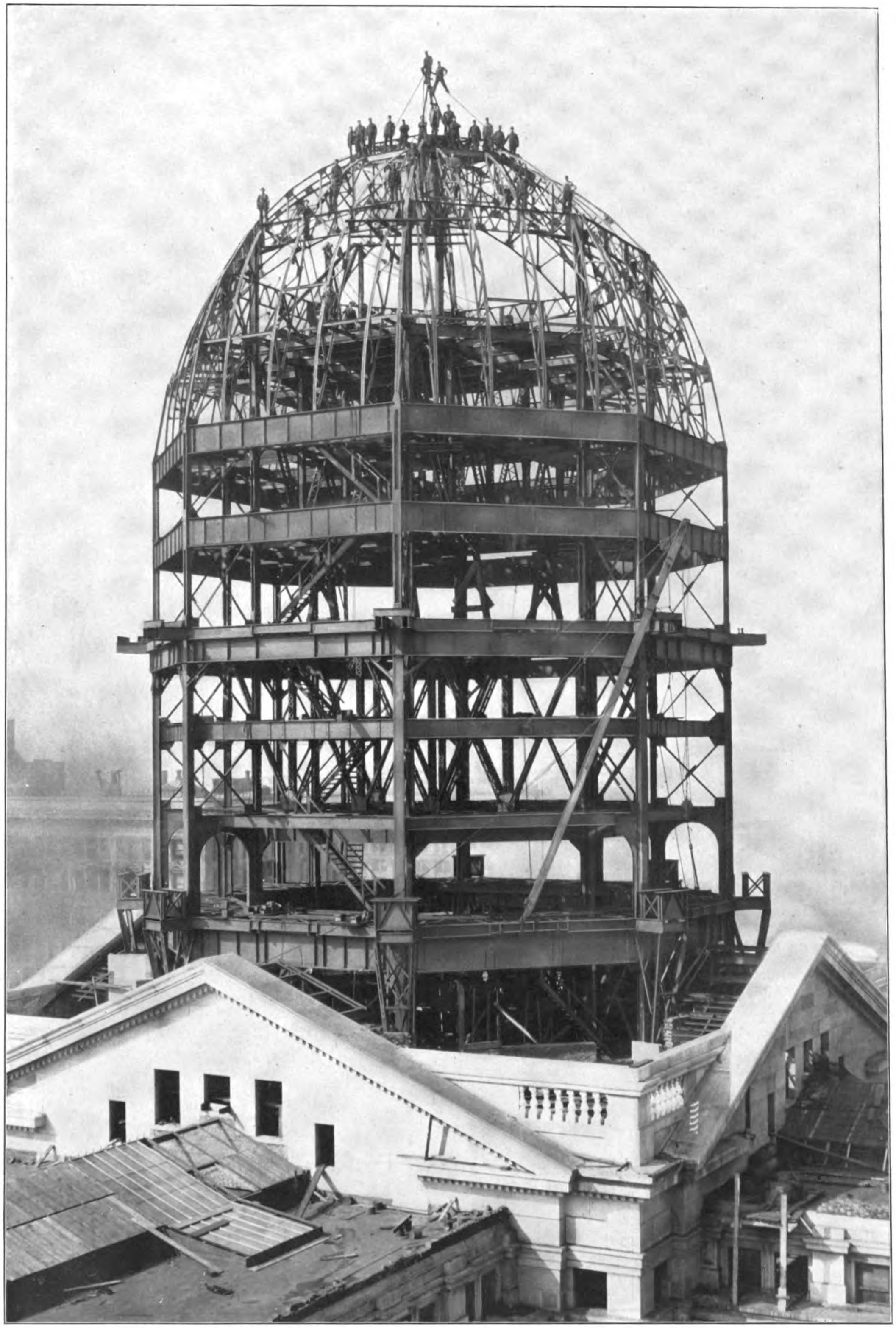
GENERAL CONTRACTOR CANNOT LIMIT RIGHT OF SUBCONTRACTOR'S LIEN.

A provision in a building contract that the "contractor will not at any time permit any lien, attachment or any other incumbrance under any law of the State or otherwise, to be put or remain upon the building or premises about or upon which any work is done or materials furnished under this contract, for such work or materials, or by reason of any other claim or demand against" the owner, does not prevent the filing of liens by subcontractors for their work and material. —Hazleton *vs.* Plumbing Co., 13 Sup. Ct., Penna., 426.

The Home-Made Greenhouse.

There is scarcely a lover of plants who has not felt the need of some place other than the ordinary window for plant growing, a place secure from dust, dry air and excessive heat that form the greatest obstacles to success. Many plants unable to survive the winter in open ground may be lifted and carried over in a dry cellar, well lighted; but many cellars are unsuited to the purpose, the extremes of furnace heat or overdampness, with poor ventilation, proving fatal to all but the hardiest plants. Suitable plant rooms are highly desirable, and the amateur will be aided in his efforts to provide such by the illustrated article in the August "Delineator" on simple forms of plant quarters, which may be made at a comparatively small expense.

CONTENTS.



FRAMEWORK OF THE DOME OF THE NEW CHICAGO POST OFFICE.

HENRY IVES COBB, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, AUGUST, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHERS AND PROPRIETORS.
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SEPTEMBER, 1902.

The Need of Trade Schools.

In view of the importance of the matter, is it not remarkable how little attention is being paid by the public press to the subject of trade schools. Notwithstanding that the need for the extension of these institutions throughout the country is conceded by all those who have studied the matter to any extent, the movement seems to evoke little or no enthusiasm on the part of the public. Meanwhile vast numbers of boys who, if provided with facilities for obtaining a proper trade education, could be furnished with the means for earning a good livelihood and becoming useful citizens of the republic, are growing up and going out into the world without any adequate industrial equipment. A refreshing exception to the general indifference in regard to this matter is noted in the strong plea for more trade schools recently presented in the New York *Evening Post* by Joshua C Pumpelly. The writer points out that we have in this country a certain number of manual training schools where children are taught, in general, to use their hands and eyes; but of trade schools pure and simple, where boys may learn a handicraft by which they can earn an honest living, there are lamentably few. The New York Trade School founded by the late Colonel Auchmuty is an example of what is needed in this line, and the New York Hebrews, with the aid of the De Hirsch Fund, have established a somewhat similar work for the Jewish boys. Then there are a few comparatively small trade schools in Boston, Hartford and one or two other Eastern cities, while the Board of Education of Springfield, Mass., has recently achieved the unique distinction of establishing a public trade school. This is about all that is being done at present in this important field. The American boy who is ambitious to learn a trade is to-day obliged to pick up a rudimentary knowledge of his chosen handicraft as an apprentice or helper, struggling all the while against the influence of the unions, whose general policy is to oppose, by every means in their power, the training of future rivals to the selfish union members, and against the disinclination of the workmen themselves to impart to others the knowledge they possess. The result of this discrimination against the American boy, which is very general among workmen, is that vast numbers of youths, many of them of more than average capacity, unable to gain even the precarious foothold of apprenticeship in any trade, are forced to seek a living by their wits, taking up whatever presents itself and drifting, in too many cases, into a life of shiftlessness, if not of dishonesty.

Trade Schools a Good Investment.

In the sharp industrial competition which is one of the characteristics of the age, an immense advantage has been derived by European manufacturers from the trade and technical schools which have been established on the Continent. Germany affords a striking illustration of this fact. Since the inauguration of the trade school system in that empire, but a comparatively few years ago, German manufactured articles, which were formerly almost unknown outside of the Fatherland, have penetrated into all the world's markets. And the same thing holds good in a lesser degree of France, Switzerland and Belgium, in all of which countries trade schools are an established institution. Great Britain too is awakening to the need of trade schools and the movement has received a great impetus in that country in the past few years. America, almost alone of the civilized and progressive nations of the world, lags behind in this important economic movement. And the only valid excuse for this state of things is that the trades unions are opposed to them. But surely the general prosperity of the country, the well being of the community and the future of the rising generation should weigh against the selfishness of a limited number of union workmen. Trade schools are among the best investments any country can make. Not only do they produce useful citizens, capable of supporting themselves and their families, but they develop, by the superiority of workmanship which they inculcate, markets for the manufactures of the country and promote an industrial excellence which tends to the prosperity and well being of the whole nation.

Wisdom of Courteous Treatment.

That courteous treatment should prevail between an employer and his workmen will be conceded by all fair minded men. Any one of business experience is aware that harshness of treatment too often results in a bitterness of feeling on the side of both parties concerned. It is probable that under the strenuous business demands of the present day some men do not take the time, that surely would be well spent, to cultivate a cordial understanding with those with whom they are in daily contact. This has probably often led to a lack of consideration in cases where to give it would be only just, which has resulted in an indifference on the part of employees to the interests of their employers that has been a disadvantage to all concerned. That this feeling exists among many employees is palpably true, and it is also true that in too many instances it has been developed through neglect of their interests by those who employ them. Not infrequently, however, such employees, in changing from one employer to another, do not alter their course of action in accordance with their circumstances, and it is possible that an employer was suffering from some such unjust treatment when the following letter was penned to us:

> Of late years I have noticed that journeymen have become less honorable than in former years. The job I have to offer is a steady one and at fair wages; and I find no fault with any man for leaving his employment to better himself. But does he not owe to his employer the consideration of at least letting him know his intentions, so that he can make his departure honorably and decently, instead of sneaking away in such a manner as only a mean man would, without saying a word, and thus leaving his employer in the lurch for a time?

Beyond doubt such treatment as that referred to by our correspondent is unfair, and while there is no proverb to the effect that two wrongs make a right, it is equally true that, in some instances, retaliatory action in return for a wrong would start the original infringer on the right line of thinking. If "honor to whom honor is due" was more frequently the motto of employers, then conscientious, honest, competent workmen would less frequently have their better feelings hurt or outraged. There are two sides to the question presented by the letter above quoted, and there is no doubt that it can be studied with advantage from both sides, when the wisdom of more generous and courteous treatment will readily be seen.

Novel Phase of Architectural Treatment in Skyscraper Construction.

The new 16-story white marble office building which is now in process of erection at the northwest corner of Broad street and Exchange place, New York City, in accordance with drawings prepared by Carrere & Hastings, will embody a rather novel feature in its architectural treatment. The site adjoins the 20-story Commercial Cable Building on the south and has a frontage of about 75 feet. The novelty of treatment consists in the construction of a balcony at the sixteenth floor, which will constitute both a balcony and a cornice. The marble and iron work of the balcony and the iron work of the windows will be blended in one ornamental scheme. The cost of the new building is placed at something like $650,000, and it is expected to have the structure ready for occupancy by May of next year. It will probably be known as the Blair Building, owing to the fact that it is being erected for the banking house of Blair & Co.

Convention of Ohio State Association of Builders' Exchanges.

The second annual convention of the Ohio State Association of Builders' Exchanges was held according to programme at Put-In-Bay, Ohio, on July 30 and 31. There were present about 400 members and their friends and great interest was manifested in the sessions, which were held at Hotel Victory. The opening session was held at 2.30 on the afternoon of July 30, when reports of officers were presented and routine business transacted. Among the preliminary work was the formal admission of the Akron and Newark exchanges to the State Association, these making a total membership of six. Eight individual members, who were residents of cities where there are no exchanges, were also admitted. The reports presented were an interesting feature of the session, imparting, as they did, much valuable information and outlining the progress and experiences of the local organizations. President W. H. Hunt reported for the Cleveland Exchange.

The annual address of President James Young of the State Association was a prominent feature of the session and was received with marked attention. In it he dealt with the labor problem and the necessity of united effort for the securing of proper and the prevention of improper legislation. James M. Carter of Buffalo, secretary of the local exchange and also of the New York State Association of Builders, read a paper which commanded the attention of all present and extracts from which we give elsewhere in this issue. Another paper was that of John A. Kling of Cleveland, which dealt with business ethics among contractors and material dealers.

Not the least important feature of the afternoon was a boat ride among the islands, with music by the Great Western Band from Cleveland, which was tendered the ladies of the party. A fitting conclusion to the afternoon's business and pleasure was the association banquet in the evening, which was a most enjoyable affair.

The morning session of the second day was given over largely to routine business of the organization and the election of officers by acclamation, which resulted as follows:

President, F. O. Schoedinger of Columbus.
First Vice-President, J. R. Squires of Youngstown.
Second Vice-President, F. H. Weeks of Akron.
Third Vice-President, J. S. Dudley of Newark.
Secretary and Treasurer, E. A. Roberts of Cleveland.

A number of resolutions were offered and adopted, among which may be mentioned one to the effect that the Executive Board appoint a special committee from the association to inquire fully into the desirability and practicability of enlarging the usefulness and scope of the manual training schools in the State to such an extent as to subserve the purposes of trade schools for boys; that the individual exchanges be requested to appoint local committees to take up the matter and act in conjunction with the general committee, and further that the general and local committees be requested that in case it be found impracticable to use the manual training schools already established, they inquire into the possibility of establishing in each city a trade school, however small, wherein young men can learn a trade, the schools to be fostered and supported by each of the local exchanges. Another resolution adopted declared in favor of home rule for the cities of Ohio, and that the Executive Board be given full authority to appropriate necessary funds and appoint a special committee among their number to see that the local exchanges and prominent builders in cities where there are no exchanges be urged to co-operate with them in securing such just, reasonable and equitable laws as will subserve the best interests of the building trades.

In conclusion, a vote of thanks was extended to President Young, Secretary Roberts and the members of the Executive Board for the able manner in which they conducted the affairs of their offices during the past year.

Varied Industries Building at St. Louis Exposition.

The structure which will shelter examples of various industries at the Louisiana Purchase Exposition, to be held in St. Louis in 1904, will cover an area of 14 acres and will be executed in the Italian Renaissance style of architecture. It will contain two interior courts, embracing together an area of 121,000 square feet, so that the net area of building under roof will be 448,000 square feet, or slightly over 10 acres. The north front of the building is formed by two straight lines, each 600 feet in length, meeting at the center of the building in a projecting angle of 150 degrees. The south front is parallel to the north one and is of two lengths of about 460 feet each. The exterior of the structure shows a continuous colonnade, with the exception of the west front and the west half of the north front. The architectural features of the building include corner pavilions, monumental entrances at the east and west fronts, smaller turrets flanking the main tower and dome, which is to be 350 feet in hight, a portico in front of the main tower and an open colonnaded screen of segmental circular design in front of the dome.

Fall of Bell Tower at Venice.

The recent collapse of the famous Campanile at Venice is a most regrettable occurrence. This bell tower formed one of the most striking of the numerous monuments of antiquity in the Queen City of the Adriatic. The most unfortunate part of the thing, however, is that, in the opinion of scientific men, the fall of the tower is simply a forerunner of the ultimate destruction of many of the historic buildings in Venice. Professor Wagner, the city architect, believes that practically the whole of the city is doomed to destruction. He says that the subsoil has deteriorated, and that the piles and pillars which form the foundations of the buildings are rotting and will shortly be unable to stand the pressure upon them. Sinking has been observed in the subsoil for many years. Nevertheless, the City Council has decided to rebuild the Campanile on St. Mark's Square.

WE understand that a movement is on foot among the leading building contractors in the southern and western parts of the State of Connecticut to organize a State Master Builders' Association, the object of which is to adjust the scale of wages throughout the State and make uniform the methods of builders in doing business with organized labor. One who is prominently identified with the movement outlines its scope as follows: "Our course of action in the future will be similar in all parts of the State and each firm will help another in the settlement of all labor difficulties. We will also be able to help laborers secure work in parts of the State other than those in which they may be, by learning the wants of builders in these parts. In this we are helping both the builders and the laborers. We all intend to co-operate in any action undertaken and assist one another as much as possible."

DESIGN FOR CARRIAGE HOUSE AND STABLE.

WE present by means of the illustrations found upon this and the pages which follow the design of a carriage house and stable possessing features which are likely to interest a number of our readers. The building is intended for the accommodation of three or four horses, and as will be noticed from an inspection of the main floor plan, has two box and two single stalls, a large carriage room and office, and in the extension there is a room for bedding. The second floor is devoted to a large loft with two rooms and commodious closets, for the use of the coachman and other help.

The half-tone plate reproduced from a photograph of the building shows its appearance as completed. Some of our critical readers, however, will probably discover a slight discrepancy between the picture and the front elevation and floor plan, growing out of a change made in connection with the bedding room, but this is so slight as to detract in no essential particular from the value of the design.

According to the specification of the architect, J. W. Foster of 313 Orange street, Springfield, Mass., the timber in the first floor is chestnut, while all other timber is of spruce. The girders are 6 x 6 and 6 x 8 inches; the first and second floor joist 2 x 10 inches, placed 16 inches on centers, the collar beams 2 x 4 inches and rafters 2 x 6 inches, placed 2 feet on centers. The plates are composed of two 2 x 4 pieces, the hight of the main plate being 13 feet and the dormer plates 5 feet 4 inches above that. The entire exterior is covered with 1 x 10 inch hemlock boards, while the roof has 1 x 4 inch spruce roof strips placed 2 inches apart. Over the sheathing boards is placed rosin sized building paper, this in turn being covered with cedar shingles laid not more than 5 inches to the weather.

All window and door casings are of pine with back band molding, while the brackets, moldings and other trim on the exterior are of white pine. The bedding room has an open slat floor. The shingles covering the exterior were treated with Cabot's shingle stains, the body being dark green and the roof a light moss green. The trim of the exterior is cream color.

The inside finish is of North Carolina pine, and as indicated in the details presented herewith. The entire first floor is sheathed with 1 x 3 inch vertical strips, with base board molding, frieze, picture mold and crown molding. The stalls, however, are an exception in not having the base or molding. The sheathing runs to the floor. The lining floor is of hemlock, over which is laid a finishing floor composed of 1 x 5 inch square edge strips of spruce. The stable has 6 x 6 inch turned stall posts with turned caps, and 2 x 8 inch matched and center beaded stall planks with 2-inch mesh wire guards. There are also wire guards on all of the stall windows. The stalls are fitted with the Lynn stall pans and all connected with the sewer, as is also the washstand.

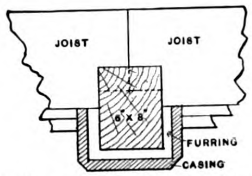
The office is fitted with large harness case having drawers underneath and cupboards above. The case is fitted with six improved harness racks. There is under the stairs a large closet for brooms, shovels, hose, &c. There is a feed closet with two outlets from the oat bin in the second story provided with cut offs. The manure pit has a vent, which extends up over the collar beams into the ventilator from the stable, which is of galvanized iron and is fitted with a patent top. The manure pit has chestnut sills and pine batten doors.

The carriage room is large and light and has capacity for six carriages. There are large trap doors in the floor of the second story, so that carriages and sleighs may be hoisted to the upper story when they are not in use. An inspection of the main floor plan will also show a concrete carriage wash, which is supplied with a combination hot and cold water bib for washing carriages. The hot water is supplied from the heater in the office, which also supplies heat for the building.

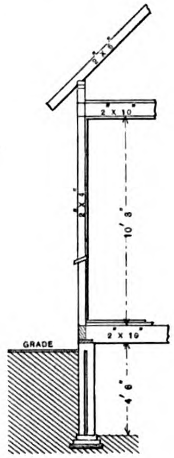
The hardware is of heavy weight, japanned. The sliding doors are fitted with Lane's barn door hangers. The interior wood work has one coat of filler and two

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

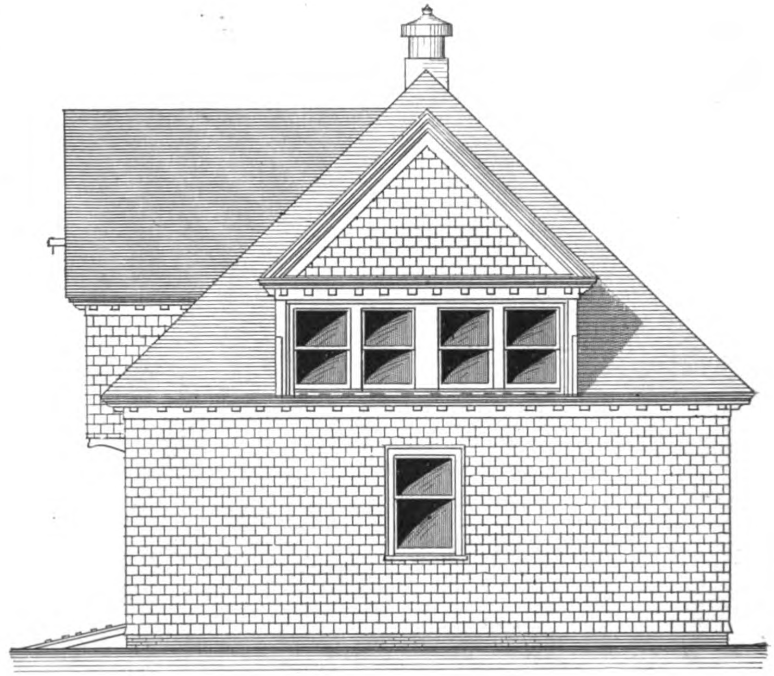
Design for Carriage House and Stable.—J. W. Foster, Architect, Springfield, Mass.

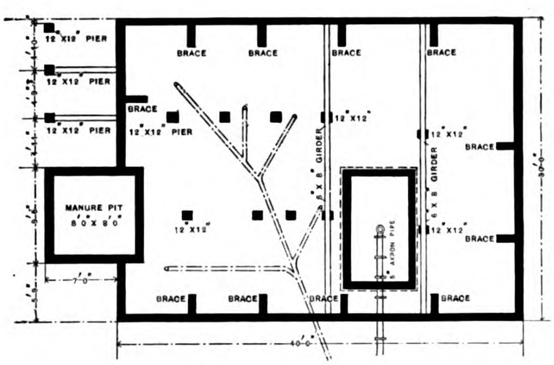


Section through Ceiling of First Floor.—Scale, ¾ Inch to the Foot.

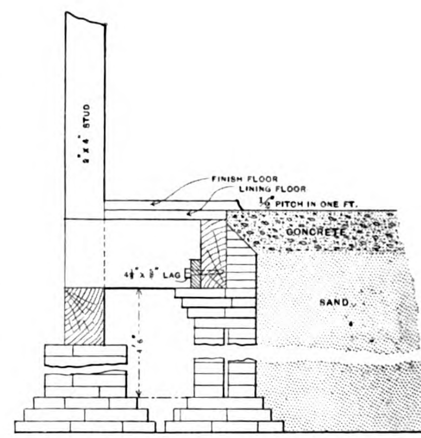


Section.—Scale, ⅛ Inch to the Foot.

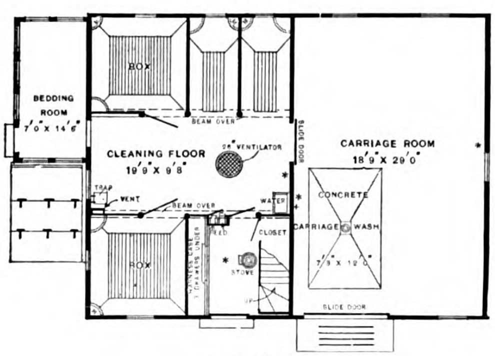

Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.



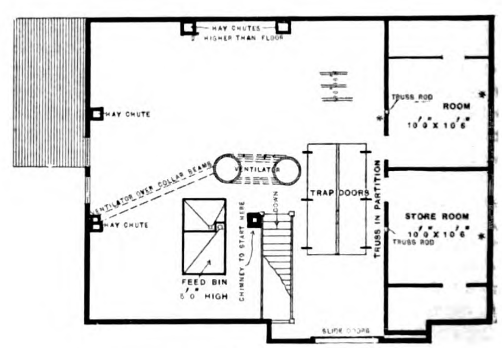
Foundation.—Scale, 1-16 Inch to the Foot.



Section of Foundation and Carriage Wash.—Scale, ½ Inch to the Foot.



Main Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

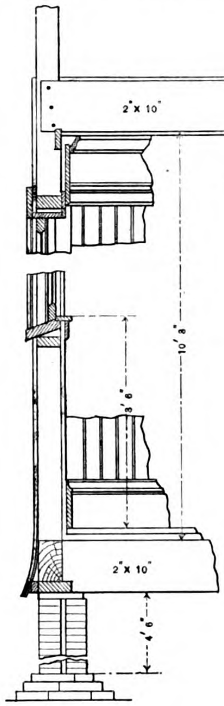
Design for Carriage House and Stable.—Plans, Elevation and Details.

coats of varnish. The exterior is stained brown with trimmings of dark green.

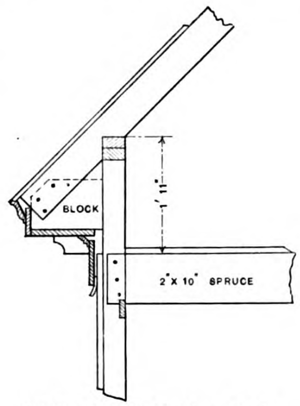
Some Phases of the Labor Question.

At the second annual convention of the Ohio State Association of Builders Exchanges, held at Put-in-Bay, one of the very interesting papers presented was that of James M. Carter, secretary of the Buffalo Exchange and of the New York State Association of Builders. After paying Cleveland some rather flattering compliments he seriously considered the labor situation as follows:

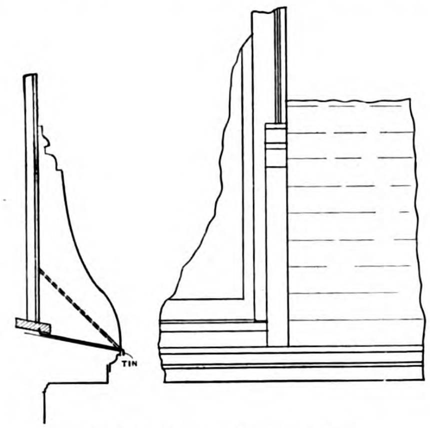
Relative to the needs of watching legislation most carefully I venture this as an opinion. The day of labor strikes and boycotts used by the labor bodies as a means to an end are passing away. Labor leaders have found that they are not the most effectual weapon of warfare, and have found that strikes and boycotts do not meet with public favor. Whereas, with the tremendous following labor organizations possess, they have a wonderful power with political parties, and shallow



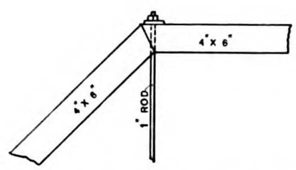
Vertical Section through Main Story.—Scale, ⅝ Inch to the Foot.



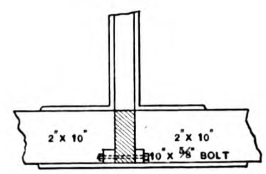
Detail of Main Cornice.—Scale, ⅝ Inch to the Foot.



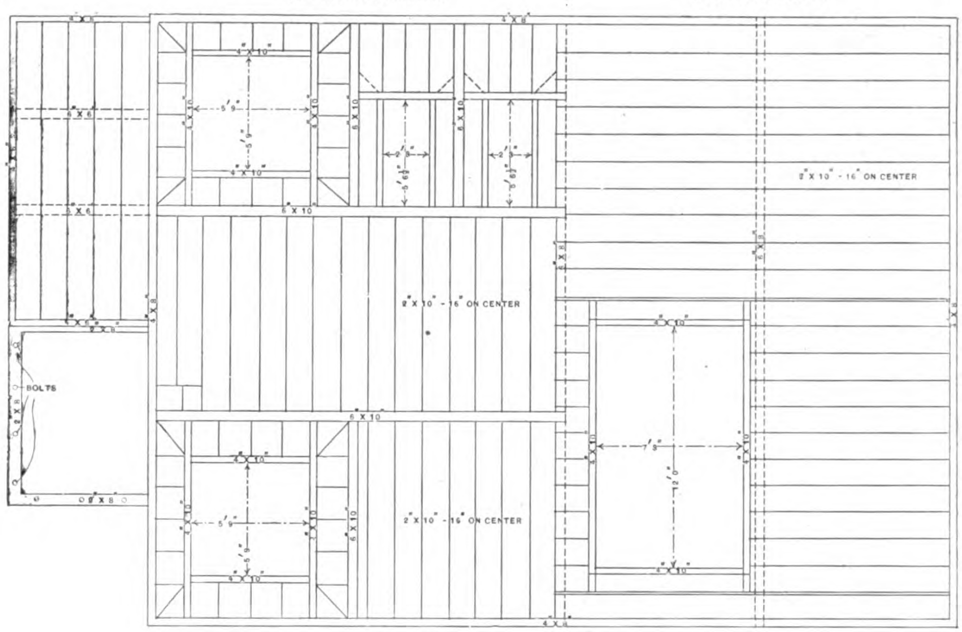
Details of Brackets on Dormers.—Scale, ⅝ Inch to the Foot.



Top of Truss in Loft of Stable Over Carriage Room.—Scale, ⅝ Inch to the Foot.



Framed in Beam in Carriage Room Truss.—Scale, ⅝ Inch to the Foot.



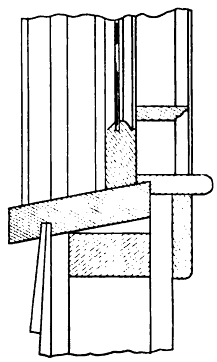
First Floor Framing Plan.—Scale, ⅛ Inch to the Foot.

Design for Carriage House and Stable.— Framing Plan and Miscellaneous Details.

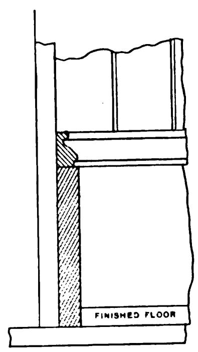
minded politicians can always be found who will advocate any sort of legislation asked for by the labor parties, thinking they are advancing their own political ends by so doing.

The master builders and employers generally must realize that labor organizations have come to stay, and that they will be greater factors in the handling of the labor capital problem in the future than they have in the past. And why should not the laboring men have their organization? Have they not the same right to organize that the employer has? Will you not agree with me that it is better for the employers as a whole to deal with the workmen as a whole, putting all of both them to live, considering what their sundry expenses amount to, gives the American workmen the privilege of saving funds vastly in excess of any other class of men.

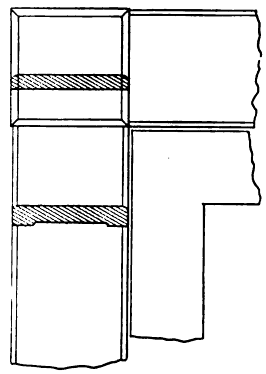
As regards the handling of labor problems, possibly following these ideas might help us some. In the first place organize your master employers in incorporated exchange organizations. Have these various exchange associations banded together in bodies like this State Association. Have your members become acquainted with one another, dispel petty fears and jealousies from among you. Take up the problems of the day and stick together, and by so doing you will convince the labor



Vertical Section through Window Sill and Frame.

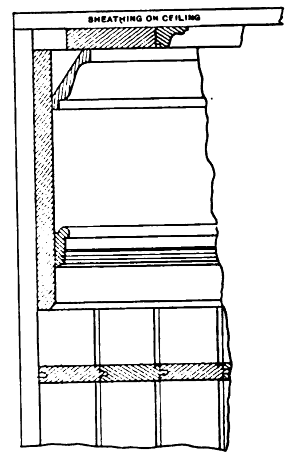


Section and Elevation of Base.

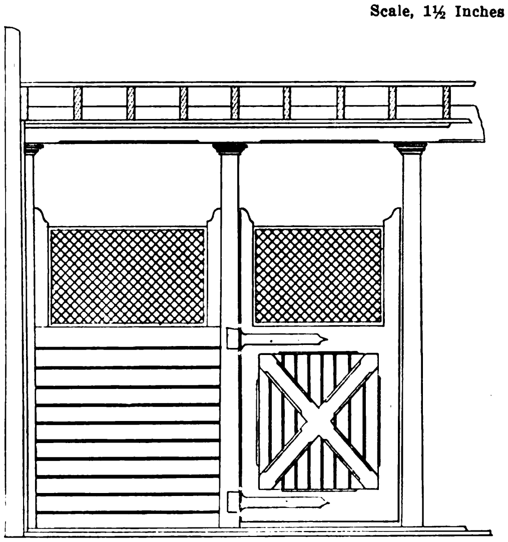


Details of Door and Window Trim.

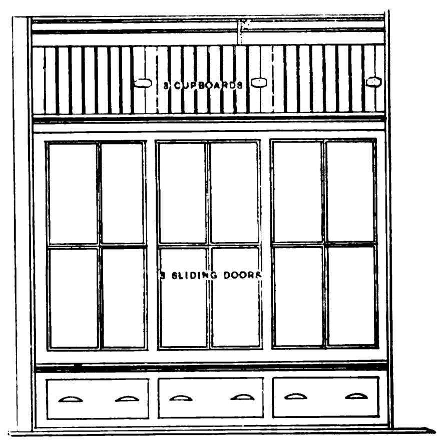
Scale, 1½ Inches to the Foot.



Details of Interior Cornice and Trim in First Story.



Elevation of One of the Stalls.—Scale, ¼ Inch to the Foot.



Elevation of Harness Case.—Scale, ¼ Inch to the Foot.

Miscellaneous Constructive Details of Carriage House and Stable.

parties on an equal basis, than it would be for both parties to be dealing promiscuously, one with the other?

Labor troubles and labor strikes have always disturbed the business world. And as capital is amalgamated and the power of capital increases, so of necessity will the amalgamation of labor increase its power. While I have not a panacea for all labor ills, still I hope some of my ideas will not be considered grandmotherish remedies for our troubles. And let me say right here that the story of the poor oppressed workingman doesn't go any longer. There is no doubt that the American workmen, as a whole, and particularly builders and mechanics, are receiving more compensation for the services rendered than any class of employees. There are thousands of bricklayers and stone masons the country over that are receiving now, and have been receiving for many years, $30 to $35 a week. Carpenters and plumbers, $20 to $25. This, considering what it costs and political parties that you have some stamina and power, and they will not fail to recognize you.

When you have this confidence and power within your own ranks, then force your labor organizations to become incorporated, so that they may have some tangible responsibility. Force the labor organizations to do away with their walking delegates; they are a thorn in the flesh. Deal with the men direct. Compel them to make contracts and adhere to them as you compel any business organization to respect its contract. Nothing is to be gained by trying to bully the men. If the men see things from a wrong light, reason with those in your employ. Do with them as you do with any one who is ignorant—educate them. Elevate them to your own standard of thinking. Impress upon them that employer and employee have but one aim and one common interest, that of obtaining work and making a livelihood.

The master employers have another duty before them. They should see that trade schools are established, or at least that young men are given a thorough training in all practical parts of the building business. A State apprentice law may be necessary to attain this end. I was greatly surprised a year or two ago to learn that not a single apprentice boy had been taught the stone mason trade in Buffalo in five years. The master builders are responsible for such a condition. Where are we to get the mechanics of the future if we do not train them to-day ?

One other point along the line of organizations. I should like to see a national association of builders formed, taking up the problems of trade schools, apprenticeship laws, uniform contracts, &c. Let the national association be formed of the various State associations of builders. Organizing the national association along these lines would also develop the State associations.

CABINET WORK FOR THE CARPENTER.

BY PAUL D. OTTER.

IN the first issue of the present volume, under the head "Cabinet Work for the Carpenter," attention was called to the prevailing class of furniture with the purpose of drawing the interest of the carpenter to objects of household use which he may construct with very little special experience in the higher branches of joinery, to the end of gratifying his natural desire to be occupied during much enforced idleness on kindred work for his own home, furnishing and executing many orders which are sure to come from a display of an article of household comfort neatly joined and properly finished.

With no desire to "teach an old dog new tricks," the subject will be taken up with the idea that the reader is a skilled wood worker, exchanging notes with the designer, and that the work under discussion will be projected with the hearty enthusiasm of the revived "Arts and Crafts" movement, the aim of which is individualism and credit to the workman.

Unfortunately, man's work of to-day, in many vocations, is by concentration of like interests specialized, and his personal touch confined to doing over and over again one small part of the whole. This suppression of real active enthusiasm in one's trade often is cause for a workman sinking into mediocrity.

Advantages of Observation.

To-day it is not enough for a man to consume at his work a specified number of hours, or to conform to the regulations of the union, but more to the self satisfaction that he has used his eyes to good advantage in observing the methods and work produced by a better workman than himself. The close inspection, if possible, when opportunity permits, of some building recognized to be architecturally correct, the relation with which the inside fitting bears to the exterior treatment, and then to the more minute inspection of the joinery, and from this the eye naturally seeks the furnishing of the room; possibly the body is very ready to seek comfort in the substantial chair or built in corner seat, and then the eye notes that there is a master builder's conception and a connection of thought from foundation walls to the portable furniture of each room. From this daily practice of observing we appreciate more that furniture is closely related and is one of the branches of architecture, the construction and treatment of which should no longer be debased and made trifling by unnecessary and insecure applied ornament, or extravagant, much cut into outlines, which time, weather and experience have taught architects to avoid in their work of recent years. This statement has no reference to churches and public buildings of the old world, completed after many years and beautified by sculpture and carving in enduring materials, but refers more to our American architecture of some 30 years since, a type which doubtless many readers have in mind, "The American Villa" style, all in wood. It looms up now as an example of the band sawyer's widest range of fancy, assisted by the wood turner, who really reached the "highest pinnacle" with his work; often he had one each on the seven gables round about. Time, as with the old woman, has made sad ravages with this style of head gear; each storm blows off a little spire or tears out a balluster. Coincident with this style were the same frailties embodied in furniture, much glued and tacked on work, turnings halved and glued on, veneer patches, crested top lines representing much misapplied work, and more to free from dust. Even the upholstery had that tacked on, insecure look. Every housewife is gladly getting rid of this by replacing it with the "Modern Art" furniture. We don't tell her this, but the "Modern Art" represents a revival of the very best that is old and, strange to say, of early American conception, plain, straight to the point, construction. Having thus brought the attention to a study of good furniture, it will be appreciated that the class of joinery embodied therein is not so much out of the province of the careful carpenter.

In occupying our time on work meant for home use we generally embody individualism and honesty of purpose to a minute detail. This idea should ever be present in a restrictive sense when it comes to duplicating your piece on an order received, or multiplying it for a small local trade. It would not be possible, however, to allow you a suitable profit on your work should you go to the great care of picking out just the "happy play" of grain or quarter which is embodied in your sample; this may have been the result of laying aside for months back certain pieces which would finally match up well for particular work. Criticism to-day is not as discriminating in cabinet work as to the nicety of adjusting stock in framing, that there be a continuity of grain or quarter marks, as in some fine old samples. When laying out stock a little forethought exercised will add greatly to the final finished appearance—as for instance, to maintain balance in the figure or markings of the wood, to cause a right and left display; this is often easily accomplished by inverting a leg or a panel, thus allowing the surface figure to "fan" out, or arch in, as the case may be, with the other half. Nothing looks so out of balance when using quartered oak in squares as to thoughtlessly frame one side plain face out and the other side showing the quarter. When using plain oak throughout, or other woods, with a large figure, marked character and added value is shown in the work. Oftentimes a combination of woods is resorted to in making up an article of furniture which materially reduces the cost, elm, ash or chestnut frequently being worked in where it combines best with the more expensive wood. Very little so-called mahogany furniture sold to-day is made up entirely in that wood, birch being largely used and sufficient mahogany being used on front parts to establish some claim to the title. As a matter of strength, birch is much to be preferred to cheap mahogany, both requiring the same imitation or darkening to the standard dark mahogany tone.

Color in Furniture.

The staining of wood in furniture is largely in practice to-day, the colors taking in quite a range of tones, most of which are imitative of natural conditions, such as "forest green," a warm green of the woods, and "weathered oak." The last named is a pleasing tone of a gray brown, derived from very old furniture which had been subjected to more open air changes than our glued up furniture would stand to-day; this in consequence is more appropriately applied to stanch heavy, or general utility pieces. Flemish oak color, a very dark warm brown, is also a harmonious tone for furniture of a sturdy class. As all these shades are an attempted representation of what time and weather conditions of several hundred years have created on ancient furniture, it is but consistent to adhere to the oil rubbed or wax like finish; this is advised on all special made pieces and will be dealt with more in detail, as this subject is touched upon now for the purpose of forming an idea of what woods may be used in furniture. While it is essential to avoid using various woods with known bad features, such as shrinking, swelling and twisting, or soft and easily indented, yet a discriminate use of woods other than oak, birch and mahogany, give very artistic results; the main point is to know that it is perfectly air or kiln dried before using.

The writer has made use of white pine panels saved from ordinary packing boxes. These work in admirably in portions of cabinet work where it is not likely to be indented, and are well worth the saving, as they are generally of the right thickness and simply need redressing. This, of course, is for work stained for walnut or mahogany.

Having considered furniture in a general way, it is assumed that a certain article is under discussion. The trade knowledge of the carpenter will not be questioned as to the handling of tools or preparing of the stock, and the work will proceed with the necessary guidance of a rough drawing. This does not imply that one should have a knowledge of designing or drawing, however desirable the cultivation of this ability is to every craftsman. It is often with settled resignation that many determine they are unable to express themselves by a drawing, when by a little trial effort interest begets enthusiasm and the rest is easy. In the absence of the regular manila drawing paper, any large sheet free from creases or wrinkles will answer temporarily; after which, should your interest excite you to further trials, the best of materials should then be secured. How many expend $10, $15 or $20 on the "most complete set" of instruments without the slightest idea of the use of two-thirds of them. Don't do this now—use a good, medium, black pencil; your 2-foot rule; a pair of dividers with well sharpened points and a pencil attachment; a soft eraser for rubbing out trial lines; a triangle and a T-square. This constitutes the essential outfit, and the main feature is to secure your paper with common tacks or thumb tacks to a smooth board surface or table, the edges of which are perfectly square. Drawings, as a rule, are made to show one-half elevation, with the end or side view and section projected to the right of this on the same base line. This shortens the work of the front elevation, and the measurements are doubled when laying out the stock. It will be seen that when drawing the side elevation on the same plane it is made very simple, for by the aid of the T-square many of the measurements are extended and ruled off. Now many will say, we are able to do and have done all this; it is simply mechanical; but what gets me is how to draw freehand, or the varying line portions of a drawing.

This no doubt confronts many as a nightmare and is intensified by the fact, generally, that the beginner starts out with the idea of drawing the line graceful and with clear decision at once. He usually fails, or probably the line or lines do not occupy the surface intended. It would take much practicing and months of time to draw a finished line needing no correction; that would be skill. You can, however, produce your curved lines and smaller detail by boldly and with a light free hand touch swinging in the lines in a given territory, and if it falls wide off the mark, or doesn't please you, erase and try again. You may have to do this several times, when you will say, "This is just what I want!" Then is the time when you can preserve the effort by carefully going over this, making the line heavy and clear. Rely upon yourself in this way rather than create the line by the aid of the compasses, which require aimless staking out of points to effect several arcs, which must necessarily be joined by hand, and the result is often a very mechanically stiff curve. The operator has the satisfaction when working from his own drawing or patterns of knowing that he can give more grace or freedom to certain lines when sawing the stock or dressing the edges with the shave, for the beauty of long sweeps can be much enhanced by the full arm movement incident to cleaning up the stock.

(To be continued.)

THE industrial school which is being erected on Ninth avenue, Homestead, by Charles M. Schwab, president of the United States Steel Corporation, is nearing completion and arrangements are being made to dedicate the school in September. The building has been in course of erection for more than a year, and when completed will have cost about $100,000. It is built of buff brick, with Cleveland sandstone trimmings. C. M. Schwab will attend the dedication, and President Roosevelt has also been invited to be present.

Narrow vs Wide Siding, Flooring, &c.

In order to demonstrate the relative advantages of narrow width siding, flooring, &c., especially in the matter of shrinkage, a leading lumber concern in the Northwest have made a number of tests with the following results. They claim to have demonstrated that the wider the board the greater the shrinkage and the wider the opening, and as a consequence the narrower the board the less the shrinkage and the smaller the opening. The narrower the board the more the tongue or lap divides the shrinkage. The narrower the board and the more the spring the quicker it is possible to make a matching, and the narrower boards are laid faster. In the narrow boards the grade defects are smaller. The narrower the boards the less the waste in cutting and trimming. In covering a certain amount of space it requires a little more of the narrower stock, but the differences are easily made up in saving of waste in cutting and trimming.

The company have made a number of experiments to determine the cost of putting on the narrower widths as compared with the wider. Two carpenters were employed to cover the same amount of space with the different widths of dressed and matched stock, on studding 16 inches apart. The results enabled the company to accurately figure the comparative cost. The first test was on blind nailing flooring and showed that the total cost per 1000 feet for laying the 4-inch was 31 cents more than the 6-inch. As 8-inch stock would have to be double nailed they estimated that it would cost $1.29 less to lay 4-inch than 8-inch. In a test of single nailing 4-inch, double nailing 6-inch and 8-inch flooring, drop siding and shiplap, the cost per 1000 feet was 58 cents less on the narrower width than on the 6-inch and 96 cents less than the cost of double nailing 8-inch stock with tenpenny nails. In a test for single nailing and double nailing alternate pieces of 4-inch, and double nailing 6-inch and 8-inch drop siding and sheathing the cost per 1000 feet was only 17 cents more on 4-inch than on 6-inch, and 20 cents less than in double nailing 8-inch stock.

Specifications for Village Concrete Sidewalks.

All concrete walks shall be laid with outer edges 12 inches from boundary lines of streets, the finished surface of the walk to be not less than 6 inches above the top of the street curb and rise 1 inch in 3 feet toward the lot line, and shall be constructed in the following manner, says a recent issue of *Cement and Stone:*

A foundation shall be prepared by cutting down or filling up the natural surface of the ground to a point 13¼ inches below the grade above fixed for the top surface of the walk, which foundation shall be properly smoothed, wetted and compacted and covered with a uniform layer of thoroughly compacted, clean, coarse cinders 8 inches in thickness, upon which layer of cinders so prepared there shall be placed a uniform layer of concrete 4½ inches in thickness, composed of 1 part of the best American Portland cement and 2 parts of clean torpedo sand, thoroughly mixed with 4 parts of clean, crushed limestone, varying in size from ½ inch to ¾ inch cubes. Before the layer last mentioned has set a layer or finishing coat shall be placed thereon ¾ inch in thickness, to be made of 1 part of the best American Portland cement and 1 part of clean torpedo sand mixed to the proper consistency with water and spread smoothly before the under layer has set and thoroughly troweled to a perfect finish. Said sidewalk shall be constructed under the supervision and subject to the approval of the Sidewalk Committee of the Board of Trustees, who are hereby appointed to superintend the construction of the same.

CONSTRUCTING A GEOMETRICAL WINDING STAIRWAY.*

BY MORRIS WILLIAMS.

IN this article we shall proceed to demonstrate the method of drawing face molds and finding the bevels for the remaining portions of the rails contained in our problem. Referring to Fig. 11, let *o c d e* represent the outline of the plan of Block 2 as exhibited in Figs. 6 and 14. As this wreath is to span over and above seven risers, make *e e'* equal to the hight of seven risers, as shown, and make *d d'* equal the hight of three and one-half risers. Connect *e'* with *d'* and prolong the line to X. Connect X with *c*, which will be the directing ordinate or level line of the plan. Draw the line *c w* square to *e d*, and from *w* draw *w c'*, square to the raking tangents *e' d'* and *d'* X. Place one leg of the dividers at *d'* and, with radius *d'* X, describe the arc X *c'*. Connect *c' d'*. In this manner the tangents of the face mold *c' d'* and *d' e'* are found.

It is now required to find the minor axis. From *o* of the plan draw the line *o d* parallel to the ordinate *c* X, and from *d'*, which is the elevation of *d*, draw the line *d' o'* parallel to the ordinate X *c'* of the section. Make *d' o'* equal in length to *o d* of the plan, and the line *d' o'* will be the minor axis. On this line make *o'* 1 2 3 equal to *o* 1 2 3 of its plan. The points 1 and 3 will be contained in the curves of the face mold. To find the bevel, place one leg of the dividers at *w* and, with a radius *w n*, describe the arc *n* 2, and connect 2 with *c*. The bevel is at 2, as shown, tangent is inclined and the upper tangent is level. It is the reverse of Block 1. In Fig. 12 Plan 4 is a reproduction of Block 4 shown in Figs. 6 and 14.

In Fig. 12 the upper tangent *h' s'* is shown to be level and the lower tangent *h g* inclined and to have the same inclination as all the other raking tangents. In order to produce the face mold, &c., commence by drawing a

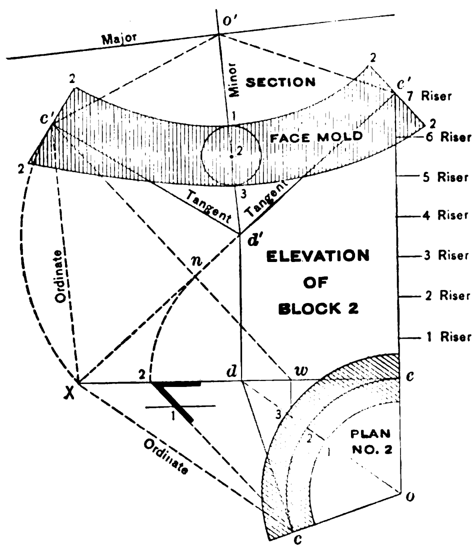


Fig. 11.—Face Mold of Block 2.

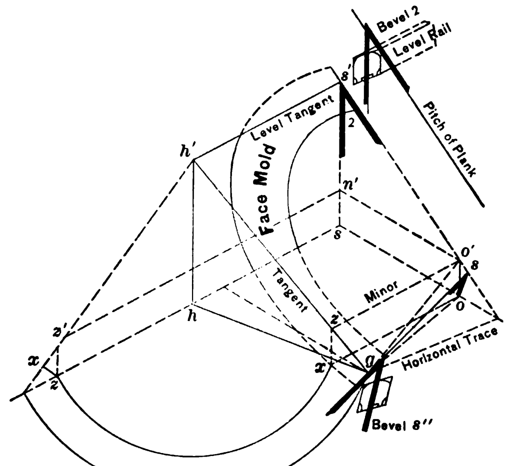


Fig. 13.—Isometrical View of Block 4, Showing Bevel and Major and Minor Axes.

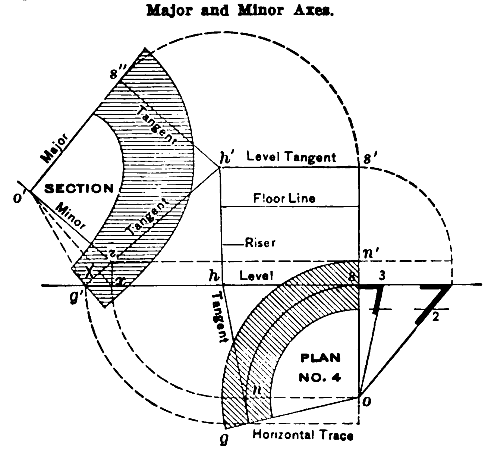


Fig. 12.—Top Face Mold with Upper Tangent Level and Bottom Tangent Having Same Pitch as the Other Tangents.

Constructing a Geometrical Winding Stairway.

and is to be applied to both ends of the wreath. From the bevel take the distance 1 2 and place it on both sides of *c'* and *e'* for the width of the face molds at these points. Now take any flexible material and bend it to touch the points 2, 1, 2 for the inside curve and to touch the points 2, 3, 2 for the outside curves.

Note that in this example, again, only one bevel is required for both ends of the wreath, and that this is owing, as previously stated, to the fact that the tangents are equal in length and inclination.

It will be observed that Blocks 3 in Fig. 6 and Fig. 14 are exactly the same in size and form as Block 2. Therefore the same face mold and bevel will work the wreath. Block 4 contains a problem in which the lower

* Continued from page 190, August issue.

line from *o* of the plan parallel to the level tangent *h s* and extending it to *n*. This line represents the plan of the minor axis, owing to its being a level line drawn from the point *o*, which is the center from which the curves of the plan are described. Now revolve the point *n* to *x* and erect *x z*. Now from *x* draw a line square to the raking tangent *g' h'* and make *z o'* equal to *n o* of the plan. This line will be the minor axis. Now draw a line from *h'* parallel to the minor axis and make it equal to the length of the level tangent *h' s'*. This is a level line because it is drawn parallel to the minor axis, which is in every case a level line. It is also the level tangent of the wreath. The line drawn from *s''* to *o'* will be the major axis, because it is a line drawn through *o'* at right angles to the minor axis.

To find the two bevels proceed as follows: From z draw $z\ n'$, and take the distance from n' to s' for the hight of the triangle and the radius of the center line of rail on plan for the base, as shown at 2. The angle at 2 will be the bevel to be applied at the end s' of the wreath. Again take x X for the altitude of a right angle triangle and the same radius for the base, as shown at 3. The bevel at 3 is to be applied at the end g of the wreath. These bevels are shown in the isometrical drawing, Fig. 13, to be the inclination of the plane of the section cut through the block. Bevel 2 indicates the inclination from the point o' to the level tangent $h'\ s'$ and the bevel at 3 its inclination in the other direction—namely, from the side $g\ h'$ to the side $o'\ s'$.

The wreath is assumed to be resting on this plane of the section, as shown in the diagram, but as it is cut out from the plank square to its face it is evident that its sides will not be plumb when resting in the plane of the section. To make it plumb when in this last position is the purpose for which the bevels are required.

In Fig. 13 is clearly illustrated the utility of the bevels, as well as the inclined plane of the wreath. The bevel marked 2 in both figures is shown in Fig. 13 to be applied to the end s' of the wreath. The correct method of application is also exhibited in this figure, the operation consisting of placing the stock of the bevel parallel to the joint s' and the blade applied toward the outside of the wreath. At the end g of the wreath the bevel s is to be applied parallel to the joint at g and the blade applied to the inside of the wreath.

Fig. 14 is presented to illustrate the combination of the preceding figures in the construction of a winding stairway. In this figure the face molds are shown projected over and above their respective plans. In order to properly understand this figure it should be rotated on the palm of the hand, commencing from the bottom face mold and turning from right to left until the upper face mold appears as it does in Fig. 12. It will be seen from this figure that each portion of the rail covers its plan tangents. For instance, face mold No. 1 reaches from a to the joint at c, face mold No. 2 from c to e, face mold No. 3 from e to g and face mold No. 4 from g to s, where it connects with the level rail of the landing.

In Fig. 15 is represented another treatment of Block

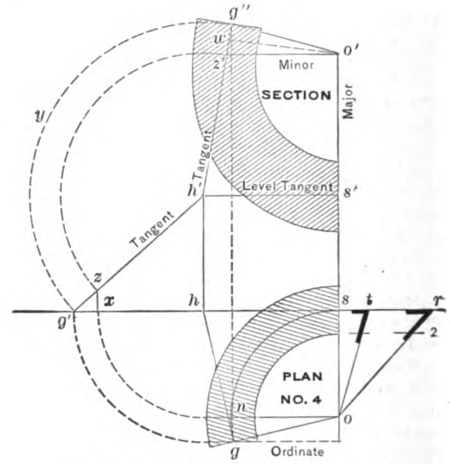


Fig. 15.—Another Treatment of Block 4.

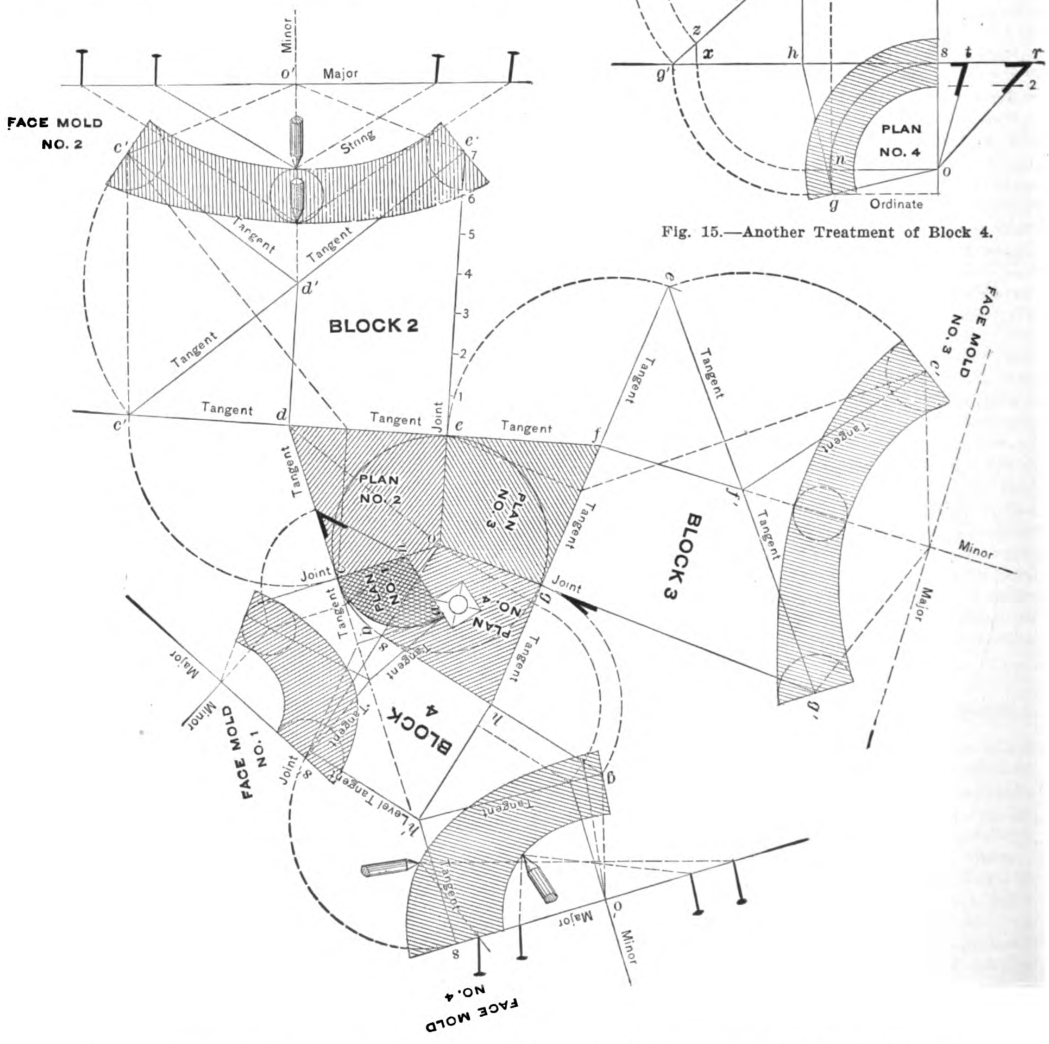


Fig. 14.—Showing the Combination of the Preceding Diagrams in the Construction of a Winding Stairway.

Constructing a Geometrical Winding Stairway.

4, wherein the development of the face mold is worked upon the level tangent *h' s'*, instead of as in Fig. 12, where it is worked upon the raking tangent *g' h'*. My inducement for presenting this figure is the additional advantage it gives in demonstrating the meaning of the primary lines made use of in all the preceding figures to develop the face mold and section, as well as the meaning of the bevels. It will be noticed that the plan in this figure contains all the lines exhibited in the plan of Fig. 12, and that the section and face mold correspond to those of Fig. 12, the only difference between the two figures being in the relation of the section and its complement face mold to the tangents.

To draw the section in Fig. 15 proceed as follows: From *g* of the plan draw the dotted line *g g''* square to the level tangents *h' s'*, and from *h'* as center, with the radius of the raking tangent *h' g'*, revolve the point *g'* to *g''*, as shown by the dotted arc *g' y g''*. Connect *g'' h'*, which will be the raking tangent revolved into the section, and therefore into its position in the face mold. The other tangent of the face mold, according to this method of development, is the level tangent *h' s'* in its unchanged position, showing clearly and unmistakably the correctness of the construction.

To find the minor axis draw a level line from *o* in the plan to *n*; revolve *n* to *x*; on *x* erect *x z*; revolve *z* to *z'*, and from *z'* draw a level line to *o'*, which will be the minor axis. Its plan will be the line *o n*. These two lines are shown to be parallel with the level tangent *h' s'*, and therefore are themselves level lines. The line *z' o'*, as previously stated, represents the minor axis, owing to its being a level line in the section, which will be over and above a level line in the plan drawn through the point *o*, which is the center of the plan rail. The point *o'* of the minor axis will be the center of the ellipse, a portion of which constitutes the face mold. Therefore it will be over and above the point *o* of the plan. Every other point and line in the section will be over and above its respective plan, as clearly shown in Fig. 13, which is an isometrical view of Figs. 12 and 15.

In order to understand the meaning of the bevels and how to find them it should be borne in mind that they represent the angle of inclination of the plane of the section shown in Fig. 13 to incline in two directions. They are shown to be composed of right angle triangles. The triangle representing bevel 2 is shown to have for its base the line *n o'* of the plan; for its altitude the line *n s'*, and for its hypotenuse the line *s' o'* of the section. Now let us find the bevels with these lines, as in Fig. 15. The base of the triangle is there shown to be the line *o s* of the plan, which is equal in length to *n o'* of Fig. 13. The hypotenuse of the triangle is the line *o s'* of the section. By laying off from *o* the length *s' o'* to *r*, as shown, the bevel 2 is found. The bevel at *t* is found on exactly the same principle. The base of the triangle is the line *o g* of the plan. The hypotenuse in this case will be the line *o' w* of the section, because it is a square line from the tangent *h' g''* to the point *o'* across the section in this direction. Now lay off from *o* of the plan the distance *o' w*, as represented by *o t*, and the bevel will be at *t*.

It is always well to bear in mind that the base of the bevel in every case is a square line to the tangent across the plan; the altitude a square line to the tangent from the face of the section and the hypotenuse a square line to the tangent across the section. This rule is universal, owing to its being a geometrical solution of finding the angle of inclination of oblique planes, of which all sections of wreaths in handrailing construction are composed.

Note the difference in the method of finding the bevels, as demonstrated in Figs. 12 and 15. In the former the base and altitude are utilized, while in Fig. 15 the base and hypotenuse are used, the result being the same. Although the bevels in handrailing are generally considered to be the most intricate part of the science, it is plain from what has preceded that they become very simple to those having a knowledge of a comparatively few geometrical problems. Hence, permit me at the close of these articles to emphasize the importance of studying geometry as a preliminary to the study of the science of handrailing. As previously stated, it is the only way to overcome all the difficulties.

Building in Philadelphia.

Some notable building operations under way or in contemplation in and about the city of Philadelphia indicate a gratifying degree of activity in the building line for some months to come. The work is of a miscellaneous character, although the buildings for dwelling purposes predominate. A recent transaction in the Twenty-eighth Ward, involving a tract of land of about 26 acres, part of which is directly opposite the Municipal Hospital, is to be improved by the erection of a large number of dwelling houses, ranging in cost from $3000 to $4000 each. It is said to be the ultimate intention of the purchaser to erect 1000 houses, some of which will be two stories in hight and others three stories, the smaller houses covering an area 15 x 65 feet and the larger ones 16 x 85 feet.

Another important improvement in the suburbs of the city is an operation involving the erection of 57 two and three-story houses, designed in accordance with plans drawn by Architect R. A. Plowman of Philadelphia. Forty of the two-story houses will each contain seven rooms and bath and 14 of the two-story houses will each contain nine rooms and bath. A third operation is that of William H. Neal, involving the erection of 16 houses in Swarthmore. Each will differ from the other in architectural design, but all will be of the same size, 40 x 57 feet. They will all be two and a half stories high, with some of brick and timber, some of brick and pebble dash work and others of stone and pebble dash.

The estimated cost of the building improvements for which permits were issued during the month of July was far in excess of that of any corresponding month of recent years. There were 660 permits issued, covering 800 operations, estimated to cost $4,013,510, as against building improvements costing $2,811,320 in July of last year. The figures also show an increase of nearly $1,700,000 over those for June of this year. The fact that the record was broken in July was due to the fact that the Bellevue-Stratford Hotel was commenced at Broad and Walnut streets, which is to cost $2,500,000. During the first seven months of the year 4526 permits were issued for building improvements to cost $19,765,-850, which is an increase of nearly $2,000,000 over the corresponding period of last year.

Portland Cement.

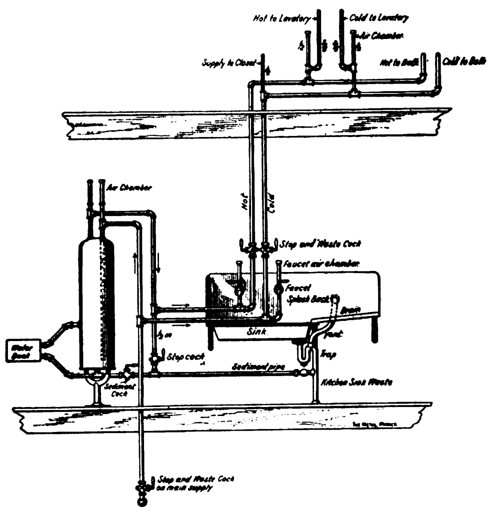
The following useful hints on Portland cement, covering a large amount of information in a small space, were recently presented in the *Irish Builder*, and we give them for the consideration of American readers. Strong Portland cement is heavy, weighing 112 pounds per bushel. Weak cement is light. Strong cement is of a greenish gray color and sets slowly. Weak cement is of a brownish color, has too much clay in it, and sets quickly. The longer it is in setting the more its strength increases. The cleaner and sharper the sand, and the stiffer it is gauged—*i.e.*, the less water used in working it up—the better. Salt water is as good for mixing with Portland cement as fresh water. It is of the greatest importance that the bricks or stone with which the cement is used should be thoroughly soaked with water. If under water in a quiescent state the cement will be stronger than out of water. Whatever concrete is employed under water, care must be taken that the water is still; otherwise a current will carry away the cement and leave only the clean aggregate.

Portland cement, if preserved from moisture, does not, like Roman cement, lose its strength by being kept in casks or sacks, but rather improves by age. This is an advantage when it has to be exported. Therefore Portland cement should not be used fresh. Neat Portland cement has a tensile or cohesive strength of 400 pounds per square inch seven days after being made up and immersed in water during that period. At the end of one year 1 cement and 1 sand has three-fourths strength of foregoing, 1 cement and 2 sand has one-half, and 1 cement and 3 sand has one-third.

Roman cement, although about two-thirds of the cost of Portland cement, has only one-third of its strength, and is therefore double the cost, measured by strength. Roman cement is ill adapted for mixing with sand and loses strength.

Cold and Hot Water Service Piping.

In ordinary work where the bathroom is on the floor above and not distant from the kitchen, the simplest method of piping is best. Whether lead or iron pipe is used, fewer joints, less pipe and the least time are required for such. The stop cocks controlling supplies to the bathroom are placed over the sink, as shown by the accompanying sketch, says "Helmar" in a recent issue of *The Metal Worker*. The hot service is properly kept above and separated from the cold on cross runs, and the hot faucets should always be on the left side. In lead pipe jobs the hot pipe is often dipped to a point below the sink, where a long shank stop cock will just reach from the hot pipe to the sediment pipe. The trap in the hot service made by dipping, as shown, must always be provided with a drain, though it is not always connected to the waste; a pet cock will answer. It is sometimes convenient to place the hot sink faucet directly in the cross run where it will also act as a drain.



Cold and Hot Water Service Piping.

The drip from the trap in the hot service should never be connected between the sediment cock and the boiler without a cock on it. This method will do if a cock is placed in the drip, and the cock may be left turned on or off regularly, but must be off when the faucets are repaired at the sink or the boiler will empty down to the level of the hot faucet. The trap, when the drip is thus connected, cannot be drained dry for repairs unless the hot faucet is directly on the cross line. On the whole, the connection as shown is best; it will take care of condensation of vapor from a hot boiler while a new sink faucet is being wiped in, and is preferable for general reasons, especially on lead pipe work. The sketch does not show all of them, but on iron pipe work unions should be placed on stove connections near the boiler; on both pipes over the boiler; on both pipes over the bathroom stops; on the drip to the hot service, above the cock; in the sediment pipe, on the drain side of the drip connection, and on the main cold service above the stop in the cellar.

No fixture should be set without unions or union couplings at the fixture end of the supply pipe. Liberal sized air chambers should be placed over or near all faucets. If the chambers will look unsightly, or it is difficult to place them at the faucets, extra large ones may be placed wherever they will be least in the way, but they should be located so as to get the most direct possible thrust from the water. Air chambers over the boiler help to prevent reaction at the faucets, and also lessen the concussion caused by the condensing of steam bubbles which form (usually in the water back, but sometimes in an air space which should not exist under the upper head of the boiler) when the water is extremely hot and the fire intense.

When the bathroom is on the same floor as the kitchen the service pipes are sometimes brought straight across from the top of the boiler and down behind the sink, the stop and waste cocks being placed inverted in the same position, as shown in the sketch. This gives the stops control of the sink faucets, too, which is bad, because the sink is without water when anything gets wrong with the bathroom work. It is a better plan to bring the hot water below the sink and carry both lines direct to the bathroom with stop and waste cocks placed after the branches for the sink supplies have been taken out. The waste tubes can be connected to the sink waste.

Lever handle cocks are best where unskilled persons are to use them, because it is easy to see whether the cocks are turned on or off. Those who wrangle over hair splitting points object to connecting the sediment pipe below the sink trap on account of the probability of sewer air thus entering the house at times.

Paint for Outside Walls of a Stone House.

In telling a correspondent what kind of paint to use and how to mix it for the outside of the walls of a stone house, a writer in the *Painters' Magazine* says: We should advise a strictly pure oil paint, omitting turpentine, benzine, &c., entirely, and using only as much japan as is absolutely necessary. For first coat we would suggest that pure white lead, tinted to suit with oil color, be thinned with pure raw linseed oil and a trifle of japan, and that this priming should not contain over 10 pounds of white lead and color to each gallon of oil and japan, while in succeeding coat or coats not over 5 gallons of oil and japan be used for 100 pounds of pure white lead. Of course, if the color is to be deeper than a light tint, then more oil will be required. If the tint is to be very light or delicate, or if the paint is to be clear white, about 15 per cent. of zinc white may be added to the paint for the finishing coat, which will give a cleaner tone and prevent possible chalking.

Phase of Western Building Situation.

One phase of the building situation as it has prevailed, particularly in the West, is worthy of note, and it has never been more remarkable than during the present season—that is, the weather. Rarely, if ever, has the contractor been compelled to submit to such unfavorable conditions as have prevailed throughout the present season and in all sections of the country, says a writer in *Construction News*. Truly, the elements have been against him. Work that was put in early in the season upon the most carefully calculated plans fell down on account of the heavy fall of rain, not only to the embarrassment of the man who designed it but to the cost of the owner and contractor, none of whom were to blame. Instances of this sort multiplied all over the country to such an extent that the aggregate of loss must by this time be considerable. Not so expensive from the contractor's standpoint, but more so from that of the owner, have been the temporary delays in the beginning of work, but it is to be hoped that the end of the unpleasant weather has been reached and that henceforth the path will be clear of such obstructions.

The new Pennsylvania State Capital Building, designed by Architect Joseph M. Huston of Philadelphia, Pa., will be a magnificent granite, marble, brick, stone and terra cotta edifice, 519 feet 10 inches by 258 feet 2 inches in dimensions, and will accommodate the entire State Government within its walls. There will be four main floors, an entresol floor, a basement and a sub-basement.

COAL STORAGE BUILDING OF STEEL AND CONCRETE.

EVERY form of building construction has in it more or less of interest to the ambitious builder who desires to keep abreast of the times, even though its nature be such as to preclude the probability of his ever being called upon to execute something similar. The increasing use of steel and concrete in the erection of buildings at the present day has worked many radical departures from previous methods of construction and the end is by no means in sight. These materials are so widely adapted as to make their use especially desirable in structures where great strength is required, as, for example, in buildings intended for storage purposes. A most interesting example of the application of steel and concrete for this purpose is found in the construction of the coal storage plant of the Lowell Gas Light Company of Lowell, Mass., a description of which was presented in a paper read by Franklin M. Bowman at the Boston meeting of the American Society of Mechanical Engineers in June, and from which we take the following:

In the design of the plant every effort was made to obtain not only a useful and permanent but handsome structure, if a coal storage can be called handsome. It is a steel frame structure with concrete walls, foundations and floor and with a tile roof resting on steel purlins. It is fire proof throughout, well ventilated and lighted, protected as much as possible from corrosive influences and arranged so that the pocket can be expeditiously emptied should there be fire from spontaneous combustion or other causes. The steel truss is braced from the outside of the building with the main columns vertical. With this construction these columns, with the concrete wall, form the bulkheads for the coal; the inclined back leg, forming the brace at each column, is outside of the storage and supports the overhang, as shown in the sectional view presented herewith.

A further reason for the use of this construction is that an inclined floor, with a tunnel in the center of the building, was required, and the conditions made it impossible to put in tie rods across the building to unite the bases of the main columns and thus take more of the wind strains and the pressures of the coal against the sides of the building.

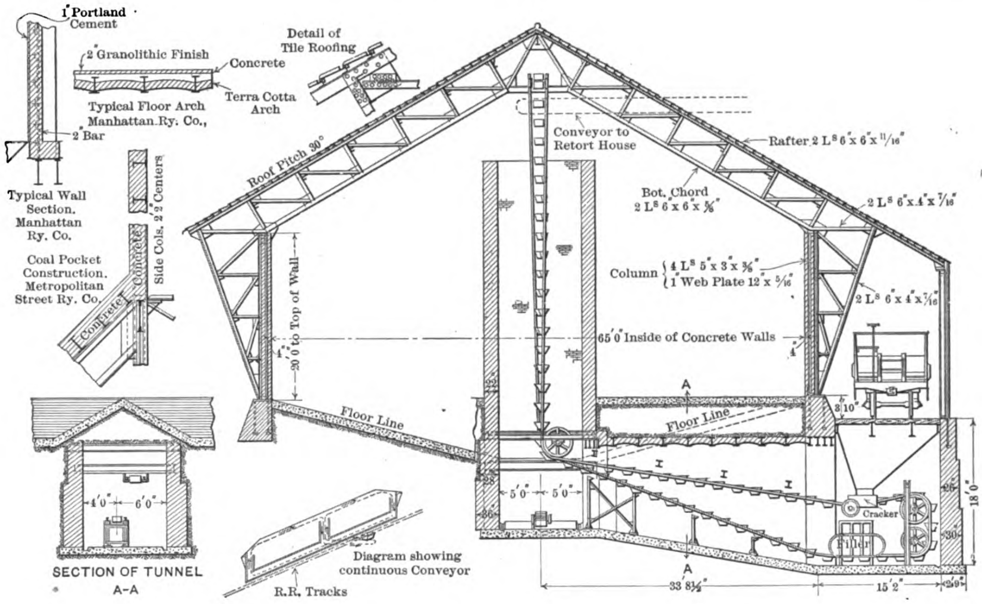
The shallow truss with bottom chord parallel to the top chord makes it impossible for the coal to reach the truss at any point, while the channel tie across the center of the truss, near the ridge, forms a support for the conveyor. It may be noted that the building is without a ridge strut, but the two girders on either side of the ridge answer the purpose, and at the same time form a support for the conveyor, as well as a guard for the foot walk. The shallow inclined truss, with the tile glazed roof, together with the concrete walls and floor, give the inside of the building a neat and substantial appearance, while the overhang on the sides, together with the tile roof and the octagonal ends, make the exterior appearance pleasing.

The floor and foundations of the structure are made of concrete, the foundations having an inclined back wall slanting away from the building. The building is so designed that the main columns have no horizontal thrust at the base, but the small intermediate columns have the thrust of the coal at their base, thus taking care of the pressure of the coal against the sides of the building.

The roof is covered with Ludowici tile, the finish of the tile being what is known as nonglazed or semiporous. Except for its expense, glazed tile would be satisfactory for this structure, because any sweating and dripping inside of the building would do no harm. Unglazed and semiporous tile is necessary in such buildings as a power house or machine shop, so that there may be none of this dripping. The tile does not, as might be expected, freeze and crack in cold weather from the absorption of water. During a cold spell last winter, lasting almost two weeks, the shed became covered with ice and snow, mostly ice, to an average depth of 4 inches. but the tile has, apparently, not been injured.

Light is obtained principally through skylights in the roof, made of glazed tile of the same form and size as the ordinary tile and laid on the roof in the same manner. Additional light and ample ventilation is obtained from the opening between the roof and the top of the wall.

It is to be noted that the coal in this building is stored on the ground and not in an elevated structure; wherever possible, it would seem that coal should thus be stored, and where this is impractical it is important that the inside of the storage be entirely lined with concrete,



Coal Storage Building of Steel and Concrete.—Transverse Section of Building, with Details of Construction.

so that no part of the supporting steel work is exposed to the corroding action of the coal.

Public attention has recently been called by Mr. Sooysmith to the possible danger due to corrosion in tall steel frame office buildings, but danger from this source is largely accentuated in a coal storage, with its sulphur and other corrosive substances. For this reason, where a permanent and costly structure is to be built, as is usual in the case of large power houses, coal bins lined with steel plates should not be used, as they are liable in time to become a menace to life and property.

In the case of Lowell, all main columns, and as far as possible the intermediate columns, are entirely covered with concrete. The steel work which is exposed cannot be reached by the coal, can readily be painted and is made throughout of heavy material.

The coal storage pockets of the power houses of both the Manhattan Railway Company and the Metropolitan Street Railway Company of New York are steel structures, and are constructed along the lines indicated in the illustration, the steel framework being covered with concrete. The Manhattan Railway Company adopted the Columbian system, which consists of putting in small special beams about 2 feet apart, thus allowing the main beams to be spaced further apart than otherwise. They are thus able to use a less thickness of concrete and effect a saving in weight, cost and space. Another similar and very good construction in use is either expanded metal or wire netting covered with concrete. The essential point is to have the steel framework, and especially the joints, entirely surrounded and imbedded in concrete, as under these circumstances steel will not corrode.

On account of the limited space on the property for the coal storage plant it was necessary to keep the building narrow, and consequently coal had to be piled to the considerable depth of 40 feet. It was therefore thought best to design the pocket so that it could be promptly emptied in case of fire from spontaneous combustion or other causes. With this in view the floor was given a pitch of 15 degrees toward the tunnel in the center of the building, so that the two sides can be easily and well drained of coal by the conveyor. In order, however, to expedite the removal of coal in case of fire two panels in the sides out of every five were made of removable steel buckle plates with a movable column in the center; these can be unbolted and moved promptly and coal can be taken out of this opening; it is 10 feet wide.

A Freak of a House.

A writer in one of our exchanges gives the following description of the unique dwelling which Charles F. Lumis, author and editor, has planned and built for himself with his own hands among the gnarled sycamores that grow in the old bed of the river on the outskirts of Los Angeles, Cal. Architecturally it would be classified as a freak. It has been the owner's recreation, after business hours, for many days. It stands on a 3-acre patch, which has been transformed into a rustic park. The walls are massive, four feet thick, built of bowlders of every shape and color, placed in the wall just as they were found, without dressing, and held in place by cement. Unhewed girders of oak stretch between walls and support a low, flat roof, which is to be used as a promenade. The doors are hewed out of heavy plank, oddly grained, no two being alike, and placed without regard to symmetry; each door is hung on fantastic wrought hinges. The windows are of all shapes and sizes. A circular jagged tower rises above the roof to a sufficient hight to give an unobstructed view of the landscape.

The interior is more unique and curious than the exterior. The upper floor is the author's workroom, which is reached only by an outside stairway. It is one large room, an ideal author's den, containing the library of rare and expensive books, documents, early works and prints, and a small ante-room at the stair head contains many rare relics of an early civilization dating back to the Aztecs. In the living room on the ground floor is a collection of art works, curios and relics, with landscapes by Keith, flower pieces by Longpre, Navajo blankets, &c. All is odd and original, yet home-like and suggestive of comfort. Order, which is said to be Heaven's first law, is conspicuous here by its absence. The fact that the owner has been architect, stone mason, carpenter, painter, in fact, the "whole thing," makes this effort interesting chiefly because it has been so done. It is as unusual as it is inartistic, more's the pity.

Cooling an Auditorium by the Use of Ice.

In a paper read at the summer meeting of the American Society of Heating and Ventilating Engineers, at Atlantic City, N. J., the author, J. J. Harris, described how he made use of ice in cooling an auditorium. He said: 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 auditorum 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 was constructed in the fresh air inlet large enough to hold about 8 tons of ice, with several shelves having slatted bottoms, 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, which are located in the aisles. The construction of this system admits of bypassing 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 employed the method at the exercises held the present month.

Fires Caused by Electric Lights.

Although electric wiring, through being defective, is often the cause of fires, says *Fire and Water*, yet it may be that it is not unfrequently made a scapegoat for the carelessness of those who place inflammable goods and stuff too near incandescent electric light bulbs. It is a mistake to rely too entirely upon that method of lighting as being nearly absolutely safe—as great a mistake as to imagine that these bulbs give out small quantities of heat. An electrical expert says that "measurements show that of the energy of the current only 6 per cent. is turned into light; the other 94 per cent. manifests itself as heat. Inflammable substances near incandescent lamps are readily ignited. If a 16 candle-power lamp lighted by a current of 100 volts is immersed in a vessel containing 300 grams (10½ ounces) of water it will bring the water to boiling point in an hour. Celluloid near such a lamp is inflamed in five minutes. These and other experiments of the sort direct attention to the necessity of care even with electric light." The above statement tends to show that many of the fires that start in show windows lit by incandescent lamps are traceable, not to defective wiring, but to the abnormal heat generated by the electric light itself.

BONDING IN BRICK WORK.

SOME very interesting comments upon the manner in which bricks should be laid in a wall so as to tie them together are presented in a paper on "Brick Masonry," read not long ago by Architect George Beaumont before the apprentices and members of the Chicago Masons' and Builders' Association, and the United Order of American Bricklayers and Stone Masons, at the rooms of the former organization in Chicago. The paper was illustrated by a number of drawings showing various forms of bond in brick work, which, with the matter relating thereto, are presented herewith. In the course of his remarks he dwelt at considerable length upon early bricklaying as practiced by the Egyptians, discussed the rate of wages in ancient times and then took up the more practical side of the trade as followed in this country.

The author pointed out that good bricks are those which give out a ringing noise when an attempt is made to cut them with a trowel. "When I am on a building," he said, "it is not necessary for me to see the bricks which the teamster is delivering in order to judge whether they are good or bad, because I can tell by the sound which is given off as he unloads them. If they clink merrily as they are thrown to the ground, I make no further inspection beyond a glance at them, but if they give off a dull, loose kind of a rattle, my attention is at once aroused, and I call the foreman and make an examination, which often results in rejecting the bricks and demanding their instant removal. The teamster, evidently not wishing to haul them to the yard, simply takes them to some other building where the architect and foreman are not so particular. I mention this to show how necessary it is to carefuly watch the material as it is delivered at the building, for if the architect and foreman are careless in this matter they will get more than their share of poor, soft brick, even if the contractor is paying full price for them." Before being put into the wall during dry, warm weather, the bricks should be well watered, for neglect of this often causes serious disaster.

The quality of lime mortar determines the strength of the brick work. This has been demonstrated so many times by scientific tests on carefully built brick walls that it is now an established fact. No matter how good the bricks may be, or how skillfully they are laid, if the mortar is of poor quality the wall or pier will possess neither strength nor endurance.

The most intelligent laborer on the building should be put to work at the mortar box and the foreman should see that all the lime is well and freshly burnt, free from clinkers, cinders or hard lumps. The color of the lime is no guide to its quality; the real test is its rapid slacking and smooth, fine texture when turned into a paste by the aid of clean water.

Then comes the sand, which is of equal, if not more importance than the lime. The sand must be clean, sharp and free from dirt or loam; its particles should not be too fine or round, but rather angular, for this kind clings to the lime paste and makes a very strong, durable mortar when mixed three to one, that is, 1 part lime and 3 parts sand, which should be well tempered and of a consistency just stiff enough to spread easily and not stick to the trowel. If the mortar is thin and sloppy it has no strength and the setting will be very slow, which causes the wall to settle more than it should do. When you hear the mortar leave the trowel with a gritty kind of a swish you may feel reasonably satisfied that it is good.

Next in importance is the bond or the manner in which the bricks are laid in the wall so as to tie them together and distribute the pressure on one brick over as large a number of the bricks underneath it as possible, as in Fig. 1. This shows the face bond only, and is formed by breaking joints on the stretcher courses. Stretchers are the bricks laid with the long side parallel to the longitudinal face of the wall; of course this kind of bond can only be used when building a 4-inch wall. Immediately the wall is made 8 inches or more in thickness, it then becomes necessary to bind it together transversely or across the wall. This is accomplished by means of headers laid at right angles to the face of the wall, which leaves the small end of the brick, or head, showing on both faces if it is an 8-inch wall and the header a genuine one; besides it has lapped over two stretchers in the direction of its length and thus effected the tie or bond required to tie the two faces together.

If these two bonds of headers and stretchers were not used, the wall would consist of vertical strips parallel with the face, but having no connection with each other they could not be used for supporting the weights of floors, girders, roofs, &c., as in Fig. 2.

It is possible, however, to use both headers and stretchers in a wall and yet not have it properly bonded. For instance, if the joints were regular or unbroken the wall would be built in vertical slices 8 inches wide, having the appearance of narrow piers running up the face of the wall without any longitudinal connection or bond, and of course would be very little stronger than the wall just mentioned, which had no headers or cross bond, as in Fig. 3. The remedy for this defective bond is to "break joint," as you term it, and use a closer or quarter bat. Wherever a vertical joint comes directly over another one, there you have a weak place in the wall.

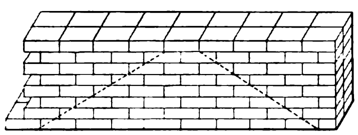


Fig. 1.—Showing Face Bond.

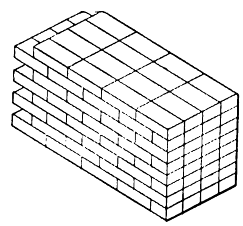


Fig. 2.—Poor Construction.

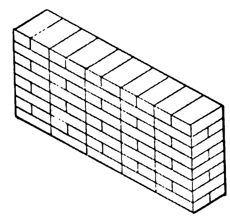


Fig. 3.—Wall with Headers and Stretchers and Yet Weak.

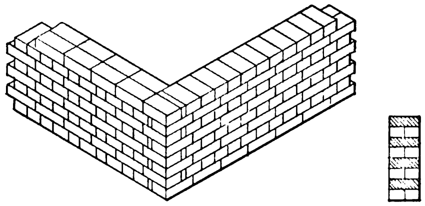


Fig. 4.—Example of English Bond.

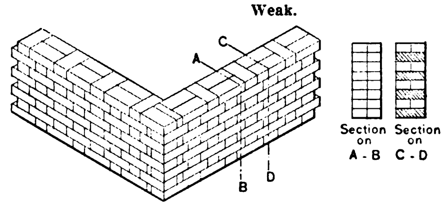


Fig. 5.—Showing Flemish Bond.

Some Examples of Bond in Brick Work.

The three principal bonds in use I will class as follows: Old English bond, for strength; Flemish bond, for beauty, and Chicago bond, for cheapness. There is also the English garden wall bond, but this is not often used here, and I only know of two cases in Chicago; one is the wall recently built around Graceland Cemetery and the other is a wall built on Oak street, near State.

There is yet another called the German cross bond, which has a very pleasing appearance, but I have never seen a specimen of it outside of Germany, although there may be, and no doubt are, some examples in this country, built by German architects and builders.

English bond, Fig. 4, consists of full rows of headers and stretchers laid in alternate courses. It is the simplest combination for producing great strength and should be used in all walls that are subject to vibration from heavy moving loads and running machinery.

Flemish bond, Fig. 5, is an arrangement of headers and stretchers alternately in every course, and has the header placed in the center of the stretcher under it; this gives a better appearance than the English bond, but is not so strong.

Where Flemish bond is used here in pressed brick facing, the header is unfortunately clipped, thus further reducing its strength.

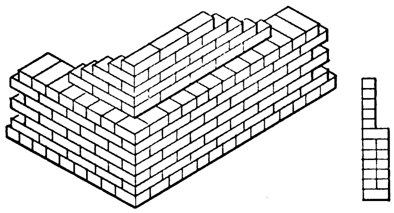


Fig. 6.—What is Known as Chicago Bond.

must be devoting some of yours to the study of plans and how to carry them out. Watch your employer and see how he orders his material, arranges the scaffolding and handles his men so they won't lose any time. Avoid spitting tobacco juice over your work, it defaces it, and, above all, don't have a can of beer under your nose while you are working. I know some mechanics who, when at work, daily drink five or six cans of beer and then wonder why the boss does not promote them.

Remember that the architect when visiting the building also watches you. He feels a certain responsibility for the skill of the men who work under him, and nothing pleases him better than to see a mechanic do his work well and quickly.

After a few years as foreman you may decide to become a contractor, and that is the time when you will call at the architect's office, asking permission to figure on work which is to be let by contract. If he knows you to be a good, clean, conscientious foreman he will probably give permission, but if you have blundered on his building or allowed poor work to be done he will probably refuse you.

Don't imagine all the good places are filled and that your chances for advancement are few, for there never was a time when the best places were waiting to be filled by competent men as they are at present. It is simply necessary for you to be a little more competent than the old style of foreman, and you can be if you seize the prevailing possibilities for acquiring skill, which he did not have.

This three months' compulsory schooling during every year of your apprenticeship, enhanced with what study you may do on the wet and other days you are laid off, will furnish you with invaluable knowledge, which can be turned into money by the time you are 25 or 30 years of age.

When you get to be a full fledged member of the

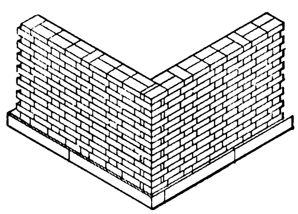


Fig. 7.—English Garden Wall Bond.

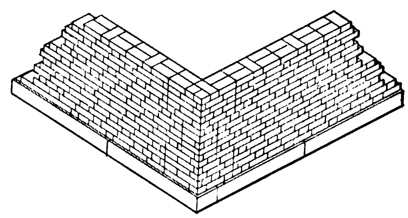


Fig. 8.—The German Cross Bond.

Some Examples of Bond in Brick Work.

Chicago bond, Fig. 6, permits five courses of stretchers to one course of headers. In theory this alarming absence of headers is all wrong, but in practice it seems to answer the purpose even in buildings where the walls carry very heavy weights. I sometimes wonder if the omitting of so many headers in our Chicago brick work is responsible for the cracks occasionally seen in walls built with this bond. Of course, some of the cracks we can trace to certain defects or movements, but there are others for which we cannot account.

What is known as English garden wall bond, shown in Fig. 7, is formed with three stretchers and a header alternating on the same course, and is used in 8-inch walls which are faced on both sides, but as the headers are not generally true on both ends, it is desirable not to have too many of them cut through the wall. In Fig. 8 is shown the German cross bond, formed with two stretchers and a header alternating on each course. This style of bond works out badly at the angles if quoins of brick or stone are not used; otherwise it is a good bond.

In concluding Mr. Beaumont addressed some very pertinent remarks to the apprentices which cannot fail to interest the younger element in the trade. Among other things, he said:

If you aspire to the position of foreman in your trade it will be necessary to work much harder than do the ordinary run of bricklayers. When your fellow workman is spending his evenings at a cheap theater or in the saloon or having what he calls a good time, you

union don't hesitate to break one of its unwritten rules by doing all the work you fairly can and not shirking when you get near joist high, as so many men do in order to make the work last out the half or full day. Little things of this kind, together with carelessness on the part of bricklayers, have caused millions of dollars' worth of work to be carried out in other materials than brick. In many cases great engineering structures have been executed in concrete instead of the handy brick, for no other reason than the fact that so many bricklayers do their work badly and require so much watching in order to get the walls and piers well bonded and solidly built that the expense of supervision becomes so great owners are compelled to adopt other materials and methods of construction, thereby causing you a loss of work.

One word more and I have done. Although probably 75 per cent. of our foremen bricklayers are born and trained in foreign lands, yet they gain and hold positions here by reason of their superior skill and character, but, unfortunately, in many cases their knowledge of the English language is so defective they do not always read the plans and specifications correctly. This causes mistakes which, I hope, will not occur when you are advanced enough to take their places, for surely the American boy is as bright as any other boy, and if you embrace the opportunities now so freely offered I have no doubt you will, with your American training, worthily fill the places of our present very worthy foremen and contractors.

CORRESPONDENCE.

Plans Wanted for a House for a 25-Foot Lot.

From S. G. H., *Atlantic City, N. J.*—Will some of the readers of the paper kindly furnish for publication plans for a house suitable for erection on a 25-foot lot in the suburbs of Philadelphia? I want a room convenient to the front of the house for my study and office. I want four bedrooms and a bathroom; also a rear stairway. The house must not cost over $2000 complete. I am a carpenter and expect to start in business very shortly.

Remodeling a Small Church.

From FRANK E. KIDDER, *Denver, Col.*—Apropos of the letter of the Alabama correspondent in the July number, relative to designs of church trusses, it may not be without interest to refer to a piece of work along these lines with which I have recently had to do. In Fig. 1 is shown the general appearance of the old building before the work was commenced. The case was one where the new building was erected against the old one, the latter being used as a Sunday school room, or lecture room, and was to be connected with the audience room by means of folding doors. The doors were to be so arranged that when open there would be no obstruction whatever of the view. There was no remodeling of the old building, except taking out the wall under the truss and removing the porch. Fig. 2 shows the method adopted by the writer for supporting the roof over the opening, 28 feet wide, between the audience room and the lecture room of the church. The tie beam of the new truss was placed so as to receive the foot of the trusses in the old building and virtually to take the place of the wall plate. The new truss comes within the lines of the new roof. It is studded up and plastered so as to form the end of the audience room. It also supports the ceiling and roof purlins over the audience room and a portion of the new roof extending on the old roof. The posts are set on top of the truss to support the upper purlins. This method of trussing over an opening can always be adopted whenever there is roof space above to contain the truss. The photograph from which Fig. 2 was made was taken before the braces of the center panels of the trusses were put in place. Both regular and counter braces should always be inserted in these panels. The piece of work is a very good example of roofing a church with scissors trusses, and at the same time it is a very common plan. In some future number it is possible I may show the manner of roofing the new church and give details of the trusses.

Fig. 1.—View of Original Church Before Work Was Commenced.

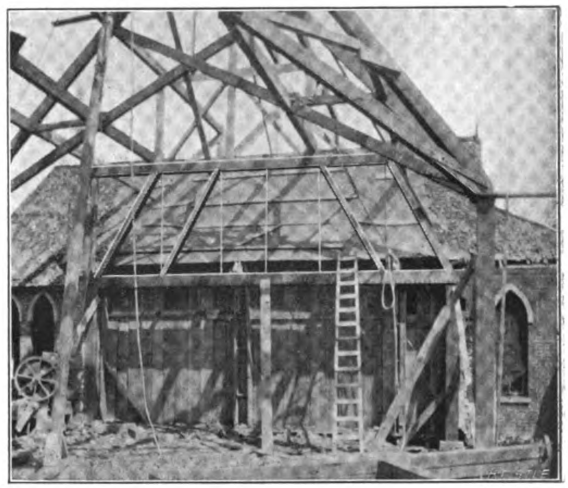


Fig. 2.—Showing Truss Supporting Old Roof of Lecture Room.

Remodeling a Small Church.

Hanging Doors.

From DOWN SOUTH, *North Carolina.*—I am inclined to think that "A. P. R." of Meshanticut, R. I., must have fallen in with some lightning door hangers. He does not say as to the size or thickness of doors or what style of trim was involved on his "good job," but I must say his estimate is pretty high, even for white pine. What I consider a good authority on this subject says "to fit, hang and put a mortise lock on common doors, using one pair of loose pin butts and a common mortise lock, the average is about six doors per day of ten hours." The same authority says that in estimating the average is what must be sought, which is very true. It is well known that some men have a particular knack in certain kinds of work. There may be men who can fit, hang and trim 15 "common" doors in a day; but put one of them at something else—say shingling, siding or laying floors—and it may be found that another will leave him out of sight.

There are several different ways of fitting and hanging doors. One I may mention as being the style in an Alabama mining town is to make the frames ½ inch over size, give the edges of the door a "lick and a promise" with a jack plane, drive the screws up with a hammer and "let her go at that." Such work as that would disgust a mechanic and certainly ought to.

From YOUNG CHIP, *Lindsborg, Kan.*—What does "A. P. R." of Meshanticut, R. I., mean by hanging doors? Does he mean to say that one man can hang 15 doors complete, fitting in locks and doing all the work in eight hours, or does he mean by hanging doors simply hanging them on the hinges?

Framing an Octagon Silo.

From W. T. B., *Danbury, Conn.*—Will some of the practical readers of *Carpentry and Building* tell me through the Correspondence Department the best method of framing an octagon silo 20 feet across by 25 feet in hight?

What Constitutes a Day's Work for a Carpenter?

From M. L., *Newark, N. J.*—I should like to shake hands with the man who, according to "Wandering Wood Butcher," can lay 2500 to 3500 shingles in ten hours; also the man referred to by "A. P. R.," who can fit, hang, lock and trim 15 doors in eight hours. He is a wonder and should be given a front seat. Perhaps the man who lays the shingles simply picks them up and lays them down again in any old place, not including breaking joints or nailing, while the man who hangs the doors simply stands the trim against the wall and hangs the door on a nail or any place that comes handy, where it does not need hinges, lock or saddle. If, however, "Carpenter" or "B. L. C." should base estimates on the figures given, they would not be in the business long because they would get all the work, as they would be the lowest bidder, but would fall short in money in a very brief time. In estimating carpenter work of this kind I offer the following for shingling roofs, including valleys, hips and dormer windows, scaffolding and removing same and leaving the job complete:

At $2.50 per day	$3.25 per 1000
" 2.75 " "	3.70 " "
" 3.00 " "	4.00 " "
" 3.25 " "	4.40 " "
" 3.50 " "	4.70 " "
" 3.75 " "	5.00 " "

For setting jambs, trimming same, fitting, hanging, lock and putting down saddle for doors:

At $2.50 per day	$1.00 per opening.
" 2.75 " "	1.15 " "
" 3.00 " "	1.25 " "
" 3.25 " "	1.35 " "
" 3.50 " "	1.45 " "
" 3.75 " "	1.50 " "

Therefore, I fail to see what the birthplace of the man or the place in which he was raised and educated has to do with his ability to lay shingles or hang doors.

Question in Veranda Roof Construction.

From DOWN SOUTH, *North Carolina*.—In the July issue of the paper, "H. C." of Pike River, Canada, asks for information in regard to a porch roof having two pitches. Not knowing what style of cornice he might prefer, I send pencil sketches of two plans, either of which could be used. Of the two I would prefer the first, although it will reduce the pitch somewhat, yet will make the neater looking job. If a box gutter is wanted the point of the rafter can be cut off far enough back for the width of the gutter, or the rafter itself could be set back the width of the gutter, which will help the pitch a trifle. I have indicated shingle roofs in both cases, although that is immaterial.

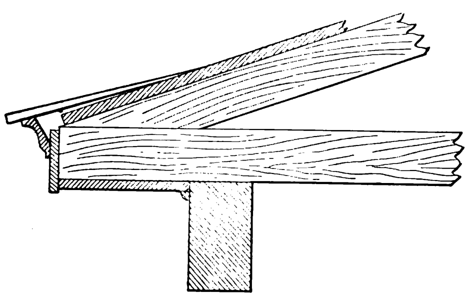


Fig. 1.—Preferred Form of Cornice Construction.

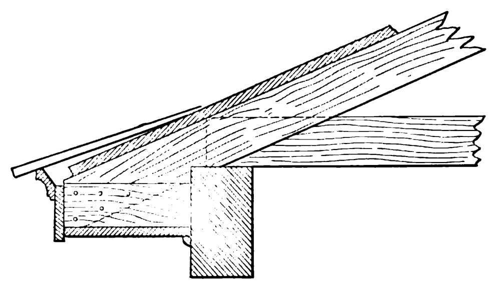


Fig. 2.—Another Form of Construction.

Question in Veranda Roof Construction.

In the second case the plate must be built up on the steep part of the roof until the lower ends of the rafters come in line with each other, and care must be taken to place the hip rafter so that it will conform to both sides of the roof. The latter plan also brings the cornice so low that it covers a goodly portion of the plate, which does not look so well. I have shown it somewhat lower than is perhaps necessary.

Filing a Saw.

From M. H. K., *Shreveport, La.*—For the benefit of "Young Chip," Lindsborg, Kan., I would say that it makes little difference which way his file points, provided he uses good judgment as to when he stops filing, so as to leave the teeth all one size, shape and length—more especially as to length. When I file a saw for soft wood, such as white pine or California redwood, I point the file toward the point of the saw, and for hard wood, such as hard pine, Norway pine, oak or Oregon fir, I point the file toward the heel of the saw. The former makes a longer tooth, with more cutting bevel, and the latter a shorter one, with less bevel. The pitch of the tooth can be made more or less to suit the strength of saw blade or the muscle of the man using it, regardless of which way the file points. When I was a "wood butcher" I filed my saws accordingly until I acquired sense enough to experiment. Then I took a day off, and going to a barn where no one could see me, I went to work and filed and refiled my saws until I was satisfied they were fit to use on a job without being ashamed of them. In 60 days I was filing all the saws in a crew of 16 men, who claimed their eyes were poor. It took me three years to learn they were all liars, who were ashamed to tell the truth for fear it would reflect on their mechanical skill. The foreman told them I was the only carpenter in the crew who could file a saw properly, but he never found out that I learned the art in a stable with no one around to give me points.

In filing a rip saw I always point the file toward the heel, making the front of the tooth square and the back slightly beveled, or enough so to cause the outside of the tooth to be a little longer than the inside. I file from both sides, the same as for a cross cut saw, making the pitch to suit the kind of wood I work in, giving more for soft and less for hard wood. I always float the teeth before setting or filing, and then watch closely the flattened points in order to have them all of one length and the size in order to know the side of the file on which to bear the hardest so as to have them of one size and shape.

In setting saws I usually give enough to allow dressing the sides down with an oil stone slip kept for that purpose, by placing the blade on a straight, smooth board and running the slip from point to heel. This gauges all the teeth and takes off the wire edge, so that the saw cuts clean and smooth and requires little set. When I file from the point to the heel, I set the saw blade plumb and hold the file level. When filing from heel toward point, I lean the saw from me more or less as suits the bevel and pitch I wish to give. These are two points which must be constantly in mind. If I have a very hard saw, such as Disston's No. 12, I usually lean the saw more than for a Disston No. 8, and file toward the point in order to give a long, deep, slim tooth that will stand considerable set without breaking. This is another little point I have never seen mentioned by saw filers and is worth remembering, as well as affording a basis for a little experimentation. "Young Chip" can learn more in one day's work experimenting than in 365 days' reading with no experiments or practical experience.

From C. H. M., *Holly Beach, N. J.*—I saw in the August issue a letter from "Young Chip," who seeks information as to the proper method of filing a saw. My way is to first place the file on the saw so that the tip of the file is close to the handle of the saw. In the next place, keep the handle of the file a little lower than the tip, which will give the saw teeth two bevels. A saw filed in this way will cut if directions are followed. A man in sawing a board or stick always puts the greatest pressure on the downward motion of the tool, the upward motion serving to rake out the dust created by the first motion. By filing a saw this way the sides of the teeth nearest the tip of the saw have a clean, smooth, sharp edge, while if reversed they will have a slightly ragged or feather edge, and so will never be in good condition. I shall be glad to have other readers tell their methods of filing a saw.

Elevations of First Prize Plan in Floor Plan Competition.

From JOHN P. KINGSTON, *Worcester, Mass.*—In reply to the correspondent who recently expressed a desire to see published the elevations of the floor plan awarded the first prize in the recent Floor Plan Competition for an eight-room house, I send herewith drawings which will, I think, cover the case. They include front and side elevations, together with the roof plan and a section showing hights of stories. The intention is to have the first story of the house clapboarded and the second, with gables, shingled. I would also suggest the use of shingles on the sides of the dormers and also on the roof. The veranda is to have round tapered columns, and the balusters to be 1 inch square, set cornerwise. The other finish, such as water table, belt courses and cornices, is t obe as indicated on the drawings. The underpinning wall is to be of stone, either field, cobble stones, or broken ashler. The foundation is to be junk stone, laid dry and pointed up.

These elevations are drawn in strict conformity with the plans, but when I thought the matter over a little I readily discovered where I might have changed some parts to advantage. It is possible that at some time I may do this and send one or more sketches indicating a different style.

Laying a Springing Floor for Dancing.

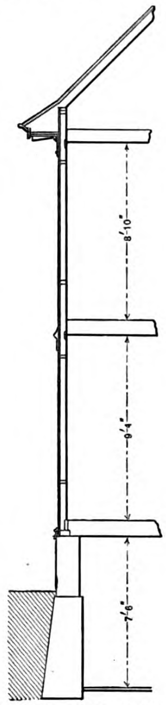
From J. H. G., *Central House, California.*—Will some of the readers of the paper describe their method of putting in a springing floor in a dance hall, 30 x 45 feet in area, and to be laid on top of the old floor? I shall take it as a favor if some of my brother carpenters who have had experience with work of this kind will send their plans for publication.

Mitering Crown Mold and Fascia.

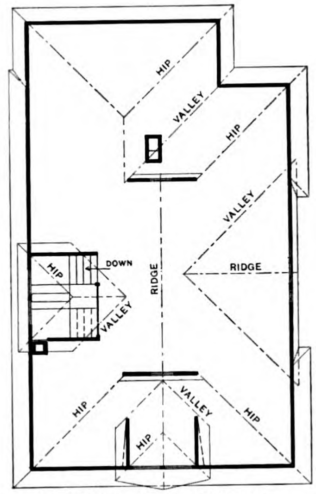
From F. B. S., *Yetter, Iowa.*—Having had considerable experience in remodeling houses and having had all kinds of members to make, I would suggest to "C. C. H.," Brookville, Pa., whose inquiry appears in the August number, that he make a butt joint on the fascia and cope the crown mold. I would not, however, consider the member practical in new work. Will some of the readers tell me if I am right in this?

Condensation in Chimney.

From G. J. N., *Meaford, Ont.*—Will some of the readers please tell what will cure a chimney of sweating? The chimney runs up through a one and one-half story cottage. It is used in connection with a hot air furnace, and an 8-inch pipe leads from the furnace up 14 feet and then runs over 4 feet to the chimney. The chimney is 10 x 14 inches in size, and it sweats so freely that the condensation runs down through the bottom of the chimney. The pipe does not sweat, the trouble appearing to be all in the chimney, yet the furnace is not interfered with from lack of draft.

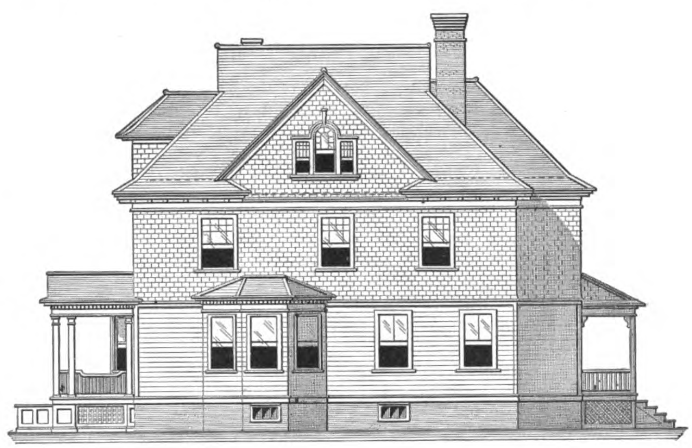


Section.—Scale, 1/8 Inch to the Foot.



Roof Plan.—Scale, 1-16 Inch to the Foot.

Front Elevation.



Side (Right) Elevation.

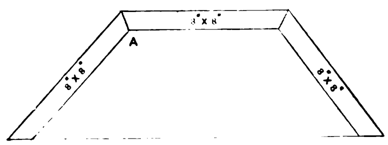
Scale, 1-16 Inch to the Foot.

Elevations of First Prize Plan in Floor Plan Competition.

Note.—Evidently the chimney is not of sufficient hight to have any considerable natural draft, and owing to its size at the point where the smoke pipe enters it is not heated sufficiently for the draft to carry off the products of combustion before condensation takes place. Where the smoke from an 8-inch pipe having an area of 50 square inches enters a 10 x 14 inch flue, which has an area almost three times as great, it is natural for the contact of the smoke with the cooler walls of the chimney to cause the condensation noted. Having stated the cause, the remedy can best be applied by our correspondent, who is on the spot and is the best judge of what is needed. It is quite possible that if a smoke pipe was run up inside of the chimney from the present point of connection to the top the trouble from condensation would be avoided.

Finding Bevel in Truss Construction.

From O. D. S., *Whatcom, Wash.*—I have been reading "The Builders' Exchange" for some time and can say that it has been of much benefit to me. I can lay out and find the bevels of any rafters without scaling them, but I do not understand how to find the bevel cut at A in the diagram of the truss inclosed herewith. Will some of the readers give me a rule for any pitch of truss and without scaling? I shall be glad to have those



Finding Bevel in Truss Construction.

answering send illustrations of their method, as I think it is a subject in which others besides myself are interested.

Papering a Ceiling.

From W. L. J., *Fowler, N. Y.*—I think "Down South," who inquired in the August number about using building paper instead of cotton cloth over his ceiling, will find it entirely satisfactory. The paper should be sprinkled with water before putting on the paste, and it is well to dissolve ½ pint of glue and add to the paste for each 500-foot roll. Let it dry thoroughly before papering over it and the wall paper will not crack.

Should Carpenters or Sheet Metal Workers Do the Work?

From F. T. P., *Dallas, Texas.*—There is quite a discussion in our city between the carpenters, tinsmiths, contracting carpenters and contracting sheet metal working concerns as to which trade belongs the work of putting up stamped steel ceilings, stamped imitation brick and rock face siding, underpinning, corrugated and V-crimped iron, &c. The carpenters claim that it is customary all over the country for them to put this material in place, and that it belongs to their trade, while the sheet metal workers claim that it belongs to the sheet metal workers' trade. We shall be glad if the editor will give his views as to whom this class of work belongs, and also hope the trade in different sections will express their views on the subject, for we would like to have this matter settled between the different trades unions.

Note.—There can be no doubt that so far as the fitting of the sheet metal is concerned, the tinsmiths are far better qualified to do the work than the carpenters, and it is naturally a branch of their work. Unfortuately, the tinsmiths have not given the amount of attention to the introduction and use of the materials mentioned that would have prevened the present question from arising. The result is that in many sections contracting carpenters buy and put in place much of these materials. We are inclined to think, however, that this is a special branch, and it has been so treated by some architects and builders. It has been taken up in some cities by men who make a specialty of store decorations and furnishings. This is particularly noticeable in parts of New England. In the larger cities the outside work is naturally done by journeymen tinsmiths and sheet metal workers, and we think that throughout the country they handle by far the greater proportion of this class of material. So far as the inside work is concerned specialists now do a good share, if not the larger proportion, of the interior decoration of buildings with ceiling and side wall patterns in stamped steel. Carpenters and handy men doubtless do some of it, and the sheet metal worker a fair proportion.

With all this said, however, we submit the question to our readers, and shall be glad to have them express their views freely and fully in the light of their own experience.

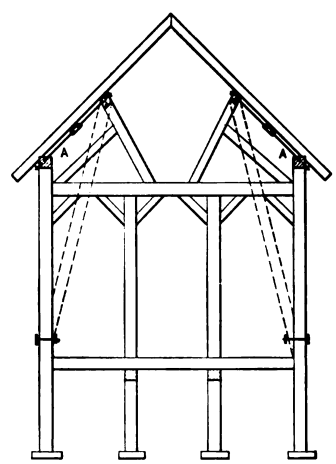
Laying Out Curved Rafters.

From G. L. McM., *Tacoma, Wash.*—Referring to the method of "W. A. E." of East Waterford, Maine, in the June issue, I would say that his method of finding the forms of common rafters is all right if it is a Roman Ogee roof that is wanted. It is not correct, however, for the hips or valleys for the same roof. I have not had an opportunity to test practically, but the curve formed at the hip of such a roof is the same as that formed by the intersection of the surface of an upright cylinder and a plane cutting a cylinder at an oblique angle, which would result in a curve that would be more nearly an ellipse than a circle. The method may be near enough correct to answer for moldings or small roofs, where very great accuracy is not required, but I think it would not prove satisfactory in any case where great exactness is essential, or on large roofs where its variation would be more noticeable.

Comments Invited on Barn Frame Construction.

From F. M. D., *Boston, Mass.*—Inclosed herewith is a sketch from an Ohio correspondent which, if you have space, I should like to see published for the sake of comment. For my part I fail to see what keeps his barn together, except it be the strength of the posts between the inclined braces and the bottom. Even they are nearly cut off by the mortises. What do the readers of *Carpentry and Building* think of this construction?

Note.—From the sketch of our correspondent we have had engraved the illustration of the barn bent presented herewith. The particulars accompanying the sketch constitute an article taken from a newspaper and describe how an open center barn is made from an old fashioned timber frame construction. The article says: First get some ¾-inch steel rods of the proper length to run from purlin plate to the wall plate with a turn buckle in the middle, as indicated at A in the sketch. Next take out the brace running from the tie beam to the purlin brace. The dotted lines indicate the new



Comments Invited on Barn Frame Construction.

braces or slanting posts made of 3 x 12 inch plank doubled and bolted together. A notch is cut each side of the beam to receive the plank, which should be bolted through the tenon thus made to the beam, and securely fastened by means of ½-inch bolts run through the outer post to the slanting post or brace, as shown. The beam can now be cut off next to the slanting post and the two inside center posts removed from the barn, leaving an entire open center. These slanting posts will add to the strength of the barn instead of weakening it.

EASY LESSONS IN ROOF MEASUREMENTS.*

OUR eighth lesson, in Fig. 8, shows a hipped roof with wing attached. In this lesson we shall only give special attention to those parts which have not yet been explained in previous lessons. Assuming that the main building were minus the wing, it would be figured in similar manner as explained in connection with Fig. 6. We would, however, in this case have to deduct the space taken up on the roof for the chimney in Fig. 8, and deduct the space where the wing intersects the main roof. The chimney is 8 x 8 feet in size, as shown in plan, and intersects the pitch of the roof at a distance of 6 feet, as shown in front elevation. Now average the distance in plan between the apex *a* and the side of the chimney *b c*, as shown from *f* to *h*, which is 4 feet; then 4 × 6 feet equals 24 square feet. Now in the side elevation the chimney cuts into the pitch roof also at a distance of 6 feet, as shown.

The line of the chimney in plan *c i* equals 8 feet, and the ridge line, as far as chimney intersects it, from *a* to *j*, measures 4 feet. Then average the distance between *a j* and *c i*, which is 6 feet and is shown by *h k*. Then 6 × 6 equals 36 feet, multiplied by 2 sides equals 72 feet, plus 24 feet for the front equals 96 square feet, which would be deducted from the main roof covering. The space which will be deducted from the side of the main roof, to admit the intersection of the wing, is obtained as follows: The width of the wing in plan is 30 feet. Now average the distance between the points *m n* and the apex *o*, which will measure 15 feet, as shown from *r* to *t*. Now multiply 15 feet by the length of the rafter *y z* in side elevation, or 20 feet, which equals 300 square feet, also to be deducted from the main roof.

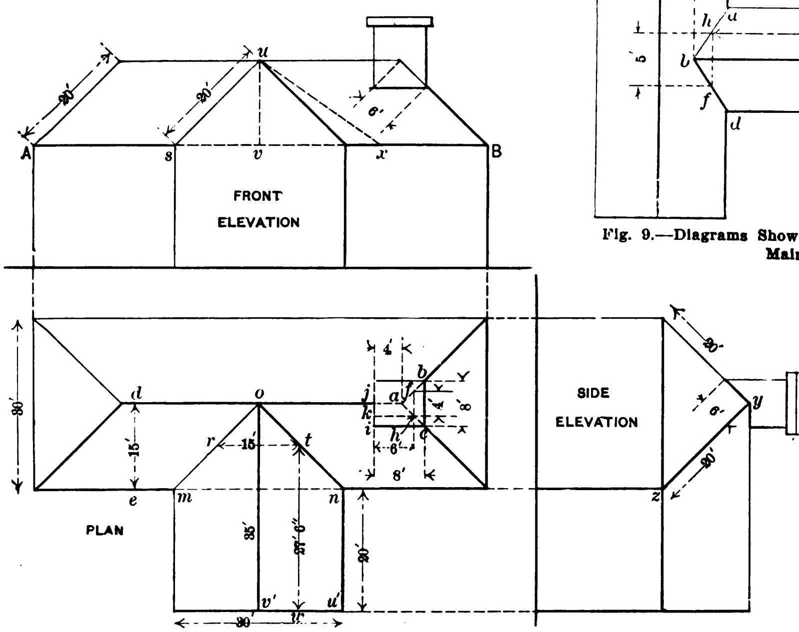


Fig. 8.—Plan and Elevations of Hip Roof with Wing Attached.

Easy Lessons in Roof Measurements.

For the amount of roof surface in the wing only proceed as follows: The length of the ridge from *o* to *v'* is 35 feet and the length of the eave from *n* to *u'* is 20 feet. Now average the distance between the eave and the ridge, which will be 27 feet 6 inches, as shown from *t* to *w*. Now multiply this by the length of the rafter *u s* in front elevation, which is 20 feet; thus 27 feet 6 inches multiplied by 20 feet equals 550 square feet, multiplied by 2 sides equals 1100 square feet of surface on the roof of wing. To obtain the length of the valley, *o n* in plan, drop a line from the apex *u* in front elevation until it intersects the line A B at *v*; now take the distance *o n* in plan and place in front elevation from *v* to *x* and draw a line from *x* to *u*, which will be the true length of the valley and at the same time the true length of the hip, because the end of the wing and ends of the main building each measure 30 feet.

In our ninth lesson, represented in Fig. 9 only, that

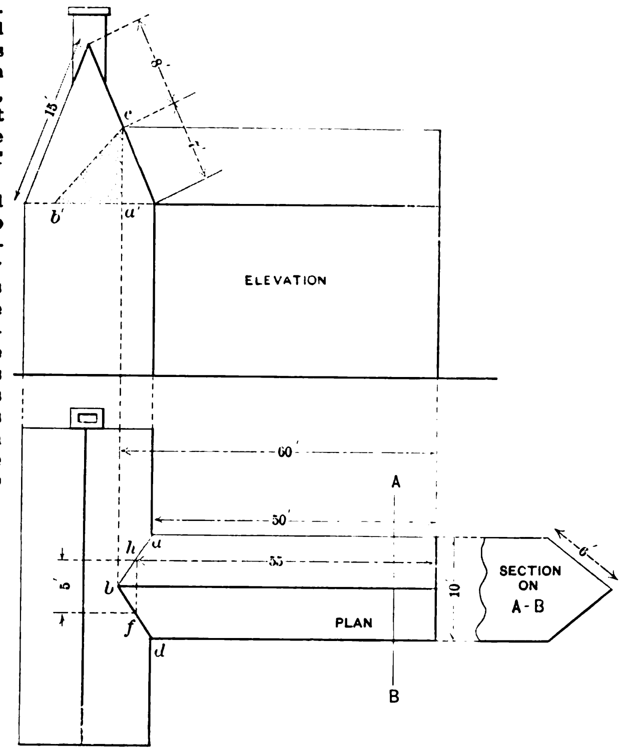


Fig. 9.—Diagrams Showing Amount to be Deducted from Side Main Roof to Allow for Wing.

portion will be shown which has not been explained in previous figures, and that is how much will be deducted from the side of the main roof to admit the intersection of the wing. Referring to the elevation, the wing intersects the main roof at a distance of 7 feet, as shown, and the width of the wing in plan is 10 feet. Now average the distance between the apex *b* and points of intersections *d* and *a* in plan, which will be 5 feet, as shown from *f* to *h*. Then multiply 5 × 7 feet equals 35 square feet to be deducted from the side of the main roof. The length of the valley is obtained by taking the distance *a b* in plan and placing it as shown from *a'* to *b'* and drawing the line *b' c*, which will be the true length of the valley. In our tenth lesson, shown in Fig. 10, is indicated the method of finding the quantities in a turret or tower, whose base is either square, hexagon, octagon or any other shaped figure. Let A B C represent the elevation of the tower, whose plan on B C is shown by D E F G H I J K. Lines drawn to the center L in plan, as shown, represent the hip lines. Now, assuming that one side of the tower, J I in plan, measures 10 feet, then average the distance between J I and the apex L, which will be 5 feet, as shown. The length of the rafter shown

* Continued from page 201 of the August issue.

from A to B in elevation being 40 feet, then 40 x 5 feet equals 200 feet, multiplied by 8 sides equals 1600 square feet surface in the tower of the dimensions given. For the length of the hip draw the center line A L, intersecting the line B C in elevation at *a*; then take the distance of one of the hips in plan, as L D, and place it as shown from *a* to D¹ in elevation. Draw a line from D¹ to A, which is the true amount of the hip, which must be multiplied by 8 for the full amount of the eight hips.

In our eleventh lesson is shown a more difficult problem in figuring roof surfaces, as illustrated in Fig. 11. Now average the distance between these points and the corner B, as shown by *a b*, which is 3 feet. Now, assuming that V U in elevation measures 10 feet, multiply this by 3 feet, equals 30 feet, multiplied 4 times equals 120 square feet for the gores. Add 352 square feet for sides, which will make 472 square feet of roof surfaces in the transition piece shown. The length of the hip is obtained by taking the vertical hight in elevation *h i* and placing it in plan at right angles to B G from G to *j*; then draw a line from *j* to B, which will be the true length of the hip, which must be multiplied by 8 for the full

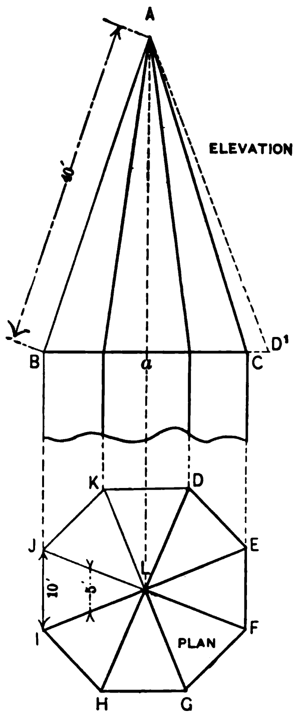


Fig. 10.—Finding Quantities in a Tower of Any Shaped Base.

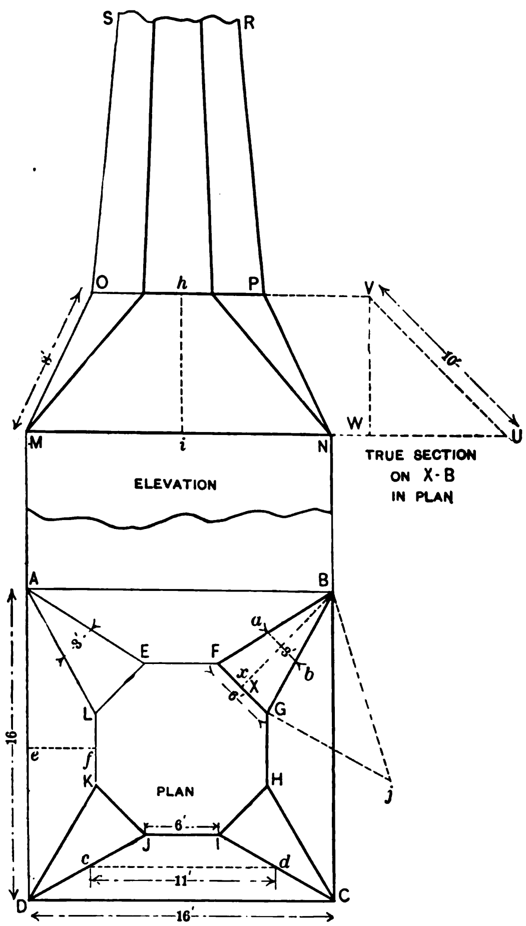


Fig. 11.—Octagon Tower with Square Base.

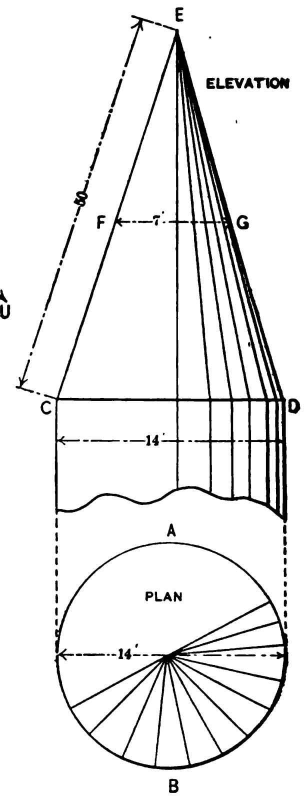


Fig. 12.—Plan and Elevation of Conical Spire.

Easy Lessons in Roof Measurements.

Here A B C D represents the square base of a tower or other object, from which a transition to an octagon takes place, as shown in plan by E F G H I J K L, the elevation of the tower or other object being shown by M N O P R S. It is this portion, shown by M N P O, which forms our lesson. The length of the rafter from O to M in elevation is 8 feet and is the true section on the line *e f* in plan. As the base line in plan is 16 feet and top line in octagonal plan is 6 feet, then average the distance between the two as follows: 16 feet minus 6 feet equals 10 feet, divided by 2 equals 5 feet, plus 6 feet equals 11 feet, as shown by *c d*. Now multiply 8 x 11 feet equals 88 feet, multiplied by 4 sides equals 352 square feet for the four sides. For the gore piece F G B in plan it will first be necessary to find the true length of the rafter on X B in plan. This is accomplished by taking the distance X B and placing it on the line M N in elevation extended, as shown by W U.

At right angles to W U draw the line W V until it meets the line O P extended, as shown. Draw a line from V to U, which will be the true section on X B in plan. The distance from F to G in plan measures 6 feet.

amount for the eight hips. Our last lesson, shown in Fig. 12, gives the method employed when estimating on conical spires or towers. Assuming that the base of the spire, C D in elevation, is 14 feet, as shown by A B in plan, then average the distance between the base C D and the apex E in elevation by dividing 14 by 2, which will be 7 feet, as shown by F G. As the circumferance of a circle is found by multiplying the diameter by 3.1416, or, as used in practice, 3 1-7, then multiply 7 x 3 1-7 feet equals 22 square feet. The length of the rafter being 30 feet, then 30 x 22 feet equals 660 square feet of surface in a spire of the dimensions shown in Fig. 12.

The first four-story apartment house to be erected in the Borough of Brooklyn, N. Y., under the present tenement house law is in progress on McDonough street, near Marcy avenue. It is a double house, each being 20 feet wide with a depth of 33 feet. The entire fronts are of ornamental limestone, with vestibule doors, involving the use of iron grating protecting panels of glass. The interior trim is hard wood and the plumbing is of the open type, with nickel plated fixtures.

ARCHITECTURE OF COUNTRY HOUSES.*

IN designing a house it must also be remembered that it must prove a comfortable haven under absolutely opposite conditions of weather; but as indoor life is so much more essential in the winter than in the summer, it will be well to consider the house rather as a protection from cold and storm than from heat and sunshine, and each room should be designed with a view to its possible comfort under the most trying conditions. Let there be in one room, at least, a fire place where the family, particularly if there are children, can gather round and watch the flickering flame of the hickory log or, for the lack of that, the bituminous coal, and by all means let that fire place be generous in size. It is not often that we see the rousing wood fires of a former generation. They are no longer an actual necessity, for modern science has introduced many other methods for circumventing the searching blasts. But if these open fires are no longer a necessity as a means of affording warmth, are they not necessary as promoters of ventilation, cheerfulness and gladness in the household? Let every man, then, who builds a house, particularly if it be in the country, see that he has at least one open chimney place, or grate, for either wood or coal. If he has any desire that his children shall ever have happy associations with home, and that in after years their thoughts shall revert with pleasure to the scenes of their youth, let the family fireside be something more than a name.

Fallacy of High Rooms.

The fallacy that high rooms constitute healthful rooms has led to the spoiling of many a house. High rooms necessitate high staircases, high doors and windows, and volumes of cold air. Spaciousness and ample superficial area are essential qualities in a good room, the effect of which excessive hight tends to limit and destroy. Let it be remembered that to make rooms healthful you need circulation of air, not space for foul air to collect in. An 8-foot room may be better ventilated and more comfortable to live in than a room 12 or 15 feet high, and it is certainly more easily lighted and warmed. Time was when our dwellings and public buildings were so constructed that ventilation existed as a matter of course. The doors and windows rattled with their looseness. The broad fire place sucked up and carried off the foul air as fast as it was generated. Now, we make our doors and windows tight and overheat our rooms with stoves and furnaces. This perfected construction has made some system of ventilating necessary. But before considering this subject, it will be best to review briefly the four methods of domestic heating in general use, together with their advantages and disadvantages.

The fire place has the advantage of being very cheerful; it is, too, a fine center for decoration, and produces excellent ventilation for a moderate number of persons, say five or six; and low fires may be maintained in spring and fall when required. On the other hand, it is dirty; most costly in use of fuel for heating; does not warm a room uniformly, and creates cold drafts unless warm air is supplied from a furnace.

Heating by Hot Air.

The most common method of heating houses is by the hot air furnace. This is simply an improved stove placed in a small inclosure, the sheet iron or brick casing being the walls. The furnace heats the air within this inclosure, and it rises to the rooms above through the tin pipes. To keep this current of hot air rising, a cold air box connects the lower part of the furnace with the outside air, and this box is generally provided with a damper, with which to regulate the supply of air to the furnace. This box should always be kept open as much as possible, and should never be entirely closed while there is a fire in the furnace; otherwise the furnace will become overheated, the fire pot broken, and some rooms in the house will become cold, because the furnace is taking its air from them instead of from the cold air box. Regulation of cold air supply is not an easy matter, as the heat of the furnace is constantly changing, requiring a greater or less supply of air to properly warm the house. The common expedient of taking the air supply entirely from within the house and recirculating the air, to be breathed again and again, cannot be too strongly condemned. The cold air duct should have, according to Willett, "an area in square inches equal to 40 times the number of bedrooms in a residence." The number of bedrooms is a fair criterion of the number of occupants of the house, and, therefore, the amount of air needed for ventilation may be expressed in terms of bedrooms. Allowance is also made in this formula for the vitiation of air by lights.

The following points should be considered in arranging pipes and registers: 1, Set the furnace so as to make all pipes to the first floor of nearly equal length, making those to the north and west the shortest; 2, make these pipes as short as possible and give them ½ inch to the foot rise; 3, vary the section of the pipe with the size of the room or the number of people; 4, make second-story pipes with an area equal to one-half or five-eighths that of pipes to similar rooms on the first floor; 5, registers should have double the area of the hot air pipe to reduce velocity of incoming air and allow for the grating; 6, double tin pipes should be used in the walls, and basement pipes should be wrapped with asbestos; 7, the cellar should have a hight of 7 feet to properly install a furnace.

The advantages of furnace heating may be summarized as follows: Cost of plant less than stoves, about half that of steam, or five-eighths that of hot water; much less trouble than stoves; will burn soft coal better than stoves, and while warming the building it supplies abundant warmed fresh air for ventilation.

The disadvantages are that the air is overheated and too dry if the furnace is too small or air supply insufficient, and furnaces out of repair may let gases leak into the hot air chamber.

Heating by Steam.

The steam boiler distributes steam at a low pressure through iron pipes to radiators in various parts of the house, and the hot radiators warm the air of the rooms. With a boiler and radiators properly proportioned, the whole house can be kept at a uniform temperature for several hours at a time with from 1 to 5 pounds of steam, as the automatic dampers with which every boiler is supplied can be set for any desired pressure of steam. Direct radiation warms in the same manner as a stove. Indirect radiation warms air which passes over it and into the room. There should always be some indirect radiation to furnish the necessary fresh air to a house. The advantages of the system of steam heating are that it is the easiest system to install successfully; the cost of the plant is less than for hot water; the heat can be more quickly controlled than with hot water; pipes and radiators are smaller, and heat may be carried further. Its disadvantages are that it is more wasteful of fuel than hot water; necessary repairs are more frequent; the plant is less durable and requires more attention than hot water, and it is often noisy.

The hot water heater is very similar to the steam boiler, except that all pipes and radiators are full of water instead of steam. The fire in the heater causes the water to circulate in the pipes and radiators, the radiators warming the air of the room as do the steam radiators. As the water in the heater becomes hot it flows up through the pipes, and as it cools flows down other pipes and returns to the heater again. The only guide for the regulation of the heat in the house is the thermometer on the heater, but with a little experience it is possible to obtain an exceedingly uniform temperature with the minimum attention. The advantages of this system have been indirectly stated in giving the disadvantages of steam heating, and where first cost is not prohibitive it should always be given the preference for residence heating.

The pre-eminent advantage possessed by the furnace is that its heating power depends upon its furnishing a large volume of air, and, if the cold air duct from the outside is fixed so that it can never be completely shut off, there will always be fresh air for ventilating. With other methods of heating, the necessary supply should be brought in through indirect radiators, that it may be warmed, so as not to create unpleasant drafts. Ventila-

* Continued from page 194, August issue.

tion is needed at all times, but atmospheric conditions materially affect the regularity of its operation. When the thermometer is at zero, and a gale is blowing, there is no doubt but that ample ventilation is being provided for the usual number of occupants through cracks and open joints, and even through the building material itself of isolated dwellings. At other times, when the air is milder but open windows are not yet comfortable, when there is no wind, and smoke will hardly rise, how are we to expect any interchange of air through plaster and building paper and inch boards? Then is when the heating apparatus which forces a change of air should be appreciated.

Air for Ventilation.

It can be demonstrated that each adult requires about 1800 cubic feet of air an hour for good ventilation, and that the lighting apparatus used by him will vitiate to an equal extent about the same amount of air. Therefore, for each person we should bring in 3600 cubic feet of air an hour, or 1 cubic foot each second. The entering velocity of air through a first floor register over an indirect radiator is at least 6 feet per second, so that 24 square inches of cross section in the pipe leading from the radiator to the register, and about the same in the fresh air duct to the radiator, will be required for each occupant. For steam radiators it may generally be assumed that there must be 1 square foot of radiation for each square inch in cross sectional area of the duct leading from it, and that for hot water there must be about 50 per cent. more radiation than for steam with the same area of duct. The air thus brought in will disseminate through the house, some getting upstairs and leaking out through windows, and some finding exit through fire places, which it is desirable to provide for the purpose.

When there are not one or two good fire places, tin ducts may be run in the partitions from registers in the base board, all to be united in the attic to a duct terminating in some standard form of galvanized iron ventilator on the ridge of the roof. For summer ventilation registers should be placed at the ceiling instead of at the floor. Owing to the small cross section and length of these ducts, it is not wise to rely on a velocity exceeding 4 feet a second, which would require about 36 square inches area for each person. Houses as now planned open together so freely that it is not necessary to provide a larger vent for any one room than can conveniently be put between the studding, and several should be located so that the fresh, warm air supplied by the indirect radiation will have to pass across the occupied spaces of the house.

Lighting.

The methods of gas lighting for isolated buildings have not yet attained the confidence of the public to the extent that has been accorded to all classes of heating apparatus, and yet some gas machines requiring no more care than a single lamp will safely generate gas enough for the illuminating of an entire house. It is the first cost that proves the stumbling block.

Gasoline and acetylene gas are the two products between which you must choose, and in either case permits must be obtained from the insurance companies. Gasoline gas lighting has been practicable for 30 years. Acetylene is hardly past the experimental stage. It is entirely safe and practicable with proper generators and intelligent handling, but without both it may be very dangerous. Mixtures of air and acetylene, running from 3 to 82 per cent. acetylene, are explosive, while with coal gas the explosive limits are 8 to 26 per cent. gas. No form of generator should be used which does not automatically prevent any air from getting into the system. Both these gases are distributed through regular systems of gas piping, and the gasoline gas is burned with the same burners, including the Welsbach, as coal gas. Acetylene requires special burners.

Gasoline gas has a decided advantage over acetylene and electric light, where only one of the three can be had, because of its availability for cooking and heating.

Sanitation.

Under this heading must first be considered the water supply. For domestic purposes it should be rain water stored in ample cisterns having good sand filters. It should be pumped to an elevated tank as required, that it may circulate to the kitchen, laundry and bathroom. If there be no power pump on the premises, a $10 hand pump operated ten minutes a day will maintain the supply. There should be a 30-gallon range boiler connected to a water back in the range, laundry stove, or house heater, that hot water may always be in readiness for laundry work, bathing and kitchen purposes. The extra outlay is returned in the economy of labor, and the small amount of effort that is needed in pumping is but a fractional part of that saved. Every farmer should have some power pump to furnish water for stock, and the same apparatus will serve for the domestic water supply, lawn sprinkling and fire protection—necessities for all who live in the country.

For pumping alone the windmill, hot air engine, gasoline engine and sometimes the hydraulic ram have their several advantages. The gasoline engine is preeminent if it is desired to have a power which may be satisfactorily used for pumping, either from a deep well or for a suction pump to deliver water under direct pressure, or to run a small grinder, a corn sheller, feed chopper, churn, washing machine, wood saw, or even a dynamo for electric lighting.

Cost for Gasoline Engine.

The cost per horse-power per hour for a gasoline engine is often placed by manufacturers as low as 1 cent, but it will be safer to say that it will not exceed 2 cents. A 3 horse-power gasoline engine, costing $160 at the factory and $4 to $6 more for belting, will run to its full capacity at a cost of 6 cents an hour, and when running at but a fraction of its capacity the cost will be proportionately reduced. A gas engine either takes an explosion only when the velocity is reduced to a certain minimum or else it explodes regularly, but only takes enough gasoline at each explosion to generate the power needed. The latter type of gas engine is the only one available for running a dynamo for electric lighting, for those controlled on the hit and miss principle vary too much in speed. A 20-light dynamo of moderate speed would cost about $60, and a slow speed one 10 to 15 per cent. more. In addition to this there would be required a switchboard, voltmeter, lamps, fixtures and wiring. The cost of installation, supposing the power to be at hand, would be less than for a gas machine, and would be the most sanitary and convenient light possible in the house. It would be considerable trouble, however, to go out and stop the engine after every one else had gone to bed; besides, the light would not be always available, as would be the case with gas.

A discussion of sanitary plumbing, fixtures, traps, vents, &c., in the brief space that could be devoted to it here would not be worth while. What I could say without entering too deeply into the subject has been heard or read by you all, and it will be much better for you to seek further knowledge in reference books.

I wish, however, to raise the query in your minds as to why ice is not used more on the farm. It is an article considered indispensable by many, and those who have enjoyed its use are unwilling to do without it. It materially increases the comforts of the house and an abundant supply is a delight.

Estimating.

In closing I wish to give a little advice on estimating cost. When people begin to figure on how much they can get for a certain sum of money they are invariably disappointed, because they have assumed that if a house can be built in Minneapolis for the given sum, or was built in their own vicinity eight years ago at the same cost, that it can be done now; as a matter of fact, it will cost at least 20 per cent. more to-day, with no immediate prospect of much reduction. Published plans are responsible for this tendency to error, but cannot always be blamed, for estimates may be correct for a certain locality, or if a building has been built for a stated amount it may have been at a past time when material and labor were very much cheaper.

A simple and rapid plan for estimating the cost of any building is by comparison. If carefully done it will give figures that may be relied upon. It would be unwise for me to attempt to name prices, when they differ so much all over the country and are changing from day to day. Select a house already built in your vicinity which represents in construction and finish about what you desire to build, and find out its cost. Compute the area of the ground covered and divide the number of dollars of cost by the square feet thus found, and the price per square foot is ascertained. The cost of a similar house of a different area may be based on this unit cost. The house chosen for comparison should have been built the same season if possible, so that prices of material and labor will be identical.

Making Blind Tenon Doors.

The day of the wedged door has passed, and all modern built houses contain what is known to the trade as "blind tenon doors." The "dowel" door is practically a blind tenon door. In plants where a set of dowel door machinery has not been installed the problem of making these doors presents itself. The advantages of this door, says H. T. Gates in the *Woodworker*, are the saving of lumber on the rails, of time in laying out all stiles both sides and mortising them from both sides, the neat appearance of the stiles, especially on natural finished work, and the ease with which they may be glued together.

Several points must be kept in mind in order to secure success. Let the stock sawyer cut all rails exact, so the tenon will not touch the bottom of mortise before the shoulder is tight at the coping. The tenons should fit more snugly both sidewise and endwise than in the old way, to hold well and make tight joints on the muntins. The glue should be applied to the mortise in such a way that it reaches the tenon, as well as the shoulders of rails and stiles, to make a strong job of the gluing.

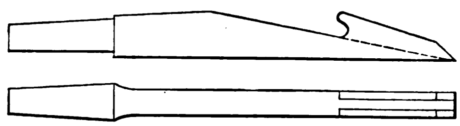


Fig. 1.—Side and Top Views of "Lip" Chisel.

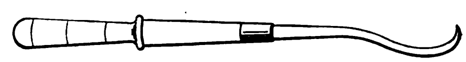


Fig. 2.—Cleaning Out Chisel.

Making Blind Tenon Doors.

The cleaning out of chips from the mortise has been a difficult problem, and it is not yet solved satisfactorily. Chain saw mortises obviate this, but they have their faults, too. What is known as "lip" chisels clear out the loose chips, but leave the fine chips that are pounded down by the action of the chisel to be removed. In order to do this a long S-shaped chisel with large wooden handle is used. The blade is ¼-inch wide and tapers from 0 at the cutting edge to ¾ or ⅞ inch at the handle.

This is a slow, laborious job. An easier method is to use a twist drill bit in a horizontal boring machine, leaving the arbor in a fixed position and moving the stiles back and forth, both lengthwise and sidewise, by hand. The bit should not be quite as large as the mortise, so as not to enlarge it and make the tenons fit too loosely. We have tried straight flute bits, double pointed bits, flat pieces of steel sharpened on edges and points, and various other patterns of cutters, and find the drill to give the best satisfaction; only, they are easily broken.

The doors should be framed and stood in a hot room for about a week to dry out. When ready to glue together they are warm and do not chill the glue as it is applied. The kind of glue has much to do with the rapidity with which doors may be glued up. Expensive glue is not required for this work, but a strong, quick setting glue is needed, so that the doors do not have to remain too long in the clamp, thus retarding the work. A light colored glue, having had a sufficient quantity of oxide of zinc mixed with it by the glue manufacturer, is the kind required. Using this, the man at the door clamp can take them out of the clamps about as fast as he can properly apply the glue, without their springing apart at the joints so as to require small clamps to hold them.

Bear in mind, in making blind tenon doors, you must have good machine work, dry lumber, snug fit to tenons, quick setting glue, all applied in a good, sensible manner. The kinds of wood and styles of doors both affect the results obtained and must be made the subject of study in order to succeed.

Cooling a Roof.

In describing the method adopted for satisfying a customer who desired to have that part of a building immediately under the tin roof made cooler, owing to the illness of the occupant of one of the rooms, a writer in a recent issue of *The Metal Worker* says:

Between the ceiling of the room and the roof was a small air space, which is quite generally provided in the construction of buildings, but it was insufficient to prevent the heat of the roof making itself very perceptible in the chamber beneath. As the work had to be done quickly, and without any damage to the roof already in place, a makeshift was resorted to. I purchased some thick, soft, open texture wrapping paper, covering the roof with six thicknesses of this material. Above this I laid 1-inch boards about a foot or so apart, and on the top of these two more thicknesses of the soft paper. On top of this again I laid 1-inch boards close together and weighted them so as to prevent any danger of their being blown off. I then arranged for connecting a hose with the house water supply at the highest point in the building so that the entire roof could be wet down to further counteract the heat of the sun. The effect not only reduced the temperature of the room several degrees, but also produced a benefit that satisfied my customer and had a substantial influence upon the convalescence of the patient.

Painting Brick Walls Showing Efflorescence.

In order to make paint hold on brick walls that show efflorescence, it is necessary to first remove this white powder, usually termed saltpeter, by washing with a mixture of muriatic acid and water, equal parts, and at the same time scraping off all the loose paint. When this has been done, sponge well with clear water and let the brick dry thoroughly before painting. The painting should be done after a spell of dry weather. It is a difficult matter to cure such walls entirely, but when the salts have been neutralized by the means referred to and a few coats of good oil paint applied, allowing each coat to dry hard before applying another, further exudation of soluble salts will scarcely make themselves apparent.

THE United States Department of Agriculture has just issued Bulletin No. 34, entitled "A History of the Lumber Industry in the State of New York," by Col. William T. Fox, and which contains much that is of interest and value. The publication deals with the methods of lumbering employed in New York from the earliest times to the present. The virgin timber forests of the State are described and compared with the present forests, which have been greatly changed and reduced by lumbering. Primitive methods of sawing lumber by hand are described, and particular attention is given to the history and capacity of the ancient and modern types of water and steam power saw mills used in the State. There is also given an account of the methods and of the difficulties of transporting logs and lumber on the principl waterways of the State by log driving and by rafting. Those who are desirous of securing a copy of the bulletin should apply to The Forester, United States Department of Agriculture, Washington, D. C.

National Association of Master Composition Roofers.

The eleventh annual convention of the National Association of Master Composition Roofers, held at Providence, R. I., on July 16, was a most interesting occasion. The sessions were presided over by the president, E. S. Bortel of Philadelphia, Pa., who, together with Secretary and Treasurer William K. Thomas of Chicago, presented the annual reports, which showed a flourishing condition of things in the trade.

The principal subject of discussion was a recommendation contained in the secretary's report regarding the adoption of a label for materials of a uniform quality and a change in the constitution and by-laws of the association. It was voted that the association adopt a trade label which must be used upon materials of uniform grades. The details of this adoption of a trade label were left to the Executive Committee, with instructions to prepare such conditions as would meet with the approval of the national association.

The following officers were elected for the ensuing year: President, E. S. Bortel of Philadelphia; first vice-president, J. William Moore of Providence, R. I.; second vice-president, J. B. Oligschalger, Louisville, Ky.; secretary and treasurer, William K. Thomas of Chicago. Board of Directors: H. M. Reynolds, Grand Rapids, Mich.; W. B. Lupton, Pittsburgh, Pa.; C. B. Jameson, Buffalo, N. Y.

The next convention will be held in Louisville, Ky., some time in June of next year, the exact date to be selected by the secretary and treasurer and the second vice-president.

Law in the Building Trades.

LIABILITY FOR SPRINKLER SYSTEM ACCORDING TO SPECIFICATIONS.

A party contracted to install a sprinkler system in a factory according to certain specifications—the work to be done subject to the rules of the New York Underwriters—and it was provided that the compensation for same should be payable upon the issuance of a certficate of approval by said Board of Underwriters. The work was performed according to the specifications—this was not questioned. The Board of Underwriters refused to issue a certificate because the water supply, for which the owner of the factory was responsible, was defective, and because such owner did not furnish a sufficient pump to be used in connection with the system. The court held that the refusal to issue the certificate could not defeat the right of the contractor to recover the contract price.—N. Y. & N. H. Automatic Sprinkler Company *vs.* Andrews, 70 N. Y. Supp. Reporter, 798.

WHEN CONTRACTOR SHOULD GIVE WRITTEN NOTICE OF DELAY.

When a building contract provides that the building shall be completed at a specified time, and that for every day that it remains unfinished after that date the contractor shall pay the owner $5 as liquidated damages, and also provides that the contractor shall be allowed additional time when he shall have been delayed by the fault or neglect of other contractors, provided he gives notice in writing to the owner of such fault or neglect of other contractors, the owner is entitled to the written notice and the contractor cannot be allowed additional time in the absence of it.—Feeney *vs.* Bardsley (49 Atlantic Reporter, 443), Supreme Court of New Jersey.

LIMITATIONS ON POWERS OF SUPERINTENDENT.

A building contract provided that, if the contractor failed to complete the work at the time specified, he should forfeit as liquidated damages, the amounts named in each of the detailed specifications for the different portions of the work. Another stipulation declared that should any disagreement arise as to the meanings of the drawings or specifications on any point, or as to the character of the work, the decision of the engineer should be conclusive on all parties to the contract. The court held that the engineer had no power to determine the claim for damages resulting from the delay of the contractor.—Chandley *vs.* Borough of Cambridge Springs (Pa.), 49 Atl. Rep., 772.

WHEN OWNER REPUDIATES CONTRACT AND REFUSES TO ALLOW WORK

Where the owner of a building repudiates the contract for its erection and refuses to allow the contractor to go on with the work, it gives the contractor immediate right of action and relieves him from the obligation of producing the certificate of the engineer, which under the terms of the contract was necessary as a condition of payment.—Smith *vs.* Watson (69 N. E. Rep., 419), N. Y. Ct. of App.

THE municipal authorities of San Francisco, Cal., are again agitating the question of limiting the hight of tall buildings. At present there is an ordinance of the Board of Supervisors which limits the hight of Class A buildings on streets 100 feet in width to 125 feet. The hight of Class B buildings on all streets is limited to 80 feet and of Class C buildings to 75 feet. It is now proposed to increase the limit from 125 feet to 130 feet on streets 100 feet or more in width, and to allow a hight of 95 feet on all streets less than 100 feet in width.

CONTENTS.

A CARRIAGE HOUSE AND STABLE IN THE SUBURBS OF SPRINGFIELD MASS.

J. W. FOSTER, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, SEPTEMBER, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

OCTOBER, 1902.

Discipline of Men in Hazardous Trades.

It is a rather curious fact, in view of all the discussion of the labor problems of the day and the efforts which are being made to ameliorate the condition of the working classes, that the managers of the labor unions have done so little in a direction in which there is ample room for needed improvement. We have reference to managers using their power over their own men to enforce discipline in hazardous callings. The demand for adequate safeguards to protect the men against injury is always upon the employer, and he is relied upon to watch the conduct of the workmen and compel them to observe rules which are regarded as oppressive and are violated and evaded as often as possible whenever they are considered inconvenient. Individual men do protest to their fellows when the latter directly endanger their lives by recklessness or carelessness, but it is considered, apparently, a breach of honor to bring the matter to the attention of the management. We imagine that it is hopeless to expect workingmen to overcome that feeling, but it would seem that the organization of the men themselves, the shop or mill committee, ought to take cognizance of the attitude of habitual offenders. The miner who tampers with his safety lamp deserves to be blown up, but unfortunately dozens and sometimes hundreds of his innocent fellows lose their lives and there is often very serious damage to the property of employers who are exhausting every known means to safeguard their men. If there is any one matter in which employer and employee should cooperate heartily and loyally it is in the protection of life and limb. The great majority of employers and their works representatives are usually more than willing to provide the means and methods, but the men are only too often indifferent or hostile, and there are usually some of them who consider it a praiseworthy feat to circumvent those in authority by breaking or ignoring the rules which aim to guard them against injury. Discipline may be irksome, but in this respect it should have the backing of whatever organizations exist among the employees themselves, and if they do not exist they should be formed. It will probably be found in the majority of cases that if the rules framed by the employer are unreasonable modifications can be readily secured by well supported representations.

Popularity of Metal Ceilings.

The advantages of stamped metal for interior decoration are so many and the attractive and artistic effects produced by the creations of modern steel ceiling makers are so striking that the popularity of this material is rapidly growing throughout the United States—growing by leaps and bounds. At first metal ceilings and side walls were almost exclusively used in offices, hotels, stores, public halls or business buildings. Of late, however, architects have come to favor the use of sheet metal for interior decoration in private houses, while many modern churches are also making use of this material. The number of manufacturers who turn out this product has increased materially within the last decade, and most of them have been forced to extend their facilities from year to year in order to keep pace with the growing demand for their goods. It is to the credit of the manufacturers in this line that they are educating the public taste by the exceptionally handsome and artistic designs in which they are offering their products. Some of the manufacturers engage the exclusive service of artists to make their designs, much in the same way as do the makers of wall paper, dress goods and upholstery materials. A glance through the recent catalogues of the metal ceiling manufacturers will show what an immense advance in the direction of art has been made by them of late. So important has become this industry that a distinct class of workmen has sprung up under the name of metal ceiling hangers, who are experts in the erection of metal ceilings and side walls, and who are paid a high rate of wages. Most of the metal ceiling manufacturers maintain their own staff of erectors and are accustomed to contract not only to supply the material, but to put it in place in the best possible manner. When in place the metal ceiling further requires the services of the painter and decorator to finish it. This work calls for no small amount of skill and taste in order to bring out the best effects obtainable from the stamped metal designs and to produce the proper harmony in the color scheme to correspond with the furnishings of the room or hall. A special class of workmen, called metal ceiling painters, are therefore employed by the manufacturers in conjunction with the metal ceiling hangers. Already the foreign markets are beginning to show an interest in American metal ceilings and stamped ware for interior decoration, and an increasing amount of these goods is being exported. In some cases expert American workmen have even been sent abroad to erect the metal ceilings or to teach the foreign workmen how to put them in place in a proper manner. There is no doubt that, in the course of time, American manufacturers will be called upon to supply a large volume of products in this line to foreign buyers. The field would seem to be almost unlimited.

The Need of Trade Education.

In a recent address on the subject of technical education in the South, delivered before the Georgia School of Technology, Richard H. Edmonds, editor of the *Manufacturers' Record*, made a very strong appeal to the South to give its youth the opportunity of learning trades and handicrafts, in order to build up the young manhood and womanhood of that section of the country, as well as its material prosperity. Mr. Edmonds showed the great advances the South is making in manufacturing industries of all kinds and urged the provision of more technical and trade education, so that the boys of the South may be trained up to take their proper part in the industrial development of their section of the country. Within the past decade the capital invested in manufactures in the South has quadrupled, and with the development of the natural resources of that section of the country, now being rapidly pushed, the growth of its industries is likely to increase many fold in the years to come. All this will involve the need of a large body of trained mechanics and workers in the mills and factories which are springing up in all parts of the country south of the Mason and Dixon line. Only proper trade instruction can be relied upon to furnish the necessary skilled labor. The raw material for labor of this class exists in amply sufficient quantities in the South, and merely needs to be molded into shape to furnish all the skilled workers necessary. Mr. Edmonds' argument, moreover, will apply to other parts of the country as well as to the South. There is a crying need throughout the United States for more facilities for the trade and technical education of our boys and young men. As we have shown before, foreign nations have realized the supreme economic importance of trade training and are paying the greatest attention to this work at the present time, whereas the United States, as a nation, does not yet seem alive to the prime necessity of taking up and pushing this movement, notwithstanding that the markets of the world are awaiting her manufactures.

Central Plants for Public Buildings.

A work that eventually will prove a substantial benefit to the general public is being done by the heating engineers throughout the country in the recommendation of the use of a central heating plant wherever municipal and county buildings are so located in a city that substantial economy can be effected thereby. The authorities at Binghamton, N. Y., are considering the erection of a central heating and lighting plant for both the city and county buildings, these buildings being so located that a considerable advantage would be gained by placing in one building all the boilers and the machinery needed for producing the heat and light for supplying the different buildings grouped around it. A combination heating and lighting plant makes an economical system, particularly where but one set of employees is required to take charge of such a plant for both the city and county buildings, as it insures a saving on the payroll. Moreover, the plan will undoubtedly effect a saving in fuel. The matter of determining the proportionate expense which two different bodies should bear is one that can readily be calculated by the engineers, and should not be an obstacle to securing the economy which such a central heating and lighting station would insure. Another advantage that should not be overlooked is the isolation in a separate building of all the noise, dust and dirt producing apparatus, so that the other buildings are free from such annoyance. This is not a new proposition, but it seems to be receiving more general consideration, which affords evidence that the heating engineer is an accepted authority in his special field.

The New Flood Building in San Francisco.

At the present time there are in process of erection in the city of San Francisco 52 fire proof and semi-fire proof buildings, which will involve an expenditure of something over $6,600,000. Nine of the buildings, which are said to be both fire and earthquake proof, will cost $3,570,000, or more than half of the total involved. The most conspicuous structure now under way in the city is the new Flood Building, located on Market street at its junction with Powell street. It has a frontage of 186½ feet on Market street, nearly 23 feet on Eddy street, 275 feet on Powell street and 137 feet on Ellis street, the building covering an area of 35,000 square feet and rising 12 stories above the level of the curb. Colusa sandstone will be used for the exterior walls and enameled brick and glazed terra cotta will be used for the interior light court wells. The first two stories of the building are to be entirely of plate glass set in copper frames, with the exception of the pavilions, which will be of stone.

The style of architecture will be an adaptation of the classic, with large Corinthian columns extending through the fifth, sixth and seventh stories. At the top of the building there will be an arcade with Ionic columns which will extend through the eleventh and twelfth stories. The entrance will be imposing and thoroughly in keeping with the character of the building. The main corridor will extend from Market to Ellis street and will be 150 feet in length, varying from 25 to 28 feet in width. The walls of the corridor will be of polished marble, with a row of detached marble columns at each side. The stairway will be of marble, with a bronze railing.

The first two stories of the structure will be arranged for stores, while the upper floors of the building will be divided into 680 offices.

Convention of National Association of Builders.

A few months ago we called attention to the fact that at a preliminary meeting of the National Association of Builders held in Washington it was decided to hold a regular convention in October of the present year. In accordance with that decision Secretary William H. Sayward of 166 Devonshire street, Boston, Mass., has issued the following announcement to all constituent bodies of the National Association of Builders and to all organized bodies of builders throughout the United States:

The thirteenth convention will be held in the city of Washington, D. C., at the New Willard Hotel, on Tuesday and Wednesday, October 28 and 29, 1902. The principal question for consideration will be "Labor Issues in Relation to the Building Trades." One session will be held each day, beginning at 10 o'clock a.m. All associations which intend to be represented at this meeting are requested to notify the secretary at once. No general arrangements for reduced rates of transportation will be made through the National Association, each delegation being left to make the best trade possible with their local transportation companies. Further information, if desired, will be furnished upon application to the secretary at the address given above.

A Mammoth Electric Power House.

The building which will contain the plant for generating electricity for the underground railroad now in process of construction in New York City will be unique in many ways. It will be 580 feet in length by 200 feet in width and will measure 115 feet in hight. The four *façades* will be finished in face brick, granite and terra cotta, while the roof will be covered with enameled Spanish tiles. The design of the exterior, which was prepared by Stanford White of the well-known firm of McKim, Mead & White, will be in the Roman style of architecture. The building, which will occupy the easterly portion of the block bounded by Fifty-eighth and Fifty-ninth streets and Eleventh and Twelfth avenues, will be divided into two parts, one a boiler house, the other for the engines and electrical machinery. A novel feature of the plans has to do with the power house, the arrangement being such that it can be extended to receive 12, or even 14, engines, by the construction of additional sections, without variation in its design. The entire boiler, pump, condenser, engine and electrical equipment will be practically upon one level—the ground floor. There will be ten 8000 horse-power engines, each directly connected with a 5000-kw. alternator. For each of the engines six boilers will be provided, symmetrically arranged with reference to the engine, and this arrangement will be carried through the building for each generating unit.

A large force of men are now at work on the power house, the total cost of which with its equipment is placed in the neighborhood of $5,000,000. All the plans except those prepared by Mr. White were made by J. Van Vleck, mechanical engineer for John B. McDonald, the contractor. The electrical work was designed by L. B. Stillwell, electrical director for the contractor. It is thought that eventually this power plant will be the largest of its kind in the world, this rank now being held by the largest of the Edison power houses, which has 83,000 horse-power, or 3000 more than the one for the subway.

THE "FLAT IRON" OR FULLER OFFICE BUILDING.

AMONG the many towering office buildings which have been erected in the recent past in New York City probably none has attracted more attention, not only on the part of local and visiting architects and builders, who would naturally take an interest in such creations, but of pedestrians generally, than the unique appearing structure located on the block bounded by Broadway, Fifth avenue, Twenty-second and Twenty-third streets. It has been commonly designated as the "Flat Iron" Building by reason of the peculiar shape of the site which it occupies, although its official title is the Fuller Building, so called in honor of the founder of the company which constructed it. An idea of the appearance of the building just after the exterior was completed may be gained from an inspection of the half tone supplemental plate which accompanies this issue of the paper, and which is a direct reproduction from a photograph taken especially for our purpose. The view is taken from near Twenty-fourth street, looking down Broadway and Fifth avenue, with Madison Square Park just at the left of the foreground and the Fifth Avenue Hotel immediately to the right of the clock and the solitary 'bus seen in the picture. While the building is located in one of the busiest portions of the city, the deserted appearance of the streets is due to the fact that the picture was taken about half past 9 on a Sunday morning. The structure is 21 stories in hight, and, as will be seen from an inspection of the picture, towers high above everything in the neighborhood. But it is is apparent from the drawings. The excavation extends 26 feet beyond the center line of the Fifth avenue columns and 22 feet beyond the Broadway columns, so that the whole structure has the benefit of this enlarged base.

The excavation for the building was carried to rock 35 feet below the curb. Upon this were erected the piers located as shown in Fig. 3. These were built of concrete

Fig. 1.—View of the Framing of the Rounded Apex of the Triangle as it Appeared March 10.

Fig. 2.—View Showing Masonry in Progress at Different Levels.

The "Flat Iron" or Fuller Office Building.—D. H. Burnham & Co., Architects, Chicago, Ill.

not to its hight alone that its prominence is due; its shape is such as to command attention, while the light stone of which it is built and the beauty of its architectural features arrest the eye. The reason for the name "Flat Iron" is that above stated, and in the picture that well-known kitchen utensil will be seen accurately outlined against the sky by the projecting cornice.

The building in plan is the shape of a right angled triangle, the base of which measures 83 feet, the altitude 202 feet, and the hypotenuse 228 feet. As shown by the plan, Fig. 4, the building proper is a little smaller than this, as all the corners are rounded. The piers on the base of the triangle are spaced 16 feet apart, center to center, on the altitude 17 feet, and on the hypotenuse 18 feet 5⅝ inches apart. The foundation extends under the sidewalk, thereby providing a much greater breadth than up to the sub-basement, and then capped with granite, upon which were placed the cast iron bases for the columns.

Structurally the building follows the methods ordinarily employed in similar cases, but with two notable exceptions. The frame is unusually heavy, and wherever the design would permit corner braces have been introduced to unite the columns and floor girders. These are clearly indicated in Figs. 1 and 7, but the diagonals shown in Fig. 7 are only temporary and have no permanent place in the building. These brackets are of two kinds—plates, as shown in Fig. 1, and beams of varying sections and weights, as shown in Figs. 5 and 6. Since it was not possible to introduce braces at every corner, even if such a course had been desirable, the floor system and its arches are depended upon to distribute the

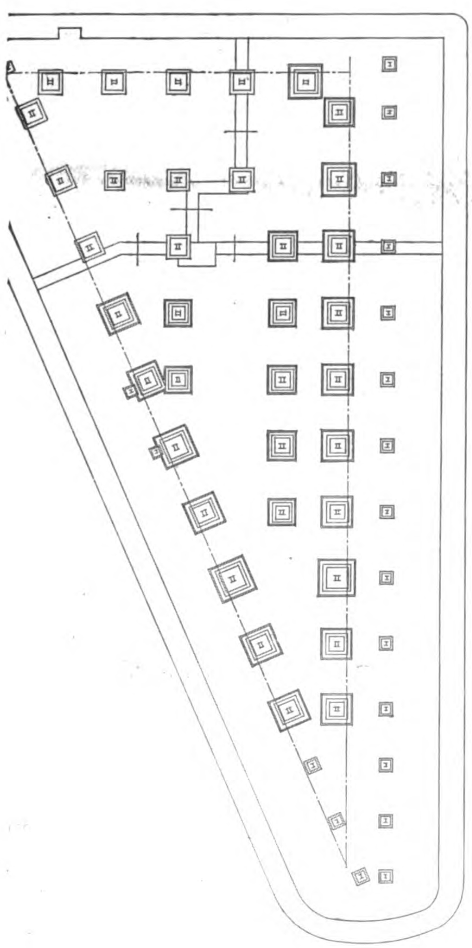


Fig. 3.—Plan Showing Location of Piers.

Fig. 4.—Floor Plan, Second Story.

The "Flat Iron" or Fuller Office Building, at Broadway, Fifth Avenue, 22d and 23d Streets, New York City.

stresses. By this means the strain is distributed over those portions not provided with corner brackets, the result being a structure rigid in every respect and well calculated to resist a wind pressure of 50 pounds.

The peculiar shape of the building, with its comparatively long and narrow ground plan, made it necessary, as just explained, to pay particular attention to the bracing of the frame. To support the dead load was not such a serious problem as providing against wind pressure. The weights are by no means excessive, and are much greater in many other buildings of similar character. strength and rigidity sufficient to permit its being moved as an integral whole and in no other way. Since there is no weak joint in the entire system there is no danger of failure at any point between the foundation and roof.

The sub-basement has a hight of 11 feet 8 inches; the basement, 13 feet 8 inches; the ground floor, 25 feet 2 inches, and the upper floors, 12 feet 8 inches. The elevators are located about in the center of the building, with entrances on both the Broadway and Fifth avenue sides. The first floor is devoted to stores, the rest being

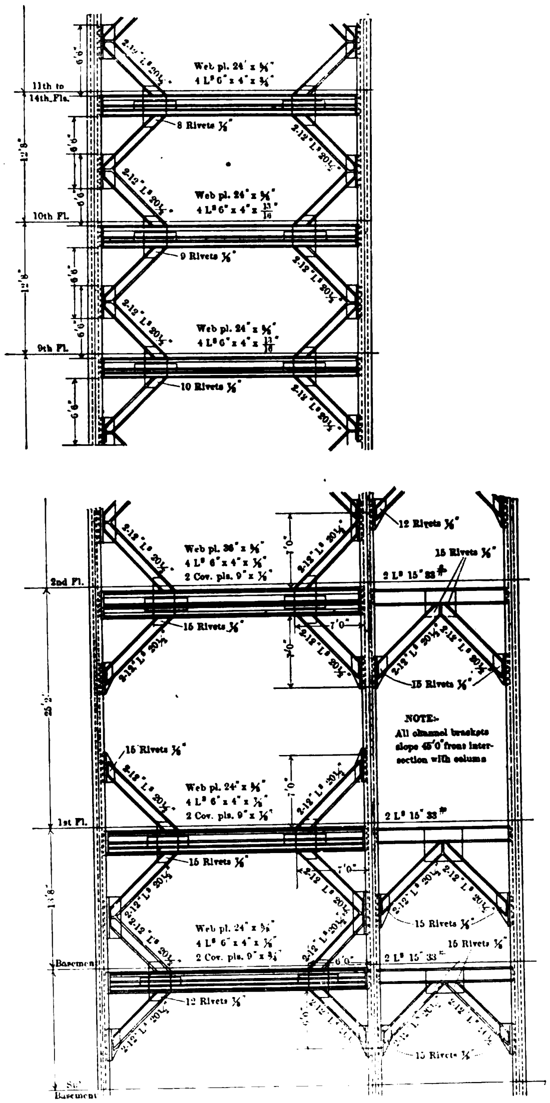


Fig. 5.—Frame Near Center of Building.

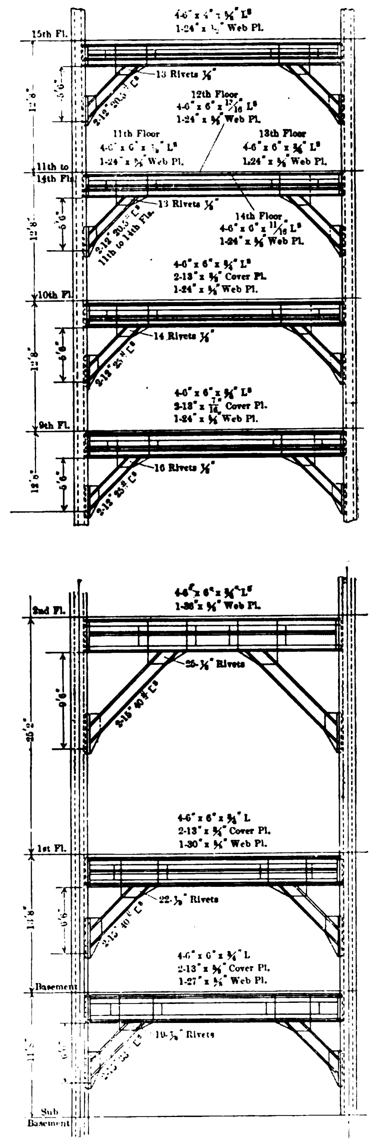


Fig. 6.—Frame at Second Column from Apex of Triangle.

The "Flat Iron" or Fuller Office Building in New York City.

All of the buildings nearby are low, so that for its entire hight above the sixth or seventh story the new structure is entirely unprotected and is exposed to the full force of the wind. This will be severe, particularly on the Broadway front, which has an area of about 65,000 feet and which will feel the wind sweeping across Madison Square. Therefore the frame has been designed to resist a wind pressure of 50 pounds to the square foot. It is calculated that in order to wreck the building a wind pressure capable of tipping it, with the bottom of one of its long sides acting as a fulcrum, would have to be exerted. Expressed in another way, it possesses divided into offices. It is needless to say that the structure is fire proof throughout.

The building is owned by the Geo. A. Fuller Company of 137 Broadway, New York, and was erected in accordance with drawings prepared by D. H. Burnham & Co. of Chicago, Ill. The engineers were Purdy & Henderson of that city.

It is facetiously remarked by a local paper that a Chicago architect has finally succeeded in constructing a flat so small that in it there isn't even any room for improvement.

A New Method of Fire Proofing.

Some interesting tests of a severe nature were recently made in England of a new fire resisting material for constructional purposes known as uralite. It was originally invented by a Russian artillery officer, but since greatly improved by the British Uralite Company, at whose works, near Rochester, Kent, the tests were made. From the *Insurance Observer* we glean the following particulars:

In the manufacture of uralite, asbestos from Canada, the United States and the Ural Mountains is ground to pulp and mixed with about 30 per cent. of chalk to fill up the interstices between the short fibers, and after going through a number of chemical processes appears in the form of tough, pliable strips. Finally, gelatinous silica is used for cementing purposes, about 20 per cent. being required, and this combines with the 30 per cent. of chalk and some 50 per cent. of asbestos in making boards of uralite, which are stiff, will stand a great amount of wear and tear, and, above all, are impervious to fire.

A deed box, constructed of wood and lined with uralite, one soft layer of which separated two layers of wood, while two more layers, one soft and one hard, covered the inside and outside, was placed on iron standards inside an iron framed hut, covered and lined with uralite. A fierce fire was kindled, the temperature inside at one time reaching 2030 degrees F., and after being left for over half an hour an examination was made. It was found that the wood nearest the fire was charred right through, but the middle uralite was sound. The outer layers had porcelained and were badly cracked. Papers placed inside were slightly discolored, owing to distillization, but were not charred. Sulphur and fusible metal placed within crucibles were unchanged, a portion of paraffine wax in another crucible alone having melted.

Another test had for its object the trying of what various pattern doors fitted into a brick hut would stand. A fire was ignited inside and the doors were closed and left so for over an hour. The highest temperature at one time was 2350 degrees F. As a result, one door of two layers of uralite running throughout, and forming the panels, with a framework of timber on either side, was penetrated by flames after some time, which was not surprising, considering its slight structure, and most of the wood was charred off. The uralite, however, stood. Another door of two layers of oak separated by uralite, with two layers of the same material, without and within, proved impenetrable, the inner layer only being cracked and porcelained. This was intended to represent a warehouse door. Two other doors were equally successful, a sheet of tin in one only being slightly buckled.

In the case of two sections of platform, one of wood only and the other of wood cased with uralite, the former was rapidly eaten away by the flames, while the latter was at the end quite strong. Subsequently, the various processes were explained, and it was shown that uralite can be painted, and will take a wood veneer, which will not warp or crack, and is about one-fifth of the weight of its own size in corrugated iron.

New Theater for Providence.

The new theater which is rapidly approaching completion in Providence, R. I., embodies the latest and most practical notions in theatrical architecture and appointments and will prove an attractive addition to the city. The *façade* of the "Imperial," as it will be called, shows a hight of six stories, with a broad entrance in the center between two stores, both of which open into the lobby as well as upon the street. The interior is beautifully decorated and the wood work is finished in antique oak. The building throughout is supplied with an improved thermostat system of fire extinguishers, which are placed on the ceilings and in all the rooms, while in addition patent extinguishers are installed along the walls. Heavy metal doors, which can be closed instantly, are designed to shut off different parts of the building when desired, so that if a fire should break out in any part of the structure it could be confined to that place and more easily extinguished. The stage, which is so put together that sections can be taken out when required, measures about 67 feet across and 65 feet high. The dressing rooms are supplied with hot and cold water and every room can be warmed in the coldest weather. The drawings, which call for a building in the style of the Italian Renaissance, were prepared by Architects Colwell & Gould of Providence, and the builders are Horton & Hemenway.

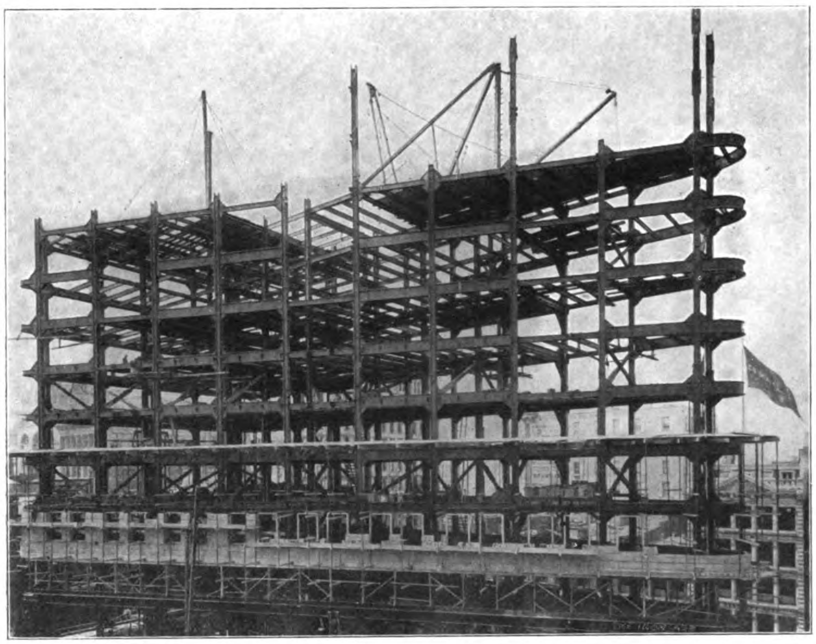


Fig. 7.—View of Steel Frame as it Appeared During Construction on April 19.

The "Flat Iron" or Fuller Office Building in New York City.

CABINET WORK FOR THE CARPENTER.

BY PAUL D. OTTER.

We have selected as an apt subject for illustration a hall seat, this being largely within the province of the joiner and the general scheme of interior case work, and indeed it may be made a feature of the wainscot of the hall if so desired. In this instance we will consider it as a movable piece and use it as a model with which to convey to the reader certain information regarding detail which he will doubtless appreciate if he proceeds to lay out the drawing and construct one.

The style is plain, almost severe, as shown in Fig. 1, the charm depending solely on the easy line of the end piece and foot in its relation to the arm. The rare beauty in good furniture is to create that smooth roundness or undulating surface which the worker, an enthusiast, alone knows has not been produced successfully by mere machinery. It is this changing surface which even the artisan does not fully comprehend until after the final finishing to a dull polish, when the effect of the lights and shadows brings out the personality of the work. This grades it far ahead of the "cut and dried" mill work, however much we may admire the monotonous precision.

As the drawing is sufficiently explanatory, little need be said other than to enlarge it upon the drawing paper. Starting with the vertical center line and the floor line, as indicated in Figs. 2 and 3, lay off from these measurements taken from the cut—hight of seat and arm first—and as a guide against going very much astray on a changing line we have thrown out a few light lines and measurements from the floor line of front and end views. This, with a little judgment and observation of relative points, will enable the workman to enlarge that portion of the detail which cannot be done by a straight edge. Draw the arm as though it were closely related to the end and front line; it will be finished flush, as it joins to the front edge. The bottom line of the end must also be made with a free curve and as though it were cut from a solid width. However many pieces one may use in jointing the board, it will be surfaced and considered as one piece. The back part consists of a squared framing, as shown, with stiles continued to the floors. Through these and the bottom rail screws are put in from the back and secured to the end piece, seat and the arms. Below the seat line and at the back and under the exposed bottom rail a cheap paneling, and then a bottom rail must be embodied in the construction of the back framing. Through this rail screws hold the bottom of the box under the seat. The bottom may be of whitewood or other low grade lumber, the seat ends being gained to receive it and the front edge snugly fitted to front board and held with a few glue blocks underneath. Stiles and rails in the back framing should be joined by a mortise and tenon joint, the end pieces secured to the front panel under the seat by three flat head screws, sunken and flush plugged with wooden plugs to match the grain.

The seat is raised from the front and hung by three 1½-inch butts screwed to a 2-inch strip, which in turn is screwed to the back rail. A resting cleat should be neatly fitted in directly under the seat and screwed to the inside of the ends. It will be noticed in Fig. 3 that the back center panel is inclined forward at the bottom. This inclination is more restful to the occupant than a vertical position and adds much to the design. The edges are worked off to a long round. When measuring stock for this panel 2 inches extra should be allowed on the ends of the panel, these to be cut off and glued to the ends on the back and a strip glued on at the bottom. This gives stock on the edges to produce the long round and to advance the bottom edge as shown. The entire panel being fitted, slip into the opening of the frame on this bevel and it is then held by glue blocks in the rear.

Aside from the drill it gives in laying out a correct working drawing, the foregoing description need not be expressed on the drawing, merely the definite points and marking outlines being required. The minor details are much a matter of trade experience and judgment. If the drawing is to go into other hands all features should be intelligently drawn.

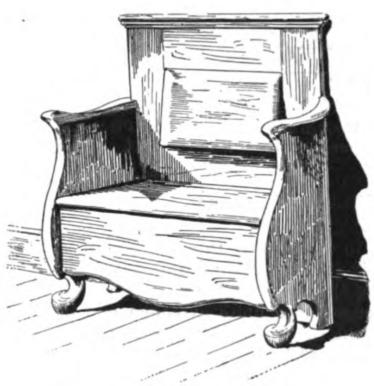


Fig. 1.—General View of Hall Seat.

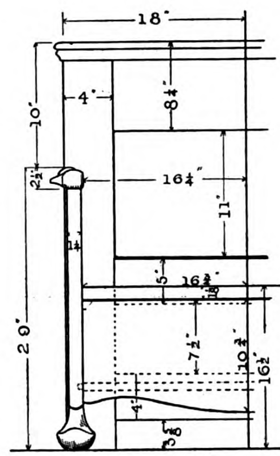


Fig. 2.—Half of Front.

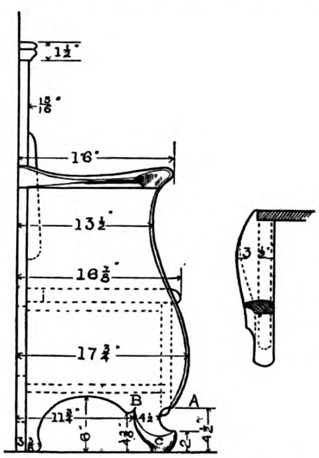


Fig. 3.—Side Elevation, with Detail of Arm at the Right.

Cabinet Work for the Carpenter.—A Hall Seat.

There are several ways of transferring irregular detail or ornament from the drawing to the stiff paper which one may cut out as a pattern to mark the stock. Closely prick the marking lines of the drawing and, laying stiff paper underneath, use chalk or charcoal dust held in a piece of linen tied in the form of a loose ball. This is pounced over the punctured lines, thus imprinting the dots on the paper underneath. Another way and one very satisfactory is to place the pattern paper under the drawing with a sheet of typewriter's carbon paper between and then trace over the outline with a steel or agate tracing point, the transferred outline being then carefully cut out with scissors or by following the line with a sharp pointed knife over a hard board.

With the patterns secured, the stock surfaced to the right thickness and the edges jointed, it will be found very satisfactory while the drawing is still pinned to the level table to mark off the points, placing each piece represented up to the line and with a flat square marking the line or bevel, also at same time marking the position of dowel, screw centers or mortise and tenon. Should there be two or more pieces alike bring them together on the level surface, and by the point marked line them all with try square and do other necessary gauging, which will not make it necessary when at the bench to interrupt operations by taking off more measurements. Care should be taken when using marking gauge not to run out onto an exposed surface, as this is a weakness with some workmen and shows up badly in the finish.

The band saw, whether driven by foot or power, is nowadays in use by many carpenters, or at least they have easy access to one, and the simple outlines of this pattern may be readily cut out. In the absence of it, however, it is not so intricate but that it may be cut out, even though roughly, with a keyhole or, better still, a "turning" saw and the outline worked true in the after dressing. Using a band or scroll saw, the ends may be glued up in a solid width and sawed true to line. Should the line have to be cut in some other way it would be well to figure the front edge from a 6-inch width, securing the line and that of the under line before gluing together. The foot, or modified type of "bandy leg," is obtained by gluing to both sides of each end with a rub joint a piece of equal thickness and 4½ inches long. In order to get a similarity in grain use blocks from the same piece of stock, arranging them, if necessary, to joint with reference to the grain. An even shade will at least be assured even if it be impossible to satisfactorily match the grain. It is sometimes possible to carry along all details in the construction to a "knock down" condition—that is, assemble it for a trial fit before giving attention to working off the edges. In this instance the various parts had better be worked up to the final sanding, this involving the branch of furniture work termed "stock dressing," the producing of changing surfaces and molded edges, which cannot be done by machinery without considerable preparatory expense.

The tool illustrated in Figs, 4, 5 and 6 is very essential in performing this class of work. It is strange that, with the many uses to which it may be applied, it is seldom found in the hands of others than skilled cabinet makers and particularly chair makers, where twists and winds in the construction render it a necessity in creating a beautiful curved or sinuous surface across two glued up parts, as in shaping sawed legs, and many other uses as an after finisher of roughed out work from the draw knife or spoke shave, or in tapering off plain molds.

The tool is not to be obtained through regular hardware supply houses, it being one of the instruments "handed down," so we give the detail and would state that it is very easily made. The part marked No. 1 in Fig. 4 represents a little more than one-sixth of the full length and size of the handle portion. The wooden parts, Nos. 1 and 2, the latter being shown in Fig. 5, are made of beech or maple, the center part in Fig. 4 being cut out, as shown, to half the thickness, and a corresponding piece, shown in Fig. 5, fitted neatly within it. These two parts are protected on the working face by small plates of heavy sheet brass, or much better, a piece of bone, as shown at the bottom in Fig. 4, flat head screws being used, sunk flush and filed smooth to the plate. Previous to fitting these plates the two wooden pieces are slightly beveled away from the center, as shown at No. 3 in Fig. 6. The inner face of Fig. 5 is cut out, as shown by No. 3 in Fig. 6, the length of the recess on the protecting plate seen in Fig. 5. This is similar to the throat of the plane. The protecting plate in Fig. 4 is a straight strip similar to that in Fig. 5, but without the recess.

The manner of holding the parts together and binding the blade to a set position is by means of two 1¼-inch stove or slot head bolts, passed through holes shown in Fig. 4, and in a corresponding position through Fig. 5. The nut of the bolt is sunk flush on the outside in Fig. 4, as shown by the dotted lines. Small washers are imbedded in the sides of Fig. 5 to prevent splitting.

The tool is now ready to receive the blade, and when all parts are brought together the part No. 2 in Fig. 5 should almost come in contact with the part shown in Fig. 4 when screwed up tight with a driver. The scraper blade, No. 4 in Fig. 4, is set between the two wooden parts, Nos. 1 and 2, and may be made from a broken hand saw blade, about the gauge of a finishing saw, or a regular hand scraper blade of good steel may be used. When sharpened for use the edge would appear as shown in an exaggerated way in No. 5 of Fig. 6, the edge having previously been ground on an emery wheel or grindstone to a firm, long round on one side only, then trued on an oil stone, leaving a heavy edge, sharp and square. The object then is to turn down this keen edge, not simply making it a wire edge, as practiced on a cabinet scraper, but by means of a polishing steel turn it over evenly and with considerable pressure produce an extended edge of some permanence.

The polishing steel may be made of an 8 or 10 inch discarded rat tail file, ground smooth and polished with emery cloth. The end has an obtuse point identical with a center prick punch for metal. This instrument, which is easily made, when handled resembles a butcher's steel. To use the steel place the scraper blade, which has been squared on an oil stone, between the jaws of a vise or other clutch, rounded edge up and toward you. Starting in with a gentle pressure of the steel held in both hands, stroke the squared edge down and away from you, back and forth, in an even way, increasing the pressure for some time, when you will find the edge to be quite extended and beginning to curl against the face of the blade. Remove the blade from the vise and with the steel point touched with a little oil apply the point at one end of the blade, which should be held slanting against a flat surface. With a firm and careful first stroke one will be able to slide the oiled point between the turned in edge from end to end of the blade, thus pressing it out at any angle desired, stroking it several times to secure a firm, straight edge. What this angle is must be determined by the operator of the tool, for it depends altogether on its relation to the beveled face shown in No. 3 in Fig. 6. It is a matter of experimenting, as with the adjustment of plane irons or spoke shave blades. When the blade is inserted, with back against recess in Fig. 4, fit the part in Fig. 5 in place and insert nuts in pockets cut in outside of Fig. 4. Slip the bolts with washers through the two holes on the side of the part in Fig. 5 and draw up tight with a screw driver, allowing the cutting edge to project slightly for a trial. By experimenting on a piece of oak one will know either that the edge has been pitched too low or not enough, by its digging in too greedily or by not cutting at all. Remove the blade, place it in the vise and remedy with the polishing steel.

A disposition to "chatter" is sometimes located and remedied by filing in a more rounded manner on the protecting plate under No. 1 in Fig. 4. With a few peculiarities to overcome in getting the "just right" adjustment, one will appreciate having an extremely useful tool for irregular surface work, or for reshaping hatchet or other handles to your own particular form. It is essentially a hard wood tool.

(To be continued.)

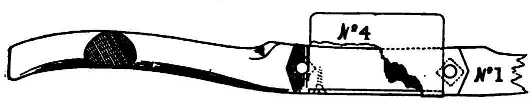


Fig. 4.—View Showing Half of Stock Dressers' Scraper.

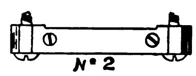


Fig. 5.—Wooden Piece for Clamping Blade.

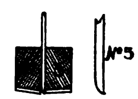


Fig. 6.—Showing Blade in Place and Appearance of Sharpened Edge.

Cabinet Work for the Carpenter.—Stock Dressers' Scraper, with Details.

THE BUILDING TRADES IN CUBA.

SOME rather interesting information regarding the building trades in Cuba is contained in the *Bulletin* of the Department of Labor for July, just issued by Commissioner Carroll D. Wright. The ground is covered so thoroughly that we take the space to present the following rather copious extracts for the perusal of our readers, and especially for those who may be contemplating a change in that direction:

Most house construction in Cuba requiring skilled labor is of brick or of a cement and rubble composition called *mamposteria*. Stone is used in some of the more pretentious city edifices. Frame buildings are to be found occasionally in the suburbs of the larger cities, especially in the summer resorts near Cienfugos, Santiago and other coast towns. While of modest dimensions, these are frequently well built. The wooden buildings common in the country and in the smaller towns are usually of very crude construction. In a few of the older and less progressive towns adobe or wattle construction is being used, even in buildings erected at the present time, but no skilled labor is required for this purpose. Most of the country people of Cuba reside in palm bark huts, which are made and repaired by the occupant without the employment of hired labor. The kind of construction requiring skilled mechanics is therefore of a durable and permanent character, though Cuban masonry requires more frequent repairs than its appearance of solidity might indicate. A large proportion of the people are housed in buildings which, though temporary in character, require for their construction only the talent of the country laborer. Consequently the number of men engaged professionally in the building trades is not relatively a large percentage of the population of the island.

Two Trade Distinctions.

While the two occupations are not distinguished from each other by special designations in the native speech, the trade of the rough carpenter employed in frame construction and outdoor work in general should be treated as a quite different occupation from that of the cabinet maker and the carpenter employed in interior finishing. The two trades signify an entirely different degree of skill and general efficiency in Cuba. For this reason only rough carpenters are considered under the present heading. The higher class workmen may be employed occasionally upon houses, but it is only in a subsidiary capacity. They make the doors, panels and finer interior finishing of masonry buildings, but are not employed on work that involves a knowledge of structural questions.

As a rule the Cuban rough carpenter or the skilled carpenter employed upon work that requires a knowledge of framing is a peculiarly inept and inefficient workman. The men are not well enough educated to be handy with the practical application of figures to the problems of their trade, and all the work is done by rule of thumb. This does not matter so much, in fact it may lead in the end to more careful work in constructing a piece of furniture. But the Cuban workman is more apt to slide his finger to the proper point on his rule and hold it there in making a number of measurements than to take his distances from the readings. In putting a small piece of wood into position he cuts it a trifle too large and then patiently works it down to exactly the required dimensions until it fits almost with the exactness of a fragment of marble in a mosaic. But he cannot apply these methods of work to erecting a building, and in attempting to do so resorts to extraordinarily awkward and time consuming expedients. Timbers for rafters will be taken to the top of a building, placed in approximate position and marked, and then taken down or even brought back to the ground for sawing. Another method of securing the same result is to construct the roof frame entirely upon the ground and then take it to pieces and re-erect it in its proper position. Frame posts and timber beams are not set square or exactly in line, siding boards are not sawed squarely across so as to make close joints, and it would sometimes be a matter of difficulty to find in any door or window frame or any room corner of a building a single right angle.

The number of carpenters in Cuba, according to the occupation tables, is over 14,000. A majority are whites. The wages of a skilled mechanic in this trade vary widely in different parts of the island. In Habana, Matanzas and Cienfuegos ordinary carpenters receive $2 and $2.50 in silver ($1.40 and $1.75 American) for a ten-hour day, which falls within the range of wages paid by the public works department, except that the day is two hours longer. In the smaller towns wages vary with demand, and in the winter of 1901-02 men could be found working at this trade for a peso silver (70 cents American currency) a day.

According to the census statistics there are less than half as many masons as carpenters in Cuba. This is due partly to the fact already mentioned, that woodworkers of all kinds are often spoken of as *carpinteros*. There are also many men employed on buildings as masons' helpers who do not rank as members of the trade. The best trained workman in a community is often a black man, and in several places where houses were being erected or repairs were being made in Habana and vicinity the foreman in charge of the work was a full blooded negro, while many of the men under him were whites or mulattoes. Some branches of this trade require an exceptional amount of skill and command higher than the average wages. Tile layers and stone masons are better paid than ordinary bricklayers.

Construction is not accurate, and traditional methods, forms, plans and design are used to such an extent as to make one Cuban building appear very much like another. The massiveness of the masonry, while often explained as necessary to withstand tropical storms or earthquakes, is really due to the inferiority of the materials employed, the lack of knowledge of structural economies on the part of builders, and an unevenness in the skill of mechanics that makes it necessary to allow a large margin for possible errors or slighting in the work. The lack of accuracy in measurements is sufficiently indicated by a mere glance at a room floored with tiles or other regular pavement. The tiles will usually run away from and encroach upon opposite sides of the room, necessitating the use of cement to even out the flooring material. Floor beams and the rafters that support the tile roofs are put in by the masons and carpenters, and so in large buildings recently constructed in Habana, where considerable steel frame work was employed, the latter was set up by the same gangs of workmen that made the walls.

The Best Paid Men.

The best paid men among the masons are the stone cutters and tile layers, if we leave out of account wages paid for supervision. A native stone cutter can do more with the soft limestone used in Cuban buildings than an American versed only in working the harder stones used in the United States. He can earn about $3 in Spanish gold ($2.70 American) a day. A tile layer can do even better, earning $4 and $5 a day at times, if he does work on contract. This applies only to flooring tiles, for roof tiles are laid by ordinary masons and bricklayers. If employed at a wage the floor layers receive $3 Spanish gold ($2.70 American) a day in Habana, and if they do piecework they are paid 40 cents a square meter (10.764 square feet) for laying. From 8 to 10 meters (86.111 to 107.639 square feet) is a good day's task. Where they work on contract and furnish the tiles they receive about $5 a square meter (10,764 square feet) for high grade work. But there are many workmen, in fact a majority of those employed in this branch of their trade, who do more common kinds of work, such as laying court flagging and cheap floor tiles, and do not earn more than a third or a half of the wage just mentioned. It is the same with the different kinds of stone cutting. While, as said above, men employed on a large public edifice, like the trade school building now being erected at Habana, can earn $3 gold ($2.70 American) or over a day, marble cutters, who represent a trade requiring equal skill, are paid but $2.50 for lettering and $1.50 for polishing. There are no fine stone carvers or sculptors in Cuba, and the best monument trade of Habana is in the hands of an Italian.

Skilled bricklayers receive from $2 to $3 a day in Spanish silver ($1.40 to $2.10 American). Apprentices are paid about half that amount. A good man can lay —parallel or in any of the imperfect bonds in common use—300 to 350 of the large brick of the country in a day. These brick measure 11½ x 5½ x 3½ inches, so that about 40 cubic feet of wall is considered a normal day's task. Hod carriers and other helpers receive $1 silver (70 cents American) a day. Contractors sometimes employ skilled masons by the month.

The laying of roof tiles is not considered a separate branch of the trade—unfortunately for the people who live under them—and is usually done by the same men who make the walls. Plastering over lath is not practiced in Cuba, and there is little or no hard finishing or calcimining. Exterior brick work is always cemented over, so that the brick walls in the United States look raw and unfinished to the Cuban seeing them for the first time. In most cases this plastering directly against the brick is done by the men who lay the walls. Where it is a separate occupation wages are about the same as those of bricklayers, with a tendency to be somewhat lower where there is any difference.

Painters rank all the way from common laborers to men of some taste and training employed upon sign work and interior decoration. The whitewashers and brush men who lay on the exterior colors used to protect the cement surfacing of Cuban houses from the weather receive from $1 silver (70 cents American) to $1 American money a day. The latter wage is paid by the engineering department. The average pay of skilled painters is $1.50 silver ($1.05 American). The best men receive $2 American currency in Government employ. A sign painter or decorator working at Habana is able to command $12 to $15 silver ($8.40 to $10.50 American) a week. Some of these men are very skillful workmen. A large majority of them are whites.

Until the American occupation, and at the present time outside of Habana, plumbing was not considered a separate trade from gas and electric fitting. There is no steam fitting for heating purposes in Cuba except in a special way in some canneries and other industrial establishments. For many years a number of Cuban towns have been supplied with water and gas, and some have nominally had sewer systems. A Cuban pipe fitter was therefore supposed to be able to install any piece of apparatus connecting with a tube, but as there was no freezing less demand was made on the skill of the plumber or fitter than in the United States. Few plumbers were familiar with modern forms of flushing apparatus. There was not such a thing as a wiped joint in Cuba. On the other hand, ground connections had to be permanent on account of local methods of construction. The tile floors are laid in concrete and it is an expensive matter to tear them up for repairs. For this reason simple connections and cast iron joints were used wherever possible, even at the surface, where no allowance has to be made for frost expansion. Interior plumbing is practically the same as street work and exterior connections.

With the American occupation, when many public buildings came under the charge of army officers and other officials from the United States, American apparatus and methods of installation were introduced. The native plumbers were not usually qualified to do the work required, and as a consequence a number of plumbers from the United States found employment in Cuba, especially in Habana. These men are organized and the union wage of $5 a day is maintained. Cubans are eligible to membership in the American union, but none have qualified. Native workmen receive from $2.50 to $3 in Spanish gold ($2.25 to $2.70 American) a day, but do not have regular employment. Apprentices are paid 50 cents a day and meals. Gas fitters in company employ are paid $60 and $75 a month in Spanish gold ($54 and $67.50 American), and helpers, who are listed in the rolls as *plomeros*, or plumbers, are paid $37 a month in the same currency ($33.30 American). Electric fitters receive $3 a day in Spanish gold ($2.70 American).

An American firm dealing in electrical supplies and doing a general contracting business in both New York and Habana reports that about as much and as satisfactory work can be got out of a Cuban electric fitter in a nine-hour day as from an American workman in New York in an eight-hour day. Young Cubans trained as riveters in iron construction master the business in a few weeks and do as well as Americans at the same wages. But in spite of the prevailing lower price of labor the cost of construction in Cuba is much greater than in the United States. According to estimates made by the engineering department of the military government for the express purpose of establishing the facts, the labor cost of erecting a building is 40 per cent. greater in Habana than in any city of equal population in the United States. Masonry construction costs about 30 cents American money a cubic foot. Why Cuban labor is relatively so expensive is indicated by an experiment made by the Palatino Brewing Company of Habana. As this company chanced to be conducting building operations in that city and in the United States at the same time they transferred a gang of American bricklayers to Habana and put them to work by the side of the Cubans already employed, so that the conditions of labor were the same. Upon actual measurement the maximum number of brick laid by a Cuban workman was 500 a day and by an American 1000, nine hours constituting a day's labor. This proved the average ratio between the amount of work done by the two gangs. Although the Cuban bricklayers were paid only $2.50 silver a day, which at current exchange amounted to $1.75 in American money, and the Americans received the union rate of 55 cents an hour, or $4.95 for a nine-hour day, the cost of laying 1000 brick with American labor was but $2.75, while with Cuban labor the cost was $3.50, estimating upon the maximum number of brick laid by a workman.

Nationalization Plan for Journeymen Plumbers' Union.

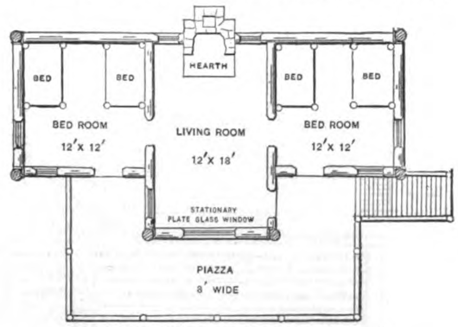
One of the most important actions taken at the recent annual convention of the United Association of Plumbers, Gas Fitters and Steam Fitters' Helpers in Omaha, Neb., was the adoption of a nationalization plan recommended by the Executive Committee of the union. The various local unions under this plan will pay to the national organization such funds as may be required, a strict account being kept of the transactions. At the end of the year a balance will be struck and the unions which have contributed more than the average will be repaid, while those whose contributions to the general expenses of the association have not been as much as the average will be required to pay the difference. This plan, which was adopted unanimously by the convention, will not go into effect until next year. The convention has referred the matter, with its approval, to a referendum vote of all the members of the union. The vote will be taken by the 350 affiliated unions on October 27, and the final adoption of the plan will depend upon the result of this vote. It is understood, however, that the attitude of the journeymen plumbers is such as to insure the approval of the plan.

The plan is somewhat of a departure in American unions, although it has been in effect to a great extent in the German unions, and was brought from that country, with slight modifications, by the Cigar Makers' Union, by which it has been operated with more or less success for several years. The plumbers' plan is a slight modification of that of the cigar makers. There is provided a death benefit of $100, a sick benefit of $5 per week for a term of 13 weeks and a strike benefit of $5 per week for 16 weeks, after which the benefit drops to $3. The most radical feature is an old age pension of $500. This is paid to a member of the union who after having carried membership in the union for 25 years becomes incompetent by reason of old age.

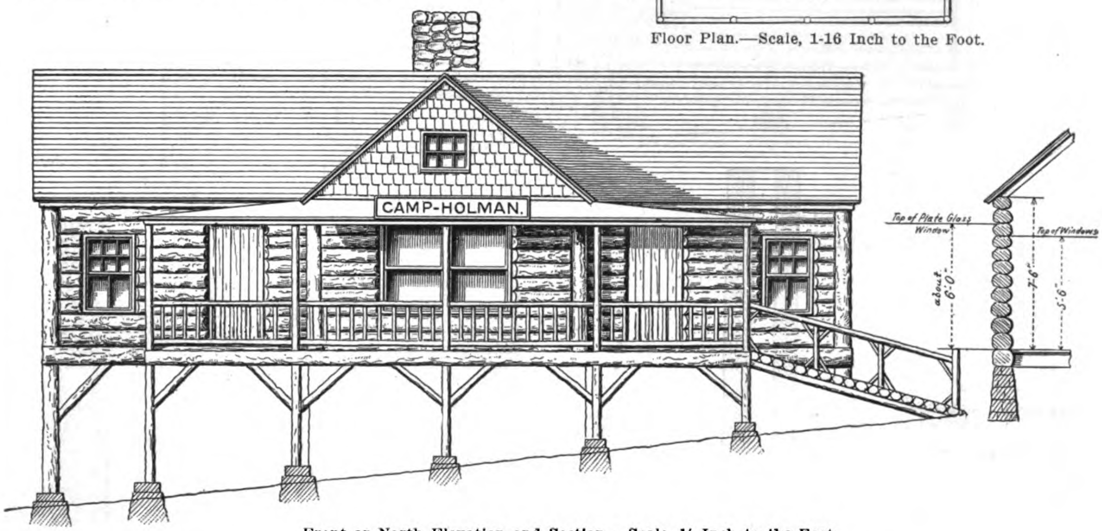
DESIGN FOR A LOG CABIN.

THE design and construction of a log cabin is a matter possessing interest for many of our readers, if we may judge from the inquiries received in the recent past, and with a view to meeting some of their requirements we present herewith drawings of a building of the character indicated, erected last summer at Rose Pond Camps, Bingham, Maine, for Stephen Holman of Holyoke, Mass., a great lover of camp life and who, though now 83 years old, has for the last 40 years made a practice of spending a portion of each season in the Maine woods. He built the cabin, as he says, for the "Holyoke boys," and takes great pride in entertaining his guests at the camp. The floor plan which we present shows the general arrangement of the interior of the building, while the elevations and details, which are reproductions of pen and ink drawings made directly from the blue prints furnished by the architect, afford a very good idea of the rustic effects which are possible in the erection of dwellings of this kind.

The cabin is built of solid logs up to the line of the gables, the cornice of the building being constructed as indicated in the details. The gables are shingled and the rough stone chimney outside is ornamented with the name of the owner of the cottage, or camp, as it is



Floor Plan.—Scale, 1-16 Inch to the Foot.



Front or North Elevation and Section.—Scale, ⅛ Inch to the Foot.

Design for a Log Cabin—George P. B. Alderman & Co., Architects, Holyoke, Mass.

called, the letters being formed of bottles inserted with the bottoms protruding and not broken off. The large window in the front, facing up the lake, consists of four lights of plate glass, as it would have been difficult to have gotten it in one light, owing to the problem of transportation. We understand that it is necessary, in order to reach the camp, to travel 12 miles by stage from the railroad station and walk the remaining 5 miles, although some go on horseback. A buckboard is used to carry the baggage over the last 5 miles of the distance, and it is probable a visitor could ride if he was well strapped on and completely covered with pads.

In the interior of the cabin the logs are peeled to give the finish and the partitions are of logs, the same as the outside walls. The fire place shown in the elevation and section is laid up with native field stone, the floor is of matched boards and the doors are of sheathing, while the windows are fitted with common sash.

The drawings of the cabin were prepared by Architects George P. B. Alderman & Co. of 437 High street, Holyoke, Mass., and the cost is given at $600. We understand that the cabin is regarded by those who have seen it as the best of its size in the Maine woods.

A CORRESPONDENT of a lumber journal calls attention to the mixed effects which some people and some architects are disposed to get in their houses. He tells of a bill of materials for a house that called for 26 windows of 22 different sizes, containing 52 sizes of glass, not counting the small glass in border work.

Business Ethics Among Contractors and Material Dealers.

One of the interesting papers read at the second annual convention of the Ohio State Association of Builders' Exchanges, held at Put-in-Bay the last of July, was that bearing the above title and prepared by John A. Kling, president of the Interstate Supply Association. Among other things he said:

The nature of the subject might incline one to the belief that something lofty and ideal was intended to be portrayed in this paper. Such is not the case. Already there exist certain well defined rules and regulations of business between contractors and material dealers which bring their calling to a higher plane than it has ever had before.

Formerly the business of building might have been regarded as a "harum-scarum" business with few restrictions and limitations and very much lacking in order and system. The results brought about by organization and the constant dissemination of principles for the betterment of existing conditions have had a very beneficial effect and to-day the business of the contractor and the material dealer has much less of thorns and more of roses than used to be the case.

While there still are some bruises and scratches received in plucking the rose of profit they are compensated for in the pleasure and comfort which the material man derives from the close and friendly relationship with a large majority of those with whom his business brings him in contact.

The dealer appreciates the advantage to be gained by fair and liberal treatment and is inclined to encourage and support all undertakings which have this end in view. The contractor on his side no longer considers the material man an enemy, but rather recognizes him as a friend who can be of marked assistance to him in many and varied ways.

One of the very large and sharp variety of thorns which we believe is gradually, and we hope permanently, disappearing is that of the unmethodical and slow settlement variety. Contractors realize more and more the importance of keeping their credit of the highest, and the number who are taking advantage of the liberal discounts offered for prompt and regular settlements is daily increasing. Good credit not only means that the contractor has prestige with the dealer, but with the general public as well.

Another variety which is gradually becoming extinct is the chronic kicker thorn. Although this class was never as numerous as the slow settlement, it has been more vexing and harder to deal with.

Contractors and material dealers should recognize that their interests are one. There should be harmony at all times between these two great branches of the building business. What affects one directly affects the other. As the contractor depends upon his laborers for his support in executing his contracts so the material dealer depends upon the contractor for the great bulk of his business.

The various branches of building are interrelated. While the merchant is simply a distributing agency between his customer and source of supply the contractor stands related to several different elements, all of whom must receive full consideration. He executes the ideas of the architect. If he has proper material and good workmen his task is comparatively light. Right here comes his dependence on the material dealer, a dependence which is altogether mutual.

Therefore contractors and material dealers should at all times stand together. Happily they do thus stand, the one ever ready to support the other and ever ready to encourage improvements and reforms.

The contractor no doubt appreciates prompt attention to orders, prompt delivery of material in good condition, businesslike handling of the financial end of transactions and reasonable patience in meeting unforeseen trouble.

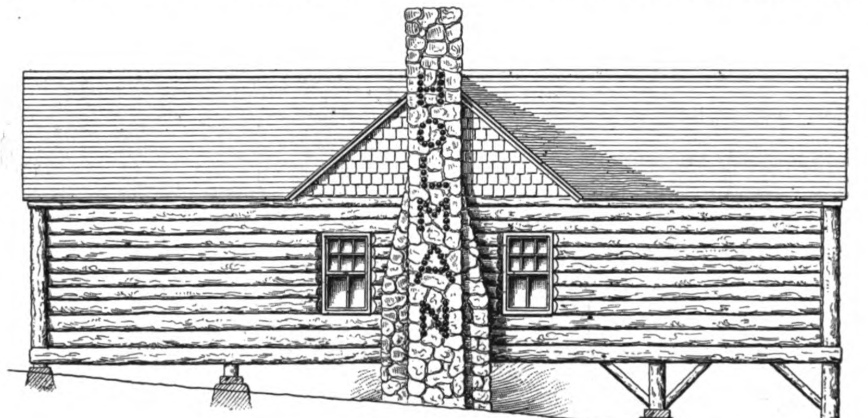
What pleases the material dealer is the prompt acknowledgment of receipt of delivery, prompt report of material damaged in transit or not according to instructions, reasonable patience in unusually busy periods and punctuality in paying bills.

It is desirable that the contractor should keep in close touch with the material man, being well advised on changes in prices and as to the quality and durability of the material he puts in his buildings.

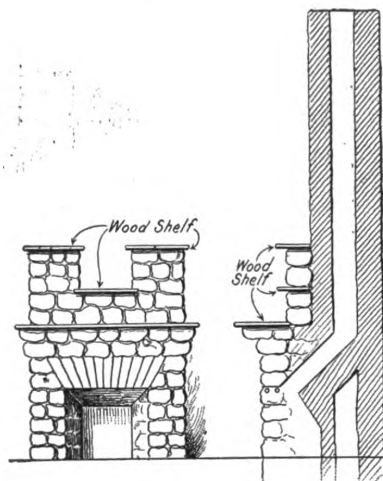
This may be regarded as theoretical, but it is eminently practical. It may be said also that it should not be the aim of the dealer in material simply to get his goods on the ground and receive his money for them, but rather to study his business, watch the results achieved with his material, report defects to the manufacturer and strive toward excellence in his chosen line the same as a professional man does in his.

In conclusion it is my belief that if the building business in this State and country is to be brought to its highest possible standard, there must be mutual effort, study and application toward better things by the architect, the contractor, the material dealer and the great army of skilled workmen who do the actual service in executing what may be desired by the owner and original designer.

That this association may have a leading part in working out such reforms as may be agreed upon and such recommendations as may be made from time to time in this connection is my sincerest wish.



South Elevation.



Elevation and Section of Fire Place.

End or West Elevation.

Design for Log Cabin.—Elevations.—Scale, 1/8 Inch to the Foot.

CORRESPONDENCE.

Address of "Flood City" Wanted.

If the correspondent signing his letter "Flood City, Pa.," and replying to the inquiry of "O, D. S.," which appeared in the September issue, will send us his name and address we shall be very glad to give his communication attention.

Curbing of Artificial Stone.

From J. E. S., *Delaware City, Del.*—Thinking the matter may be of interest to some of the readers of the paper I inclose sketches showing a system of curbing made of artificial stone which can be used for various purposes. It is constructed by the use of forms and when nearly dry the posts and long pieces are finished smooth, then thoroughly dried out before setting up in the place they are intended to be used. The object gained is in allowing the soaking away of the water and preventing cracking when put down in long sections, as whatever settlement there is occurs at the posts. The system has been used for several years and has given entire satisfaction. In the sketches Fig. 1 represents a portion of a ground plan, Fig. 2 a length of the stone coping, while Fig. 3 represents a section of the curbing in position. The posts are 3 feet 2½ inches in hight, the bevel flare of the post at the top being 2½ inches. The stone is set back from the face of the post 1½ inches.

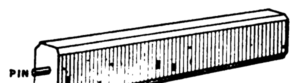


Fig. 2.—A Length of the Coping.

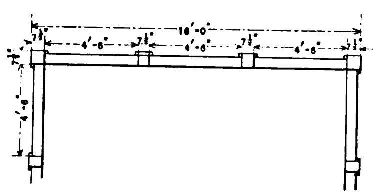


Fig. 1.—Portion of Ground Plan.

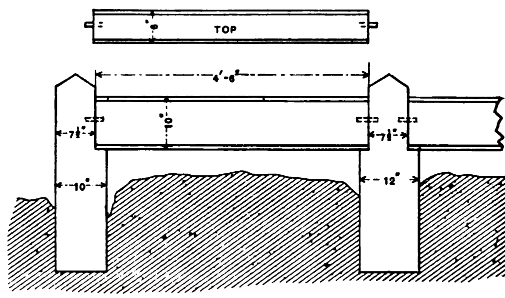


Fig. 3.—A Section of the Curbing in Place.

Curbing of Artificial Stone.

The width of the top of the post is 7½ inches and the last 2 feet of the post is 10 inches wide at the bottom, while that of the middle post is 12 inches at the bottom. The length of the stone coping is 4 feet 6 inches and the width 6 inches, all coping and posts having ¾-inch bevel.

What Constitutes a Day's Work for a Carpenter?

From M. L., *Newark, N. J.*—I have read the various opinions of the readers regarding the amount of work a carpenter is supposed to be able to do in a day, and I have been especially impressed with what "Down South" says in the September number. I must agree with him that "A. P. R." has run up against a lightning door hanger, but in my opinion, no matter how fast a man may be in his work, he cannot fit and hang 15 doors in ten hours, putting on the hardware complete and making a thoroughly good job. I had a man working under me at one time who laid claim to putting in 22 doors in nine hours. I said nothing, but when the doors came on the job I set this "wonder" to fitting and hanging them; but I did not have the pleasure of seeing the work completed, because the man quit the job before it was finished. It is no wonder that "Young Chip" asks the question in such a surprised way, but I would remark that it may be the doors were only "hung," and strap or T hinges used at that.

I should like to hear from "A. P. R.'s" man and others in the trade with regard to clapboarding, sheathing, framing, laying floors, setting partitions, &c. I once heard of a man who claimed that he drove a keg of nails per day at sheathing. He is another wonder to take a front seat. This question of estimating is a very good one for the readers to express their opinions upon and we may all learn something from the experience of others. I give herewith a few estimates for others to talk about:

LAYING FLOOR—2½-INCH FACE.

At	$2.50	per day,	$1.00	per	100	feet square.
"	2.75	" "	1.10	"	100	" "
"	3.00	" "	1.22	"	100	" "
"	3.25	" "	1.33	"	100	" "
"	3.50	" "	1.43	"	100	" "

LAYING FLOOR—3¼-INCH FACE.

At	$2.50	per day,	60 cents	per	100	feet square.
"	2.75	" "	70 "	"	100	" "
"	3.00	" "	75 "	"	100	" "
"	3.25	" "	80 "	"	100	" "
"	3.50	" "	90 "	"	100	" "

CLAPBOARDING.

At	$2.50	per day,	$2.00	per	100	feet square.
"	2.75	" "	2.25	"	100	" "
"	3.00	" "	2.45	"	100	" "
"	3.25	" "	2.65	"	100	" "
"	3.50	" "	2.85	"	100	" "

In connection with the estimate for clapboarding I would say that the work includes water table, corner boards and putting up and removing the scaffolding.

From WANDERING WOOD BUTCHER, *Alexandria, La.*—For the benefit of "M. L." of New Jersey and other readers who have evinced an interest in the subject allow me to say that it was an easy matter some years ago to shake hands with carpenters throughout the Eastern States and Canada who could lay 2500 to 3500 shingles in ten hours, and it may be possible to do it to-day. I have seen two men carry 28 bunches of narrow cedar shingles onto a roof and lay them in ten hours in the month of December, when the thermometer was 15 to 20 degrees below zero. The nails had to be warmed over a fire in order to keep the men's fingers from freezing to them, and on the same building other men worked just as hard or harder and laid less than half as many shingles, because they dragged their bones around over the roof like a cat with seven lives and a broken back.

While I never saw a man hang 15 doors I have seen 12 hung, and on the same job there would be other men who could not hang three doors in ten hours and do the work properly. The three-door man would plunge about the building, fall over the nail kegs and saw benches, and, in fact, everything seemed to be in his way. His tools, such as they were, would be scattered around on the sandy floor and he would chase them from one room to another, faint or stagger if the boss came in and saw his awkward position, and would look, act and feel as if a street car had hit him with another following to catch him again. The hinges in some mysterious way would get on the wrong side of the door, sometimes upside down and sometimes several inches out of place on the jambs. The 12-door man never found anything in his way; all tools required by him, as well as material, seemed to come to him as if by magic. He reached out his hand and found them in their proper place and sharp, ready for use. He was always in good humor and never in a rush. Every move he made was connecting and making time for him. He would always be at ease and not jump out of his clothes when he heard footsteps approaching, fearing the mighty boss was near.

Now here is the reason for these extremes: One is a mechanic and knows it; the other is a botch and feels it. One took time and learned his trade; the other took short cuts to obtain wages he cannot earn. He never stopped long enough on one job and in one town to learn anything. He may be an ex-hack driver, ex-policeman, ex-bartender, ex-county clerk, ex-preacher or some other sort of an "ex," who joined the union for the time being and waiting only for something to turn up; he therefore does not want to invest too much money in tools or waste any time learning to use them. Ofttimes he turns out to be a contractor (?) and here is how he would get his average. The three-door man and the 12-door man hang 15 doors, or an average of 7½ doors. The 12-door man gets no more than the three-door man, but he is always at work, and it falls to the three-door man's lot to do the agitating on shorter hours and more pay—the 12-door man does not have the time.

As to birthplace and education, I find that, too, makes a great difference. A man who gets to work on a breakfast consisting of a cup of black coffee and a cigarette cannot be expected to lay as many shingles or hang as many doors as the man well filled with pork and beans and many other good things, and who has a good stomach to digest them. A steamboat in order to make good time must have good boilers, good coal and plenty of it. The man who goes to a store to buy tools consisting of a 50-cent blue saw, a 35-cent square, a 25-cent cast iron hammer, and then pays $22 for a .45 Colt or Smith & Wesson revolver to protect himself and his property, is educated wrong side up. I will say from personal observation that neither the first nor the last man here referred to will ever make a record hanging doors or laying shingles.

The Use of Concrete for Stable Floors.

From C. C. F., *St. Joseph, Ill.*—Will some reader of the paper furnish for publication such information as he may have in regard to the use of concrete for stable floors? I would like to learn regarding its utility, comparative cost and method of construction.

Strength of Roof Truss.

From T. L. B., *Fairmount, W. Va.*—I inclose herewith sketch of a roof truss which I have to build, and since it is a slight variation from the usual form of this style of truss I think it might be of interest to readers of the paper. I would be pleased to have Mr. Kidder's analysis of this truss, together with his criticism. The roof is to be covered with slate and there is to be a plastered ceiling suspended from the trusses. The latter are to be spaced 14 feet between centers.

Answer.—We submitted the sketch of our correspondent, presented in Fig. 1, to Mr. Kidder, who furnishes the following comments:

The truss of the correspondent would not be safe,

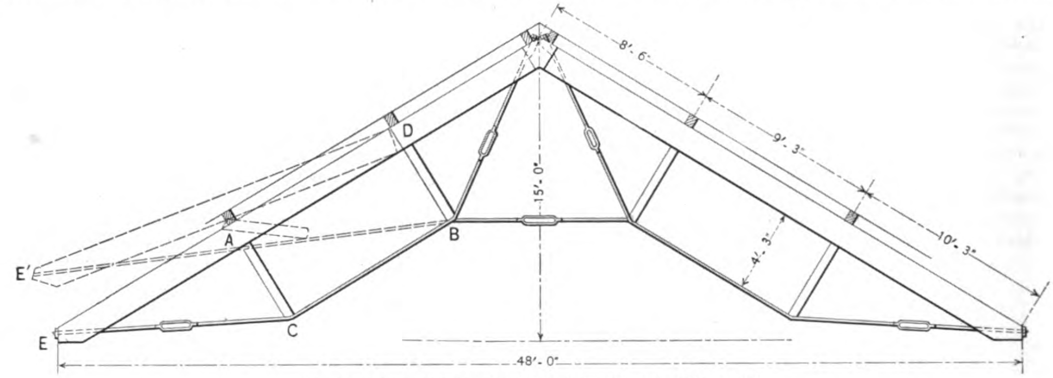


Fig. 1.—Reproduction of Sketch Submitted by "T. L. B."

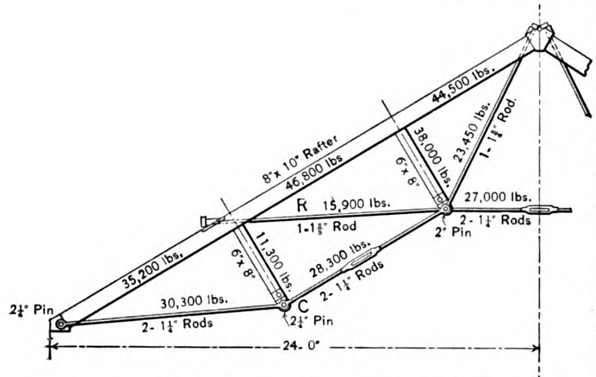


Fig. 2.—Method of Truss Construction Suggested by Mr. Kidder.

Strength of Roof Truss.

whatever the size of the timbers and rods, unless the walls were strong enough to receive the horizontal thrust, the trouble being that there is nothing to keep the joint C in position. If built in accordance with the correspondent's sketch, the strut A C would probably be pushed out of place so that the rod E C B could straighten out, as indicated by the dotted lines in Fig. 1, thus breaking or bending the main rafters at D. At any rate there will be a tendency for E C B to straighten out, but just what would give way it is difficult to say.

To overcome this tendency of the tie rod to straighten out it will be necessary either to put a tie between the joints A and B, as shown in Fig. 2, or a strut between C and D, as in Fig. 3. In Fig. 2 is shown the best method of constructing a truss of this shape, and also the stresses and sizes of the timbers and rods required to support a slate roof and plastered ceiling. The rod R takes up enough of the horizontal thrust to prevent the joint C from being pulled out of place. In Fig. 3 the strut S holds the end of the short strut in place and the member X is in tension, instead of compression. I consider Fig. 2 to represent the better truss of the two shown. With either truss there should be a cast iron shoe on the bottom of the short struts made to receive a steel pin, and the rod should have eyes to fit over the joints. The truss shown in Fig. 4 is a better type than either of those indicated in Figs. 2 and 3, but it does not give as much clear space in the center. I would remark in this connection that the 8 x 10 rafters in Figs. 2 and 3 should be of yellow pine.

How Many Shingles in a Bundle?

From C. B. T., *Hastings, Fla.*—For several months past I have been a reader of *Carpentry and Building*, and on the strength of my interest in its material welfare I take the liberty of making a few remarks. Often when one of our perplexed brothers asks how this or that should be done our editor kindly adds a note giving suggestions but leaving the subject open for remarks. Now that is what makes the Correspondence pages valuable to the subscriber, for many such a question when not answered by the editor has gone with no reply, or the reply came too late to be of any value except in a general way. If the desired information comes in time it may be worth many dollars and the subscriber realizes that the paper is a good investment.

In running over the many communications which have appeared in the Correspondence department my attention is arrested by the letter in regard to the number of shingles in a bundle. Permit me to inquire if this correspondent who finds his shingles short count is not "barking up the wrong tree." I would say to him, "count your shingles," and if you have not full count then tell the maker you are going to buy elsewhere, but I doubt if the fellow who makes short bundles ever reads this paper. In this thing we "Crackers" are not behind the times. Our shingles are put up in bundles of 50; they are light to handle, easy to inspect and convenient to open on the roof.

Note.—With regard to the point raised by our correspondent in the early portion of his letter, it may not be out of place to state a few facts derived from observation and experience. While it is true that in the majority of instances letters of inquiry are referred without editorial comment to readers of the Correspondence department for their consideration, it is done for the purpose of drawing out an expression of opinion from as many of our friends as possible. It has been noticed that practically in every case where the editor gave an answer to a correspondent's inquiry the readers have apparently taken it for granted that nothing further could be said on the subject and as a consequence they have refrained from giving their views for publication. On the other hand, where an inquiry has been referred to the readers without comment it has often been taken up at once by them and a discussion started which has resulted in drawing out a vast amount of valuable information by reason of the diversity of opinion expressed, while at the same time all sides of the question have been freely considered.

There are many among our readers who apparently are so modest that it prevents them from writing for publication, while others feel free to write only after some one else has taken the initiative and started the discussion by a letter in this department of the paper. This may be one of the reasons why so many inquiries which are presented fail to receive comment on the part of our readers, and if such is the case it is greatly to be regretted.

The columns of the paper are open to all for a full and free discussion of any topic of trade interest, and we shall be glad if those having the material welfare of the paper at heart will take the time to send an occasional letter for publication. We do not wish them to feel because an inquiry receives editorial comment that there the matter ends, but rather that they are to express their views just as freely as they would have done had the editor remained silent.

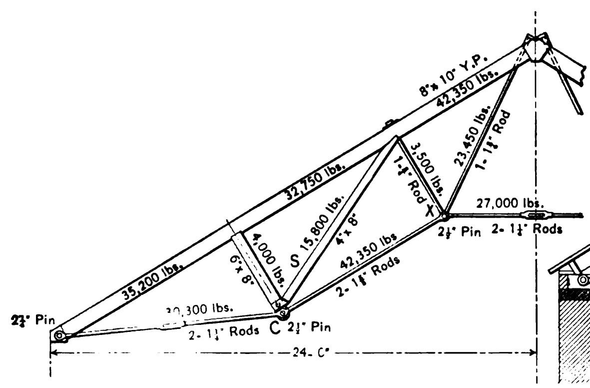


Fig. 3.—Construction Showing Strut Inserted Between C and D of Fig. 1.

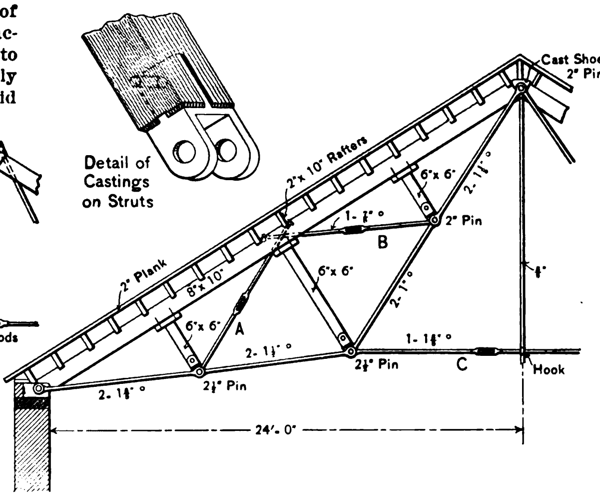


Fig. 4.—A Better Type of Truss Than Those Shown in Figs. 2 and 3, But Giving Less Clear Space in Center.

Strength of Roof Truss.

Finding Bevel in Truss Construction.

From J. T. R., *New Salem, Pa.*—I would say in reply to "O. D. S." of Whatcom, Wash., whose inquiry appears on page 228 of the September issue, that he can find the bevel at "A" in the truss construction shown by using a common carpenters' square. Take 12 inches on the blade and one-half the rise on the tongue and the tongue will give the cut. For example—if the rise is 8 inches to every foot in width take 12 inches on the blade and 4 inches on the tongue; the tongue gives the cut. This rule holds good for any figures.

Papering a Ceiling.

From T. K. W., *Lake Providence, La.*—In the August number of the paper "Down South" asks for advice as to covering an old ceiling with paper. My experience teaches that no kind of paper will answer as well as cloth. There used to be a paper sold for that very purpose, called "cartridge paper," and it was very good, being smooth and strong. Ceilings and walls are never flat, but undulating, and as such paper as he speaks of will not stretch it will not follow the bends in the ceiling but will have what we call "blisters," which cannot be made to lie down smooth. The result is the wall paper is spoiled when the attempt is made to put it on. We have a great deal of this kind of work here, and I find the best way is to cover for the foundation with a good, cheap domestic, say about 3 or 4 cents per yard, for very high ceiling, and the correspondent can use cheese cloth at a cost of a cent and half for side walls if he likes, and it will do pretty well, but will not hold overhead. I would suggest using plenty of tacks and then for the correspondent to go over the ceiling and all around the windows and doors with a good coat of paste, giving it time to dry before papering. This method sticks the cloth to the wood and saves wrinkles.

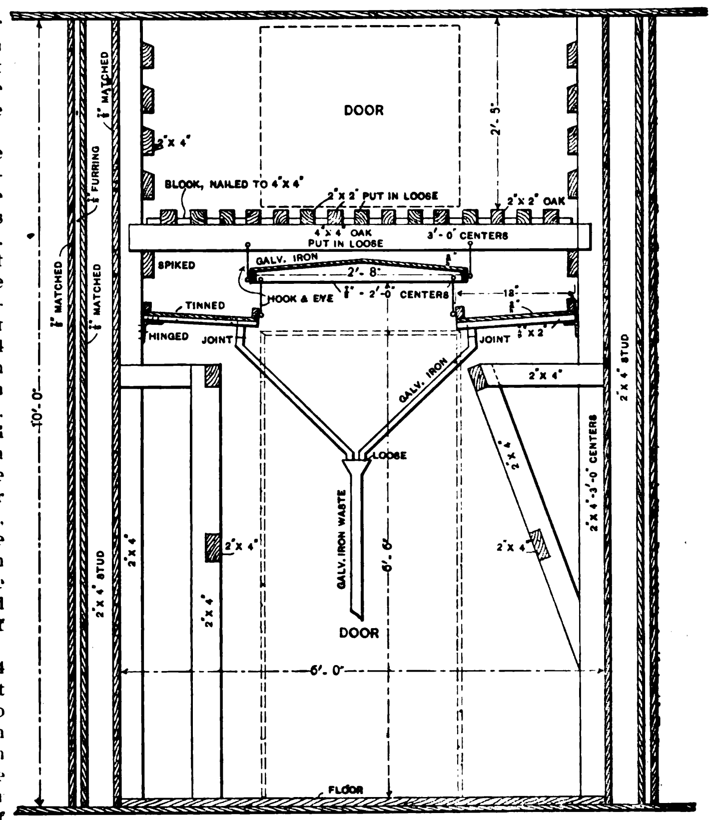
Criticism of Floor Plans for Eight-Room Houses.

From J. P. W., *Webster City, Iowa.*—I desire to offer some criticism on the plans of eight-room houses which were published in the March issue of the paper. My attention is drawn to the matter at this time by the elevations for the first-prize plan given in the September number. Mr. Kingston shows in that issue that the hight of the first story is 9 feet 4 inches, the second-floor joist adding 8 inches, thus making 10 feet. The front stairs have 16 risers and the back stairs 13 risers. Now the real point to be decided in a flight of stairs is an easy, regular travel; hence the travel on all steps should be the same as far as possible throughout the building. But how can this be obtained with 7½ inches rise in one flight of stairs and 9 3-13 inches rise in another flight, with only a partition between them? To an old stair builder the objection to the platform stair is the break in the travel, so I agree with our old friend, Morris Williams, and if he has time I know it would be a lasting benefit to the readers of your valuable journal if he would treat this matter in an article, explaining the principal objects to be kept in mind in the planning and construction of stairways.

Referring to the March number, plan No. 123 has 15 risers in the front stairs and 14 in the rear stairs. In plan No. 18 I am able to figure out only 12 risers and in No. 25 there are 17 risers. Verily, our friend Williams has a large field in which to work.

Construction of Butchers' Refrigerator.

From Frank M. Hamlin, *Lake Villa, Ill.*—While I have been a subscriber to *Carpentry and Building* for only a few months, I have in that short time found it to be a very useful journal for any one employed in the building trades. I am especially interested in the articles under the head of "Correspondence" and have derived from them a great deal of information. In the August number I notice the request of "T. K." for information on the subject of a refrigerator for meats.



Construction of Butchers' Refrigerator.—Vertical Cross Section.—Scale, ½ Inch to the Foot.

The accompanying drawing represents a vertical cross section of the refrigerator which is most used in this locality. In fact, the construction is so successful that I have changed several of the old style into this kind and in all cases they have given entire satisfaction.

In the drawing I will try to make the main points clear to the reader. The refrigerator shown is 6 feet wide in the clear on the inside. It can be made as long as required, to suit the builder, but it must not be less than 10 feet high. The room should be as near the width shown in the drawing as possible. The walls should have at least two air spaces. The studding are 2 x 4 inches, covered with matched stuff on either side. Furring strips are then nailed on with building paper underneath, and then ⅞-inch matched stuff is nailed on the furring strips, all as indicated in the sectional view. The nature of the construction demands that the main door should be in either one end or the other, with the waste pipes at the end opposite from the door. The door to the ice room may be located on either the side or the end, as may be most convenient. It should have its sill on a level with the tops of the 2 x 2 strips shown in the drawing.

Set up on each side of the room 2 x 4 standards about 3 feet apart. At a hight of about 7 feet from the floor spike onto them a 2 x 4 piece to form a ribbon. In order to insure a safe job the ribbon should be let into the standards. Use 4 x 4 oak cross pieces, cut a trifle shorter than the inside width of the room, and of required size the ends to an even depth where they rest on the ribbon. They should be put in not more than 3 feet between centers. Use 2 x 2 oak strips for the ice to rest upon. They may be held in place by placing a ⅞-inch block between each 2 x 2 at the two end and center cross pieces. The reason the cross pieces and the strips should be put in loose is so that the room can be more easily cleaned by removing them. In the ice room spike 2 x 4, with the top edge beveled, onto the standards all around the room. This must be done or the drip from the ice will go through onto the meats below. The space behind these bars forms a chamber for the free circulation of the air.

The drip pans should be hinged to the standards and should have about 2 inches pitch in 10 feet. This may be done by hooking one end higher than the other. The shed should be hooked up to the cross pieces with screw hooks and eyes, as should also the inside edge of the drip pans. The shed should be covered and the drip pans lined with galvanized iron or heavy tin. The shed may remain level, as the water runs the other way on it. The meat racks may be made to suit the builder. The doors should be made in the usual manner—that is, with beveled jambs and fitted with lever attachment in order to keep them tightly closed.

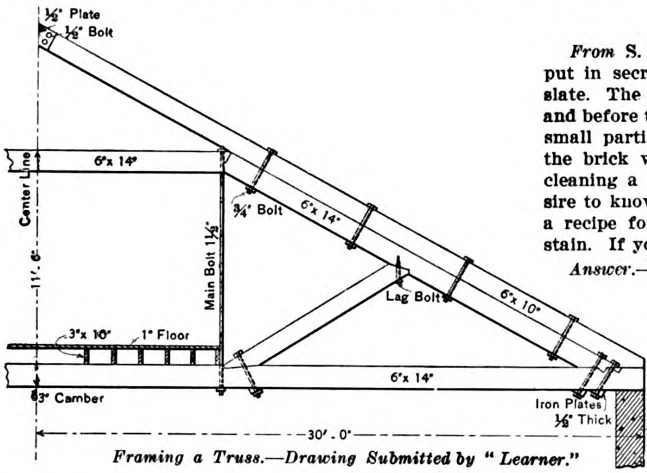
The main feature of this style of refrigerator is that the cold air can come down in the center of the room, where it is most needed, while the hot or warm air can come up on the outside. In the old style the cold air came down at the outside only. Another little feature to which I would like to call the attention of the correspondent at this time is the method of forcing out the warm air. Bore a 2-inch hole clear through the wall at the extreme end furthest from the main door and up as high in the ice room as it can be made. Bore a hole on each side as described and cover the holes with wire netting to keep out the flies. We all know that warm air rises and as a consequence the warmest air is always at the top. In closing the door of the room there is a compression of the air and the holes at the top allow the warm air to escape. In fact, in closing the door the warm air is forced out through the holes in question. This can be readily demonstrated by holding the hand near the hole when the door is being closed. Hoping that this description and sketch will be of some use to my brother chips, and especially to the one making the inquiry about refrigeraters, I remain, ever a friend of *Carpentry and Building*.

Mitering Crown Mold and Fascia.

From J. M. B., *Monroeton, Pa.*—I would say to "C. C. H." of Brookville, Pa., that my method of getting over the difficulty of mitering a crown mold and fascia would be to let the corners of the gable project horizontally 2 or 3 inches more than the eaves, forming a right angle where they intersect at the foot of the valley. If he follows this course I think he will have no trouble in accomplishing what he desires, and I think it makes a better looking job than where the crown mold and fascia come flush.

Framing a Truss.

From Learner, *Paterson, N. J.*—I send herewith sketch showing a half section of a truss having a span of 60 feet and which is to be loaded in the center with a floor. I would like to know if the proper way to frame it is to cut the braces short enough so as to give a 3-inch camber in the center of the bottom chord of the truss, or should I frame the exact size and crown rafters and chord with main bolt? I would also ask if this is a good form of truss construction. I hope the practical readers will discuss the matter and freely criticise the method presented by the sketch.



Framing a Truss.—Drawing Submitted by "Learner."

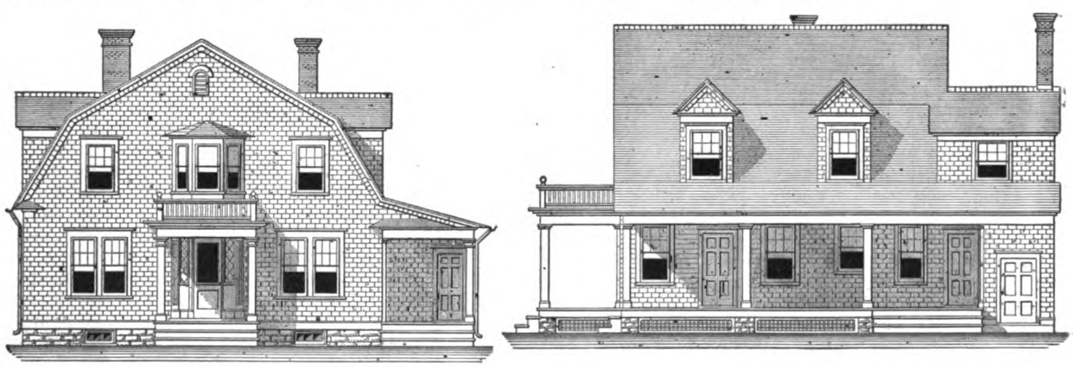
Building a Double Crib for Grain.

From C. C. F., *St Joseph, Ill.*—Will some builder furnish a plan showing the method of constructing a double crib with a method for lifting the grain into the bin other than by hand? In this connection I would state that I am greatly interested in the construction of balloon frame barns and would like to see a discussion of the ideas advanced by "G. M." in the July issue.

Elevations for Farm House.

From Exterio, *Pennsylvania.*—I have been greatly interested in the farm house competition recently conducted by *Carpentry and Building*, and if it is not contrary to the rules I would like to see published the elevations of the set of plans submitted by "Wyo." and thus give the readers an idea of what the committee having charge of the competition call "one of the best of exteriors for a farm house."

Note.—In compliance with the request of our correspondent we have had engraved the front and side elevations accompanying the designs submitted by "Wyo." and present them herewith.


Front Elevation. Side (Right) Elevation.

Scale, 1-16 Inch to the Foot.

Elevations for Farm House.—Design Submitted by "Wyo." in Thirty-fourth Competition.

Roofing Over Old Roofs.

From G. A. H., *Cincinnatus, N. Y.*—Will the brothers of our craft please give their views and experience in laying galvanized iron roofing on old roofs? Is it better to tear off the old shingles and lay the iron on the roof boards, or let the shingles remain and lay the iron directly on the old shingles? The question is, which will make the best roof? There is a difference of opinon in our shop, and we wish to settle it by reading the experience of others.

Removing Stains on Walls.

From S. W. B., *Johnson City, Tenn.*—I have recently put in secret gutters on a house that is covered with slate. The house is veneered with cream colored brick, and before the down spouts were put up the rain washed small particles down from the slate roof and stained the brick wall. The common muriatic acid used for cleaning a brick wall fails to remove this stain. I desire to know if you or any of your readers can give me a recipe for a fluid that will successfully remove this stain. If you can do this I shall be greatly obliged.

Answer.—We can only advise our correspondent to try a saturated solution of oxalic acid in water on the stained parts of the wall. Keep it wet for a few hours, when it should be washed with water and a brush. This acid is very poisonous and should be avoided on the person and clothing. If this fails we would suggest rubbing the face of the stained wall with the same kind of brick and washing it. There is a possibility that sulphuric acid may do better than muriatic acid in some cases of stained walls.

Size of Engine for Operating Wood Working Shop.

From C. A. D., *Penacook, N. H.*—In reply to "A Builder in the North Climate," who asks in the August issue what size steam plant, gas or gasoline engine would be required to successfully run:

One 24-inch combined pony planer and matcher.
One 36-inch band saw.
One 16-inch buzz planer or jointer.
One turning lathe.
One emery grinder.
One shaper.
One sandpaper drum.
One dowel and boring machine.

I would say that if not more than three of the largest machines are to be in operation at the same time and the location of the machinery in the shop is such that the least possible amount of power is lost in transmission, a 15 horse-power engine would be sufficient. As the shop is not to be run steadily a power is required that can be started quickly, cheaply, and not require too much attention. The gasoline engine offers many advantages for small powers that are to be in operation-only a part of the time. It is easily and quickly started to its full capacity, and does not require a great amount of attention. Unless the location of the plant is such that steam fuel would be very cheap or gasoline dear a gosoline engine is no doubt the cheapest for operating a small plant.

GIVE THE YOUNG MEN A CHANCE.

UNDER the above head we have presented at intervals during the past year or two letters from various correspondents, setting forth the difficulties the young building mechanic encounters at the present day in his efforts to advance in his chosen calling. Reference has also been made to the apprenticeship question and to the advantages which would result from an extension of the public trade school system. Bearing upon this important question, a recent issue of *The Painters' Magazine* has a most interesting article, and while it is written from the standpoint of the painter, it has in it so much of suggestive value to building mechanics generally that we republish it herewith.

The old apprenticeship system is dead. It is true that here and there you will find employers who have apprentices in their shops, but they are apprentices more in name than in fact. The master, as a rule, is too busy to teach them the trade—modern business methods have compelled him to devote all his time to figuring on ways and means of getting new work, and of attending to the financial details of his business, so that in many cases the employer has very scant time for personal inspection of the work he has in hand—a few minutes a day being all he can allow to any job—and still less time to devote to the trade education of any boys he may have in his employ. The apprentice in the average paint shop—and the case is nearly the same in all the building trades—has become an errand boy for the journeymen, or a helper, doing the rough work that the men gladly shift to some one else. It is true that here and there, in the country, there are employers who take boys in an old-fashioned apprenticeship, and, working side by side with them, teach them their trade; but these cases are rare. In many large paint shops no boys at all are employed, the ground being taken that it is more profitable to hire skilled mechanics. Even were the employers willing to take apprentices, in many localities the rules of the trade unions forbid more than a limited number in any shop—too limited to supply the depletion in the ranks of the journeymen by death or by entrance into business on their own account. As a consequence, most of the skilled workmen in many trades are foreigners by birth, who have been trained in old world shops.

Good Mechanics Needed.

Good mechanics are needed, and for the really skilled man there is opportunity for constant employment. True, there are plenty of building trade mechanics who are idle half of their time, but it will generally be found that these men are either poor workmen or else have a chronic objection to hard work, and when they do get a job their chief effort is to do as little as they possibly can. Naturally, when work becomes dull men of this class are laid off, and complain of the poor opportunities their trade affords a man to make a living. Such men would find it difficult to make a steady living at any occupation. Good mechanics in every branch of the building trades earn better wages than bookkeepers, clerks or floor walkers in department stores or the average employees in mercantile life. If they are bright, intelligent and ambitious, they may start in business for themselves with very little capital—so little, indeed, that any journeyman who is thrifty will have no difficulty in saving it. And once in business, the possibilities for earning a good income are better than those open to the average doctor, lawyer or clergyman, and equal to those of any other mercantile calling. Yet conditions nowadays are such that the American boy is practically debarred from entering any of these trades. It is almost impossible for him to acquire a thorough working knowledge of a trade in a shop, if so be that he should be fortunate enough to be taken as an apprentice. Graduated from the public schools, with an academic education better than the rich man's son could obtain in an expensive academy a half a century ago, he is turned adrift to seek a living and finds himself fitted for nothing but the already overcrowded mercantile pursuits, or for the professions. Nothing in his school training has paved the way toward entrance into the trades, where the constant cry is that good mechanics are scarce.

The object of the public school education is ostensibly to fit our American youth to be better citizens and to prepare them for life's battles, but their training is unfortunately along academic lines, and many of their studies are of little or no value to the intelligent boy without a rich father to push him forward in some already established business or to support him during his years of future preparation for a profession. He is shut out from honest handicraft, with all its golden opportunities, and his public school training has only served to give him a disinclination to labor with his hands.

It is to the trade schools that we must look for the mechanics of the future. But as yet trade schools are few and far between. Boys from the smaller towns, and from many of the larger cities, are almost prohibited, by reason of the expense, from attending the few that do exist. It is too much to expect that private generosity shall be called upon to establish trade schools in every city or town. They should form a part of the public school system just as much as the high school. At present, however, it seems almost too much to expect that public school boards can be induced to open regular trade schools, for it takes a long time to educate the people into the necessity for such trade education. Moreover, it is unfortunately true that trade schools have earned the ill will of organized labor, as the chief aim of the labor unions seems to be to restrict the number of mechanics, in order that their demands for higher wages can be more readily enforced.

Manual Training.

The opportunity is ripe, however, for establishing a course in manual training in connection with the public school system, which shall be as essential a foundation for a future trade education as the knowledge of reading, writing and arithmetic is to the study of law or medicine. Leave out of the public school curriculum some of the useless 'ologies and 'isms that are forgotten as soon as school days are over, and which have no real value in any walk of life, and substitute for them a practical training of the eye and hand. Teach every boy, no matter what his future occupation is to be, the rudiments of mechanical and freehand drawing, the art of reading drawings, the use of the scale, the theory of mechanics and its practical applications to simple problems, practical mensuration as applied to everyday questions, and the use of simple tools—the hammer, the saw, the chisel, the plane and the brush. Then when the boy leaves school he has acquired such an elemental knowledge of handicraft that he can readily learn a trade, even without an old-fashioned apprenticeship, for he has learned to be observant of mechanical processes, and he has been taught the reason for handicraft operations, so that even though he is but a mere errand boy about a shop, he will find an opportunity of learning the trade. Now is the time to make an effort to stir up our school boards to institute a course in manual training. Public sentiment seems to be growing in favor of it, if we may judge from the fact that the editorial on the subject of "Trade Education in the Public Schools," which appeared in the May issue of the *Painters' Magazine*, was widely copied by the daily press and in many papers received favorable editorial comment. Let each one of our readers do his part in urging the matter in his own community. Let every association of master painters bring the subject before the local board of education and let them urge the associations of employers in other branches of the building trades to co-operate with them.

A CHEAP AND EFFECTIVE ECCENTRIC CHUCK.

BY FRED. T. HODGSON.

A CHUCK which is often employed for eccentric turning may be readily constructed by any fairly good workman who cares to undertake the job. An illustration of the device is shown in Fig. 1, while in Figs. 2, 3 and 4 are various parts to an enlarged scale. For the sake of convenience these parts are similarly lettered and the description which ensues relates to all. Referring to the illustrations, A in Fig. 1 represents the ordinary face plate of the lathe, into one of the slots of which is fitted the block B, moving freely but not loosely therein. This block has a projecting arm, R, one end of which is turned up to receive a screw for holding the eccentric chuck C in position. The block B has a circular hole drilled in it through which one portion of the chuck pin D, Fig. 2, passes, and is fastened to the nut E, as shown. At the other end is a taper screw for holding the work or the chuck to which it is attached.

The eccentric chuck C has a square hole in the center into which fits the upper part of the pin D, and is thus prevented from turning upon it, although the lower part

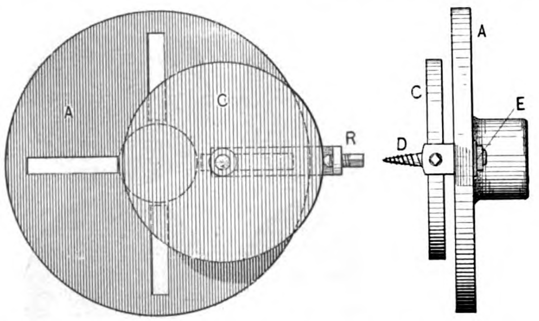


Fig. 1.—Front and Side Views of Face Plate and Eccentric Chuck.

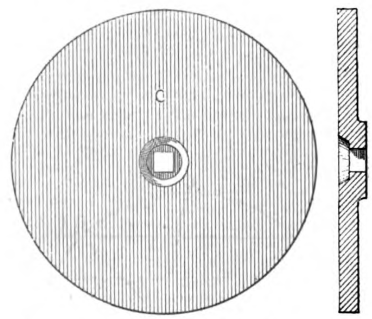


Fig. 3.—Face and Sectional Views of Eccentric Chuck.

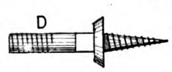


Fig. 2.—Chuck Pin.

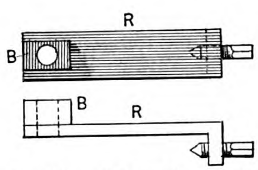


Fig. 4.—Side and Rear Views of Block for Chuck.

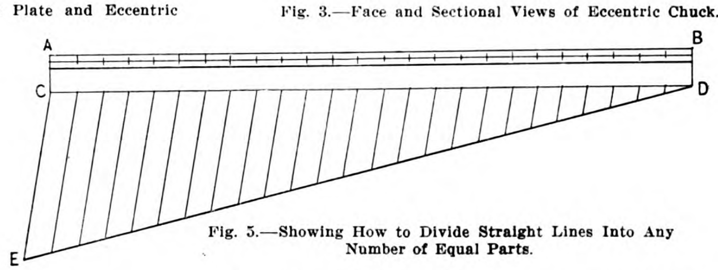


Fig. 5.—Showing How to Divide Straight Lines Into Any Number of Equal Parts.

A Cheap and Effective Eccentric Chuck.

of the pin, which is circular, is free to revolve in the block B, and when both are attached to the face plate can be retained in position by the nut E. The block B must be somewhat less in thickness than the face plate so that there may be a slight space between it and the washer resting on the back of the face plate to allow of tightening. The chuck may be of wood or of metal, but its edge should be of some material sufficiently hard to preserve the divisions from damage. This may be done by putting on a metal ring, or if the amateur can find a spur wheel with the number of teeth or divisions to suit his purpose this will be all that is required, provided that it has sufficient surface for any wrench or chuck that may be fixed on the screw to work against. In fact this part of the arrangement acts practically as a division plate.

In making the eccentric chuck care must be taken by the workman, whether amateur or professional, that when block B butts against the outer extremity of the slot, or is as far from the center as it will go, the head of the set screw clears the bed; and the elbow carrying the screw should be as near the chuck as convenient, so that the screw may be as short and free from vibration as possible. Thus if the face plate be 6 inches in diameter the radius will be 3 inches, and allowing 1½ inches for the projection of the eccentric chuck when it is out to its fullest extent, this will leave a space of ½ inch for clearance—the lathe being 5-inch center.

When making the set screw it will be as well to obtain beforehand a clock key, gun nipple wrench, or any other contrivance to fit the square head, so that it may be used for turning it when inserting or withdrawing it from the holes in the division plate. Dividing this plate may seem to be a difficult job, but it can be easily accomplished in the manner indicated in Fig. 5. Of course, if the workman has provided himself with a spur wheel he need not take this trouble. In order to do the work take a strip of paper the width of the edge of the chuck C and of sufficient length for A to B to go exactly around it and draw a line along its center. Then divide this line into any number of equal parts. Lay off a line, as for example C D, of the same length as A B, or, in other words, of the same length as the circumference of the chuck. From the point D draw another line, D E, at any angle to C D. On this line mark off a number of equal spaces of convenient lengths corresponding to the number of divisions required. Then supposing C to indicate the furthest point of the last of the distances required, draw a line from E to C and proceed to rule lines parallel to this, each line starting from a point on E D; then the points of intersection of these parallel lines with A B will mark off the same number of equal distances on that line. Transfer these distances to A B and paste or glue the paper around the circumference. Through these points drill holes for the reception of the end of the set screw. In the present example there are 25, which is about as awkward a number as could well be fixed upon, but the same rule applies to any number of dimensions.

While on this subject it may not be amiss to show by means of Fig. 6 another method of dividing the face of the division plate. Describe the circle and divide it into quadrants, although any other division less than a semicircle will do. Bisect A C B at the point C, then with one point of the compass at A and with the radius A C describe the arc C D and from D set off on the chord A B produced beyond D the straight line D E, equal to A D. Now divide the distance E B into three equal parts and add one of them to the straight line A E; then the line A F will be equal to the length of arc A B C. Divide this line, already shown, into the required number of parts and mark them off on each quadrant. There will be a slight difference, as each distance in the compass will be the chord of the arc and not the length of the arc itself, but the difference will be so small that it can be readily adjusted.

Having done all this it will now be in order to put the machine in a position for work like that shown at A, Fig. 7. First adjust the centers of A and C of Fig. 1 so that they are 1 inch apart, and fix the work on C, using it to turn against the cutting tool for a portion of a revolution. This should be done by hand, as a revolution is not completed. Loosen the nut E and move the chuck one or more divisions; fix the set screw, tighten E and repeat this until all the curves are traced.

The pattern B in Fig. 7 is done in the same way, but as the circle is continued across the design the motion may be given by the foot. For the pattern C set the centers ¾ inch apart, and describe as many of the small circles as desired, then move the centers 1-16 inch—that is, to ¾ and 1-16 inch—and repeat the operation, which will give the second sized circle, the tool of course to be held to agree with its diameter, which, if it touches the circumference of the other, will be ⅛ inch greater diameter; move another 1-16 inch, and touching circle will be ¼ inch larger.

For the pattern D the centers are set ¾ inch apart, and of course a more finely divided division plate is used to allow of so many circles being made. For the pattern E the centers must be 1 inch apart and only four divisions used. The pattern F has its centers 1⅜ inches apart, but in order to so form this pattern the face of the work must be more or less coned, and some care will be required to make the junction of the lines correspond. This difficulty may be partly overcome by making a tool with a serrated edge like a screw tool; you can then cut several circles at one time and will consequently want fewer adjustments.

This chuck, though cheap and simple in construction and easily manipulated, is capable of turning out an almost endless variety of designs and is only limited in this direction by the skill and ingenuity of the operator, who, when he becomes familiar with the little machine, will be able to so adjust it that the most beautiful and graceful combination of curved lines imaginable may be produced. One design will always suggest another and a more complicated one.

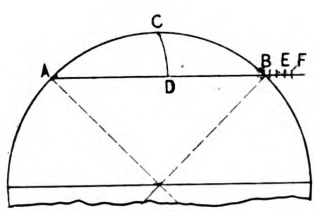


Fig. 6.—Diagram Showing How to Divide Circles.

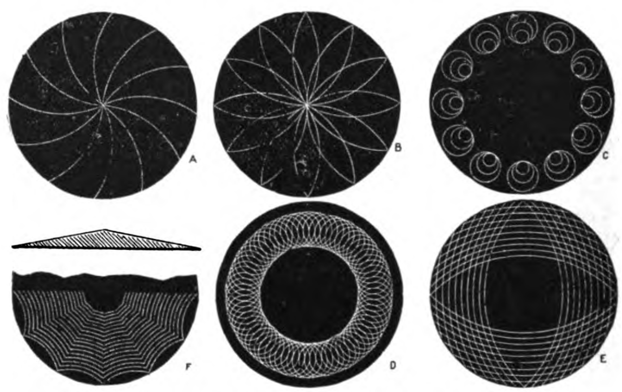


Fig. 7.—Some of the Patterns Which May Be Worked by an Eccentric Chuck.

A Cheap and Effective Eccentric Chuck.

International Fire Exhibition.

The British Fire Prevention Committee, an official body whose headquarters are at 1 Waterloo Place. London, S. W., have arranged to hold, from May to October, 1903, at Earl's Court, near London, an international exhibition of fire extinguishing and life saving appliances. Recognizing the soundness of the maxim that "prevention is better than cure," the promoters of the exhibition intend to give special prominence to the subject of fire prevention in methods of building construction and equipment. The exhibition is to be divided into various sections covering the whole subject of fire prevention. Section 6 will be devoted to Water Supply, under the sub-heads of Water Works, Reservoirs, Water Works Installations and Machinery, Private Water Supply, Fittings, Hydrants for Street and House Use, Pipes, Stop Cocks, &c. A series of diplomas and medals will be awarded to successful exhibitors in the different classes. Floor space will be provided at the rate of about $1 per square foot, and exhibitors will incur no further expense beyond the transportation of their exhibits and the equipment of their stand. The undertaking will be under the management of the London Exhibitions, Limited, Earl's Court. The exhibition buildings which exist there are said to be admirably fitted up with regard both to decoration and sanitary arrangements. Foreign exhibits are solicited. No duty will be payable on such exhibits entering England, while special advantages will be granted by shipping and railroad companies to facilitate the transportation of foreign exhibits. Information in regard to space, &c., will be supplied on application to the secretary the British Fire Prevention Committee, 1 Waterloo Place, London, S. W.

New Building for District of Columbia.

The committee, composed of the Secretary of the Treasury and the Commissioners of the District of Columbia, having charge of the construction of the new District Building, have selected Glenn Brown, Hornblower & Marshall, March & Peter, William A. Poindexter, Robert Stead, James G. Hill, and Wood & Deming, all Washington architects, together with A. W. Longfellow of Boston, E. P. Casey, Heinz & Lafarge, Albert R. Ross of New York City, and Cope & Stewardson of Philadelphia, Pa., to submit plans for the structure, the designs to be in the hands of the Commissioners on or before December 8 of the present year.

A uniform sum of $500 will be paid to each of the competitors invited, with the understanding and agreement that the architect or architects whose design shall be placed first will be awarded the commission for carrying out the work at a fee computed on the basis of the schedule of charges adopted by the American Institute of Architects.

The Board of Award will consist of the Engineer Commissioner of the District, the Supervising Architect of the Treasury, D. H. Burnham of Chicago, R. S. Peabody of Boston and George B. Post of New York. Their duty will be to judge and report as to the relative merits of the designs submitted and to advise as to the desirability of the competitors selected for the competition.

WHAT BUILDERS ARE DOING.

THE building situation in and about the city of Baltimore, Md., at the present time is comparatively quiet, although a considerable volume of work is in progress and mechanics are in active demand. The recent settlement of the differences which for some time past have existed between the Master Builders' Association, the District Council of the Brotherhood of Carpenters and Joiners, Building Inspector Preston and others, as to the rate of wages to be paid union carpenters, is expected to encourage building operations to some extent. The agreement is that from Monday, July 14, 1902, nine hours shall constitute a day's work, with eight hours on Saturday, and the minimum wages for carpenters be $2.75 per day; that on and after May 1, 1903, eight hours shall constitute a day's work, at the same rate of wages, and that in future any demands or grievances of the carpenters shall require six months' notice to the contractors. While the outlook for building is encouraging, new operations may be held back to some extent by the difficulty in obtaining structural iron and steel, and by the inadequate railroad transportation facilities and the coal situation.

Some of the recent contracts which have been awarded to members of the Builders' Exchange cover the Shearith Israel Temple, an addition to the warehouse of R. M. Sutton & Co., an annex to the State House at Annapolis, an addition to the Union Station in Baltimore, a city residence for Thomas A. Naylor and the Fulton Avenue Presbyterian Church.

Kalamazoo, Mich.

A movement which has been on foot for some time past among the carpenter and mason contractors of the city looking to the formation of an organization through which they might better protect their interests came to a head on Thursday evening, August 21. A well attended meeting of the contractors was held in the hall of the Grand Army of the Republic, when a Builders' Exchange was organized with the following officers:

President, Frank Plaitz.
Vice-president, Benjamin Roe.
Secretary, E. J. Manning.
Treasurer, William Welsh.

Committees were appointed to secure quarters for holding regular meetings and to formulate a constitution and by-laws. It is stated that one of the influences which had a strong bearing upon the formation of the exchange was the fact that labor in all branches of the building trades has been well organized for something like two years.

Los Angeles, Cal.

For nearly a year past a movement has been on foot in Los Angeles, Cal., for the erection of a large apartment building, and a few weeks ago the Twentieth Century Apartment Hotel Company were formally organized to carry out the project. The site chosen for the hotel is the southwestern corner of First and Hill streets. The plans contemplate the erection of a building 320 feet long by 160 feet wide, with parks separating the structure from the streets and from adjoining properties. It will be eight stories in hight and will be built of steel, concrete and glass. The whole will be covered with a glass canopied roof, in which will be an auditorium, music parlors, sun parlors and gymnasium for the convenience of guests, together with some 28 studio suites of two rooms each, adapted for artists, &c. On the roof will be a public photograph gallery and sun baths. Below the roof canopy there will be eight floors, arranged in suites. On each floor there will be two eight-room apartments, four six-room apartments, four four-room apartments and 52 three-room apartments. On the streets surrounding the structure and in the entrance hall will be 24 booths or stalls. A billiard hall, *café* and bathrooms will be located in the basement. An immense dining room will be located underneath the glass floor of the great court. The building will be provided with a modern cold storage plant, laundry and other conveniences. Lockers allotted to each suite in the building will be placed in the basement. Four high speed elevators will be located in the central court.

In the center of this court is to be placed an ornamental fountain. Around this, from the first floor to the roof, will circle an inclined plane, to serve instead of the ordinary stairway. The floors of the passageways, halls, galleries and corridors will be of glass and porcelain tile. From the main floor of the building to the top of the dome, which will cover the central court, the distance will be 140 feet. The design of the whole will follow Egyptian models.

Louisville, Ky.

The annual report of Building Inspector Tilford, which has just been issued for the fiscal year ending August 31, makes a most favorable showing when compared with previous years. The total outlay for buildings of all classes was $2,828,457, which is an increase as compared with the year 1901 of $935,542, and was $1,000,000 greater than any previous year in the history of the department. Out of a total of 1600 permits issued 1367 were for frame structures, valued at $874,887, and 233 for brick buildings, costing $1,821,573. There was a decrease in the number of permits for brick buildings and an increase in the number of permits for one and two story frame dwellings.

The National Trust Company are making extensive improvements on a large building at Fifth and Main streets, which, when completed, will give them one of the handsomest banking rooms in the city. D. X. Murphy & Bro., architects, have the contract for the new jail, which, when completed, will be a thoroughly modern structure of its class. The Polytechnic and the Masonic buildings are inclosed and the work of completion is being pushed rapidly forward.

The members of the Building Contractors' Exchange are all very busy. The Saturday lunch during "'change hour" has proven quite a feature and the attendance on Saturday is gradually increasing. The monthly "smokers" are also largely attended and thoroughly enjoyed by all. At these smokers the members are usually entertained by vaudeville performers after the business of the evening has been concluded.

Lowell, Mass.

Building continues active, and there are indications of considerable new work in the immediate future in the way of new factory construction. It is understood that more plans for new mills to be erected in the city within the next year are under consideration than for ten years past. As a consequence of the promising outlook the contractors of the city are naturally feeling greatly encouraged, and with labor interests harmonious there seems to be no reason why a large volume of business should not result. Among the more recent contracts may be noted that of the brick mill building on Market street for the Bigelow Carpet Company, estimated to cost in the neighborhood of $150,000. The contract has been secured by W. H. Wiggin, a member of the Builders' Exchange. The Appleton Mfg. Company are contemplating important additions to their plant, and the Massachusetts Cotton Mill are adding to their storehouse on Bridge street. A large new mill, to be occupied by the Massachusetts Mohair Plush Company, is nearly completed on Western avenue.

Omaha, Neb.

The present outlook for fall building is quite encouraging, and architects appear to have plenty of work ahead. There has always been a disposition on the part of many to put off building until late in the fall and then rush matters until the cold weather put a stop to operations. Why they do this our correspondent states he has never been able to understand. There was quite a marked improvement in the number of building permits taken out during August, as compared with the corresponding month of last year, although the figures for the eight months show a considerable falling off in the aggregate of business. The estimated cost of the building improvements for which permits were issued up to September 1 of this year is placed at $799,694, as against $1,627,294 in 1901 and $1,043,645 in the year 1900. Going back still further, the figures show for the eight months of 1899 that the cost of the building improvements projected in that period was $1,009,744. In 1898 the cost was $1,361,352; in 1897 it was $1,299,147, and in 1896 it was only $291,155.

There have been no important labor troubles in the building line thus far the present year, and none are expected, as the employers have an understanding with the labor unions that all disputes shall be referred to the Arbitration Committees of the Builders' Club and the labor union before the men are taken off the work. So far this arrangement has proved very satisfactory to both parties.

The Omaha Builders' Club has been obliged to occupy more commodious quarters on account of its increased membership, which now numbers 65 contractors and 25 associate members. The club has one large room for general use, one committee room and two rooms for figuring purposes. The club is entirely out of debt and has a balance in the treasury—a record of which it may be justly proud, when it is considered that it is only 18 months old. The club was started under rather trying circumstances, but it has had a steady growth from the start, and Secretary W. S. Wedge states that they expect the membership to run up to 100 by January 1, 1903. The club now occupies rooms 604, 605, 606 and 607 in the Paxton Block.

Philadelphia, Pa.

The August report of the Board of Inspection shows that 708 permits were issued, covering 1096 operations, estimated to cost $2,500,790, which compared with 660 permits for operations costing $4,013,510 in July and 760 permits covering 937 operations and costing $2,356,650 in August of last year. Two and three story dwelling houses called for nearly $1,000,000 of the total, while new factory buildings called for nearly $500,000. About $450,000 was involved in alterations and additions.

A large amount of work is being done in the outlying districts, as has been the case for some time past. One of the more important operations includes 134 two-story houses and eight three-story stores, which are being erected by John Gallagher on a tract of land at Eighteenth and Porter streets, the cost being estimated at over $300,000. Another operation recently started is that by William E. Hause in West Philadelphia, where 35 three-story and six three-story stores and dwellings are under way. Still another operation recently commenced is that by Pugh & Downing, architects, consisting of 22 two-story houses on the west side of Fifty-first street, north of Arch street.

Quincy, Ill.

The Master Builders' and Traders' Association is in a flourishing condition and now has a membership of about 70. The officers are: President, J. J. Shanahan; vice-president, Adam Frick: treasurer, B. Schullion, and secretary, E. J. Demfer.

Salt Lake City, Utah

Construction work in Salt Lake City is moving along rapidly, notwithstanding the high price and scarcity of materials and labor. Modern residences are especially in demand, and the construction of this class of work is expected to increase rather than diminish. A large number of high class buildings are also to be commenced in the near future. On August 30 the University Club negotiated a loan of $40,000, to be used for the erection of a new club house, which will be colonial in design, three stories in hight and will occupy a site 82½ x 165 feet. Experimental excavation is now being made on the United States Government Main street site for the purpose of constructing the new Federal Building. The work is being done under F. L. Averill, the structural engineer sent out by the Government for that purpose.

Another piece of Government work which is attracting the attention of Salt Lake builders is the enlargement now under way at Fort Douglas. The War Department has set aside $120,000 for this work, exclusive of the funds to be used for heating, plumbing and sewer work. Other building projects of large dimensions are the $30,000 addition to the Brigham Young Trust Company's Building on State street; the three-story apartment building of Edward B. Miller on North Temple street, which will cost $20,000, and the improvements at All Hallows' College on Second South street. These improvements will cost in the neighborhood of $60,000.

St. Paul, Minn.

We are indebted to the secretary of the Builders' Exchange of St. Paul for a copy of a neat directory of that body, which has recently been compiled and issued. It gives in alphabetical order the addresses and telephone calls of members of the Builders' Exchange corrected up to July 15 of the present year, following which is a classified list of the members of the exchange, showing in what branches of business they are engaged. In conclusion there is given a list of architects of the city, these being arranged in alphabetical order with their addresses and telephone calls. The matter is gotten up in shape to be very convenient for reference, and the size of the directory is such as to be easily carried in the vest pocket.

San Francisco, Cal.

The most significant fact connected with the building trade, as far as the construction of frame buildings is concerned, is the cut of $2 a thousand which was made by dealers on all kinds of California lumber. This is not sufficient to especially effect the cost of construction to owners, but it is a relief to contractors who have already figured on work, and it may serve to check the growing tendency of capitalists to postpone the construction of residences and other small buildings for renting purposes. The labor supply is still extremely limited, and recently the contractors were compelled to avoid a strike of union plasterers by rescinding their rule that no plasterer should be paid more than $5.50 per day. The amount of building contracts recorded has fallen off somewhat within the last few weeks.

Washington, D. C.

A large amount of work has been done in Washington during the past year, and a noticeable fact is the steady improvement in the character of the dwellings erected. The annual report of the inspector of buildings recently issued shows that during the 12 months ending June 30 building and repair operations had been carried out costing $8,310,-240, the highest point ever reached in the history of Washington, and $2,000,000 more than was expended similarly during the preceding year. The figures are important in disclosing that the tide has turned from the building of large apartment houses in favor of the erection of private dwellings. While there were 154 of the former class of buildings constructed during the fiscal year ending June 30, 1901, there were 100 less this year, the single dwellings aggregating very nearly 900.

A glance through the annual reports of the inspector shows a steady improvement in the character of the buildings. During the fiscal year 1895 there were erected 1067 brick and frame dwellings at an average cost of $2960; in the fiscal year 1896 there were 1006 dwellings, averaging in cost $3151; in the fiscal year 1897 there were 732 dwellings of an average cost of $3391; in the fiscal year 1898 there were 699 dwellings of an average cost of $3150; in the fiscal year 1899 there were 913 dwellings of an average cost of $2824; in the fiscal year 1900 there were 650 dwellings of an average cost of $3905; in the fiscal year 1901 there were 734 dwellings of an average cost of $3247, and in the fiscal year 1902 there were 893 dwellings of an average cost of $4138, showing that in eight years the average cost of dwellings has risen 40 per cent.

It is noteworthy that the number of dwellings, 1067 in 1895, diminished with but a single fluctuation to the beginning of fiscal year 1901, reaching in 1900 the low mark of 650, although in that year the average of cost was $3905, next highest to this year's high water mark. Coincidental with this fall was the increase in the number of apartment houses, from three in 1895 to 58 in 1900, followed by 154 this last year. The conclusion is inevitable that the large supply of flats and apartments checked the home building tendency of the people, and that the high average of dwelling cost was due to the handsome homes erected by wealthy residents, rather than to a high average of cost in the modest dwellings.

Law in the Building Trades.

PARTY WALLS.

An owner of land, the corner of which was occupied by a tenement house extending the full depth of the lot, and the balance by a dwelling occupying only a part of the depth, with a party wall extending the full length containing flues for the use of the dwelling, and having windows on its sides overlooking the yard of the dwelling, conveyed the dwelling to one party and subsequently conveyed the tenement to another party. The court held that the owner of the dwelling had a right to close up so much of the windows as stood on his land, and also to maintain the flues.—De Baun *vs.* Moore, 52 N. Y. S. Rep., 1102.

CONSTRUCTION OF CONTRACT TO REPAIR.

A contract for the repairs to a building provided that the waste pipes of a water closet should have all proper branches and bends to receive drainage from all other fixtures and conductors. It was held that this did not impose on the contractor the duty of connecting the kitchen sinks with the waste pipes, where the kitchen sinks had been previously connected with a waste pipe of their own, which it was not stated in the contract was to be abandoned, and the waste pipes of the water closet were separated from the sinks by the whole width of the back entry and the partition wall.—Leverone *vs.* Arancio (Mass.), 61 N. E. Rep., 46.

ARCHITECT'S CERTIFICATE MAY BE ONLY PRIMA FACIE EVIDENCE

Though a building contract provides that payments shall be made on the certificate of the architect "to estimates and valuations for materials furnished and work done," admission in evidence of a certificate that the contractors "are entitled to payment" of a certain sum "for material furnished and work done," is not wrong, where other evidence show that the certificate was only considered as *prima facie* evidence, and the court instructed that the owners might have damages for delay in completion.—Bailey *vs.* Trustees (Pa.), 50 Atl. Rep., 160.

WHEN OWNER IS NOT BOUND BY CERTIFICATE OF ARCHITECT.

Where a building contract prescribes that the architect's certificates shall be in writing and recites that the work estimated was done to the architect's satisfaction, and should be signed by him, an architect's certificate not signed, which does not confine its estimate to the structure described in the contract, and does not recite that the work estimated was performed to the satisfaction of such architect, is not determinative of the owner's liability, as it would have been if it had been made in accordance with the contract.—Mockler *vs.* St. Vincent's Inst., 87 Mo. App. Ct. Rep., 473.

WHEN COUNTER CLAIM WILL NOT BE ALLOWED.

In an action by an architect against the owner of a building to recover for services, a counter claim founded on the improper construction of the building was properly dismissed, where the owner had compromised and settled a claim for damages against the contractor founded on the same improper construction as was alleged in the counter claim.—Rivers *vs.* Blom, 63 S. W. Rep., 812.

REPAIRING A CHURCH ROOF.

SOME time ago it was found necessary to repair the nave roof on the cathedral at Winchester, England, owing to the defective state of the outside covering, as well as to the unsatisfactory condition of the framing. The conditions were such as to render something more than ordinary repairing essential, and as a consequence the work had to be undertaken on a somewhat larger and broader scale than would otherwise have been the case. Just how this work was done may be interesting to readers on this side of the water, and we present herewith two sectional views, Fig. 1 showing the old roof as it appeared before the work was commenced and Fig. 2 the manner in which the repairing was accomplished by the architect of the cathedral, John B. Colson of Winchester.

As the age of the roof seems to be undetermined it may not be without interest to give a few extracts from the *Building News*, bearing upon this point: "All the uprights from the beams, the horizontal timbers extending east and west, the multitudinous struttings, bracings, scarfings and other supports apparent under the collars, are entirely foreign to the original structure. There is no record as to when these were inserted, and their date is therefore merely a matter of conjecture. Ewan Christian, in a report to the Dean and Chapter in 1873, mentioned the roof as 'without doubt Wykeham's work.' Others, however, have asserted it to be the original Norman roof, with later work and reparations of or about Wykeham's time. There is much evidence to prove that the latter opinion is more likely to be correct; but whether the reparations were effected prior to or subsequent to Wykeham's time is still a vexed question and one not easily determined. It may be fairly assumed that the older timbers in the nave were of Norman date; but the extraordinary mutilations that they had undergone tended to deceive the eye and to give the appearance of a structure erected at a much later date. The various scarfings were no doubt the result of this extraordinary pressure being on the tie beams, and have probably been made subsequently to Wykeham's restoration of the roof. This master's boldness in casing, strengthening and increasing the thickness of the original Norman walls no doubt averted much mischief that the condition of the roof would otherwise have produced, but it never was intended that the grand and graceful vaulting and groining of the nave should in any way be subject to the weight that had become imposed upon it.

"The main rafters were in nearly every instance disconnected at the apex, and the whole series of bracings and strutting had become so dislocated as to leave the roof with little inherent strength. From the similarity of the scarfings of the tie beams they all appeared to have been executed about the same period, and it was in a great measure due to their unskillful construction that the timbers of the roof had sunk, and were lying a dead weight on the vaulting. Natural decay of the timbers, especially at their weakest parts—viz., at the tenons and mortises of the framings—had also added to the general disintegration and disorganization of the whole structure.

"The section, Fig. 1, shows the pitch of the Norman roof. A A indicate the Norman timbers reframed by Wykeham (1367-1404); B B the new timbers he inserted, and C C the subsequent scarfings. The second section, Fig. 2, illustrates how the renewal of the roof has been carried out, D D D being Mr. Colson's work. Note that in the former drawing the ties rest on the crown of the vaulting while in the other diagram they stand some 5 inches clear above it.

"Considerable mystery was attached to the fact of the old rafters being supported upon plates and sills

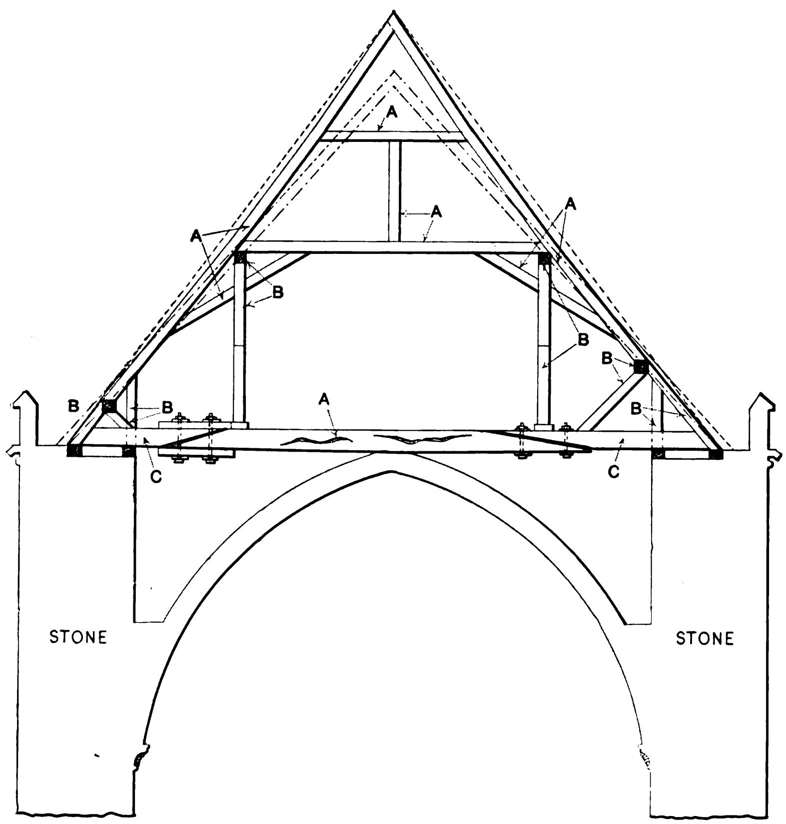


Fig. 1.—Vertical Cross Section Showing Roof Before it Was Repaired.

Repairing a Church Roof.

raised off the walls, as shown in Fig. 1. It was surmised that the feet of the rafters had become defective, and so were cut off, and that this method of support was adopted instead of renewing the whole rafter or splicing the ends of the timbers in order to obtain the required length.

"The Norman roof, as indicated by the string course on the tower, was of a flatter pitch, and the length of this projecting string exactly coincided with the rafter on the north side of Wykeham's roof. It thus is concluded that Wykeham reconstructed the roof with the original Norman timbers as far as they were serviceable, thus retaining the general Norman appearance of the structure, the increased 'pitch' in conformity with Edington's gable at the west end being obtained by raising the rafter feet off the walls and supporting them as described. It was this arrangement of various lengths of rafters with sills at different levels and no direct tie that caused the mischief. Lifting trusses have now been introduced very cleverly on each side of the tie beams, which by these means have been raised and the vaulting is thus relieved of enormous pressure. Owing to the difficulty of obtaining English oak of the length and size, each 45 feet long, 12 inches wide and 20 inches deep, it was found necessary to resort to the use of oak from Stettin. A false sill piece has been inserted at the back of the rafters on the north side at a corresponding level to that of the sill on the south side, and these sills have been securely tied together from north to south with stout iron bolts. With the exception of new battening and covering with recast lead the five westernmost bays of the roof have needed no repair. The timbers had greatly decayed by the action of the worm, which necessitated as much as two-thirds of the structure being replaced with new oak. The insect causing this sad havoc is known as the 'Sirex gigas.' In its grub state it does the mischief, eating away the timbers till these were literally honeycombed."

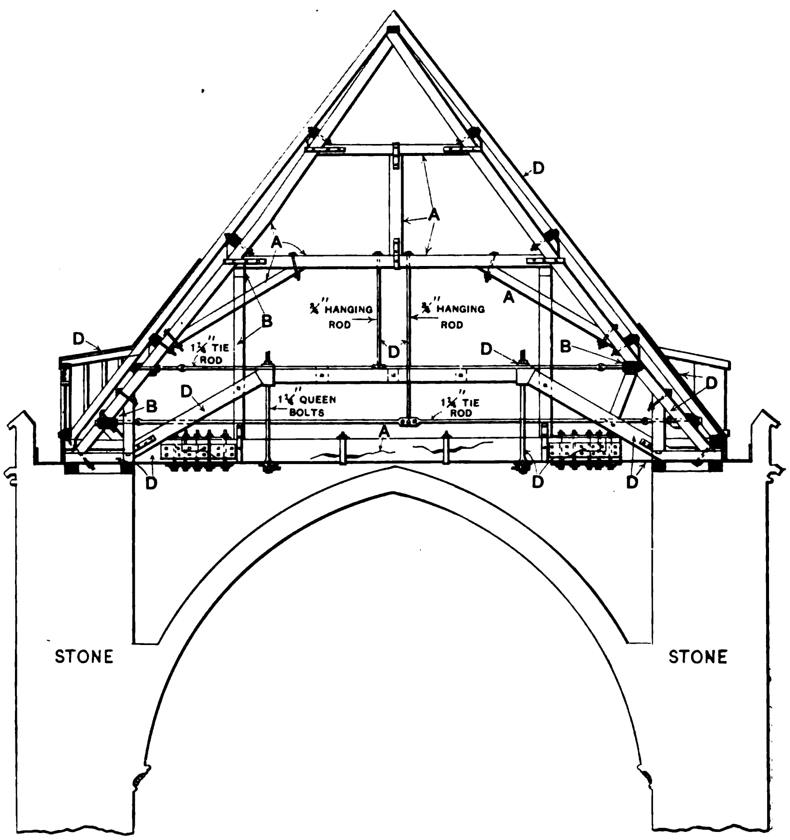


Fig. 2.—Vertical Cross Section of Roof After Work Was Completed.

Repairing a Church Roof.

Unique Architectural Treatment of a Dwelling.

An idea which has never before been attempted in that city, although not unfamiliar in New York, has just been carried out in connection with the external treatment of a handsome dwelling in Oakland, Cal. To people passing along the street the glistening, sparkling effect makes the walls look as if they were studded with jewels.

The house, which is of striking architecture, is a massive wooden structure, and the exterior, by sanding, is given the appearance of having a brown or sand stone facing. The workmen, to get the jewel effect, crush the finest of blown glass together with the sand, and, while the wooden exterior is still damp with paint, the combination of glass and sand is thrown onto the surface and the effect is obtained of stone and sparkling facing. When the sun shines on the house the effect, while being novel in that city, is extremely fascinating—so much so, indeed, that almost every one passing is seen to stop and make an inspection of the building. It is one mass of sparkle from the Gothic roof to the ground.

The "sparkle decoration" was first suggested by a French architect, who had noticed the glistening of snow on the sides and roofs of houses. He was much interested in the effect and came to the conclusion that a perpetual glistening of the walls of dwellings would be a unique form of decoration, and it was he who conceived the idea of crushing glass and sand together to get the "diamond sparkle" effect.

WHAT is said to be the largest block of slate taken out of any quarry in the valley was hoisted at Howell's quarry, Bangor, Pa., on July 25. From it was made five squares and 43 feet of roofing slate. Two squares and 94 feet were made into 12 x 24, 127 feet into 18s, 20s and 22s, the balance being made up in smaller sizes.

Concrete Masonry Construction.

In considering the subject of masonry construction E. S. Gould states that first-class concrete, as far as manipulation is concerned, may be made in several different ways, all of which, however, must possess the common attribute of a thorough and intimate intermixture of the ingredients.

Upon the whole I think that as good a way as any is to mix the cement and sand dry (this should always be done), and thoroughly drench the broken stone with water and then mix stones and mortar together without further addition of water until the mass has been well turned over. Then, while continuing the mixing, add water (by sprinkling, not dashing) until the proper fluidity has been secured. This depends upon circumstances. In a very wet foundation pit of small area good results may be obtained by pumping vigorously up to the last minute; then pulling out the pumps and quickly shoveling in the concrete without any further admixture of water, merely leveling it off and allowing the water to rise and percolate through it. It will soon get quite wet enough and can be settled in place by gentle ramming.

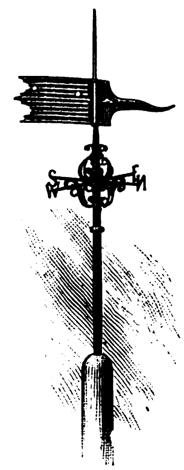
I think the throwing of large stones in a mass of concrete is always detrimental to the work, which should be as homogeneous as possible. When time is an object it is sometimes permissible to use them so as to get on faster, but the quality of the work is never benefited by it. On the other hand I believe it is often improved, particularly when using very wet concrete, by spreading here and there a layer of the broken stone used for the concrete and beating them well in. It is sometimes—perhaps generally—considered that the richer the concrete is—that is, the smaller the dose of broken stone—the better the result. I am convinced that this is a mistake, and that if the stone is hard and sharp the more of it that can be rammed in the better, provided that the pieces are thoroughly coated with mortar. The reason is that the stone is stronger than the mortar, the only object of the latter being to fill the voids and bind the stones together. Of course, this requires great judgment and a competent and faithful inspector, or the license would be grossly abused when the work is done by contract.

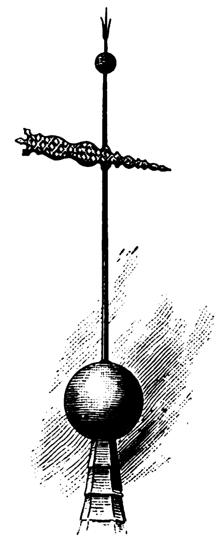
Writers on the subject of concrete making do not dwell sufficiently upon the after treatment of the material. The work is not finished when the concrete is made, mixed and rammed. All exposed surfaces must be kept constantly and thoroughly moist for an indefinite period, the longer the better. The top surface of a concrete foundation must be kept wet till it is covered by the superstructure.

Historic Weather Vanes.

A century or two ago weather vanes were held in higher estimation and were more generally used than at the present time, when the daily papers give a forecast of the weather—correct or not, as may be—for several days in advance. No little skill and taste were displayed in the design and construction of these vanes, as may be readily seen from the two historic specimens now in the possession of the Washington Association, at Morristown, N. J., and which are shown in the accompanying illustrations, says a recent issue of *The Metal Worker*. Fig. 1 represents a weather vane that was used on the estate of Lord Stirling, at Somerville, N. J. While it probably occupied a neutral position in the matter in dispute between the Continental troops and King George's soldiers, like many other non-combatants, it did not escape injury. The two bullet holes shown in the tail of the vane are mementos of its experience in the little exchange of compliments that took place in 1777. The staff supports an ornamental iron construction, which gives the points of the compass.

The second vane, shown in Fig. 2, did service on the top of the First Presbyterian Church of Morristown, from 1791 until recently, when the new church was built. It is preserved as a relic at the "Headquarters" maintained by the Washington Association in the suburbs of Morristown, where many other historic relics are also preserved and on view. Particularly interesting to readers of *The Metal Worker* would be a visit to the old kitchen of the headquarters, with its equipment of a century and a quarter ago, and also the dining room and parlor with the antique fire backs, which were among the first manufactured in the United States. The vane in Fig. 2 still rests in the apex of the old church steeple, which was sawed off several feet below the top. A few feet above the wood work is a copper ball. Our temperance readers will find pleasure in the fact that this ball was made from three distillers' kettles. It still retains a remarkable trueness of form, testifying to the skillful handicraft of the coppersmith who produced it.





Above the ball is the weather vane, in the design of which the curved line of beauty has been used with considerable taste. Above the vane is another copper ball. The upper ball is probably 9 inches in diameter, while the lower ball is about 2 feet in diameter. The top of this spire terminates in a graceful trident.

New Publication.

Modern Carpentry and Joinery. By Fred. T. Hodgson. 193 pages; size, 5.152 x 7¾ inches. Profusely illustrated. Bound in stiff board covers. Published by Frederick J. Drake & Co. Price, $1, postpaid.

This work is by an author whose writings for many years past have been familiar to readers of this journal, and he has treated the subject indicated by the title in a way to command the careful attention of students of carpentry, while possibly affording many valuable hints and suggestions to some of the older members of the craft. The subject matter is contained in four parts, all of which are illustrated with diagrams and figures showing the solution of many intricate problems in geometry, roofing, carpentry, joinery and stair building. In the first part attention is given to carpenters' geometry, wherein is defined the qualities of circles, polygons, ellipses and other geometrical figures with which the ordinary workman may have to deal. The second part relates to timber framing and carpentry, showing the use of the steel square, as well as methods of framing roofs, bridges, domes, &c. Part 3 relates to joinery and joiners' work, while part 4 is devoted to tables and handy rules for estimating and measuring work of any kind. The matter is presented in Mr. Hodgson's characteristic style, the various points being explained in a way to be readily understood by the younger element in the trade.

IN the construction of a large storage building near the corner of Sixty-fourth street and Columbus avenue, New York City, some rather novel ideas have been incorporated. The plans drawn by B. W. Levitan provide a scheme for detecting and extinguishing fire in each storage room, this being accomplished by closing the ventilating apparatus of the room when a fire breaks out and at the same time automatic sprays moisten the air, giving a blanketlike effect. The structure is ten stories high and cost about $500,000. It is of the modern French style of architecture, with a monumental exterior elaborated in Indiana limestone and hydraulic pressed brick. Surmounting the edifice is a bronze statue of Liberty, 60 feet high, and with a powerful beacon light 200 feet above the sidewalk. A feature of the finish of the general office on the ground floor is a mantel of pure royal copper with *bas-reliefs* of fine workmanship.

"M. F." Brand Tin Roofing.

An interesting discussion recently arose as to the origin of the "M. F." brand of roofing tin, which is being put on the market by the American Tin Plate Company, and of which W. C. Cronemeyer, Carnegie Building, Pittsburgh, is special agent. The supposition was that the letters "M. F." stood for "Most Favored," but, in order to remove any doubt in the matter, Mr. Cronemeyer addressed a letter to Margam & Mansel Tin Plate Works, Port Talbot, Glamorganshire, England, making inquiries as to the origin of this brand. In reply Mr. Cronemeyer received a letter from Sydney H. Byass, a copy of which we have been able to secure and which reads as follows:

"In reply to your favor of the 17th inst., I thank you for sending me one of your new booklets, and with regard to the origin of the letters 'M. F.' I do not think that any of the theories which have been advanced to you are correct, but, as a matter of fact, the letters stand for 'Margam Forge.' I have not been able to absolutely make certain that this is the case, but it is more than probable that this is the correct solution, as at this works the brand was first made, and in fact was made here until four or five years ago, when the works were dismantled. They are still known by the name of 'M. F.' among the old workmen."

The process under which the "M. F." brand of roofing tin is made has proved to be successful in producing a roofing tin of lasting qualities. Since being acquired by the American Tin Plate Company the process has been considerably improved. We may state that the U. S. Eagle brand of roofing tin, made by the United States Iron & Tin Plate Company in this country years ago, was made by the same process as the "M. F." brand. The main improvement in the process made by the American Tin Plate Company was in giving the plates a bath in oily substances, horizontally instead of vertically. By this process the common fault of allowing a large part of the coating to adhere to the lower edge of the plate when it is removed vertically from the tinning pot is overcome and the coating is distributed evenly over the entire surface of the sheet.

Berry Brothers' New Office Building.

Finding it necessary to increase their office facilities and concentrate the various commercial departments under one roof, Berry Brothers, Limited, of Detroit, Mich., lately erected a structure especially adapted to meet their requirements in this particular line. The building is a type of the modern French Renaissance, and its details, both exterior and interior, have been dominated by this idea. The character of the structure is such that the term office seems altogether inadequate in this case, owing to the fact that the various departments and the large clerical staff, handling not only the Detroit business but that of the many branches located in the principal cities of the United States, are installed beneath its roof, thus making it more the administration building of the firm, which in reality it is.

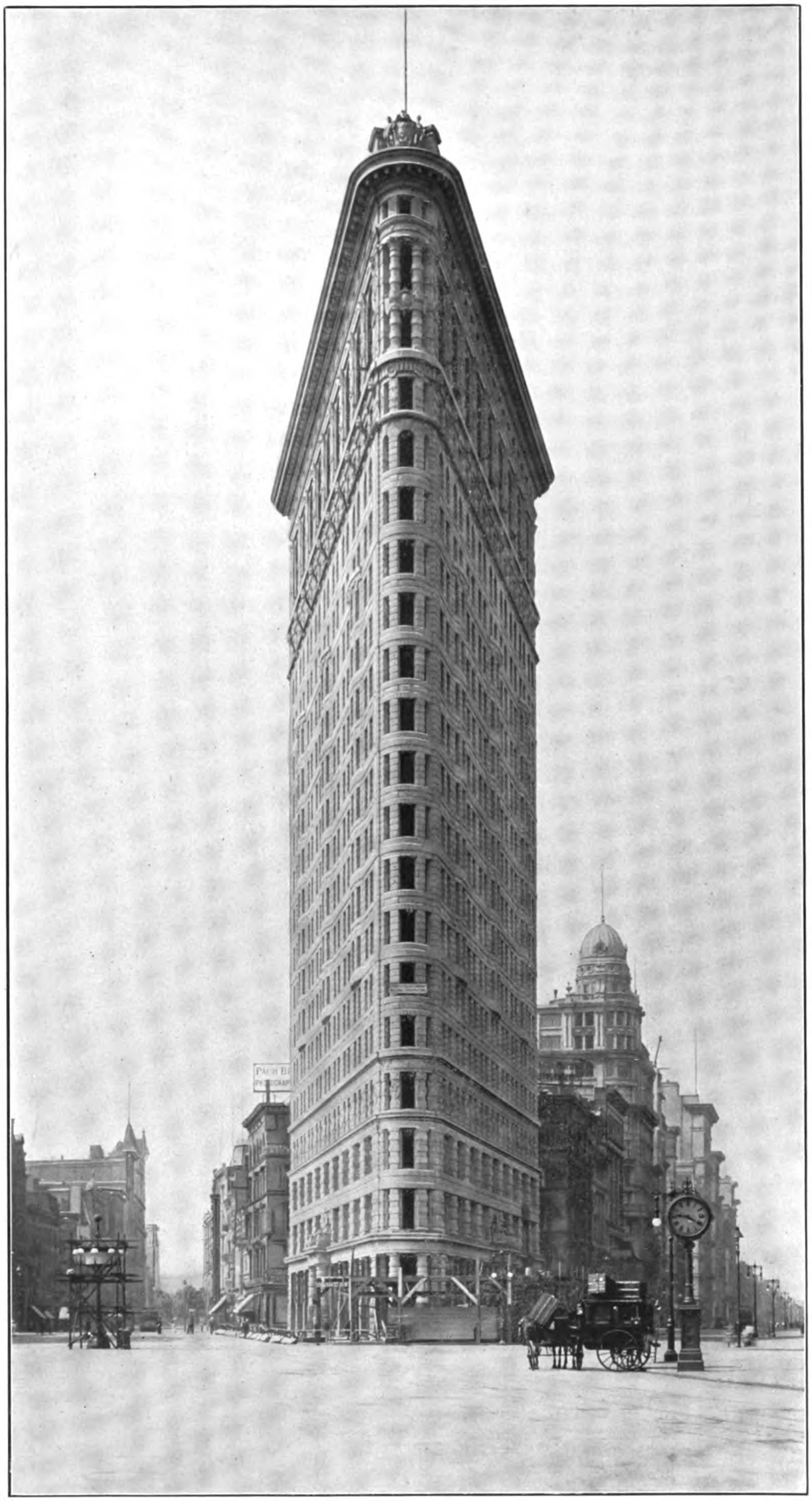
Exteriorly the walls are of dark red pressed brick, laid up in English cross bond, the main cornice, main entrance and exterior trimmings generally being of gray terra cotta. The roof is of red terra cotta tile.

The interior trim is of antique finish quarter-sawed oak, the finely developed grain of the wood bearing eloquent tribute to the owners' well-known hard oil finish. The ceiling is supported by massive columns of Florentine marble, with bronze capitals and verd antique marble bases. The columns carry ornamental stucco cornices of handsome fluted design, with which the entire ceiling is paneled. The main office floors are of quarter-sawed white oak, laid in herringbone pattern in pieces 12 inches long, and as finished with Berry Brothers' liquid granite present a very handsome appearance.

The large and finely appointed private offices, of which there are six, are divided by wide oak panels built up of veneers, with molded cornices, the spaces between them and the ceiling being filled with polished plate glass set in antique brass. The private offices have also antique oak mantels and fire places of verd antique marble and bronze.

An extensive system of fire proof vaults is fitted up with the latest devices in steel shelves, lockers, &c., and the entire building is heated by hot water, with both direct and indirect radiation, with the fan system for ventilation. The building is 95 x 115 feet in plan and an excellent example of the restful and conservative type of architecture, exciting admiration for the dignified symmetry of its lines and proportions.

CONTENTS.



THE NOTABLE "FLAT-IRON" OR FULLER BUILDING, NEW YORK CITY.

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NOVEMBER, 1902.

A Mammoth Apartment House.

One of the most notable of the recent additions to the domestic architecture of the residential section of New York City west of Central Park is the mammoth apartment house known as the Ansonia and fronting on the entire block extending from Seventy-third to Seventy-fourth streets on Broadway. While more or less reference to it has been made it is probable that the average reader outside of the city has little conception of the imposing character of the design, the massive proportions of the structure, the complexity of the equipment, or the perfection of its appointments. Some idea, however, may be conveyed by the statement that above the street level there are 2500 rooms, so planned as to make possible any combination desired. There are more than 400 bathrooms, with tiled floors and wainscoting, containing solid porcelain tubs, wash basins and toilets, aside from which are 600 additional toilets and 800 wash basins. Every private kitchen has a porcelain wash tub and an electric closet with electric cooking range. Every apartment also has filtered hot and cold water, as well as iced water and long distance telephone. An idea of the multiplicity of appliances and apparatus may be gained from the fact that there are 175 miles of piping of all kinds concealed within the floors and walls of the building designed for conveying messages, protecting bell and telephone wires and electric conductors, providing gas, hot, cold and iced water, heating the rooms, refrigerating the ice boxes, operating elevators, of which there are 16 in the building, draining and ventilating the sanitary appliances, conveying steam to and from the engines and pumps, &c. The main floor is devoted to public rooms, offices, a bank, a pharmacy, a florist's establishment, a finely appointed public restaurant with private dining rooms and an old English grill room, while on the top floor, overlooking the Hudson River and commanding a view of miles in all directions, is a banquet hall and a roof garden. Adjoining the main entrance on Seventy-third street is a palm garden and assembly room, the latter being arranged for the use of private entertainments.

Equipment of Modern Apartment House.

All the public rooms are finished in the style of Louis XIV, while the apartments are decorated in the French Renaissance style, with white enameled woods, mahogany doors and hard wood floors. The manager's office is provided with a series of indicating instruments which record the pressure of air, steam and water, the temperature of the outside and ventilating air, its degree of humidity or dryness, the temperature of iced water and brine, the electrical conditions and the records of the watchmen as they patrol the building at night. On each floor is a serving room, by means of which meals can be served in the apartments from the restaurant kitchen, and in this room is a cold storage for keeping articles for tenants whose suite does not include a kitchen. Pneumatic tubes from the manager's office to each floor expedite the conveyance of visitor's cards, messages and orders to and from the apartments. Another striking feature of this twentieth century habitation is the equipment of the basement, where are to be found a grocery department, a bakery, a butcher shop, a milk depot, a laundry, a storage, repair and charging room for automobiles, ladies' hair dressing and manicuring parlors, safe deposit vaults and cold storage rooms for furs, &c. Here is also located one of the largest swimming pools in the city, supplied with water from the Hudson River and with a capacity of over 300,000 gallons. Provision is also made for hot and cold salt water baths, as well as fresh water baths, all the water being filtered so as to make it perfectly clear. The system for supplying water to the plumbing fixtures is something entirely new and the like of which is said to have never before been attempted. The matter of ventilation has been carefully considered and the building is unique in the provision of a supply of fresh, filtered air to the interior of every suite of apartments. The air is drawn into the building through screens and filter cloths to the sub-basement, where large electric blowers force it over coils, which in winter are heated by steam and in summer cooled by freezing brine, and then discharge it under pressure through the galvanized steel flues which arise through the building. All impure air, gases and odors arising from cooking are drawn out of the rooms through vents by means of electric exhaust fans on the roof.

Skilled Workmen Good Citizens

All students of history agree that a nation is strengthened as the skill of its workingmen increases and as the proportion of skilled labor expands. The acceptance of this conclusion should make every well wisher of his country zealous in affording to young men the best possible opportunities to become skilled and self supporting workmen. Unfortunately the conditions under which many branches of business are conducted to-day make it difficult to give to the training of young men the attention that it received before the apprenticeship system became practically obsolete. While to a limited extent the apprenticing of young men is in vogue in certain trades to-day, the system does not by any means supply the training that was given when the employer was himself a skilled workman and worked daily in company with his employees, so that he could have an eye over his apprentices and see that they were properly instructed so as to early become efficient hands in his shop. Not only are the conditions so changed that it is impossible for the employer to give such attention, but of late years there has been a disposition in all the trades where young men were hitherto apprenticed to restrict the number of apprentices and otherwise reduce to a minimum the opportunity for a good, stout, intelligent boy to become possessed of such skill and knowledge of his chosen trade as would enable him not only to earn a livelihood, but also to become a useful citizen. Manual training has found its way into the public school system, and in some localities excellent trade schools have been established to enable young men to acquire the theory and handicraft of their trade. While these schools never can supply the practical information that is gained in several years of actual experience with work in the shop, they give valuable instruction as to the best method of handling tools and doing work, and enable the young workman to thoroughly learn the underlying principles of all the work that he does. It is encouraging that the trade school idea is gaining ground, although slowly, and that in addition to such institutions the correspondence schools have been established to aid those who are not advantageously located in mastering the theories of different trades. These institutions mark an evolution in the process of securing skilled workmen. While some obstructive methods are used by men already possessing a trade training it is improbable that their attempt to reduce the number of skilled workmen by restricting apprenticeship will be successful to any considerable extent.

Chicago Building Record.

The figures recently made public respecting real estate deals and building operations in Chicago are interesting and of special significance as revealing the substantial improvement which has prevailed in that section not only during the last nine months but for several years, being a direct outcome of the prosperity of manufacturing interests. The figures referred to break the record for any three-quarters period in ten years, the total number of transfers of property for the first nine months of 1902 being 19,903, while the considerations aggregate $97,138,158, which is an increase of 2992 in the number of transfers and $12,688,219 in considerations over the corresponding nine months of 1901. While the transfers have been so much greater the number of new structures erected up to October 1 of this year is only 47 more than during the corresponding period of last year, but the estimated cost is $11,399,820 in excess. This is the greatest value record since 1892, when there was extraordinary activity in building and real estate transfers because of the World's Fair; but the character of the buildings erected thus far in 1902 is vastly superior, all things considered, to the buildings erected in 1892. The average cost for this year was $8080, for last year $5743 and for 1892 only $4745. One of the more important projects under way and which when carried to completion will prove a highly creditable addition to the architecture of the city is that of the 20-story building of the Continental National Bank, to be erected in accordance with drawings prepared by Architect Cass Gilbert of New York City. This, with the additional stories to the Rand-McNally Building adjoining, will make a 20-story business block, covering an area 210 x 165 feet and involving an expenditure closely approximating $4,000,000.

Novel Street Connection Through Two New Office Buildings.

It is not often the case that two streets of a city are connected by an arcade extending through two modern office buildings of the steel skeleton type, but such a feature will soon be found in the lower section of New York City, and it will be the only instance of the kind thus far in the metropolis. On the north side of the block between Nassau and William streets, known as 28 to 32 Pine street, work is now in progress on a 12-story office building which Kean, Van Cortlandt & Co. are erecting and the ground floor of which they will occupy. Adjoining their property on the north is a plot which the Mutual Life Insurance Company are improving, with a building to be leased for a long term to the Home Insurance Company. The bankers have provided in their building plans for an arcade 10 feet wide, near the easterly side of the plot, running from the entrance straight back to the Home Insurance Building, which will have a corresponding arcade connecting with it and running to Cedar street. The latter will also be 10 feet wide, with booths lining both arcades.

A MOVEMENT is at present on foot looking to the erection in Cincinnati, Ohio, of a 15-story building to be constructed entirely of cement concrete. It is probably the most pretentious undertaking of the kind ever attempted in this country, if not in the world, and the outcome will be watched with no little interest by architects and builders everywhere. The architects are A. L. Elzner and George M. Anderson, and the work is being undertaken by the Cincinnati Fire Proofing Company. The structure will cover an area 50 x 100 feet, and will be erected under what is known as the Ransome system of concrete and cold twisted steel construction.

Lectures to Masons' Apprentices.

The success which attended the lectures given by architects of the Illinois Chapter of the American Institute before the masons' apprentices in Chicago last winter was so signal that they will be repeated the coming season. It is not generally known that the master masons and the masons' union have arranged an apprentice system under which each apprentice receives three months' schooling each year, during which time he is obliged to attend school and also receives his pay from his employer. The city of Chicago, says the *Inland Architect*, has also arranged schoolrooms and teachers for their special use, and their studies not only comprise elementary branches, but follow such technical lines as will best serve them in their work. It is encouraging to note that of the apprentices who attended school last winter not one seemed indifferent, and many attended the night as well as the day classes, and all were enthusiastic and diligent. This has all been accomplished by the unselfish work of a few men who wish to aid in the elevation of the workman and the improvement of his work, and shows what can be accomplished in every trade, and how gladly such aid is accepted by the young mechanic who wishes to succeed in mastering his trade.

New Post Office at Mexico City.

The new general post office building at Mexico City, on which work was commenced September 14, will be the handsomest as well as the largest and tallest modern building in the Republic of Mexico. The building will have a frontage of 45.72 m. on *Calle de San Andres* and a frontage of 7.22 m. on *Calle de Santa Isabel*. It will have a ground area of 3735 square m. and will be 28 m. high. It will be a four-story steel frame fire proof and earthquake proof building, and will be the first steel frame building constructed in Mexico. The building will be of stone and will be built in the Spanish Renaissance style, resembling somewhat the new post office building at San Francisco, Cal.

The internal arrangements of the building will present all the latest improvements in postal service. A wide gallery will run around the building, enabling the public to reach the different departments. The whole of the service will be carried on in the center, which will consist of a large glass covered court, which is to be ventilated and lighted according to modern standards and to be fitted out with native Mexican marble.

The designing and supervising architects are Gonzalo Garita and Adamo Boari. The corner-stone was laid by President Diaz of the Republic on September 14, and work on the building is now under way.

AT the recent convention of the United Brotherhood of Carpenters and Joiners of America, held in Atlanta, Ga., the latter part of September, W. D. Huber of Philadelphia was re-elected president. The convention to be held in 1904 will be in Milwaukee, Wis. The general headquarters of the Brotherhood will hereafter be located in Indianapolis, Ind., they having been in Philadelphia for the past ten years or more.

IN view of all that has been and is being said about the notable "Flat Iron" or Fuller Building in New York City, it may not be without interest to state that in 1879 a church was erected at Brighton, England, on a plot of ground very similar in shape to that of the New York structure. At the time the church was the object of no little criticism on account of its peculiar shape.

A BRICK HOUSE IN ST. LOUIS.

A PLEASING variation in our series of half-tone supplemental plates is the two-story brick residence with its frame work of heavy foliage which forms our leading subject this month. The house is pleasantly located on Cabanne avenue, St. Louis, Mo., is constructed of brown mottled brick with stone trimmings and has the sides of the dormers as well as the various roofs covered with 12 x 20 inch green slate laid not more than 7 inches to the weather. The front and side views which constitute the basis of our half-tone plate are direct reproductions from photographs taken especially for the purpose.

The interior of the house is arranged with large reception hall, parlor, dining room and kitchen on the main floor, a sitting room lighted by a projecting window, three sleeping rooms and bathroom on the second floor, while in the attic are two good sized sleeping rooms, a girl's room and a commodious linen closet with the usual appointments. The first story is 9 feet 10 inches in the clear, the second story 9 feet 4 inches and the third 8 feet 6 inches. The cellar is 7 feet 3 inches in the clear and has a floor consisting of 4 inches of cinders and Louisville cement with a top dressing of Portland cement, troweled to an even, hard finish. The cellar girder is 6 x 8 inches, made of three pieces well spiked together; the posts are 6 x 6 red cedar; the second and third tier of joists 2 x 10 inches placed 16 inches on centers and each tier having two rows of 1 x 3 inch cross bridging. All joists are doubled under partitions, trebled and trussed under sliding doors, and where of more than 14 feet span are stiffened with 1 x 6 inch pieces nailed to the sides. The rafters are 2 x 6 inches spaced 2 feet on centers; the porch joist 2 x 8 inches and the ceiling beams and rafters 2 x 4 inches. The wall plates are 2 x 8 inches and the stud partitions are placed 16 inches on centers.

The floors of the house are of yellow pine, with porch floors 1⅛-inch white pine, blind nailed and with joints laid in white lead. The porches and underside of the bay are ceiled with 2½ x ⅝ inch matched and beaded yellow pine.

The first and second stories have 5-inch molded pilaster finish with plain round edge corner blocks, molded plinths and 10-inch base with back mold. The hall, parlor and dining room are finished in red oak, as shown in the details. The kitchen, rear hall, rear stairs and bathroom have wainscot caps and base for cement wainscoting. With the exception of the parlor, dining room and hall, the wood work is of selected cypress. The newels, balusters, rails, face and wall strings, spandrel, &c., in connection with the main flight of stairs are of red oak, the style being clearly indicated in the details. In the kitchen is an enameled iron sink with slate backboard and 40-gallon galvanized iron boiler. In the bathroom is a syphon jet wash out closet with tank supported on brass nickel plated brackets, stone china bowl wash stand with countersunk marble slab. The plumbing is of the exposed type, installed in accordance with the city ordinance, and the trimmings are nickel plated.

The exterior and interior wood work has three coats of pure lead and linseed oil tinted according to the taste of the owner. The building is wired for electric lighting, the various switches being located as shown on the floor plans. The house is heated by a No. 48 hot air furnace made by the Front Rank Steel Furnace Company of St. Louis, Mo.

The dwelling here shown was erected for Morris Glazer, in accordance with drawings prepared by Ar-

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

A Brick House in St. Louis.—A. Blair Ridington, Architect, St. Louis, Mo.

chitect A. Blair Ridington of 904 Olive street, St. Louis, Mo.

Suggestions for Flat House Construction.

In connection with a proposed ordinance regulating apartment house construction in Chicago, W. D. Cowles, an architect of that city, offers some rather interesting suggestions. He says: I would suggest, first, that all apartment buildings six stories and over be fire proof; second, all three stories and over, up to six, be built under the following three principal requirements:

First, all ceilings wire lathed.

Second, 1 inch or 1½ inch of cinders mixed with lime or cement between the rough and finished floor of each floor.

Third, all partitions of light, incombustible material of the nature of mackalite.

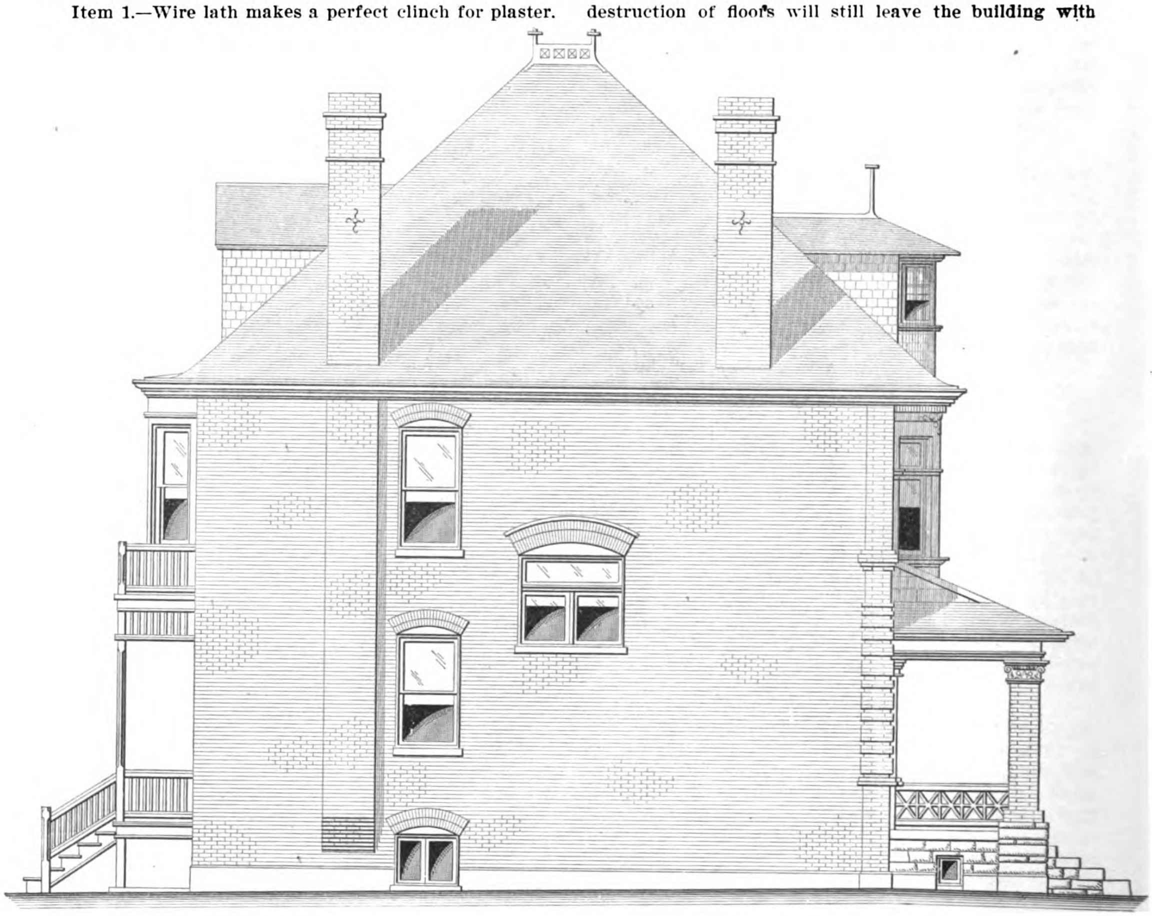
Item 1.—Wire lath makes a perfect clinch for plaster. The wire has no warping strength. The flames must roll fiercely and continuously before a break can be made in such a ceiling. I had a fire in a dry goods store at one time; it had a good start, but the wire lath ceiling never cracked and saved the building.

Item 2.—The cinder layer makes a second check to the flames working up, also a check to down working. I had a fire in a flat some years ago that burned a piece out of the floor about 4 feet square, but stopped at the cinders, saving the building. It looked as though this particular fire had been built on that particular floor.

Item 3.—The firemen can flood every floor with water, but can not reach partitions back of the first partition from the outside windows. In a large building like the Vincennes the firemen poured tons of water on each floor, filling the basement and creating rivers in the street, but back of the first partition each partition burns merrily away. A fire starting in the top story seems more certain of destroying the building than if starting from the bottom.

Every partition should be fire proof, confining the fire to the floors. These principles will not add seriously to the cost of the building.

The present system of supporting columns and T beans, so economical of space, can be continued, but the use of I beams for columns, a mongrel construction, should be forbidden. Columns should be cast iron. Cast iron columns will not melt or bend in any but the most extraordinary circumstances. It is current opinion that they will, but this opinion is book acquired and a superstition. I have personally examined every ruin I could find in the last 15 years and I never saw a bent cast iron column. All columns should be tied laterally at each floor by the rods to outside walls, the I-beam forming a tie in the opposite direction, securely fastened to columns. Let the beams bend with the fire, total destruction of floors will still leave the building with its walls and its interior system of columns, beams and rods to hold it together.



A Brick House in St. Louis.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

The brick walls should be built so they would not fall when the joists are burned out. If split up with wooden bays there should be piers at each end of the brick. Wood construction corner bays of towers should be abolished.

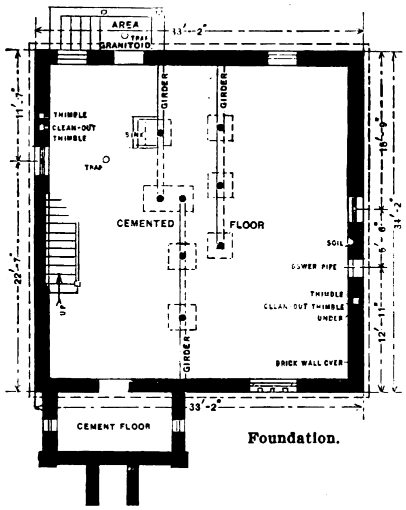
The firemen's lives should be saved from falling walls as well as the lives of tenants.

Meeting of Texas Builders' Exchanges.

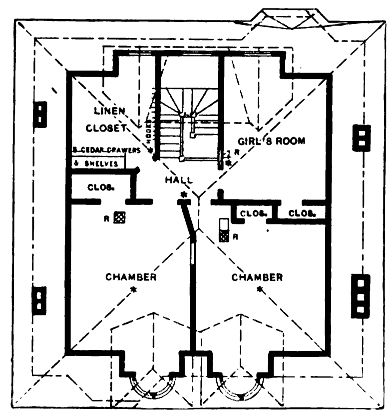
The third annual meeting of the Texas Builders' Exchanges was held in Dallas the first week in October, with delegates present from the principal cities of the State. During the three days the members were in convention matters of general interest to builders throughout the State were discussed and officers for the ensuing year were elected as follows: President, L. P. Boettler of San Antonio; vice-president, L. R. Wright of Dallas; secretary, H. C. Opperman of Galveston; treasurer, William Brice of Fort Worth, and sergeant-at-arms W. E. Murphey of Denison.

Why a Building Did Not Fall.

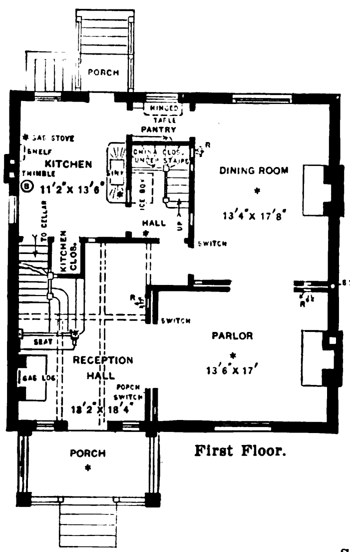
Apropos of the fall of the Campanile and the paralyzed manner in which the Italian authorities seem to have been unable to avert the calamity, we are reminded of an incident which occurred in connection with the erection of one of the large office buildings in New York City some 20 years ago, says a writer in the *Brickbuilder*. This structure was one of the first of the heavy office buildings, and while by no means as tall as what we have become familiar with since, the column loads were very considerable and required some careful manipulation. The building was partly on made and partly on natural ground, and for some reason the foundations were partly upon the earth and partly upon piles. It is a well-known quality of piles driven into the earth that after they have once acquired a set they can be very heavily loaded without any appreciable settlement until the load becomes so great that the skin friction and resistance of the soil are overcome, when the pile suddenly settles very perceptibly until it comes down to a bearing. In other words the pile presents considerable inertia to the load. This is what happened in this case, and after the masonry was all in place and the columns very heavily loaded one of these columns under an inner corner of the building began to give way. We remember the very graphic description of what happened, given us by the builder who had charge of the work—how he stood beside the column putting his ear to the ironwork and could hear it snapping and giving way, and how he took a stand at the entrance to the building with a crowbar and by sheer pluck and muscle forced the badly terrified workmen to get the necessary shores in place and hold up the building. He was successful. The building did not go down, but he did not have many seconds' leeway, and it was a kind of experience which left its mark upon him for years.



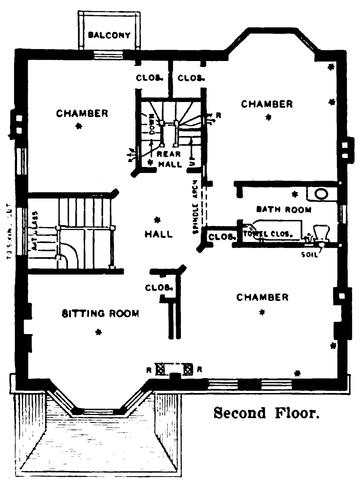
Foundation.



Attic with Outline of Roof Plan.



First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.

A Brick House in St. Louis.

Papering Ceilings.

In view of the discussion which has recently been in progress in our correspondence columns relative to the above subject, the following comments by a writer in an English contemporary may not be without interest:

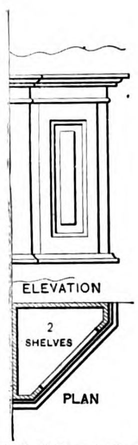
When, in order to strengthen a surface or hold up a badly cracked ceiling, the surface is covered with paper or canvas, the object to be aimed at is to hang the paper smooth and straight. Very much depends upon the laying of the first length. It must be laid perfectly true to a straight line, the other lengths will then follow straight. A straight line, struck by means of a chalk line down the center of the space to be "lined," will serve as a correct start and hold all the other lengths to accuracy.

For work that butts a straight edge with a steel edge to it and a trimming knife are necessary, especially for stout paper. Many manage to do the work with a pair of scissors, but in that case the edges seldom meet accurately. A roller is also of service to rub the edges well down. A roll of paper held in the left hand is useful; it helps to hold up the limp pasted lining paper when applying it to the ceiling, leaving the right hand to fix the paper to the joint. It is then easy to sweep the paper up with the roll in the left hand, continuing to butt or lap the paper with the other hand by means of a cloth or brush. When the paper is pasted and folded, take in the left hand the roll you are using to help to lay the pasted paper, and place it under the center of the paper; then unfold the right end of the paper, which should be the shortest fold. In this way carry it up the steps.

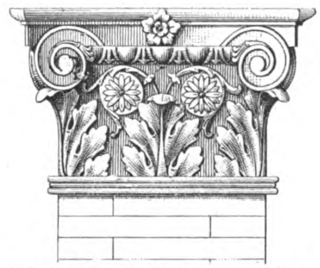
The short way of the ceiling allows shorter and more manageable lengths to be hung, but the lap should be hung away from the light, so as to be less perceptible. Begin at the light; work away from it so that the laps do not show. Lapped paper is certainly less liable to curl up from the ceiling than when it is butted.

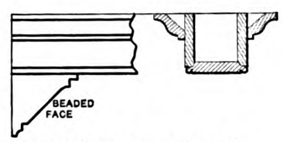
The new Government Printing Office in Washington, now near completion, affords a floor space of 7 acres and will have cost when finished $2,400,000. In its erection there were used 14,000,000 pounds of steel, 2,000,000 pounds of cast iron and 40,000 barrels of Portland cement. The doors are made of asbestos composition, and the door and window frames of iron.

At the St. Louis World's Fair great fluted pillars 36 feet high and 4½ feet in diameter are now being made in a mold set in place, the liquid plaster being poured in at the top. Ordinarily such pillars are made in 24 pieces and set in place, leaving many joints that have to be carefully pointed. There will be 112 such columns on the Textiles Building.

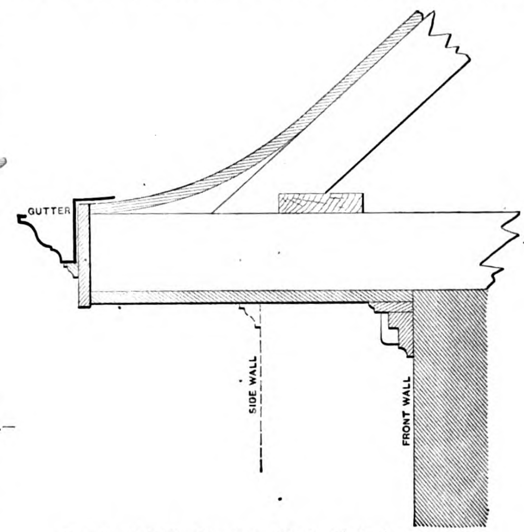


Detail of Towel Closet in Bathroom.

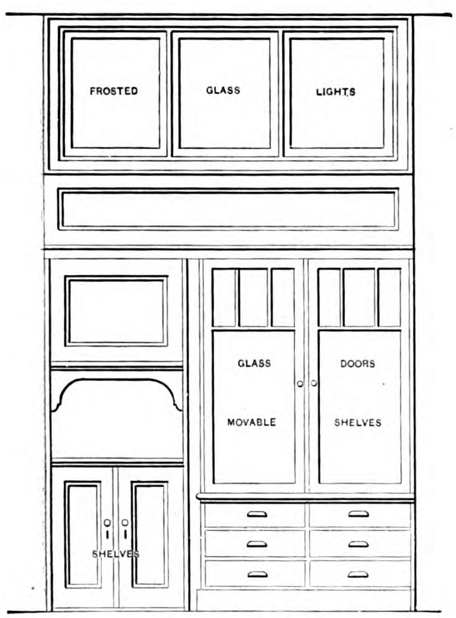

Detail of Porch Capital and Column.—Scale, 1 Inch to the Foot.



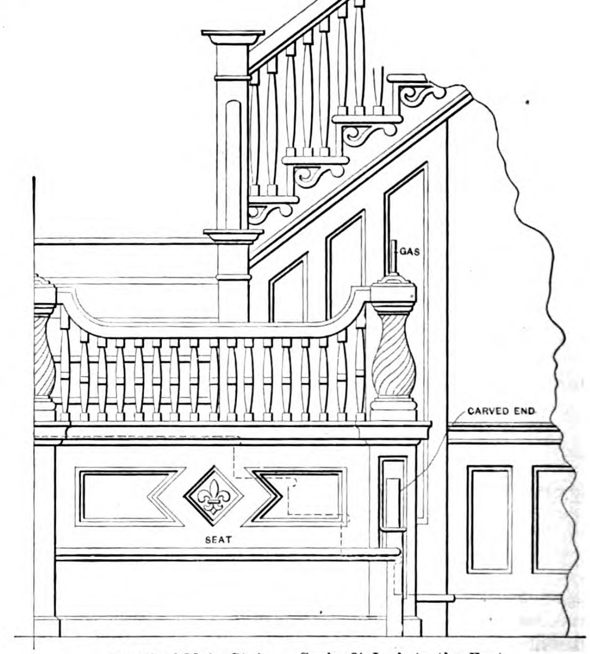
Detail of Ceiling Beam in Hall.—Scale, ¾ Inch to the Foot.



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



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



Detail of Main Stairs.—Scale, ⅜ Inch to the Foot.

Miscellaneous Constructive Details of a Brick House in St. Louis.

CABINET WORK FOR THE CARPENTER.

BY PAUL D. OTTER.

On the same basis of construction as that already outlined, a convex scraper may be made, by arching the central part of the handle to any desired curve and making the blade in conformity. This tool is used in shaping to a finish the hollow or saddle surface on wood seat chairs, the roughing out work being effected by a mallet and gouge, followed by a convex shave similar in round to the scraper. As a necessary adjunct, or rather a preliminary tool, the spoke shave, Fig. 7, has much to do in preparing in an easy way the surface or edge, before using the scraper described. A form of this tool is to be had from hardware dealers, but like many bought tools and a few all metal tools, it does not appeal to the men whose work requires a spoke shave. The illustration, Fig. 7, shows the form of handle, section and tightening bolt, which is set in a similar way to that of the scraper. The blades can be bought of different sizes. A handle made for a small blade, such as would readily cut the edge of a portion of a 3-inch circle, would be found very serviceable, with one large tool for heavy work. It is suggested that a plate of bone be used for the heel of the tool instead of brass; a strip sawed from a beef shank, inserted in the wood handle, held by screws and filed to a flush finish, causing the tool to work more freely than metal. A little oil wiped over it now and then will add to easing the work.

Now to the application of these tools to the hall seat and other furniture forms. With the work all in the square edged state, note what is desired—a reduction of certain surfaces and edges beyond the range of any shaper knife, universal plane or other tool running in a set form or along a gauge.

The panel above the seat is the only part of the back on which the edges will be rounded off in a vigorous way. After having been fitted to the exact position it occupies in the opening of the frame and marked with a scribe line, remove and secure it in the vise, edges up, or else screw on temporary cleat blocks in back and catch this in the vise. This is a better way for stock dressing, as all edges and surfaces are up to view, and a full sweep is given in reducing the stock in a symmetrical way. This work creates a feeling for form and trains the eye to considering an even balance of right and left. A ⅝-inch sliver at the least should come off the edge at the start, and the draw knife is brought into use to do it quickly and easily; then with the spoke shave begin the rounding, taking care not to run too close to the scribe mark or the edge. With an easy swing, work well over onto the surface, so that there is one continual roundness. The surface is now reduced to a condition where the scraper tool is brought into use. With this remove all streaks and smooth over with the grain and diagonally across the grain at the ends. Noting the grain and being in thorough sympathy with the "varying moods" of wood growth is everything in using this tool successfully after the adjustment of the blade and heel plate is to your satisfaction. An after finish with the cabinet scraper blade prepares the surface for sanding with No. 0 sandpaper, using the sandpaper block and then the loose paper. The front edge of the seat is molded off in about the same way as the back panel.

Continued from page 241, October issue.

The draw knife will again be required in removing the edges of the end pieces. The full sweep of the line from under the arms to the termination by the curve above the foot will be molded evenly on both edges to a half round. This will make a contrast to the foot, or bandy leg below, which is rounded off from a square edge at A, Fig. 3, in an easy sweep to a shade off onto the surface at B, keeping full width of blocks at C, this work, of course, being carried out at both sides of the end. We remove the square corners of the glued-on blocks in a decided manner with the draw knife, thus reducing them in a roughly rounded condition to that of the side line. Then take a gouge and mallet and cut away the superfluous stock intervening of the glued-on blocks between A and B quite down in a slanting manner to the middle surface. With a pencil mark from top of toe a curved line illustrated in the foot, shading out at B. When such a line is to be marked for a number of pieces a pattern should be made of zinc, with a check or stop at B and at the floor line. This being slightly bent in conformity to the roughed out part, the line may be marked out quickly and with accuracy.

As the original sample is being constructed, this is a part of the work where the eye, and a decision as to what looks right, must be exercised. Using more care with the gouge, cut near to the line, both legs being worked away in this rough state. Continue with the spoke shave to round off the bottom portion under the marked line, almost in the same manner that a lathe would do it, shading off the rounding at B. Here we shall have to resort to a chisel, as the shave cannot be worked. This is to be followed by a coarse half round wood rasp, using the flat side for the under part of leg, and the round side to be brought into use on the upper and curved surfaces, where the shave and scraper will not go. Having satisfied yourself that the leg has been worked into a trim, evenly balanced form, finish with the cabinet scraper and No. ½ sandpaper. If the glue joints are good, the joint should be very little in evidence. The arm, which has been fitted and scribed underneath, where it rests on the end, is now to be treated to a low round on the face, and the nose rounded off in keeping with the flowing line underneath; then, as shown in the illustration, it is coved out underneath on the outside, shading out as it nears the back. The serpentine edge of front board is shaped off with shave and scraper; this leaves no square edges on the construction except on the back framing.

A convenient holder for shaping arms, legs and other irregular parts with the spoke shave and scraper is shown in Fig. 8 of the illustrations. The outline of the

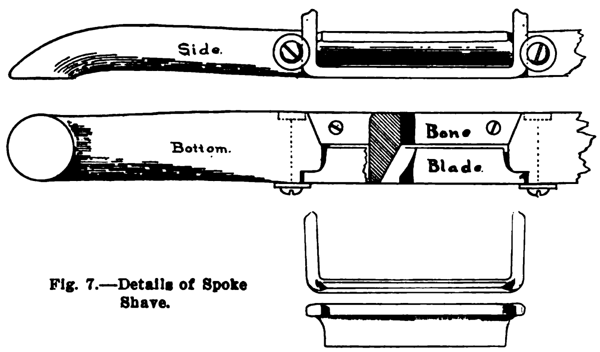


Fig. 7.—Details of Spoke Shave.

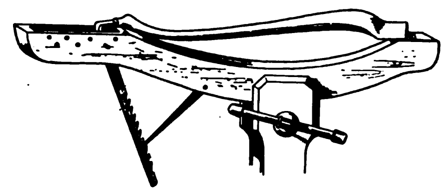


Fig. 8.—Holder for Shaping.

Cabinet Work for the Carpenter.

wooden yoke and the length are optional. The one shown is in use for many purposes, and consists of a 3-inch piece of stock, sawed to shape, having a long mortise in one end and a number of holes piercing it for a loose pin. A hard wood stick, tapered and elastic, notched as shown, and provided with an extended metal prod, is adusted in the mortise at any place desired and secured by the pin passing through it. At the other end of the yoke is a projecting metal stop, and, as shown, underneath another hard wood stick is recessed and secured with a loose pin, and the other end tapered to slip in the notches. The piece to be shaped is set on yoke, against the stop, with the notched stick secured in proper hole; it is then pulled forward, both ends are sharply dug into, and held in that position by the swinging stick underneath by slipping the wedge end into a notch.

Having completed the shaping of all parts, the work should be carefully glued up. A temporary clamp or squeezing device may be arranged on the floor in glueing up the back framing. Three or four bar clamps are a necessity, with several smaller steel or cabinet makers' clamps at hand to avoid any bungling in bringing the work up tight while the glue is hot. Too much cannot be said concerning the importance of having good, fresh, hot, easy flowing glue, and in real cold weather the parts well warmed when clamped together.

While the trick of dragging screws over a bar of soap may be known to many carpenters, it is worth doing in all hard wood work, as it makes them drive very easily and quickly when gluing. There is great satisfaction when all parts are united in a solid construction by good joinery and glue to run your hand over the work and feel that it has beauty combined with utility, or note, as a whole, where some part might be improved by making the line or surface easier. It is just as important for the joiner to inspect his work from a distance as the artist finds it of value to step back from his picture to note the distance effect of his painting. Arbitrary lines or detail expressed in a drawing may have to be modified by your better judgment when viewing the form complete.

The subject having been detailed from the drawing throughout, the matter of finishing will be taken up, but in passing it might be well to state that a chair, sideboard, or other piece of furniture on plain lines, would be treated in much the same relative way in drawing it full size, and the various parts shaped or described. On certain constructional forms, where glue joints are required to unite several parts in an unbroken line—characteristic of many "Dutch" chairs of the early colonies —the rough stock dressing is done before gluing and after jointing and fitting with dowels, sufficient wood being left near the jointed edge to insure working it away to an easy, graceful line after the parts have been glued up. No attempt should be made to do this in a trial fit. Always consider construction as a unit.

Finishing.

Having treated of this subject in a slight way at the inception of our work, we need to particularize now that the hall seat is ready to finish. Assuming that it has been made in oak, particular care should be taken that it be thoroughly smoothed over with at least No. ½ sandpaper, rubbing along the grain only. Next the color of the finish must be decided upon, as that is embodied in the filler. Many modern interiors are still being finished very near to the natural tone of the oak, and should this piece of furniture be made for an interior in this color it would be proper to finish it to match. However, this is not arbitrary with movable pieces of furniture and the prevailing finish is in the standard golden oak, which is readily obtained from varnish dealers. In remote places, where golden oak filler is not to be obtained, secure a gallon of white filler and add ¼ pound of raw umber and ¼ pound of burnt umber; thin the mixture with turpentine. If, after trying one piece of wood, a darker shade is desired, add more umber; if a lighter shade, add dry raw sienna, or turpentine and oil. I would say that oil in the umbers is better than unmixed.

When the desired shade is secured, apply with a brush and leave to dry for a few minutes. Then wipe off with a coarse rag and clean dry with cheese cloth and leave dry for half a day. Sandpaper with No. 0 sandpaper. Treat the work with a coat of orange shellac, allowing a day to pass before rubbing over with No. 00 sandpaper; then put on a second coat of shellac and rub down after hard and dry with sandpaper, and apply a final coat of hard oil finish, and when this is thoroughly dry the surface is treated to the oil rubbed finish, which leaves a finish which will always be durable and pleasing, as it does not have the intense shine of cheap varnish finish. A rubber made of listing, or a long narrow strip of suit cloth about 2 inches wide, rolled up tight and wound through the middle with twine, is more serviceable than a loose piece of cloth or heavy felt. This rubber, dipped in a semiliquid mixture of raw linseed oil and powdered pumice stone, is applied to the surface in a circular motion, and after a little practice, and wiping with a dry rag occasionally to watch how evenly the work is progressing, you will learn just the amount of energy to apply. When this entire piece has been worked over, clean off with a clean rag the excess oil and powder and go over with another dry cloth—cheese cloth preferably—bringing the surface to a good dull polish. This surface will always be benefited by after rubbing, or dusting, and may be brightened after a long time by rubbing over it a mixture of a third quantity of turpentine in raw linseed oil, using a small portion poured on a part of a cheese cloth rag.

Mortar Joints.

A very simple device for very greatly increasing the effectiveness of plain brick work consists in raking out the mortar from the joints to a depth of ½ or ¾ inch below the surface of the brick, the mortar in the joint being afterward pointed with a special tool which bevels the joint slightly so as to throw the water from each brick course. Work laid in this manner simulates to a certain extent the effect of the old brick work which has stood for generations and from which the mortar has dropped out. The mere imitation of the old work of itself is not necessarily an advantage, but by accentuating the joints, especially if the joints are laid pretty full, the surface of the wall is broken up in such manner that it is impossible for it to have a monotonous appearance, each brick casting a sharp, well defined shadow. Such a method, of course, would be impracticable for a public building or any large structure, but it lends itself very successfully to a picturesque treatment, and especially when the bricks are laid with the Flemish bond is the effect very satisfactory, says the *Brickbuilder*. The average mason is apt to make his joints too thin and to bring the pointing out beyond the face of the brick or at least make a broad tuck joint which loses itself with the face of the brick and is apt to be characterless. In the early days of the use of pressed brick in this country it was quite the custom, and is still, for that matter, in some cities, to paint the entire surface of the brick wall with red paint matching the color of the brick and afterward line off the joints in black paint. This was about as reprehensible a practice from an artistic standpoint as could be imagined, but where smoothness and a monotonously even appearance were desired such procedure was quite to be expected. There is no handsomer surface considered as a wall texture than well laid brick work, and especially if the joints are accentuated in the manner just described the surface can be a delight to any one who appreciates artistic effects.

THE fire loss of the United States and Canada for the month of August, compiled by the New York *Journal of Commerce*, is placed at $7,425,550, or about $1,000,000 below the amount charged against August, 1901, and $3,000,000 less than the loss of July, 1902. August has given the underwriters a welcome relief after the unusually severe tale of losses of last winter and spring. For the eight months ending August 31, 1902, the aggregate of fire losses is $104,559,000, against $113,000,000 for the corresponding period of 1901 and $127,206,000 for the first eight months of 1900.

READING ARCHITECTS' DRAWINGS.

THE ability to read with facility an architects' drawing is a necessary part of the education of every young mason or carpenter who is at all ambitious to make a reputation in the trade which he has chosen as a means of livelihood. That young mechanics experience more or less difficulty in acquiring this knowledge is too well known to call for comment, and it is therefore not surprising that there is manifest on their part a strong desire to learn all that is possible regarding the proper way to read drawings as prepared by members of the architectural profession. Some suggestions along this line which cannot fail to prove of interest and value to the younger element in the trade are contained in a lecture delivered before the masons' apprentices of Chicago by W. Carbys Zimmerman, a leading architect of that city, and which we present herewith.

It may seem strange to some of you that the art of drawing is older than writing, and that aside from the use of language, picture writing or drawing is the oldest method of communicating thoughts and ideas. The picture writing of our American Indians exemplifies this. Writing in all its varied forms capable of communicating the finest shades of meaning and most complex thoughts and ideas has developed from this earlier art.

The architect, however, finds that this ancient art of drawing is nevertheless still the best adapted and most serviceable for communicating his ideas and conceptions to the builder. A simple plan of a building will to the initiated, to him who can read its language, tell more at a glance than pages of written description could convey.

It is natural to suppose that having better instruments and material, the plans of the later-day architect are more intelligible than those of his forefathers. Plans are to-day not merely freehand sketches, but are carefully drawn with T-square, triangle and compass; so that the walls, which are parallel and at right angles, are so graphically represented on the plans. You can assume, therefore, that unless it is otherwise specially indicated by figures all angles shown on the plans correspond with those of the architect's T-square and triangle—that is, they are either right angles or one-half of a right-angle—that is, 45 degrees—or, possibly, 30 or 60 degrees.

Note Scale of Drawings.

The architect's plan of this country you will find as a rule drawn to a ¼-inch scale—that is, ¼-inch of your pocket rule will represent 1 foot of the drawings, or 1 inch of your rule will stand for 4 feet on the plans. In special cases, as of buildings of unusual size, or structures of very simple character, plans are often drawn to one-half of this usual scale, or ⅛ inch to the foot, and in exceptional cases 1-16 inch to the foot is used. Plans drawn to these scales do not permit of properly showing construction which is in any way unusual or complicated, and in such cases detail drawings are made use of, the scale of which varies from ½, ¾ and 1½ inch to the foot to 3 to 4 inches to the foot.

Then, again, there are matters of construction and design which can only be represented satisfactorily by drawing them the full size. As these latter drawings generally involve very considerable time and study they are, as a rule, not made until after the building operations are ready to begin, and will not be of service to you in estimating and getting at the exact nature of this class of work. It will be well for you, therefore, to give particular attention to those parts of your ¼-inch scale drawings which will be later on detailed to full size. During your apprenticeship, therefore, it will be advisable to constantly compare your small scale drawing with either the full size given you later or the actual executed work. By doing this you will, after some time, be able to intelligently interpret the meaning of moldings, cornices, belt courses, carvings, &c., and will know what to expeect in the way of a full size drawing of such work, later on, and will be able to form a more nearly correct estimate of its cost.

Again, you will note that at times, while a number of sheets of a set of plans are drawn to, say, ⅛-inch scale, an elevation or some floor plan is drawn to ¼ inch to the foot. First of all, therefore, take special note of the scale to which the plans are drawn. It is not at all unusual in making estimates for the estimator to overlook this essential point, and find later to his sorrow, and possibly to the owner's glee, that his quantities are taken off one-half what they should be, using his ¼-inch scale on a ⅛-inch scale plan. I hope, by the by, that none of you will ever be in the predicament of a contractor whose way of estimating came under my observation. He seemed to be a good workman and knew about the special branch of his business, but most of the lines on a plan were absolute Greek to him. To estimate the cost of the work and get an idea of the size of a building he would throw his hat on the plan, walk around it and see how much of it was covered by its rim.

As the scale to which the plans are usually drawn will make it difficult to measure the exact distances and sizes with a rule, the different measurements are indicated by figures. Very often the scale of a measurement on a plan is only approximately correct, and at times, for some reason or other, the scale of parts of a plan does not correspond at all with the measurements indicated by the figures. In all such cases, unless it is apparent that an error has been made, the figures on the plans are to be accepted for your guidance. As a rule, the figures are not indicated by writing feet and inches after the corresponding figures, but the feet measurement is shown by having one short vertical line or dash over the number, while the inches have two of these dashes. Be careful, then, by looking closely at these dashes, to determine whether, for instance, a measurement such as two twos close together stands for 2 feet and 2 inches, or 22 inches.

You will find that most plans you will deal with are either hectograph copies or blue prints. The former are usually printed in color, and will be more intelligible than the uncolored blue prints.

Colors for Different Materials.

Custom has fixed the colors for designating the different building materials. Red is used for brick work, yellow for wood, blue for stone, a darker red for terra cotta, and, as a rule, green represents iron. Being familiar with these distinctions, it will be an easy matter to tell at a glance the character of the material called for on the colored plan. It will, however, require judgment, close attention and experience to make these distinctions on an uncolored print, especially when, as is often the case, no special lettering helps you. You will find that after a little study of such plans you can distinguish a brick wall from a wooden partition by the figure giving its thickness or width. A figure 9 or 13 inches would mean a brick wall, while figures such as 6 or 7 inches would show that the partition is of wood; while figures above 12 inches would generally show that the wall is of brick or stone.

On uncolored plans you will often find that the different building materials are indicated by cross hatching or lining in the brick walls. Sections of stone walls on such drawings you will find represented by an imitation of the appearance of the joints in rubble work, while cement work will be shown by having the section of it covered with dots or stipples. Terra cotta and tile work is made distinct by drawing the joints and showing the open spaces characteristic of this material.

Every architect's office has more or less a manner of its own of making a plan intelligible in this respect, and no general rules for your guidance can be given, except to become familiar by experience with these different methods.

An architect's drawings of a building consist, beside the ground plans of the various floors, in elevations or views of the different fronts and such sections as may be necessary to show the hights and interior construction. The floor plan of a structure is a bird's-eye view, which assumes that the building is cut by a level plane at a point, say, 4 or 5 feet from the floor. To make a distinction and call attention to construction above this imaginary plane dotted lines or sometimes faint lines are used. Thus you will find the girder carrying the floor above indicated by dotted lines, and windows high above the floor and special ceiling construction are generally represented in this manner.

In ordinary cases the different elevations are distinguished by a "front elevation"—that is, the view facing the street, the opposite or "rear" elevation, and the "side elevations." In other instances you will find these elevations designated by the points of the compass, as the North, South, East and West elevations, and again the name of the alley, street or streets may determine the name given to the elevation. Somewhere on a set of plans you will always find a section of the walls, giving you their thickness and hight.

When it is desirable to show more than these measurements use is made of sections or a view of the inside of the entire building. One of these views is a longitudinal section—that is, a cut through the long way of the building—and the other a cross section, which is a view at right angles to the first one, or through the width of the structure.

These different elevations, plans and sections are dependent one on the other, and only a very incomplete conception of the intended structure can be formed by not considering them as a whole. To read the plans as intelligently as possible, and form a proper idea of the architect's intention, you will therefore compare the different drawings with one another. Take up the ground floors, see where one wall is set over the other, notice where your piers stop off, study the chimneys to see if they are intended to be directly over one another or changed in size or position, &c. Compare your elevations and sections with the floor plans, notice the different hights of walls, piers and openings, verify the thickness of the walls, the size of the foundations and footings with those shown on the floor plans and those indicated on the sections.

This process of study takes time. While working at the building you will have small chances of doing it; manage, therefore, to get the plans of a building, and, if possible, the plans of a structure you are working on, to take home to study nights and nonworking days.

You will find that in your chosen life work, as well as in any other business or profession, the man who works and studies during the nonworking hours and prepares himself beforehand by extraordinary effort for future duties and higher kinds of work is promoted over the others and is the successful one.

General Knowledge Required.

But to fully understand and read a plan of a building, especially when the projected structure is of a higher order, a knowledge of the essentials of all the building crafts should be your aim. The average building of to-day is a complicated composition, made up of a great number of different materials, devices and contrivances, one more or less dependent upon and interwoven with the other, and to fully appreciate the meaning of your part of the work you should be familiar in a general way with what the carpenter, iron worker, plumber, painter, plasterer and others are doing.

Then, again, it will be difficult for you to fully catch an architect's meaning, as shown by his plans, without having some knowledge of the art of architecture. The full meaning of a plinth, base, shaft, capital, frieze, entablature, cornice, dentil, modillion, &c., should be as familiar to you as to the architect.

The success of many of our foremost builders is greatly due and easily traceable to their general knowledge of architecture and building, which they attained in their earlier days in an architect's office.

Again, you will find that in your intercourse with the superintendent or architect you will yourself be able to express your ideas on many a building problem in the best manner by making a sketch of the matter under consideration.

Carry a sketch book and pencil in your pocket, and during odd moments practice representing on paper any building detail before you. In the evening sketch from memory and compare in the morning with the executed work such features of construction as may be new or not familiar to you. This will not only impress the matter on your mind, but a memorandum of this character will generally be of great value for future reference, though it may be that when you have acquired this art of drawing you will find, as does the architect at times, that it is very often impossible and impractical to fully describe on a plan all the conditions of a complete structure.

The architect, therefore, is greatly dependent on your general education, skill and experience to fully understand and to translate into actual structure those details and matters which can only be indicated in a rather crude manner on a plan. Again, an architect's plan, before coming into your hands, goes through many a transformation. Our clients will make constant changes, no matter in what state of completion the plan is, being naturally unconscious of the work and worry it causes. Even after being entirely completed the plan is constantly, for one reason or another, revised and rearranged. These changes make errors of figures or arrangement almost unavoidable.

This same client, especially in this country, is always in a great hurry and rush. When he has made up his mind to build he wants to begin operations at once, and would like the plans the next day. This demand for haste and other apparent reasons make it necessary that more than one man in an architect's office should work on the plans of a building. Different minds will take different views of matters. And no matter how close the general supervision of the architect may be, no matter how carefully he may go over the finished plans, errors of one kind or another seem unavoidable.

In view of these difficulties, an architect therefore expects his builder to go over a plan most thoroughly before beginning operations, so that these errors may be corrected before they get to be serious. It seems that our clients and the building public expect us to be infallible, and we do not relish stepping off this pedestal on account of some miserable clerical error in figures on the plan, which if carried out might be disastrous. The builder who will so co-operate with his architect that these errors and oversights may be discovered and taken up in time will naturally be the most favored one, and I suppose that is somewhat desirable.

(To be continued.)

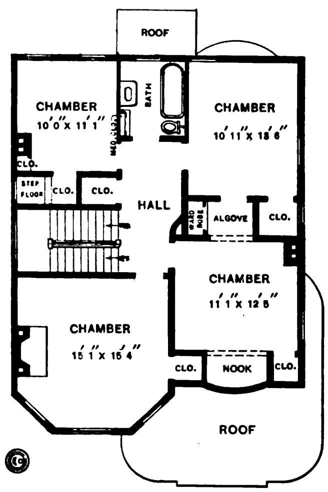
Massive Building of Slow Burning Construction.

What is said to be the heaviest example of slow combustion mill construction ever put up in the city of Pittsburgh, Pa., is now in process of erection in West Carson street, for W. N. Lawrence & Co., paint manufacturers of that city, in accordance with plans prepared by Architect William G. Wilkins. The structure covers an area 100 feet wide by 170 feet deep and will ultimately be ten stories and basement in hight. The structure, the foundations for which are now being completed, will be supported by 100 concrete piers extending to a depth of from 36 to 40 feet. Above the piers and foundations the walls of brick will graduate from a thickness of 36 inches to 18 inches at the top. The walls will be of red brick with stone trimmings resting on heavy columns of Oregon fir, some 28 inches square, and girders of the same material will be the solid floors made of 2 x 10 inch joists of yellow pine, set on edge and supporting a heavy flooring of maple. The floors are to be built to sustain a weight of 400 pounds to a square foot. The heaviest grinding machinery of the works will be on the top floor, and the process of manufacture will move from the upper stories to the lower floor, and the storage department in the basement. In order to make the fire scheme of the structure more complete the stairways of steel will be on the outside of the building. The structure will have a water system of its own besides being connected with the city supply. There will be water storage tanks on the roof, one supplying the automatic fire system running throughout the building and the other to hold the supply for general use. The contract for the foundations was executed by the Drake-Stratton Company, and the superstructure will be erected by the George Hogg Company.

STUDIES IN HOUSE PLANNING.

IN the planning of houses the main idea is to so arrange the interior as to meet specific requirements and at the same time utilize the space in the most economical manner. The latter feature is particularly true in the case of dwellings where cost is the prime factor and where it is desired to secure the most convenient arrangement of rooms with the least expenditure of money consistent with good design and workmanship. There are, of course, many things to be considered in the planning, not the least of which are the size and position of the lot the house is to occupy and how the building is to face as regards the points of the compass. The subject of planning is one of ever increasing interest to the ambitious builder and progressive architect, as well as incidentally at least to the prospective house owner.

As affording some valuable hints on the planning of houses of moderate proportions we present herewith several studies contributed from widely scattered sections of the country. The general scheme running through all the plans is that of an eight-room house with bath, although in some instances this number of rooms is exceeded. The variety of arrangements is sufficiently great to meet many requirements, while with slight modifications any particular set of floor plans can be adapted to specific needs. We shall be glad to have our readers comment upon the plans as here presented, offering such suggestions or criticisms as their own personal experience or wants may dictate. For the sake of facilitating freedom of expression through ease of reference to any particular set of plans we have given each a number in the same manner as in connection with the 12 sets of floor plans published in our March issue.



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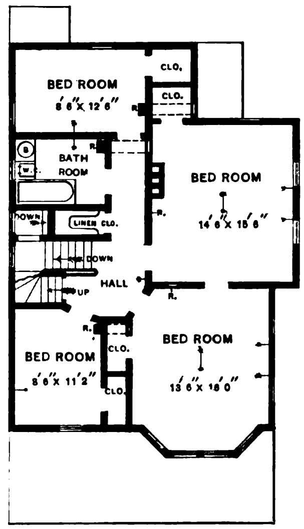

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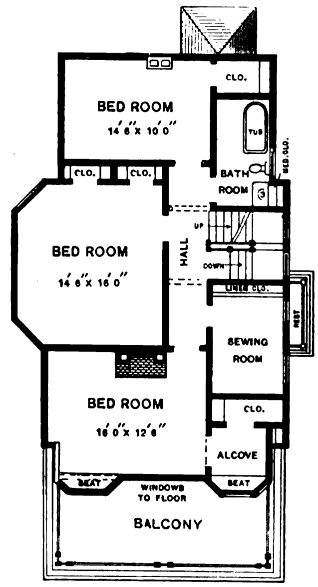

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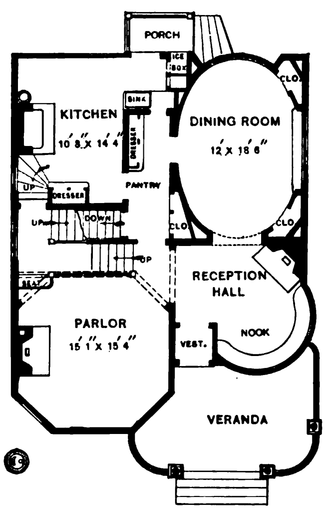

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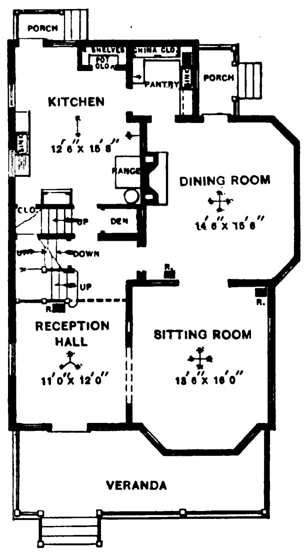

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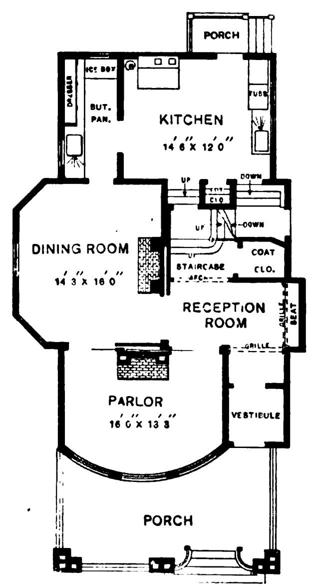
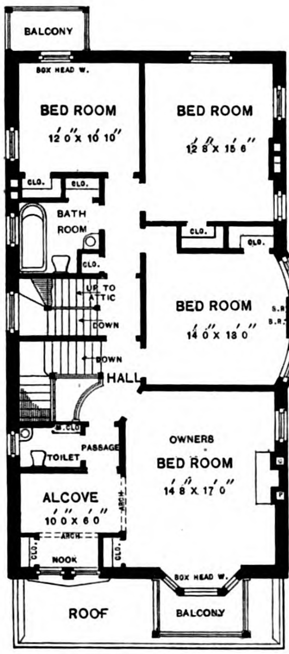


No. 43.—First Floor.

Studies in House Planning.—Scale, 1-16 Inch to the Foot.

THE new structure to be erected on the site of the Hotel Monmouth at Spring Lake, N. J., which was destroyed by fire a little more than a year ago, will be four stories and basement in hight and cover an area

200 x 350 feet in general dimensions, each wing being 46 feet wide. The plans, drawn by Watson, Huckel & Co. of Philadelphia, Pa., call for a structure in the Spanish Renaissance style of architecture, the central feature of the sky line being a dome flanked by two ornate towers. The building will be of buff brick, trimmed with red brick, and will have a roof of red tile. It will have a veranda extending entirely around it and about 18 feet wide. The main feature of the interior will be the office arrangement on the first floor and the rotunda in the center under the dome to be lighted from above. This is circular in form and supported on columns with balconies at each story. The dining room will accommodate about 400 people, and there will be 175 bedrooms and about 50 bathrooms. A large proportion of the rooms will face on the ocean, as will also the dining room and parlors. As the structure is intended for use in winter as well as in summer, it will be heated by steam direct radiation. There will also be electric and refrigerator plants in the basement. The estimate of the cost is placed at $150,000, exclusive of the furnishings, which will cost about $50,000 more.



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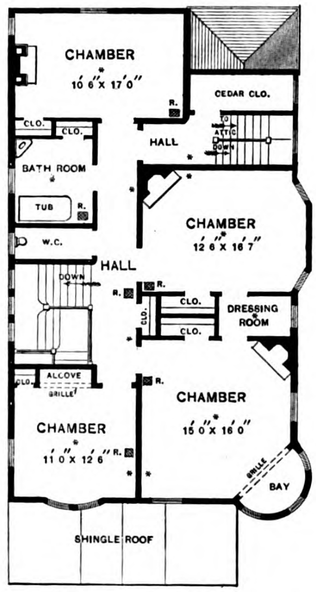

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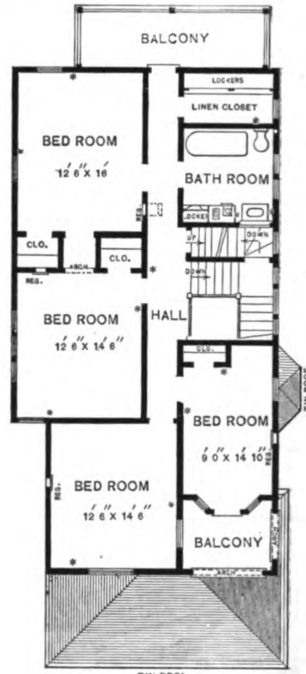

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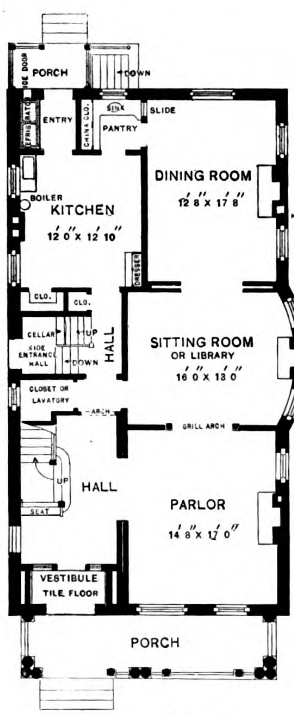

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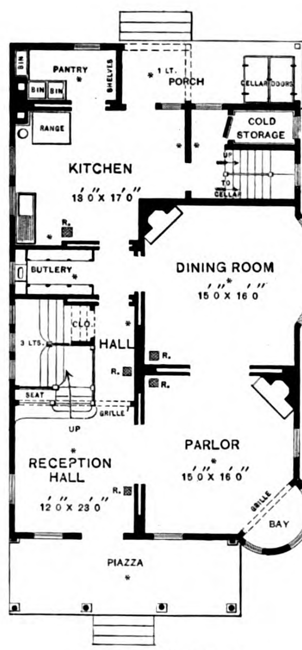

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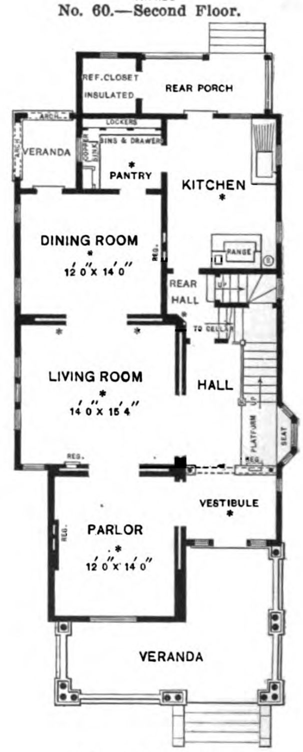
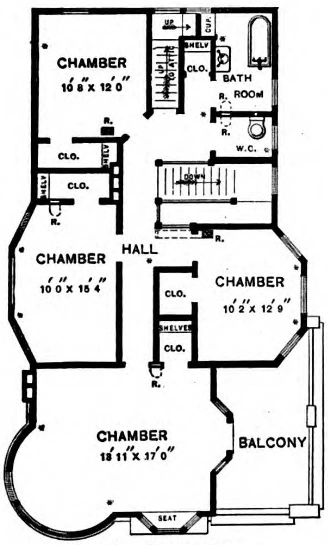


No. 60.—First Floor.

Studies in House Planning.—Scale, 1-16 Inch to the Foot.

Fires in Fire Proof Buildings.

In discussing the subject indicated by the above title a writer in a recent issue of the *Brickbuilder* says: Ten or 15 years ago a fire proof building was a novelty. To-day it is an accepted fact and it is no longer a question as to what method of construction shall be adopted for a commercial building. Aside from the statutes which prescribe that buildings above a certain hight shall be of normal conditions, but while we continue to use wood in finish and fill our offices or stores with highly combustible material we much expect continual fires which will consume the contents. Rarely, however, does a fire in a fire proof building extend beyond the room in which it starts, and only in such extreme hazard as is typified by the Horne buildings in Pittsburgh is there any liability of structural damage. We are therefore perfectly safe in claiming that fire proof construction is to-day an exact science, that the application of brick and terra



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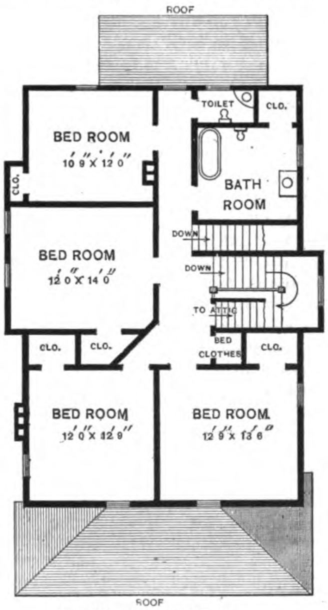

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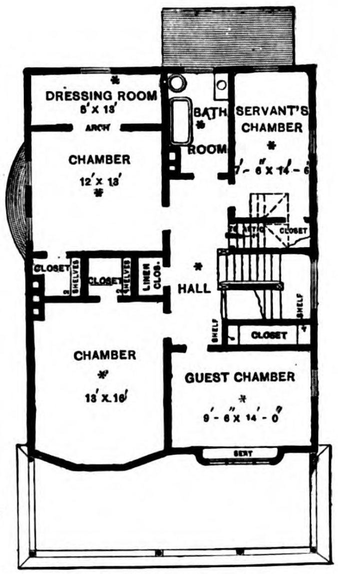

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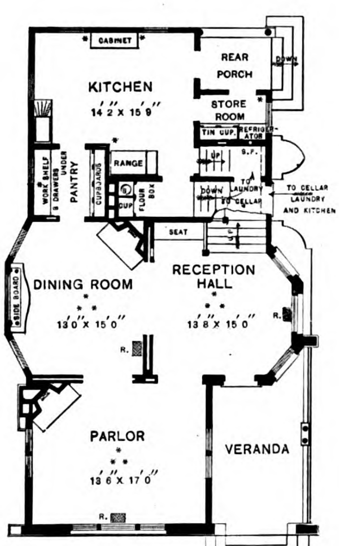

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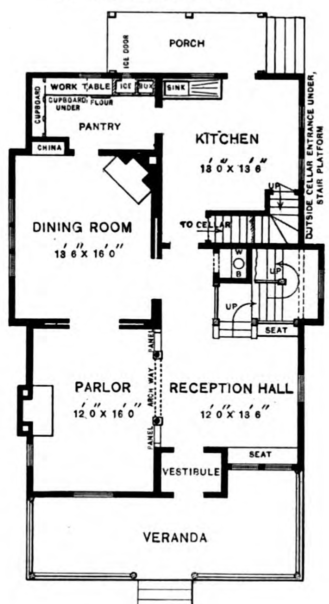

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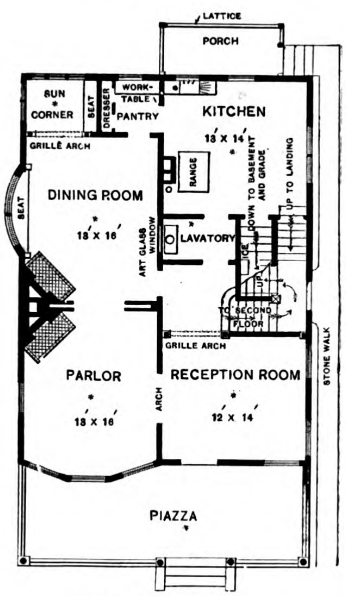


No. 63.—First Floor.

Studies in House Planning.—Scale, 1-16 *Inch to the Foot.*

fire proof construction, business prudence calls for this and for nothing else in first-class buildings of to-day. It was long ago discovered, however, that a fire proof building did not imply immunity from fires, and hardly a week passes that we do not see reports in the papers of a fire in a fire proof building. Contradictory as this may sound it is perfectly logical. Scientific construction has been developed to such a certainty that we can absolutely protect the structure of any building from material damage by even an excessive conflagration, under cotta has been perfected to a point which insures absolute protection, and that if fires continue in our fire proof buildings it is in no sense because we do not know how to thoroughly protect them. It is unfortunately still cheaper in some cases to pay insurance than it is to use the precautions which we know will protect, but, given an owner who is willing to pay the bills and an architect who understands his business, there is not the slightest difficulty in so building that every chance of fire shall be eliminated.

CORRESPONDENCE.

Mr. Kingston's Comments on Prize Floor Plans, Average Day's Work for Carpenter, &c.

From J. P. KINGSTON, *Worcester, Mass.*—In answer to "J. P. W." of Webster City, Iowa, regarding stairs in prize plans, I must acknowledge that there was a mistake in the number of risers shown for the rear stairs, as I did intend to have and show 14, which would make each 8 8-14 inch rise. This I think well enough for a rear flight. I do not intend to make any stairs in a house with a rise more than the above, except in a very rare case to the cellar or attic, where they would not be used so much. I never think of having a rise of more than 7¾ inches on a front flight of stairs, and it rarely exceeds 7½ inches. I never before heard of the question being brought up of having all stairs about a house the same rise; I think this is not necessary at all, and is seldom carried out. I am very glad to have our good friend from Iowa call my attention to the mistake so that I can remedy it in my drawing, and as far as possible prevent others who might use the plans from building the stairs with only 13 risers. I am always willing and glad that any of the readers should call me to account if they see any mistake in my work or criticise it if not right. I quite frequently ask contractors who figure on my work to call attention to any mistake they may find or to anything left out that should be on the plans or in the specifications. I do this to make sure everything is right before building is commenced, as it is easy to make a mistake, and I should rather find it out before than after the contract is let.

In regard to platform and winding stairs I do not agree with "J. P. W." or with "R. F." of St. Mary's, Ont. I think that a flight of stairs with one or more platforms is much easier and prettier than any winding stairs can be, and I always use them where I possibly can. The use of so many more of the former than of the latter shows their popularity and that most architects think the same.

I should like to answer some or all of "O. K. W.'s" correspondence in the May number, but it would take too much time and space; at this writing I will just say that he is astray in his criticism of the vestibule question, as three of the six he mentions as having no vestibules have them. I refer to Nos. 5, 25 and 123. Perhaps his criticism refers to the rear of the house; if so I agree with him every time, and I would not plan any kind of a house without an entry between kitchen and outside, and wherever possible a porch over the outside door also. The entry not only keeps out the cold and storms, but it should be large enough for a refrigerator, with a pan built in the floor to catch the drip.

As to the matter of a day's work I have no doubt I could, as well as many others, fill an entire issue of the journal with comments on that question and experiences we have had. If I had time I would like to tell some of mine, but I will content myself by saying we have as thorough and as fast mechanics in New England as any I have met from other sections. I have come in contact with some "wonders," such as "M. L." writes about, but when it comes right down to facts they are not in it. My experience with doors is that a man who will on an average fit, hang and trim complete six to eight doors in ten hours is doing all right, and on hard wood doors he will not do better than four to six and sometimes not that. I have seen a workman joint in and fit 20 doors in ten hours, but this does not mean to hang and trim. They were done before the threshold was put down. As regards shingling I have been in close contact with a man who has carried up and laid a bunch of shingles in 45 minutes and doing good work. This would be about 3000 per day of ten hours, but one cannot keep it up all day, and very seldom gets a plain roof to do it on. I am well satisfied if a man will average seven bunches of shingles every ten hours.

GIVE THE YOUNG MEN A CHANCE.

I have been much interested in the matter of "giving the young men a chance." Now my experience has been that the more chances I made for myself the more I got from others. Let the young man keep his eyes open; not depend altogether on what he can learn in the job through the day, but get some books and journals to help him. If he will do this and only spend one-quarter as much for these as most young men do foolishly; read them and practice what they teach, and if possible go to a drawing school, I will guarantee that he will not be the last on the job to be recognized or the first one to be let go. Contractors know the ones who work most for their interest and give them chances accordingly.

I would advise every young man who starts to learn the building trade to always keep his own time as nearly as possible, and the amount of time spent on the different kinds of work; then if he can find out the number of feet of framing lumber he can tell quite closely how much it costs to frame and put it up. Do the same with lining floors, inclosing boards, clapboards and shingles; the same with outside finish and also interior work. He will then know for himself, and when he gets to estimating on work will know very near what he is doing.

I was much amused when I read the letter from "M. L." of Newark, but there was more truth than fiction in it; no doubt many others have had the same experience. The readers may imagine from seeing my name under the head of "Architect" several times that I have been one all my business life, and have had no practical experience; but not so. I spent 19 years at building. In that time I learned the trade, worked as journeyman, was foreman and superintendent, so I think I can write a little from actual experience. I have been following my present profession about 12 years, and I might say for the benefit of many young chips that I had no more idea of being an architect when I started my trade 30 years ago than I had of being the President of the United States, so I say again to the young men, "Help yourself and some one will notice it."

Hoping these few lines may be of benefit to at least a few, and thanking the editor for the space this letter will occupy in his ever welcome journal, I will close.

Design Wanted for Small Grain Elevator.

From C. C. C., *Adamsboro, Ind.*—I am greatly interested in grain elevator construction and would take it as a favor if some of the practical readers would furnish for publication drawings of an elevator having a capacity of about 3000 bushels of grain and with four bins. The power is to be operated by gasoline and the equipment is to be modern and thoroughly up to date. No doubt there are many readers of the paper who have had experience in putting up grain elevators and are in a position to offer many valuable hints on the subject.

Note.—It is possible that our correspondent may derive some suggestions from the illustrated article descriptive of a grain elevator which was published in the issue of the paper for June, 1899.

Artificial Stone for Stable Floors.

From W. W. SCHOULER, *Newark, N. J.*—In reply to the correspondent "C. C. F." of St. Joseph, Ill., who asks in the October issue with regard to the use of concrete for stable floors, I would say that in my judgment artificial stone is the best pavement for a stable, for the following reasons:

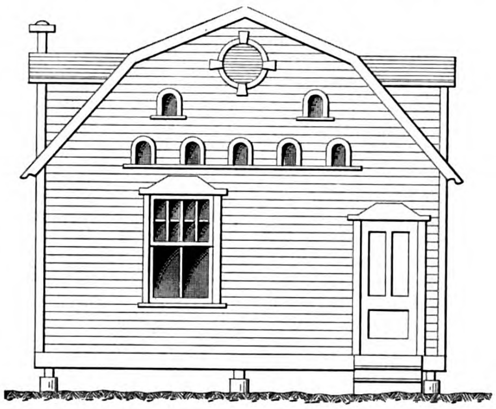
First, as to cost. A 4-inch floor of artificial stone costs little or no more than the common plank floor and much less than a maple floor, while considering the wearing properties it is far less than any other material, owing to the fact that when well laid there is practically no "wear out" to it.

In the next place it is sanitary, being non-absorbent and proof against rats, which are so common around stables. Being laid in a plastic state it can be made ornamental by forming the washstand and gutter and grooving it into 6-inch squares where the horses travel. As the material is very hard it is best to stand the horses in the stalls on wooden slats. Door and window sills may be formed of the same material, costing one-half as much as stone.

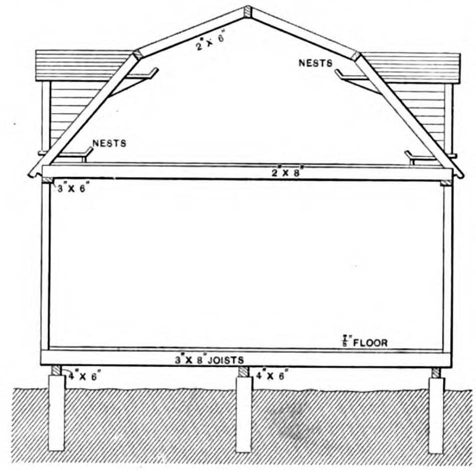
Combination Workshop and Poultry House.

From J. J. BROWN, *Germantown, Philadelphia, Pa.*—Thinking the matter may be of interest to readers of *Carpentry and Building* I send sketches of a combination workshop, tool house and poultry house which I have recently constructed after plans made by T. Frank Brown of this place. An inspection of the drawings will show that the building is arranged for breeding pigeons as well as for the purposes named above. It is built on of the success in this line depends on the building in which the stock is kept.

Referring to the illustrations it will be seen that the first floor is divided into a workshop, tool room, chicken room and feed room, the latter being provided with bins for holding the different kinds of feed. The second floor is divided into two parts, the front one being the flying room and the rear one the breeding room. The latter room is treated in the same manner as the poultry room

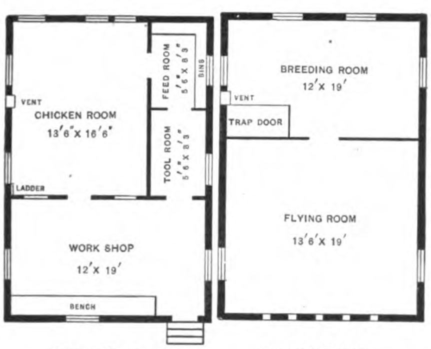


Front Elevation.



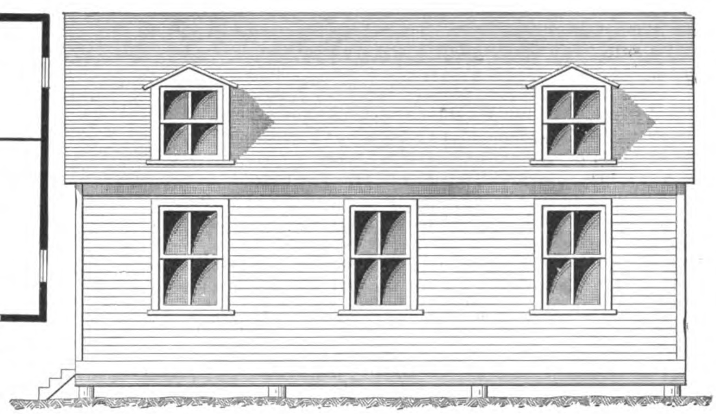
Cross Section.

Scale, ¼ Inch to the Foot.



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.



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

Combination Workshop and Poultry House.

cedar posts, which are put into the ground 3 feet below grade and cut off at any convenient hight desired. I made use of 4 x 6 yellow pine stringers, upon which rest the 3 x 8 inch hemlock joists spaced 2 feet on centers. The posts and braces are all of 3 x 4 inch hemlock; the second-floor joists are 2 x 8 inches and are carried on 3 x 6 inch hemlock plates, while the rafters are of 2 x 6 inch hemlock. The rafters are sheathed with 1 x 12 inch hemlock boards planed on one side and these in turn are covered with cypress shingles. The outside of the frame of the building is covered with German siding. The interior of the chicken department has a layer of tar paper nailed all around the under side of the joists and then covered in with beaded fencing boards, 6 inches wide, of white pine. The reason for using the tar paper is a double one; first, it is a very good preventive against poultry lice, and in the second place it is considered healthful to the poultry. The boards make it air tight. The boards are treated to three good coats of whitewash, and it is my experience that wherever this plan is adhered to the poultry will be healthy and pay their owner a good return on his money. A great deal could be said on the one point of construction, as much on the first floor. It will also be noted from the drawings that the first story has a high ceiling with plenty of light and ventilation from the roof, thereby affording fresh air at night when the poultry are resting. The ladder shown on the first floor should be placed on the further side of the window so as to bring it directly under the trap door in the second floor.

What Constitutes a Day's Work for a Carpenter.

From F. G. ODELL, *Lincoln, Neb.*—Among the variety of timely and interesting topics discussed in the Correspondence department none seems so important to the craft from the viewpoint of the writer as the recent discussion on "What Constitutes an Average Day's Work for a Carpenter?" Several have told us of some exceptionally fast workmen they have known; others have expressed their skepticism concerning these relations, while still others have wisely offered suggestions as to averages which have fallen within the scope of their experience. The writer has no doubt as to the ability of some men to hang 15 doors in a day. I have known a man to fit, hang and trim 1⅜-inch white pine doors with rim locks and ogee stops at the rate of one door every

30 minutes and keep it up for ten hours, and the doors were all hung and trimmed in a first-class manner. I have known the same man to hang and trim with mortise locks 15 doors in ten hours, and have no doubt there are many others equally proficient.

I recently sublet a job of shingling to a professional, who undertook the work for 80 cents per 1000 and carried his own shingles up a 20-foot ladder. He averaged over 4000 shingles per day on that roof and a better one was never laid. He used neither line, straightedge nor helper, and it would be a most particular man who could pick a fault in his job. This fellow had a hole drilled in his hatchet 4½ inches from the head and a pin stuck in to form a gauge with which he measured his courses to keep them straight. He made a little triangular saddle of boards, with some nails driven through for spurs to keep it from slipping, and on this simple seat he clambered all over a half-pitch roof and laid the entire roof in the time some carpenters would take to set up a scaffolding and carry up the shingles.

My observation of the average carpenter, however, leads to the belief that he would scorn to use any appliance so simple and effective as this. He would much prefer to adhere to the old style methods and make the job cost as much as possible. The fewer tools a man handles in doing a certain piece of work the better and quicker he will do it, provided the tools are suitable and he understands his business. The ordinary carpenter spends about one-third of his time sharpening his pencil and making marks with it. More brains and less lead pencil will give us a better class of workmen.

But what I started out to say was this: Fast workmen can by no means be taken as the basis for estimates, neither can the average between the fast and the slow be safely taken as a basis. "Wandering Wood Butcher's" 12-door man and three-door man hang 15 doors in a day, or an average of seven and a half doors each, but this is not a safe basis for estimating the work of the average man.

From the comments already received, ranging from Rhode Island to Washington and from New Jersey to Louisiana, it is evident that there is nowhere any recognized basis of estimating carpenter work which can be safely taken as a guide in contracting. The capable contractor is usually a fast workman and endeavors to surround himself with employees of the same class, figuring his work accordingly. But the tendency of the labor market often gives him a class of men who will fall far below his standard and he loses money in consequence. This has been the experience of many contractors.

It is true also that carpenters do not rank as high in ability to do all kinds of work as in former years. This is due largely to the growth of the planing mill as a factor in building, to specialization of different branches of the trade, and more than all to the fact that few men comparatively speaking have any real ambition to perfect themselves in the trade of the carpenter. There is a saying in the West that "when a man fails in every other occupation he becomes an insurance agent; failing in that he becomes a carpenter." Is it possible that this proverb will apply to other sections of the country as well?

Comparatively few carpenters read a trade journal. Those who do are generally ambitious enough to escape such criticisms as characterize this article. I sincerely trust that the readers of *Carpentry and Building* will continue to discuss this question of an average day's work until we arrive at some definite conclusion as to what amount of work may fairly be demanded of a first-class mechanic.

To me the Correspondence columns of the magazine are by far the most interesting. I am sure they must prove so to every reader. This feature alone is education to the practical workman. I sincerely hope that the circulation of *Carpentry and Building* may be greatly extended.

From C. A. WAGNER, *Port Jervis, N. Y.*—In answer to those correspondents who have shown interest in what constitutes a day's work for a carpenter I would say that I have fitted, hung and locked complete ten doors in ten hours, but I find more members of the craft who do less than I do who do more. As to hanging 15 doors in the time stated, I claim that it cannot be done in a satisfactory manner. I would further state that I once put a mortise lock in a 1⅛-inch door on a wager. I was to put in the lock in a first-class, workmanlike manner inside of 18 minutes. I did the work in 16 minutes and 19 seconds and would like to hear from others on this matter. I have heard of some of these "wind blowers," but when they were called upon to do the work there was always some kind of an excuse. They would perhaps do about one-half the amount they claimed they could do. I have hung doors, or rather had my men hang them, in some of our summer hotels, where they were hung on T hinges, with rim locks, and the very best men did not put in more than 13 and often less in ten hours.

As to driving a keg of nails in a day, as mentioned by one correspondent, it is possible he may have meant 60d spikes or something of that kind. He should apply for a job in some museum or circus as a wonder, especially if he meant 8d or 10d nails.

In this locality we think it is a good man who will lay 2000 shingles in ten hours, and we bosses find a good many who lay less. We do not think of figuring on any more as an average. I have laid shingles when it was 6 and 8 degrees below zero, but I have no "seven lives" and know that as we are all human we could not stand it for ten hours, although one correspondent states that he has seen men at work laying shingles with the thermometer 15 to 20 degrees below zero. In my case I had a fire in the building, it being a large ice house 32 x 130 feet and no floor but the ground. We averaged, eight of us, about 1600 shingles for nine hours and called that a good day's work for any human carpenter.

There are too many botch carpenters in the business, as well as bosses, as I know from practical knowledge and experience. I have worked with a good many and have also employed all kinds—good as well as bad. I should think it would be a good scheme to make it necessary for a man to obtain a diploma or certificate of competency in this line and thus do away with the poor mechanics. I have worked 18 years at the business and have always taken an interest in my profession—I call it one, as it must come natural or a person cannot be counted a mechanic. I have always taken building journals, also a course through the correspondence schools, and can design and build, I daresay, anything that wood and material can be put to, but I come by it naturally. I know if more of my brother chips would give more attention to reading and practical work they would have less time to do such things as hanging 15 doors, laying 3500 shingles and using a keg of 8d nails in a day.

From T. J. LA B., *Saranac Lake, N. Y.*—I have been much interested in reading what the various correspondents have had to say regarding the amount of work a carpenter can do in a day. I would say for the benefit of "M. L." of New Jersey, that myself and a man by the name of L. W. Parker of this town built our own staging on a roof and on October 10 laid 6000 cedar shingles in 9 hours and 40 minutes, and every shingle over 8 inches in width had to be split. On the 11th of the month we laid 6000 in nine and a half hours and used 3d common galvanized nails. I wish to say that there are men who can lay 3000 shingles in one day. I had a man working for me last winter who fitted and swung in one hour three inside doors, each 2 feet 8 inches by 6 feet 8 inches in size and 1⅜ inches thick, but I do not think that a man can fit, swing and put mortise locks on 15 doors in ten hours and at the same time do a good job.

I would say for the benefit of other readers that I have found some very interesting points in the columns of the paper, and have built a house from plans found in *Carpentry and Building.*

Ventilating School Houses.

From M. M. N.—We would be glad to know which plan of heating and ventilating an eight or ten room two-story stone school building with the usual size of rooms is the best where no power or fans are to be used. One method would be the gravity system with only one vent opening into each room, leading directly into separate shafts. Another method would be the gravity system with only one vent in each room leading directly into one main vent shaft, with a stack heater. Another system, where several vent openings are made under the windows, then run under the floor and down to the foul air gathering room in the basement, thence into one vent stack having a stack heater.

Note.—We should be glad if our experienced readers would give their views on this subject. Where the ventilators and flues are of the proper size, and provision is made to have them operate positively, either by means of a stack heater or heating coil from a small steam plant, it would seem that there would be little choice, provided the flues and openings were large enough to prevent drafts.

Scheidler's Balloon Frame Barn.

From A. H. P., *Berrien Center, Mich.*—In the July number of *Carpentry and Building* I notice several illustrations relating to balloon frame barns, and I am inclined to say a few words in regard to the matter, as I believe pressure of hay or grain away from the outside studding and prevents the frame from spreading or bulging at either sides or ends. In connection with the construction there is used a wire lock for securing and holding the rafters together at the hips. In Fig. 2 is shown the position of two rafters when brought to the proper angle and having a gambrel block spiked in place, for which 16d, 20d and 40d spikes are used. A faint indication of the wire lock and the spikes used to nail it on is noted in the engraving.

In the general description contained in the pamphlet in question it is stated that in all ordinary barn building 2 x 10 sills should be used, 2 x 8 plates, purlin and ridge, all of which, except the ridge, should be doubled, while door posts should be 2 x 8 or 2 x 10. For the beams and braces from the door posts to the beams it is

Fig. 2.—Showing Use of Wire Lock for Securing Rafters at the Hips and Gambrel Block Spiked in Place.

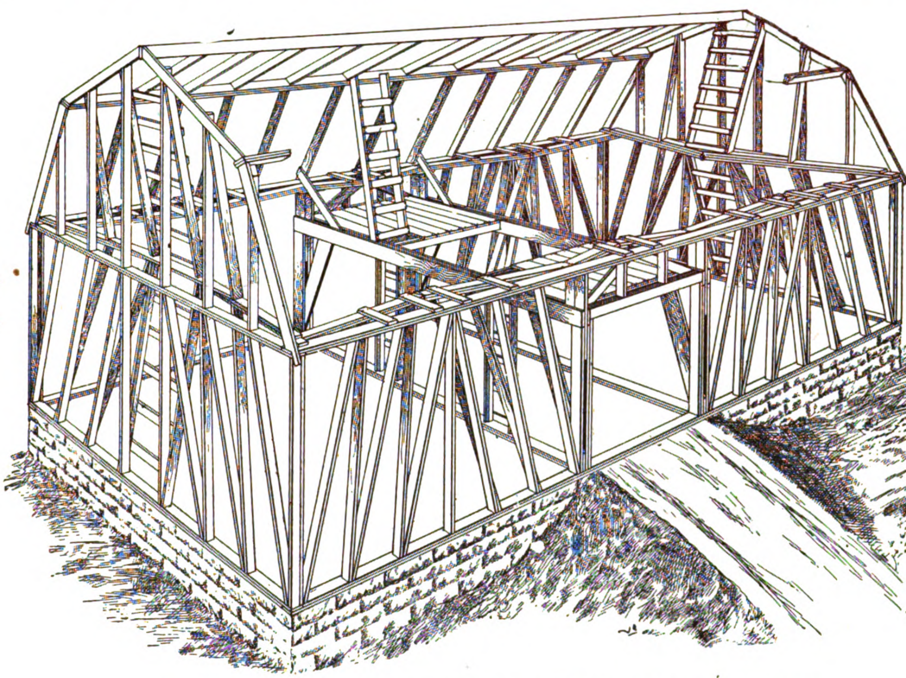


Fig. 1.—Perspective View of Framework of Barn with One Side of Roof Cut Away.

Scheidler's Balloon Frame Barn.

that builders ought to study the different methods of construction as the old frame barn will soon be a thing of the past. I have just completed a barn in Cass County, in this State, which has called forth some rather complimentary comments by those who are competent to judge. The barn frame is constructed in accordance with the ideas of John Scheidler of Coldwater, Mich., who has patented the method, but I have his full consent to lay it before the readers of the paper. It embraces the balloon frame construction, in conjunction with a self supporting roof. By using the wire lock referred to in the pamphlet inclosed the rafters can be put together in bents and raised by four men.

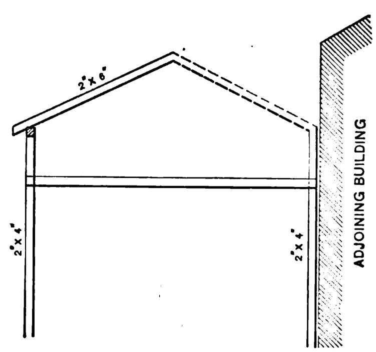
Note.—Accompanying the letter of our correspondent is a pamphlet illustrating and describing the style of barn frame to which he refers, and we present herewith illustrations which will give our readers an idea of the patented construction. In Fig. 1 the framework of the barn is shown with one side of the roof cut away, thus affording a better view of the side and end truss work, as well as the inclined studding, which tends to keep all suggested 2 x 12 be used, with 2 x 6 for studding, rafters and the trusses, excepting in bays above 24 feet in depth, for which 2 x 8 should be employed. The method of setting the outside wall studding, as indicated in Fig. 1, tends to prevent the barn from being racked out of plumb, or otherwise twisted out of shape, in case of a heavy wind storm, and it is for this reason that this form of construction is called the "Cyclone" barn. It is said that a barn built in this way will slide on its foundation walls before it will beracked out of shape, and this sliding on the wall can be prevented by anchoring the sills to the walls by long iron bolts. In barns 80 or 100 feet or more in length two driveways and three bays are provided, with the granary in the center bay extending across to each barn floor, with doors on each side, which also affords passage from one floor to the other.

Criticism of Floor Plans.

From C. A. WAGNER, *Port Jervis, N. Y.*—I agree with "J. P. W.," in his recent criticism regarding the first-prize floor plan, as published in the March issue, showing 16 risers in the front stairs and 13 in the back stairs. As to my plan, No. 123, having 15 risers in the front and 14 in the back stairs, I may have made my drawing in that way—that is, the one I entered in the competition, but as one riser will not make much difference I call that a small item. If, however, "J. P. W." will give me his full name I will gladly furnish him blue prints and convince him he is in the wrong—that I have 15 in both. With regard to platform stairs I find that the people at large will not take anything else, and that you cannot get enough of them to suit. The more irregular and crooked you can make the stairs the better they seem to like them in this section of the country. I myself should like to hear from our friend, Morris Williams, as I should like to be enlightened on the subject of stair building through the columns of the paper. I am always glad to hear from my brother chips, and it is a good thing to write for the Correspondence columns, especially on rainy days and Sundays, as well as evenings, when we have nothing else to do.

A Question in Gutter Construction.

From J. J. A., *Boulder Creek, Cal.*—Will some brother chip tell me through the columns of the paper how I am to frame the rafters of a building located as indicated



A Question in Gutter Construction.

in the sketch inclosed? The building is 30 feet wide and is situated on a corner. There is a building adjoining which stands close up to the line and I want to know how I am to cut the rafters on the side shown by the dotted lines and how I shall form the gutter on that side. I wish, of course, to make the two sides and the gutters as nearly uniform as possible.

Construction of Butchers' Refrigerator.

From W. S. M., *Tampa, Fla.*—Please allow me space for a friendly criticism of Brother Frank M. Hamlin's refrigerator, which appeared in the October number of the paper. His plan is an excellent one, as we have fully tested in this country on board ships plying between here and Havana. I would suggest, however, that the top be made the same as the side walls, unless the refrigerator extends up to the ceiling or deck; then make a good air trap for the drain pipe. No doubt many of the readers have heard the story of the Irishman who bored a hole in the bottom of a sinking boat in order to let out the water, &c., and I have heard of others as well as Brother Hamlin who cut holes in their boxes to let out the warm air and for ventilation. My theory—and experience seems to prove it to be correct—is that if we let out the air the same volume must go in somewhere else to take its place and the escaping air must be cooler than the air entering, therefore the result is a loss. More air will enter in closing the door with the holes in the box than without, because it allows of a freer circulation, and here again is a loss. Still further, the 2-inch holes destroy the very object of the paper lining, which is to get as near as possible "dead air" spaces. Sometimes we meet refrigerator agents who talk of the great advantages their boxes possess over others on account of the fine circulation which they have. Take any refrigerator, for example, step inside, close the door and hold the hand in the air passages and there will be found quite a commotion in the air. A regular little tornado is at work for a minute or two, caused by the taking in of warm air through the door. In less than ten minutes the air has become thoroughly mixed, or of equal temperature throughout the box, and the circulation has ceased until the door is opened again. "Well, now, I did not intend to leave that fellow in over five minutes."

I wish to speak of a clever trick of an agent, who was riding his hobby all over the country a few years ago. This was the "dry air" the box contained. Yes, sir, and to prove it some red headed matches were placed inside the box for an hour. Upon taking them out they could be lighted the same as any good match, but the ones left out in the moist, warm atmosphere would not go, or if they did it required lots of scratching and a little swearing to start them. Afterward we learned that these matches would strike even after being immersed in ice water, but dip them in warm water and they would not burn.

Finding Bevel in Truss Construction.

From O. L. W., *Dallas, Texas.*—In reply to "O. D. S.," who asks in the August issue how to find the bevel between a brace and the top chord of a truss, I offer the following method, which I think is a better one than that which has already been presented to this inquiry: Take the length of a brace, add it to its run on the blade of the square and the rise on the tongue and the tongue will give the bevel. For example: Take a 10-foot brace, the run of which is 7 and the rise 7: then for the bevel we would have 10 + 7, or 17, and 7, the well-known octagon miter, which, it is readily seen, is the one required. I think "J. T. R." in the October number has made some mistake in his answer. Questions in geometry are always interesting to me and I would like to see the better scholars answer them, telling us why and where they obtain their answers.

From O. D. S., *Whatcom, Wash.*—I will say in reply to "J. T. R." of New Salem, Pa., who on page 243 of the October number presents an answer to my inquiry which appeared on page 228 of the September number, that I have tried his rule and find it is not correct. It will give the proper bevel for the top chord, but will not give the correct bevel for the rafter shaped stick of timber, or brace I believe some of my brother chips term it. If "J. T. R." will make a diagram of the truss with 8 inches rise to a foot run, making the drawing to a scale of about 2 or 3 inches to the foot, and find that cut on the top chord by using 4 on the blade and 12 on the tongue of the square and marking this line, then drawing 4 and 12 on the stick that is supposed to butt against it, he will find that his cut will be open at the bottom.

Horizontal vs. Diagonal Sheathing.

From M. H. K., *Shreveport, La.*—Referring to the letter of "G. L. McM," Tacoma, Wash., which appeared in a recent issue, I for one never saw any benefit from diagonal sheathing, but sometimes have seen damage resulting, especially on the rear ends of churches, where a seam was left from the sill to the ridge of the roof and nothing to resist wind pressure but the paper and ½-inch siding boards. When bracing must be resorted to it is much better to cut or frame it in and sheath horizontally. Then there will be both a brace and a tie. One without the other is of little value. The waste of lumber and labor on diagonal sheathing will certainly pay for the latter method and the work will be done properly. This diagonal sheathing always looked to me to be a theoretical fad and more to catch the eye of the beholder than his good judgment in matters of building construction. For the last 25 years I have never been able to find any one who could give me a logical reason for employing it, and I am going to follow the horizontal sheathing and bracing, as above mentioned, until I find better reasons than are now advanced for changing to the diagonal scheme.

A CHEAP ROSE ENGINE FOR LATHE.

BY FRED. T. HODGSON.

THE following method of constructing and operating an excellent substitute for a Rose engine has never, to my knowledge, been published in any American work, though the machine can be made at very little cost by any fairly expert mechanic, carpenter, or machinist. The principle of this machine is taken from a German example, and elaborated and improved up to its present efficient condition by a Mr. R. Lewis, an English expert and authority on matters connected with the lathe, and it is from his description of the machine that the greater portion of this article is drawn; also most of the diagrams and illustrations.

In a former paper I described a Rose engine, and in that description and the accompanying illustrations the mandrel of the lathe passed through and was fixed to rosettes of various patterns, and there acting against a fixed stud, caused the head to rock as the mandrel revolved, so that a point or tool held steadily against the face of the mandrel while revolving traced a line similar to that of the rosette which caused the oscillation. In the arrangement under consideration the operation is reversed; the tool vibrates and the head stock remains stationary, a condition that possesses some advantages over the former method.

The work to be ornamented is fixed to the face plate with cement or otherwise, but to the back of the face plate is attached a rosette made of metal, and this rosette as it revolves presses against a roller carried by a working lever which is formed of a boss fitting on the working bar and having on one side a straight arm, on which is fixed a weight to keep the roller always in contact with the rosette, and on the other a curved arm having a boss at its other extremity, which acts as a tool holder for the shaft carrying the roller, and is fitted with a screw for the purpose of holding and adjusting the roller.

Separate parts of the machine are described in detail, similar letters representing similar parts in the different views. The plan and elevations of the machine are to a scale of 3 inches to the foot, which makes them one-quarter actual size, while the details are three-eighths full size for a 5-inch center lathe. The dimensions and scale may, however, be changed to suit a lathe with any swing, or different design.

The working bar G, Figs. 1 and 3, is a square iron bar, turned to a point at one end, and will be all the better if it is steel pointed, to go into a recess in the head stock, 1¼ inches above the bed, and immediately under the center. The other end has a hole drilled in it and is supported by the screw carried by the standard H, which has a tail piece, J, passing through the bed, and is held in position by the wedge K. This bar carries a slide, L, set at right angles to it, 5 inches long in the clear, or 6 inches over all, and this slide is fitted with a sliding block, 1¾ inches long and 1½ inches wide, having flanges at the side for guidance. In this block is a recess, shown in the lower part of Fig. 7, in which is set the nut of the screw S, which is supported by the standard at either end of L. This screw, for causing the forward and backward movement of the block, should be turned at the shoulder, and also at the end, to allow of it working freely and smoothly in its bearings. The collar at the head should also be turned to fit the recess made for it in the standard of the slide, and be retained in its place by a metal plate. The slide is attached to the bar G by the broad band P, forged the width of the slide and about ⅛-inch thick, but thicker at the bottom so as to give more hold to the tightening screw.

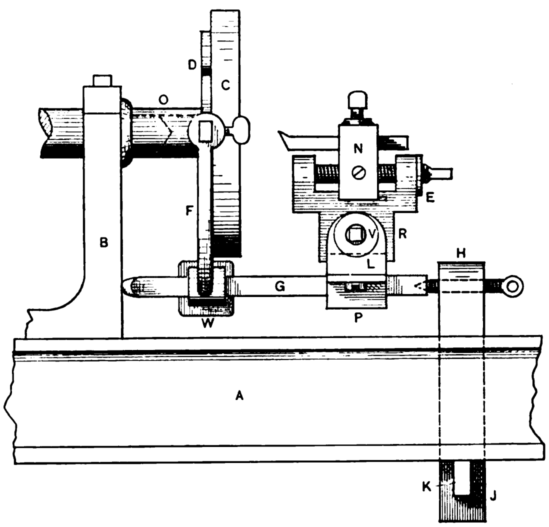


Fig. 1.—Front Elevation of Apparatus.

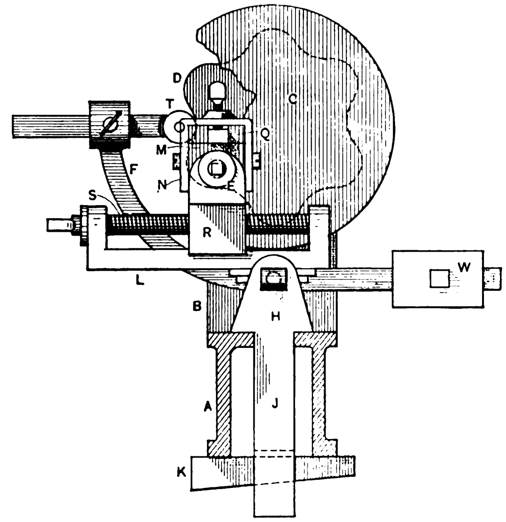


Fig. 2.—End Elevation.

A Cheap Rose Engine for Lathe.

The block E carries a slide, L, upon which the block M, 1½ x 1 x 1 inch, slides. A strip of metal, N, is screwed to this, leaving a space of ½ inch above, which, by the insertion of shaded blocks, forms a tool holder. The tool is held firmly by a screw passing through the top of N, which is forged for its reception. Its sides project between the bottom of M, to serve as guides, as shown in the upper part of Fig. 7.

It will be seen that 1¼ inches from top of bed to center of bar, G, ¼ inch more to top of bar, ½ inch thickness of slide, L, ½ inch depth of its bottom block, R, ½ inch top slide, E, and 1 inch top block, M, to the surface of tool holder, make 4½ inches, leaving ½ inch for cutting tool to level of lathe center.

Probably in some cases there will be sufficient room between the back of the face plate or chuck and the face of the mandrel head to allow of the rosette and the roller working against it. This difficulty may be overcome by making a metal chuck, O, as shown in Fig. 9, about 2 inches long, thus converting the mandrel into a female or hollow one. When supplied with a tool of this kind the operator can keep a stock of wood screws by him, ready to use on any piece of wood suitable for a chuck, in place of the face plate, which will be a considerable saving in time and expense. These screws, of course, should be of wood, and if they cannot be cut in the lathe, they may be cut by a screw box, which may be obtained from any hardware dealer for about 75 cents, or $1, including box and top.

The roller T should be as small as possible, so that it may be able to go into small indentations in the rosette; otherwise it will not reach the bottom of the pattern, and a correct representation will not be obtained.

The motion must be a slow one. In fact, it had better be caused by hand than by foot or power, as but one revolution is required to describe one complete figure, unless it is very deep.

This apparatus is, of course, only suitable for surface ornamentation, though such work as elliptical tool handles and other similar work may be turned on it, when the ordinary speed may be employed.

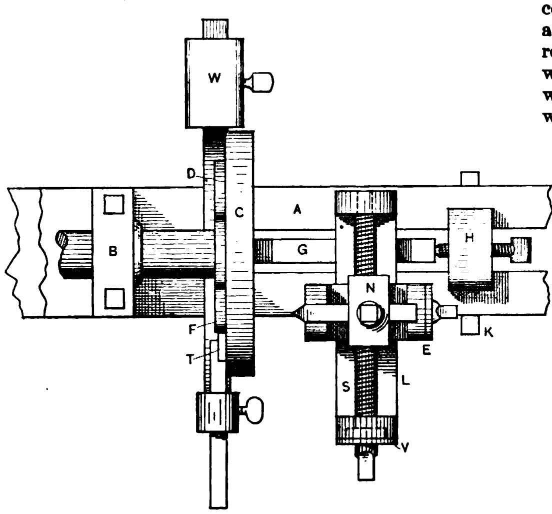


Fig. 8.—Plan View of Lathe.

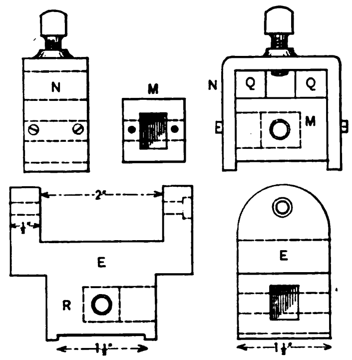
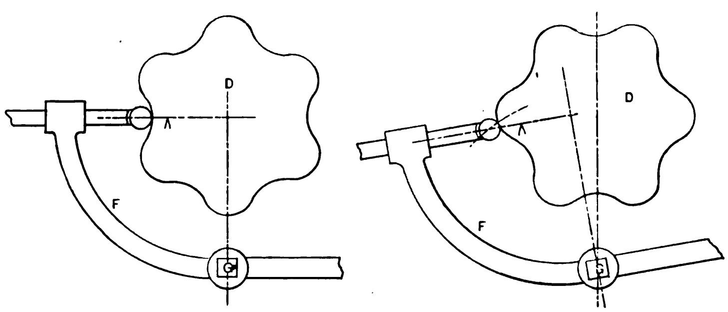


Fig. 7.—Details of Upper Slide.



Figs. 4 and 5.—Different Positions of Securing Lever Against the Pattern Rosette.

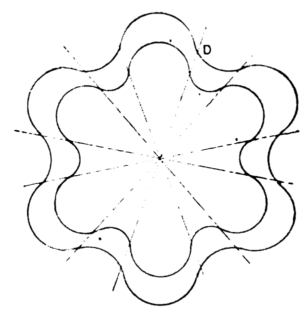


Fig. 6.—Diagram Showing How Shape of Figure is Altered by Motion of Tool.

A Cheap Rose Engine for Lathe.

The figure traced will not be an exact *fac-simile* of the rosette, except when it is the same size, inasmuch as the depressions and elevations may be the distance of the tool from the center; but as the periphery raises, so also will the figure be raised or flattened. This will be understood by an examination of Fig. 6. Again, a flat sided rosette will not give a flat sided figure, but one with hollow sides, as may be most simply illustrated by a square.

Construct a square, A B C D, as in Fig. 12, out of sheet metal or cardboard, and with a pin through its center, so that it can revolve freely, attach it to a board; then take a piece of similar material, E F G, having one right angle, as at F, and a center 3¾ inches below it, at G, which represents the distance between the center of the mandrel and the center of motion of the working bar. Now, let point H represent the roller and I the point of the tool when the sides of the square are perpendicular. Of course, there will be a similar mark at a similar distance from the center, at the middle of each of the four sides, when they revolve, but where either of the corners comes against the roller the arm will be forced into the position E' F' G, and the roller into that of H' and the tool to I', which will be where it touches each corner, which is also shown at I'' on the square A B C D.

We have now the three points of the curve showing the profile of one side, through which the line may be drawn in any convenient manner. The same operation can be repeated with the tool nearer the center, when it will be found that the lines are not parallel, although the distances apart are the same at the center and at each corner. Unless the operator has time and skill to make rosettes of elaborate design he will find that flat sided polygons will be easy to make and pleasing in effect.

In making an estimate for this machine I find that the whole can be obtained for about $1.39, which, of course, does not include screw box and top, which is not a necessity. As near as can be estimated the total time required to make this machine, the lathe being all ready, will be about two and one-half days. Very nearly the whole of it can be made of wood, even to the roller, which may be made of hard mapledog wood or Texas locust. The rosettes, of course, are not a part of the machine. These may be made as required. They should be made of sound, well seasoned hard wood, white maple being about as good as any. Even the spring or rocker may be made of wood, if the operator is skillful enough to do the work in a suitable manner. Hickory or rock elm would do very well for the rocker.

With a machine of this kind there will be no limit to the surface line work that can be done on the lathe, and any mechanic owning a small lathe, with the addition of this simple attachment, can afford himself many hours of artistic and intellectual pleasure.

Figs. 4 and 5 show the roller arm and roller in position, and Figs. 10 and 12 show the roller arm and carrier.

A journal devoted to the interests of the paper trade states that a Russian nobleman has upon his estate at Savinowka, in Podolia, a paper house of 16 rooms, built in New York, at a cost of 80,000 roubles, and its architect declares that it will last longer than a stone building. Bergen, in Norway, has a church built of paper capable of seating a thousand people.

Heating Swimming Pools.

The increase in the number of buildings in which a swimming pool is a feature is bringing to many heating contractors throughout the country the problem of heating a large quantity of water and the provision of a suitable plant for the work. In the past the magnitude of the requirements has not been thoroughly understood, and as a result the contractor in many instances has suffered no inconsiderable annoyance and frequently some loss. Even when those called upon to equip such pools with suitable heating apparatus have been willing to employ a consulting engineer to aid them in the work they often have been unable to find a suitable person or they have found the conclusions of different authorities somewhat at variance. In all engineering calculations common sense can be used with advantage, especially where there is no experience on which to form a judgment. The same commodity can be used with equal advantage in considering the basis for the calculations and the application of the calculations for heating swimming pools.

In order to give some assistance to those who are interested in the problem, says a recent issue of *The Metal Worker*, we give the dimensions of a swimming pool and the method of arriving at the size of boiler needed for the work of heating it, used by an engineer who has written the specifications for equipping a number of these institutions. Assuming that the pool is 20 feet wide and 35 feet long, to have water 6 feet deep at one end and 3 feet deep at the other, it will be readily seen that the average depth is 4½ feet. By multiplying 35 by 20 and then by 4½ it will be seen that the pool will have 3150 cubic feet of water. By multiplying this by 62½, the number of pounds of water in a cubic foot, it will be seen that there are 196,875 pounds of water. If this water is to be taken directly from the street mains the temperature will vary with the time of year and the depth of the mains below the surface of the ground. Assuming that it was 40 degrees and that it was desired to raise the temperature of the water to 80 degrees it will be seen that another little calculation is necessary.

A heat unit is the amount of heat required to raise 1 pound of water one degree. It would require 40 heat units to raise 1 pound of water 40 degrees; consequently, 196,875 pounds of water in the pool must be multiplied by 40 to know the number of heat units required to heat the water, when it will be found that 7,875,000 heat units will be required. This much of the calculation is reasonably reliable, and room for the use of some common sense comes in the calculations that remain to be completed. High grade coals burned under perfect combustion liberate about 14,000 heat units; but when this same fuel is burned in the ordinary steam or hot water boiler a considerable amount goes to waste in the form of unconsumed gases and coal, which pass to the ash pit with the ashes in more or less volume, according to the intelligence of the fireman. In consequence, it is the common custom to calculate that from each pound of coal about 7000 heat units will be utilized. By dividing the 7,875,000 heat units by 7000 it will be seen that 1125 pounds of coal will be required to heat this amount of water in one hour's time. Ordinarily more time is given, however, because few institutions will be willing to make the outlay for the boilers necessary to heat such a pool in one hour's time. If six hours are allowed it is only necessary to divide the 1125 pounds of coal by six to find that but 187 pounds of coal per hour would be necessary.

The class of boilers adapted for such work and the chimneys to which they are ordinarily connected are not capable of burning much more than about 6 pounds of coal per square foot of grate surface, so that by dividing the 187 pounds of coal by six it will be found that boilers having 31 square feet of grate surface will be required to heat the water. If boilers of the vertical sectional type are used two boilers having grates 42 inches by something over 4 feet would be required. For the work by this calculation it will be found that more boiler capacity is determined upon as necessary than is ordinarily provided for such work. As indicated at the beginning of this article the heating contractor and his customer in far too many instances have suffered inconvenience and sometimes loss, owing to insufficient capacity. Should the contractor have his work passed and secure his money the customer will be the loser, as he will be called upon to fire the boilers harder and burn more fuel, making a continual expense that would not be necessary if boiler capacity such as is arrived at by above calculation had been provided.

However, as has been pointed out, the amount of heat derived from the coals, the ability of the boiler to submit the heat generated in it economically, and the intelligence of the fireman, all have a very important influence on work of this kind, and if the contractor can secure the price of an ample plant it will be better to provide ample capacity rather than a plant having a scant capacity. It is claimed by those who have had experience that the grate surface required will vary very little, whether the water is to be heated by means of steam or by circulating the water through the boiler by means of large pipes. It is further claimed that when the water from the swimming pool is circulated directly through the pool it is better to use pipes of a sufficient size to allow the water to flow freely and prevent it becoming highly heated, rather than to use smaller pipes and heat the water to a higher temperature when it is possible that a disagreeable hot current may be experienced in some parts of it. If large pipes are used it is claimed that all parts of the tank will be heated satisfactorily without running a perforated distributing pipe along the sides of the tank, so that the hot water will enter the tank at various points.

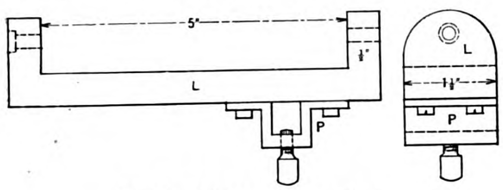


Fig. 8.—Details of Lower Slide.

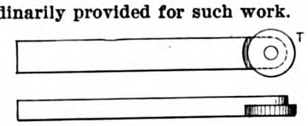


Fig. 10.—Top and Side Views of Roller Arm.

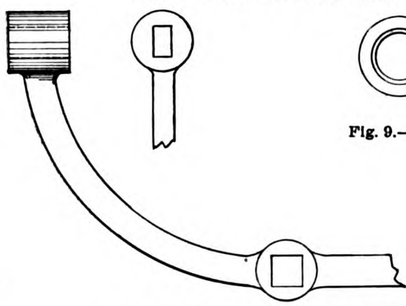


Fig. 11.—Details of Working Lever.

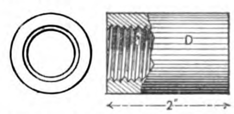


Fig. 9.—Detail of Lengthening Chuck.

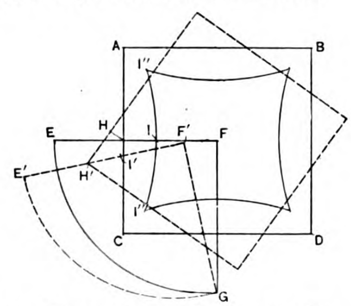


Fig. 12.—Diagram Showing How to Lay Out.

A Cheap Rose Engine for Lathe.

WHAT BUILDERS ARE DOING.

ADVICES received from various sections of the country since our last issue went to press indicate a continuance of that activity in the building line which has characterized the greater portion of the year thus far. In some instances there has been more or less of a check to new undertakings by reason of the high prices of materials entering into the construction of buildings, but for the most part the reports show little or no interruption to projected work. A noticeable feature in some cities is the improved character of the buildings as compared with previous years, more especially in the case of dwelling houses. A great deal of reconstruction work is in progress, especially in New York City, where the casual visitor is apt to get the impression that a good part of the total area of the metropolis is being rebuilt. The amount of new work, however, under way is large in the aggregate, involving an amount of capital which will reach high figures. While a spirit of unrest seems to pervade the labor world at large, there is just now comparative quiet in the building trades, and the present outlook is such as to warrant the belief in a volume of business which will compare most favorably with previous years.

Albany, N. Y.

At the last regular meeting of the Master Builders' Exchange President Richard Wickham delivered a brief address, which was received with much pleasure by the members present. Among other matters touched upon was the general activity and prosperity in building circles in Albany at the present time—something unusual for this city. The fact that there was a genuine building boom going on seemed to have escaped the attention of the members, and when the still more important fact was brought out by Mr. Wickham that about all of the work of any consequence was being done by members of the exchange it was greeted with great applause. In his remarks Mr. Wickham noted the following buildings at present under way or nearing completion: Albany City Savings Institution, Union Trust Company, the National Commercial Bank, the New York State Bank, the National Savings Bank, addition to All Saints' Cathedral, Trinity Methodist Church, St. John's Catholic Church, Church of the Blessed Sacrament, new erecting shop for the New York Central Railroad, new round house for the Boston & Albany Railroad, new building for the National Clothing Company, new factory for the United States Shirt & Collar Company, large addition to the Delaware & Hudson Canal Company's railroad building, large apartment houses in several localities, large mansion for B. W. Arnold, new building for the Albany Art Union, as well as many private dwellings and villas, flats, &c.

Most of the buildings enumerated are of much value, and will compare very favorably with those of other cities as to appointments, usefulness and architectural character. The banks noted are among the most important and substantial in the country. The Albany Art Union Building, devoted entirely to the fine art of photography and portraiture, is perhaps the most complete building and institution of its kind in the country, consisting of five stories of well appointed rooms devoted to the various branches of the business, as well as reception rooms, all reached by elevator service and fitted out with every convenience that modern building art could supply. This building is one of President Wickham's contracts, and to the erection of it he devoted much personal attention.

There seem to be prospects for even more work ere long, as the boom has evidently awakened the people to the necessity of keeping up to the times. There is great demand for dwellings and flats, new ones being rented before completion and in many instances sold. The activity has been a boon to Albany builders, and particularly to members of the exchange, who seem to have secured much of the work.

The Master Builders' Exchange continues to develop, and considering its brief existence has already accomplished much good for its members. It's rooms are open every day, and a visit there at any time during the business hours will find members in consultation. The exchange has brought the builders of the city closer together, and many who were formerly unacquainted have become good friends. The result is that a better feeling prevails, and each has a kind word for the other whenever occasion demands.

Buffalo, N. Y.

Every indication seems to point to continued activity in the building line during the remainder of the year, and the present feeling among contractors and builders is that the volume of business for the year will reach a very gratifying total as compared with the 12 months of last year. The advance in the prices of building materials does not seem to have checked new work to any great extent, and labor troubles are not interfering with building operations.

According to Deputy Commissioner Henry Rumrill, Jr., there were 347 permits issued in September of this year, covering building improvements estimated to cost $1,077,865, as compared with 65 permits for buildings costing $340,278 in September of last year. The showing for the nine months does not present quite such a marked difference in the two years, although there has been a heavy gain. From January 1 up to the end of September there were 1606 permits issued for buildings valued at $3,932,960, while for the first nine months of last year there were 789 permits granted for buildings costing $2,357,193.

Cincinnati, Ohio.

The building situation in the city continues such as to warrant the belief that the remainder of the year will witness the same gratifying degree of activity as for some months past. The outlook is regarded as decidedly encouraging and a good business is reported by architects and builders generally. There have been no labor troubles to interfere with operations, and no appreciable effect on building has been felt by reason of the high prices of materials. According to Inspector Charles A. Tooker there were 200 permits issued in September for improvements estimated to cost $291,470, as against 203 permits for improvements valued at $232,855 in September of last year. For the nine months the value of building improvements aggregated a total of $3,470,475, as compared with $2,447,925 for the same period in 1901.

Cleveland, Ohio.

As the fiscal year draws to a close the officials of the Builders' Exchange are putting forth extra efforts to increase the membership and make as good a showing as possible for the 12 months ending November 1. It is hoped to bring the list up to 300 by the close of the exchange year, the membership at present being 283. During the last few weeks ten new applications for membership have been received and the Membership Committee is actively at work.

President Hunt has recently appointed a Nominating Committee consisting of John F. Aring, mason contractor; F. A. Wadsworth, plumbing contractor; W. B. McAllister, W. H. Fry and F. W. Bell. This committee will select candidates for directors at the annual election, to be held on the first Monday in November.

A fair amount of building is in progress, more particularly in the way of dwellings. In September there were 313 permits issued for building improvements costing $871,540, against 244 permits in September last year for buildings involving an outlay of $353,425. A large apartment house is to be erected at the corner of Curtis avenue and Olive street, which will cost $100,000 and will be one of the most modern and complete structures of this kind in the city. The exterior will be in pressed brick and cut stone and the interior finely finished throughout.

Columbus, Ohio.

The report of the building inspector of the city shows that the amount of building improvements projected during the month of September was three times that of the same month last year. Once before the total valuation of new structures authorized to be erected in a single month exceeded the estimated value of those in September, but it was by reason of the fact that a few were of exceptional cost. Never before, however, were there so many permits issued or so many new buildings commenced in a single month. The outlook is encouraging, and as long as the weather will permit outdoor operations will be continued.

The Executive Committee of the Ohio Association of Builders' Exchanges recently held a meeting at the Neil House when it was decided to establish in Columbus a course of night lectures for the education of boys in the building trades. The instructors will be practical contractors and builders, and the course of lectures will be maintained by the association. We understand that there will also be day classes for apprentices.

Detroit, Mich.

The amount of building in progress in the city continues to show a gratifying increase in volume, and although the gain over last year is not particularly marked yet it shows the tendency to be toward higher figures. According to Permit Clerk C. W. Brand there were 306 permits issued in September for building improvements estimated to cost $539,500, as against 236 permits for improvements valued at $458,700 in September of last year. Taking the figures for the first nine months of the year we find there were 2347 permits issued for improvements estimated to cost $4,577,700, as against 2042 permits for improvements costing $4,302,900 in the corresponding period of last year.

Kansas City, Mo.

The present outlook for building during the remainder of the year is regarded as very encouraging, one important factor being the absence of any labor disturbances to seriously affect operations. A large part of the work done in the city during the last three months has been in the shape of dwellings, with of course more or less larger work making up the grand total. During September there were 365 permits issued for building improvements costing $540,335, and for the nine months ending September 30 there were 3122 permits taken out for buildings valued at $4,919,571. These figures compare with 3198 permits for buildings costing $4,817,160 in the first nine months of last year.

Lincoln, Neb.

Our local correspondent writing under recent date states that building conditions continue favorable with the exception of the prevailing high prices of lumber. Yellow pine dimension and rough stuff is commonly used in this market and rules at $21 to $22 per 1000, white pine finish from $50 to $60, according to grade, and hard wood finish about 7 cents per foot. It will be readily understood that these prices have a tendency to discourage building. Notwithstanding this there has been and is still plenty of work with good prospects for next season. One of the principal buildings in prospect is a $350,000 reconstruction of the Post Office and Federal Court building, the appropriation having been made at the last session of Congress, and the plans are now near completion. Lincoln is becoming an important distributing center for agricultural implements, and several of the leading manufacturers are building warehouses of a substantial character for this purpose.

The past summer has been marked by considerable activity in the labor world, and nearly all of the building trades are supporting flourishing organizations. Nebraska has made the first Monday in September a legal holiday, known as "Labor Day," and this year the Central Labor Union had a monster street parade and picnic, which was the largest demonstration of the sort ever attempted here.

The city is the home of the State University and several other prominent colleges besides the principal State institutions, and is becoming noted as one of the finest residence cities in the trans-Mississippi country. These advantages are bringing a very desirable class of residents to the city, and the probability is that the residence building of the better character will continue unabated for at least another year, especially as the crop conditions appear to be all that could be desired.

The Lincoln Contractors' Exchange is in a flourishing condition, and at its recent semiannual election of officers gave its entire executive the compliment of a unanimous reelection. The exchange is taking up the problem of "estimating" for winter study, and will endeavor to arrange a basis of estimating which will conform to local conditions.

Los Angeles, Cal.

During September the building situation in Los Angeles was not so satisfactory as during previous months, owing to the threatened labor troubles, but at the present time the situation seems to have improved considerably. A strike of hod carriers and lathers, together with demands for increased wages by other builders' unions, did much to check building during the early part of that month. Work on the plans of some large blocks is still held in abeyance and calls for bids are being temporarily delayed on other work. Dread of further exactions seems to be the deterring factor. However, the total of building operations for the month was very good, the permits issued numbering 500 and the value of the improvements nearly $900,000.

Milwaukee, Wis.

The high prices of building materials do not seem thus far to have had any appreciable effect upon building operations, and the indications point to a fair degree of activity the rest of the year. The city is fortunate in having no labor troubles to interfere with building operations, and matters are running as smoothly as could be expected. The figures of the inspector of buildings, however, show that during the month of September there was a slight falling off in the value of the building improvements projected as compared with the same month of last year. According to Building Inspector Michael Dunn there were issued in September 189 permits for building improvements costing $620,879, as against 109 permits for buildings of an estimated value of $761,266 in September of last year. For the nine months of the present year there were 1693 permits issued, covering building operations involving an estimated expenditure of $4,214,926, while for the corresponding months of last year there were 1099 permits issued for building improvements valued at $3,957,396.

Omaha, Neb.

The Omaha Builders' Club held a "smoker" and luncheon on the evening of Monday, September 22, at the new club rooms in the Paxton Block, which was attended by nearly 100 members, architects and dealers in builders' materials in Omaha and Council Bluffs. The meeting was in charge of President A. A. Newman, assisted by the Reception Committee. Short addresses were made by the president and others, and the occasion was thoroughly enjoyable in every way. The affair seemed to show that informal social reunions are much the best means of getting together those most interested in a particular line of business. Those present are much more liable to give a free expression of their views than they are when the occasion is one of formality where those present are apt to feel more or less reserve. The informal occasion appears to do away with that unfortunate feeling which seems to possess many contractors that their competitors are trying to take undue advantage of them. The average contractor is so constituted that he will get up and say something at an informal luncheon, whereas he would be very apt to remain silent if it were a regular banquet, and the Omaha Builders' Club rarely has one of these informal meetings without some good coming from it.

Philadelphia, Pa.

Building operations in and about the city continue on a scale of fairly liberal proportions, and the current figures make a favorable showing when compared with those of a year ago. The report of the Bureau of Building Inspection for the month of September shows a total of 718 permits to have been issued, covering 950 operations, estimated to cost $1,478,335, as against 687 permits, covering 907 operations and costing $1,375,420 in September of last year. Of the total for September by far the larger percentage related to dwellings and alterations and additions, the aggregate for these being nearly $800,000. Taking the nine months of the present year the figures of the bureau show 6052 permits to have been issued, covering 9000 operations and estimated to cost $23,544,983, as compared with 6569 permits covering 9482 operations and involving an expenditure of $21,043,230 in the corresponding nine months of last year.

Important building operations in the suburban sections continue the order of the day. One of the latest is that of C. R. Siegel, who is about commencing the erection of 124 dwellings in West Philadelphia, 28 of them being 15 x 39 feet each, 28 being 15 x 27 feet each, 56 covering an area 15 x 28 feet each, four covering an area 17 x 60 feet each and eight covering an area 16 x 49 feet each. These dwellings are estimated to cost in the neighborhood of $215,000. Another operation is that of David Rennock, involving the erection of 108 dwellings in Germantown. These include both two and three story houses, as well as stores and dwellings.

Another important addition to the architecture of the city will be the ten-story and basement apartment hotel designed by Architect Amos W. Barnes. It will cover an area of 80 x 130 feet, and the style of architecture will be the Italian Renaissance. For the first two stories Indiana limestone and granite will be used, and Pompeiian brick trimmed with terra cotta for the stories above. The feature of the first floor will be the dining room, the decorations of which, it is said, will cost about $5000. The upper stories will contain about 70 suites of two, three, four and five rooms with baths and a few with kitchens for housekeeping.

St. Louis, Mo.

The present situation in and about the city bespeaks a fairly active building season for the balance of the year. The high prices of nearly all materials which enter into the construction of buildings has, to a great extent, exercised a restraining tendency as regards new work, but the volume in the aggregate will reach a fair total.

According to the figures of Commissioner C. F. Longfellow there were 480 permits issued in September, covering building improvements estimated to cost $775,035, as against 328 permits issued for improvements of an estimated value of $512,291 for September of last year. Taking the nine months of the current year the figures show 3466 permits to have been issued for building improvements of an estimated value of $9,692,123.50, while for the corresponding period of 1901 there were 2773 permits issued for buildings estimated to cost $9,085,570.

San Francisco, Cal.

Building contracts are now more numerous and of larger aggregate value than for some time past and there is a large quantity of work on hand for the immediate future. A prominent factor in the present situation is the construction of solid and substantial buildings for the use of doctors, oculists, dentists, &c. The most recent of this class of buildings is the "Emerson," and nearly all of its 130 offices have been rented to doctors and others. This building has a frontage of 46 feet 6 inches and a depth of 137 feet 6 inches. It is five stories high in front and seven stories high in the rear. It is built of granite, sandstone and brick, and is ornamented externally with mosaic. The interior is finished in Douglas fir. Colton onyx is employed on the street floor, and all the arrangements are of a character to meet the wants of the building's special line of tenants. Among the proposed buildings which are now interesting contractors of the city are the United States Custom House, the military buildings at the Presidio, including a gymnasium, amusement hall and natatorium, and the proposed Merchants' Exchange Building, for which the needed $1,500,000 has been subscribed.

The first annual exhibit of the San Francisco Architectural Club opened on September 27 at the club rooms in McAllister street. The exhibit was of great interest to the architectural profession and attracted a large attendance during the period it was held.

Terre Haute, Ind.

During the month of September there was an unusual amount of new building inaugurated, the permits issued showing an increase of 48 over last year—a gain of over 100 per cent. The greater portion of the work was in the nature of small houses and cottages, with estimated costs from $500 to $1000. Building has been delayed on account of the scarcity of brick and lime, and a number of houses planned will not be started this fall for that reason. Maywood Terrace, or "Robertstown," is a new addition that is attracting considerable attention. Small cottages for rental purposes are going up at the rate of about one a day.

Toledo, Ohio.

At the semiannual meeting of the members of the Builders' Exchange W. J. Albrecht was elected the local representative on the Executive Committee of the Ohio State Association of Builders' Exchanges. The Auditing Committee reported the exchange in a flourishing condition. After the business matters had been disposed of refreshments were served and the remainder of the evening was spent in social intercourse.

Worcester, Mass.

For some time past the builders in the cities and towns in the eastern, central and western part of Massachusetts have felt the need of a closer union of interests, this need being forcibly pressed home at the time of the strike of the shop carpenters early this last summer. With a view to forming closer relations one with another, representatives from Worcester, Springfield, Watertown, Waltham, Milford, Westfield, Holyoke, Leominster, Brockton, Newton and Northampton assembled in the rooms of the Worcester Builders' Exchange on the afternoon of Friday, September 19, and organized a State Central Association of Master Builders.

The officers elected were: President, H. C. Wood of Westfield; first vice-president, M. D. Muldaugh of Watertown; second vice-president, E. T. Linch of Milford, and secretary treasurer, Henry W. Sweetser of Worcester.

A committee was appointed to draft a constitution and code of by-laws and present them for ratification at the next meeting, to be held the last week in October, in the rooms of the Builders' Exchange in Worcester.

While the main object of the Central Association is that of protection of mutual interests it will be qualified to handle any questions regarding the building trade that may be brought before it by any member. We understand that the numerical strength of a city or town will not be the chief consideration in affording it protection, and all members, whether their business be extensive or limited, will receive the same consideration. The members of the Builders' Exchange are much gratified at the successful way in which the association was launched, and efforts will be made to bring in other master builders from cities not yet represented in the membership, the idea being to make the organization as complete as possible. It is the hope that vexed questions relating to labor matters can now be handled with less friction than heretofore.

Notes.

The complete list of officers of the Duluth Builders' Exchange for 1902 is M. A. Thomson, president; H. D. Bullard, secretary, and G. H. Lounsberry, treasurer.

A Builders' Exchange has been organized in Bradford, Pa., with E. N. Unruh, president; Wm. Hanley, vice-president; W. H. Dennis, secretary, and J. W. Hayes, treasurer.

It is said that not in many years has there been such activity in building operations in Elkton, Md., as at present. Many improvements in the way of new residences, stores, &c., are under way and the scene of activity is spreading in many directions.

The Master Builders of Newport, R. I., recently perfected an organization, adopted a constitution and by-laws and elected Benjamin F. Tanner president; F. A. Allen, Jr., vice-president; William H. Langley secretary, and M. A. McCormick treasurer.

The Master Builders' Association of New South Wales, Australia, has passed a resolution by which the members of the new association decline to make tenders for the erection of one of the new pavilions at the public hospital under the conditions laid down by the Minister for Works.

Reports from Hartford, Wis., are to the effect that never in its history has so much building been in prospect. A large number of new residences are under way, most of them designed to be heated with furnaces and lighted by electricity. There is a scarcity of good mechanics, and carpenters and masons are said to be in demand.

In the opinion of those competent to judge, Fredericksburg, Va., is witnessing an amount of building far in excess of any heretofore known, particularly in recent years. Many new residences and handsome stores are under way, and there seems to be enough work in sight to keep contractors and builders busy for several months to come.

The town of Brunswick, Md., is at present enjoying a brisk demand for dwellings and there are a number of new houses under construction. The town is the center of the large freight yards of the Baltimore & Ohio Railroad, which are being greatly enlarged, and as a result many of the trainmen are moving their homes to Brunswick, which accounts for the increasing demand for dwellings.

It is stated that New Decatur, Ala., experienced this season the greatest building boom it has known in many years. The leading contractor states that during the past 12 months fully 150 dwelling houses had been erected at the expense of $225,000, and that fully $300,000 more has been spent in the erection of business blocks, yet now it is said to be difficult to find a desirable residence or business building for rent. The Louisville & Nashville Railroad Company have been spending many thousands of dollars in the enlargement of their shops, which will be completed about November 10 and will give employment to a large number of extra men.

Law in the Building Trades.

RIGHT OF ACTION AND DEFENSE ON BUILDING CONTRACT.

In an action to recover for extras furnished under a building contract providing that, in case the valuation of such extras by the architect should not be agreed to, the matter should be submitted to arbitration, neither a report by arbitrators nor an offer to arbitrate as to such extras need be shown as a condition precedent to a right of recovery without the certificate of the architect, where such certificate was refused, not because of any disagreement as to the valuation, but by order of the owner of the property.—Foster *vs.* McKeown (Ill.), 61 N. E. Rep., 514.

WHEN OWNER IS NOT BOUND BY ACTION OF SUPERINTENDENT.

Where the owner of land and a contractor agree upon terms for the erection of a building in a particular manner, and by the use of certain specified materials, "under the personal and direct supervision" of a named person, he having no authority other than that indicated by the words quoted, the right of the owner to have the terms of his contract complied with is not affected by the fact that the superintendent accepted a class of work and materials different from that named in the contract.—Cannon *vs.* Hunt (38 S. E. Rep., 983), Supreme Court of Georgia.

LIABILITY WHEN TIME OF CONSTRUCTION IS EXTENDED.

Where a contract provides that "If the time allowed for such work is extended, at the request of the contractor, for any cause whatever, all resulting expenses . . . shall be deducted from payments due or to become due," the contractor will be chargeable with the cost of inspection during the extension.—Mundy *vs.* United States, 35 Court Claims, 265.

The United States Department of Agriculture has issued what is known as Bulletin No. 33 and entitled "The Western Hemlock," by E. T. Allen, Field Assistant in the Bureau of Forestry. The bulletin presents the results of a two seasons' study of the character and uses of the Western hemlock, and those conditions under which it may be profitably grown, lumbered and manufactured with a view to determine its value as a commercial timber. The information is of a character to be of special interest to lumber manufacturers and consumers.

At a recent session of the Trades Union Congress in London a resolution favoring the establishment of a Government arbitration court in Great Britain was rejected by a three to one majority. Many of the delegates opposed the resolution on the ground that under such a system of compulsory arbitration as was proposed the unions would not only lose many of the advantages they had wrung from their employers, but would die of manition, since the need of their survival would no longer exist.

A Combination House Tank.

A combination house tank, installed some time since by the writer in a country residence, fulfils some requirements of the house owner that may be of interest to the reader, says "Helmar," in a recent issue of *The Metal Worker*. The house is of heavy frame construction with stone cellar and foundation walls. The roof is a gambrel roof, with the greater part of it forming the flat slope next the comb, as seen in Fig. 1. This gives considerable room in the loft near the outer walls and causes the flat slope to catch most of the water that falls on the roof, which is covered with slate. The architect had no thought of the plumber when he made the plans, but these conditions are all favorable and were taken advantage of in locating the tank, as indicated in Fig. 1.

The area of roof drained by the valley of the flat slope was thought sufficient to supply the tank, except in very dry seasons, and as the tank was to take water directly from the roof it was placed so that a large oval pipe could be run straight down into the tank from the point where the valley changes into the steep slope. This opening in the valley has a hood projecting upon the lower side to make all the water from the valley go down into the tank, and the opening is fitted with a wire basket. This plan not only makes possible discharging directly into the tank, but also avoids the mass of leaves, straw, &c., that would have to be contended with if the water was led to the tank from the cornice gutter. It also permits discharging the overflow, which is one-fourth larger than the pipe leading from the roof to the tank, directly into the cornice gutter, as indicated in Fig. 1.

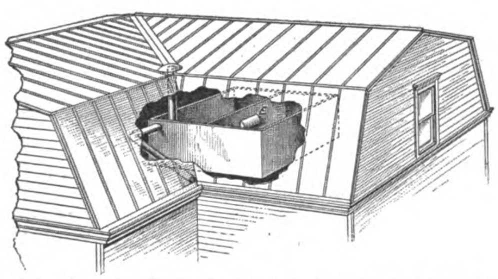


Fig. 1.—Broken View, Showing Valley, Inlet and Outlet Pipes.

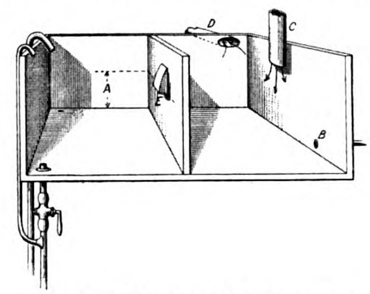


Fig. 2.—Arrangement of Tank and Pipes.

Combination House Tank.

The tank, the principal features of which are shown in Fig. 2, is 12 x 8 feet and 3 feet deep, giving about 1800 gallons capacity below the bottom of the overflow. The tank is divided in the center to make two compartments, 4 x 12 x 3 feet. It is keyed by tie rods running both ways, the 8-foot rods passing through the casing in both divisions. The two 12-foot rods are placed just high enough for their casing pipes to lie on and be supported by the casing pipes of the 8-foot rods. The wood of the tank is clear white pine, 2 inches thick, with feather joints, and the lead lining is wiped in. As shown by Fig. 2, water enters the tank from the roof through C and overflows to the cornice gutter through D. The water in this part of the tank is termed "unfiltered." Half way up the division wall the water can flow into the other half of the tank through a rectangular opening covered with wire gauze, shown at E in Fig. 2. Water in the latter part is called "filtered." That which flows in from the roof has been merely settled and strained more or less. That which is supplied by the house force pump is from a cistern and was actually filtered as it passed to the cistern from the roof. Placing the opening in the tank division half way up from the bottom, as indicated by A, reserves half the water of the unfiltered side, at all times, for fire purposes, pipe B being run down to the basement, with automatic valve and reel of hose on each floor.

GROUND has recently been broken at Frankstown avenue and the Beechwood Boulevard, Pittsburgh, Pa., for a new hospital, which will cost when completed in the neighborhood of $500,000. The right wing of the hospital is to be completed by Christmas, 1904, and will cost about $120,000. The main portion of the hospital will be the last to be erected, and it is probable that several years will elapse before the whole structure is finished. The Duquesne Construction Company have the contract for doing the work.

New Publications.

Heating and Ventilating Buildings.—By Rolla C. Carpenter, M.S.C.E., M.M.E. Size, 6 x 9 inches; 562 pages; 277 illustrations. Published by John Wiley & Sons. Price, $4.

This fourth edition of the work, by Professor Carpenter, under the above title, has been largely rewritten and increased one-third in size, many of the subjects receiving new and fuller treatment. Three new chapters have been added; one relating to the fan, or blower, for moving air; another to the general subject of mechanical systems of heating and ventilation, and a third to school house heating and ventilation. This work is one of the most popular books on the subject that has appeared of late years, and the latest edition, being more full, should be of increased interest and use to the heating trade.

The first chapter deals with the nature and properties of heat; the second with the principles of ventilation; the third, the amount of heat required for warming; the fourth, the h at given off by radiating surfaces, and so on, treating of the pipes and fittings, boilers used for steam and hot water heating, method of setting the various systems of piping, heating with exhaust steam, &c. One chapter of 20 pages treats of heating with hot air. Mechanical ventilation, temperature regulators, school house warming and ventilation, specifications, proposals and business suggestions complete the work, which also contains an appendix and a number of tables with explanations. The text of the book will be more readily understood by the ambitious young reader through the aid of the illustrations. The portion devoted to furnace work reproduces tabulated data from *The Metal Worker*, and gives some rules to aid in designing and laying out furnace work. As a book of reference, whether for the study of first principles or of advanced practice, it will be found a valuable addition to the library of every heating contractor and engineer.

Architectural Drawing. By C. Franklin Edminster. 230 pages; size, 7¼ x 9½ inches. Illustrated by means of 105 full page plates. Bound in heavy board covers. Published by the author. Price, $2 postpaid.

This is the second edition of a well-known work designed to meet the demands for a treatise on elementary architectural drawing. The edition has been very materially enlarged as compared with the one first issued, both as regards the pages of text and the plate illustrations. In most cases the latter are line drawings, although in some instances half-tones are used. The plates are arranged in such a way that each new problem involves principles a little more difficult than the one preceding, thus leading the student step by step from simple subjects up to those of a more intricate nature. The work is of a character which will be found of special interest and value to the architectural student and draftsman, especially to those who are desirous of learning how to read architects' drawings.

The first chapter deals with the subject of materials requisite in preparing drawings; the second presents some geometrical problems; the third deals with simple projection, introducing the principles of working drawings; Chapter IV considers the intersection of solids and the development of surfaces; Chapter V the projection of shadows; Chapter VI instrumental perspective, while Chapter VII relates to the orders of architecture. The study of a frame house constitutes the subject of Chapter VIII, the matter being illustrated by means of floor plans, elevations and details of construction, the latter being presented in such a way as to be readily understood by the merest novice in building construction. There is a chapter on masonry and another showing how stairs are built.

Hendricks' Commercial Register of the United States. Size, 8 x 10½ inches; over 1200 pages; substantially bound in board covers. Published by S. E. Hendricks Company. Price, $6, postpaid.

The twelfth annual edition of this well-known directory, devoted especially to the interests of the architectural, mechanical, engineering, contracting, mill quarrying, hardware, iron, steel, mining, railroad, exporting and kindred industries, has just been issued with greatly extended lists. There are something like 350,000 names and addresses arranged under 14,000 classifications. Some idea of the extent to which the present edition has been enlarged may be gathered from the fact that the index consists of 46 pages with three columns to a page, as against 44½ pages, two columns to a page, required for the 1901 edition.

The matter has been compiled with a great deal of care and will be found of value to the architect, the contractor, builder, manufacturer, buyer and seller, hardware dealer, plumber, electrical engineer, purchasing agent, mill and quarryman, makers of contractors' tools and supplies and hosts of others, while at the same time there are given many valuable mailing lists of the entire country. Some idea of the extent of the lists may be gained from the fact that the names and addresses of architects require 20 pages, carpenters, contractors and builders 138 pages, brick manufacturers 20 pages, masons and builders and their materials 56 pages; the same number is also required for plumbers, gas and steam fitters, sash, door and blind makers occupy 16 pages, and roofers and roofing materials, 48 pages. The volume is in fact of such a nature that it cannot fail to prove a valuable addition to any library of trade literature.

The American School of Correspondence.

No doubt there are many young men, as well as older men already in business, who are glad to have the opportunity of taking up technical studies at home with the assistance of an educational institution, especially if their work would count toward a degree when followed by a year or two of study at a resident school. This opportunity is about to be offered by the American School of Correspondence, heretofore located at Boston, Mass. The management of the school announce that they have made arrangements with the Armour Institute of Technology for the American School of Correspondence to be located in future on the Armour Institute premises in Chicago. Furthermore, a considerable number of the faculty of the Armour Institute will become actively associated in the instruction of the students of the American School. Dr. Gunsaulus, president of the Armour Institute, who is the chairman of the Advisory Board of the American School of Correspondence, is described as enthusiastic over the educational possibilities of the work, and it is at his invitation that the change has been made. President Gunsaulus believes that the American School system offers a means of bringing college influence to the masses such as no other form of education has ever offered. In fact, it is university extension work in every sense of the word.

Those young men who are too poor to give up four years to obtain a training and degree at a resident school can now considerably shorten their resident work by correspondence instruction, as the examination of the pupils of the correspondence school will count toward a degree at the Armour Institute. They will also be admitted to classes there on the subjects on which they have passed by correspondence. Furthermore, the management of the school will make a systematic effort to assist its students to procure positions in Chicago or vicinity, thereby enabling them to attend the excellent night schools at the Armour Institute, where all the advantages of laboratory and practical shop work are provided.

The American School of Correspondence will in no way loses its identity by the change of location. It remains a separate institution under its own management, but with the full co-operation and help of the president and faculty of the Armour Institute of Technology. In making this change the management state that they intend to use every effort to raise the standard of correspondence instruction to such a degree of excellence that their examination credits will be accepted by other schools besides the Armour Institute. They purpose to make their diploma stand for thorough work in the eyes of manufacturers and people employing trained technical help.

AT the St. Louis World's Fair great fluted pillars 36 feet high and 4½ feet in diameter are now being made in a mold set in place, the liquid plaster being poured in at the top. Ordinarily such pillars are made in 24 pieces and set in place, leaving many joints that have to be carefully pointed. There will be 112 such columns on the Textiles Building.

CONTENTS.

FRONT AND SIDE VIEWS OF THE BRICK RESIDENCE OF MR. MORRIS GLAZER ON CABANNE AVENUE, ST. LOUIS, MO.

A. BLAIR RIDINGTON, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, NOVEMBER, 1902.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

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

DECEMBER, 1902.

The Washington Convention of Builders.

The occurrence of a convention of the National Association of Builders after an interval of two or three years is noteworthy in several respects. First, that it indicates persistence of interest in the existence of a national body of this character, which was evidenced anew by the action of the thirteenth convention, held in Washington the last week in October, in determining to continue its meetings from year to year, although it was evident to the delegates present that the time of such meetings should be changed somewhat so that they would fall at a season of the year when a larger attendance of builders might reasonably be expected. The most important phase, however, of this convention, was the discussion of labor issues as the most vital of all questions affecting the building trades. Extended reference to the convention will be found in another part of this issue, where are introduced copious extracts from an address presented by the secretary of the association on the topic above referred to. The interest in this address was most emphatic and it is quite evident from the attention which it has excited in the press generally that good results will follow. In this connection it is worth noting that since the convention there has been a very important move made to bring about business relations between the master carpenters and their workmen in the city of Boston, following directly in line of the recommendations adopted at the thirteenth convention, and referred to somewhat in detail this month in our department entitled "What Builders are Doing." It will be interesting to note to what extent the recommendations of the National Association are followed in various parts of the country, and it is to be hoped they will take root quickly.

Incorporation of Labor Unions.

In connection with contracts entered into by labor unions, the complaint is justly made by employers that there is no legal method of holding the unions to the faithful performance of their obligations under such contracts. Whereas the employers, in most cases, are incorporated concerns, capable of suing and being sued, the unions, not being incorporated bodies, are irresponsible under the law and therefore able to repudiate their contracts with impunity. This is a manifestly unfair position, and in order to overcome the objection the incorporation of labor unions has been urged in many quarters of late. It is understood that a serious effort is to be made at the next session of the Massachusetts Legislature to have an act passed under which all labor unions must be incorporated and the desirability of similar action is being considered in other States. The plan has approved itself to the members of at least one important labor union, the Wholesale Grocery Employees' Union of Chicago having just applied for a charter under the laws of the State of Illinois. This step, it is understood, is taken as a preliminary to making an agreement with the firms who employ members of the union, so that the employers may have assurances that such an agreement can be enforced upon both parties alike. This entirely removes, in this particular case, the complaint of irresponsibility that lies against labor unions in general. There is nothing that has so served to alienate public sympathy from the cause of organized labor as the readiness shown by the workmen, in a number of instances, to repudiate solemn agreements entered into with their employers, knowing that there was no method by which they could be legally held to their obligation: whereas, on the other hand, the employers could be so forced from the fact that they were incorporated bodies. It remains to be seen whether other labor unions will follow the lead of the Chicago organization. Should such be the case the way will be opened to a better understanding between employers and employed, in that the former, on making agreements or contracts with their employees, will have the assurance that the latter can be legally held to such agreements. Moreover, incorporation would lend a dignity and stability to labor unions which they cannot possess so long as they continue legally irresponsible bodies.

Wages in Great Britain.

It is a rather depressing exhibit that is made in a recent official report of the London Chamber of Commerce on the changes in rates of wages and hours of labor in the United Kingdom during 1901. It foreshadows a relapse from the prosperity of the past few years, a decline in wages being recorded for the first time since 1895. Moreover, during the first half of the present year the tendency was still toward lower wages. The number of workpeople affected by reductions in wages in 1901 was greater than at any time since 1893, and the estimated amount of wage reductions last year was more than the total reductions recorded in the previous eight years. It is estimated that the net decrease in wages in 1901 was about $7,600,000, compared with a net increase of $28,800,000 in 1900 over 1899. One cheerful feature of the report, however, is the recorded fact that there was a large increase in the percentage of workpeople whose wages were settled by conciliation boards, which was mainly due to the formation or re-establishment of such boards in the British mining industry. It is to be hoped that the methods and constitution of these boards will be investigated by the authorities of this country. It is quite possible such investigation might furnish data to work upon which would lead to some system that would preclude the possibility of recurrence of such a strike as has just been ended in our coal mines. Out of every 100 persons in England whose wages were changed in 1901 only two were concerned in strikes or lockouts, which is the lowest recorded percentage. With regard to the hours of labor, 586 workpeople had their hours lengthened and 28,690 had them shortened, the net result being a reduction of 58,728 hours per week. Altogether, the outlook for labor in the United Kingdom is regarded as less encouraging than for some years past.

The Right Way.

Those who do mechanical work are, as a rule, much more eager in their search for the right way of doing things than is the business man. The engineer who designs some mechanical work, or the superintendent or foreman who has a number of men working under him at some special job, whether it be a heating system, a plumbing system, or an elaborate piece of sheet metal work, must so design it that when the workmen have done their share in the construction of its several parts it can be completed as a perfect whole. In such work absolute honesty is essential to success. Sharpness and shrewd practice are sure to bring disaster to the work. Much work of the nature indicated may be regarded as an exact science, about which there can be no equivocation, and on which employers or customers will accept no shortages or defects, nor be satisfied with promises for the future. Many business men find satisfaction in giving their attention to the mechanical branch of trade rather than to the barter and sale side. Though an underrated boiler, or an overrated piece of brass goods, or a poor quality of workmanship, may for a time bring profits to a house, it is well to be just as absolutely honest in conducting this side of business as its financial side. A business built up on an absolutely honest policy is more safe in times of trade depression, or when other unfortunate conditions arise, than one that has been conducted with an eye for immediate self interest only. There is in the thoroughness and exactness of the mechanical side of trade much that can be patterned after on the other side. A safe business man or salesman makes no representations that the goods will not justify, and he will close no deals by promises that he does not intend to keep. Recently attention has been called to the commercial law of Germany, which imposes a penalty upon some of the customs resorted to by business houses who are not actuated by a desire to enjoy the highest possible reputation, which law is designed to discountenance any but the most honorable methods in business dealings. Without the restraining influence of such legislation some men, no doubt, are tempted to resort to questionable methods in their trade practices. Those, however, who are careful to be correct in all their business dealings are likely to experience the value of a good reputation in the next few months when collecting their outstanding accounts. On the other hand, it will be well for those who have not heretofore recognized the fact that there is only one right way of doing things and that is the honest way, particularly in business, to lay this truth to heart and act upon it.

The Present Cost of Building.

That the cost of building materials has risen considerably during the past five years or more is common knowledge, but perhaps few readers realize the extent of the rise and its effects. In cities of the first class the increase is from 25 to 35 per cent., according to the class of building, but in cities of the second and third classes the increase is nearly 40 per cent. Here in Greater New York, says the *Record and Guide*, the increased cost is offset by conditions not found elsewhere, at least in the same degree. Our owners or builders have the almost certain assurance that no matter what the cost, the investment will return a dividend, when the construction is for speculative purposes and average discretion is exercised. Real estate prices go up, in New York; they never seem to come down, as a general condition. This steady advance in values will eventually overcome any excess of cost. But in other cities it is different. In the average town real estate values move at a snail's pace, and the present prices of building material are prohibitive of speculative operations.

In the towns along the Hudson River building for the middle classes has almost ceased. Only the rich build voluntarily; some business concerns must. Workingmen are simply putting off the day for building homes to a more convenient season. In a general way, it may be said that a two-story frame house, 22 x 28, with a cellar under the whole house and piped for water and gas, could have been built in 1897 for $1600; but the same kind of a house cannot be constructed under present prices for less than $2300. The house that formerly cost $3000 to build will now cost more than $4000.

To fix upon a certain place for consideration, take Albany. Figures obtained there show that the hardware in a $2000 house, which cost $45 in 1897, costs $73 now. The clapboards that cost $26 per M. in 1897 cost $30 now; hemlock, $14 then, $10 now. In an ordinary two-story frame house there are 2500 feet of clapboards and some 8000 feet of hemlock. The cost of plumbing has gone up "tremendously," and $175 is the least calculation for a house with hot water apparatus and bathroom. Three-eighths-inch pipe, to particularize, costs just about three times more now than five years ago, at Albany. Faucets, which cost 30 cents at wholesale once, now command 47 cents, and every other article of brass in proportion. The same house that could have been honestly painted inside and out for $60 in 1897, could not be done for less than $75 or $80. Eight-penny nails have gone up from $1.85 to $2.65. A furnace that cost $80 five years ago cannot be bought to-day for $90. Plastering the house costs from 5 to 7 cents more, and the cost of papering has advanced from $30 to $36. Labor has advanced, though not in the same proportion. The general effect, however, has been to paralyze building, and drive mechanics hither and yon for work. If it were not for jobbing, they would be much distressed.

Convention of Brick Manufacturers.

After carefully considering the advantages offered by the various cities of the country, the Executive Committee of the National Brick Manufacturers' Association have decided to hold the seventeenth annual convention in Boston, February 2 to 7, 1903. The city is rich in historic points of interest, and with her noted institutions affords opportunity for visitors which should draw to the convention representatives from every part of the country. This will be the first meeting of the brick makers in New England, and the Executive Committee express the hope that a large and memorable gathering will result.

New Physical Culture School.

The plans have recently been filed for a five-story and basement brick building which will be used as a physical culture school and will adjoin the new Horace Mann School on West 120th street, New York City. According to the drawings prepared by Parish & Schroeder, architects, of this city, the building will cover an area of 110 x 84 x 104 x 56 feet and will cost in the neighborhood of $200,000. In the basement will be a swimming pool, bowling alleys and three handball courts, while on the first floor will be a lecture room, reading room, reception parlor, seminary room and lavatories. The second floor will be used for exercise rooms and class rooms for men and boys, and on the third floor will be similar rooms for women, girls and boys, with shower baths for women. The gymnasium will occupy the fourth and fifth stories. In the attic will be a fencing room, with galleries for spectators.

ANOTHER family hotel is about to be erected on the upper West Side in New York City, which will involve the expenditure of something like $600,000. It will occupy a site having a frontage of 100 feet on Seventy-seventh street, just east of Columbus avenue, and will have a depth of 83 feet. It will be 12 stories in hight, and will be of skeleton construction inclosed with brick and limestone. It will be erected for the West Side Construction Company.

THE new library and museum of the New York Historical Society, plans for which have been prepared by York & Sawyer, will cover the entire block, from Seventy-sixth to Seventy-seventh streets, facing Central Park West, the frontage being 204 1-3 feet. It will be three stories high in its main portions, constructed of ornamental granite in Colonnade style, and will have a capacity for 368,000 volumes.

DESIGN FOR A SUBURBAN HOME.

A DESIGN well adapted for erection upon a suburban site and involving features of arrangement and construction which cannot fail to interest a large class among our readers is illustrated upon this and the pages immediately following. The elevations, clearly indicating the external treatment of the building, are direct reproductions from the architect's drawings, as are also some of the details, prominent among which may be mentioned the elevation of the end of the dining room, showing the china closet; the main staircase in the reception hall and the detail of the arches under the front porch. The other illustrations are prepared by our usual process. An examination of the plans shows on the first floor a large reception hall, parlor, dining room and kitchen, with a commodious butler's pantry serving as a means of communication between the kitchen and dining room. Just beyond the reception hall in the passage leading to the kitchen is a lavatory and under the stairs at the right is a closet for wearing apparel. The stairs are of the combination order, with a flight leading direct from the kitchen to the cellar, and there are other features of arrangement which are likely to be found of suggestive value.

According to the specifications of the architects, Barrett & Thomson of Raleigh, N. C., the building is of balloon frame construction, with sills 6 x 10 inches; floor joist, 2 x 10 inches; ceiling joist, 2 x 6 inches and 2 x 8 inches, and studding, 2 x 4 inches, all placed 16 inches on centers; rafters, 2 x 4 inches, placed 24 inches on centers; porch sills, 4 x 8 inches, and porch joist, 2 x 8 inches, the latter placed 20 inches on centers. The foundation plan shows that there is a cellar 8 feet deep under the kitchen portion of the house.

The exterior of the frame is covered with ⅞-inch surfaced sheathing, over which is laid one ply of water proof sheathing paper. The side walls and gables where shown are covered with pine weather boarding, laid with 1¼-inch lap. The roof and gables are covered with 4 x 16 inch sawed pine shingles, laid 5 inches to the weather, the roof shingles being laid upon 1 x 4 inch sheathing strips spaced 3 inches apart. All outside finish, such as casings, water table, cornice, &c., is of pine. The porches are ceiled with ¾ x 3 inch beaded ceiling and the flooring is of ¾-inch pine. The interior floors of the house are of ⅞ x 2½ inch strips closely driven up and blind nailed.

The interior finish is of pine, painted three coats pure lead and linseed oil tinted to the shades desired. All openings have plain casing, band mold and cap. The kitchen is wainscoted 3 feet high and the bathroom 5 feet high, the wainscoting finishing with cap and shoe. The rooms not wainscoted have molded base with cap and shoe. The butler's pantry has a counter shelf 30 inches high, with wire screen doors above and solid doors underneath. The windows, except those in the cellar and the large window on the stair landing, have rolling slat outside blinds, hung on wrought steel blind hinges. The gables have slat ventilators. The bathroom fixtures consist of a 5-foot steel clad bathtub with 14-ounce tinned copper lining and oak rim, and siphon jet closet. The lavatory is fitted with 11 x 15 inch oval basin, having 20 x 30 inch marble slab and 10-inch back. In the kitchen is an 18 x 24 inch galvanized iron sink and a 30-gallon galvanized range boiler.

All exterior wood work is primed with ocher in pure linseed oil and treated with two coats of pure lead and linseed oil tinted to suit. The sash are glazed with "A" quality double strength sheet glass, while the

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

Design for a Suburban Home.—Barrett & Thomson, Architects, Raleigh, N. C.

window on the stair landing is glazed with the best quality clear glass, leaded to the design shown.

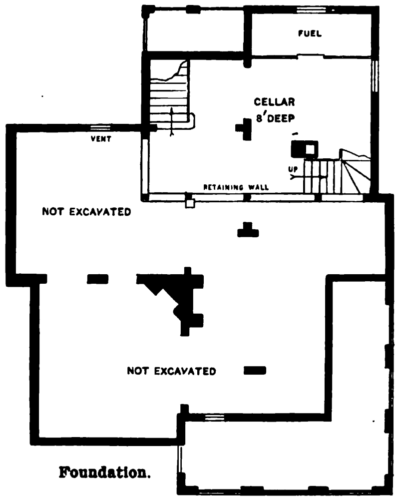
A Mammoth Farm Barn.

There is now in process of construction on a stock farm near Hamilton, Minn., a barn which for size and arrangement is worthy of more than passing notice. It is in the form of an octagon, of the Moorish style of architecture the seven wings being painted white with red roofs. The central octagon, 80 feet in diameter, will rise to a hight of 50 feet, measured from the ground to the steel trusses on the under side of the roof. A Moorish dome lighted on all sides will crown the octagon and will contain a large water tank. The wings extending from the octagon will be one story in hight and 150 feet long, and will contain box stalls and corridors running the entire length. At the further end of each wing two-story pavilions with Moorish domes will be built, the second story of the pavilions being reserved for feed boxes and the storing of hay. On the eighth side of the octagon, from which there will be no wing extending, will be the main entrance, and on either side two small Moorish towers will add to the palatial appearance of the building. The interior of the structure will be furnished in natural woods and varnished.

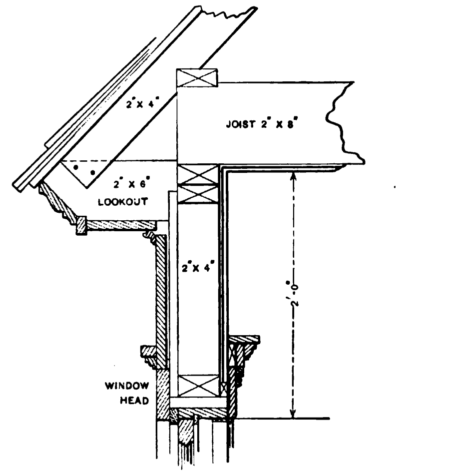
Two waiting rooms on either side of the entrance will be appropriately fitted. Staircases will lead to the second story, where the offices fitted up in fine style are to be situated, and where access may be had to a spacious balcony. In the wings large harness rooms, wash rooms and toilet rooms with shower baths will be located. A steel tramway, extending the length of each wing, will be suspended from the ceiling and a car on wheels will carry the hay and feed from the store rooms to the stalls. From the pavilion through each wing there will be complete provision made for carrying water and for sewerage, and heat will be furnished from a centrally located steam plant. The office portions will be heated to 70 degrees and the stalls to 40 degrees.

The central octagon will be cut off from the wings by fire proof material and iron doors will give further protection. The barn is located 300 feet back from the tracks of the St. Paul & Omaha road, and has a frontage of 386 feet. In connection with the stock barn, cottages, heated and plumbed throughout, and harmonizing in color with the barn, will be built for the accommodation of the employees and managers.

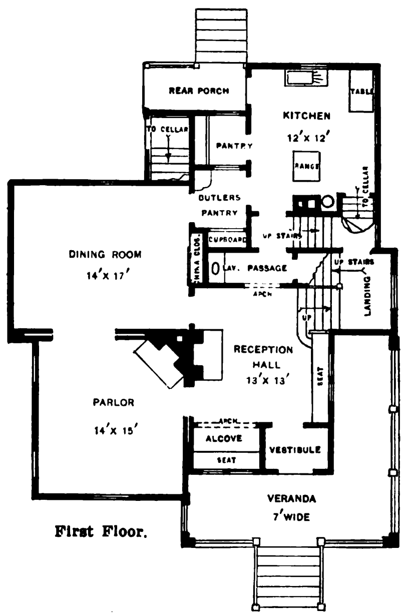
Only three of the wings will be completed at first, but as the demand for stall room grows the wings will be built out from the four remaining sides of the octagon. The barn is being built for M. W. Savage of Minneapolis,



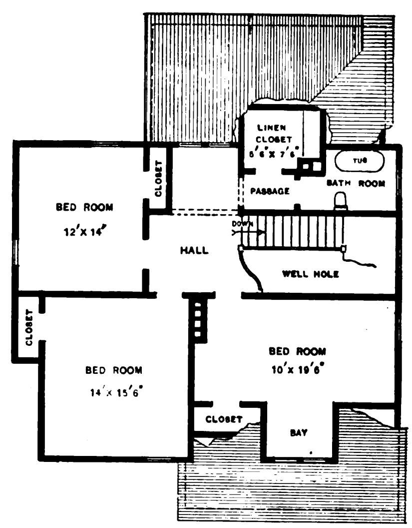
Foundation.



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



First Floor.



Second Floor.

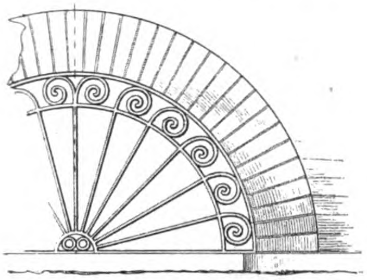
Design for a Suburban Home.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

in accordance with plans drawn by Architect Charles S. Sedgwick, with offices in the Lumber Exchange in the city named. The work of construction is being done by Frank H. Raidt of 1949 Oliver street, Minneapolis, Minn.

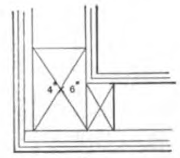
Soft Woods of Australia.

While much has been written about the heavy timbers in which Australia is exceedingly rich, little seems to be known outside that country of the numerous soft woods admirably adapted for the manufacture of furniture and cabinet work generally. Several of these timbers have a wood grained and marked most beautifully, and capable of receiving the highest polish, while others are fragrantly perfumed. Among the chief varieties of woods of this class may be mentioned the red cedar, the beautiful wood of which is admirably adapted for the finer kinds of cabinet makers' work. Some of the cedar trees grow to immense size, as much as 2500 cubic feet of valuable timber having been obtained from one tree. In addition to the cedar may be mentioned tulipwood, yellowwood, white maple, myall, marblewood, mock orange, and many others. Besides their use for cabinet making, many of the brush timbers are of great utility for the rougher kinds of carpentry, while some, both hard and soft woods, are admirably adapted for coach builders' and coopers' work. The chief description of pine growing in New South Wales is the Moreton Bay white pine, found in the coast districts as far south as the Bellinger. It is soft, light and easily wrought, and suitable for all the interior woodwork of houses, as well as for cabinet making. The red or black pine is extensively distributed over the Liverpool Plains and in the Lachlan and Darling River districts, as well as around Berrima. It is beautifully marked in the grain, takes a fine polish, and has an agreeable fragrance. There are numerous other varieties of pine, but these resemble in their main features the trees already described. Australian deal is an excellent timber, and is obtained in very large scantling, the tree frequently reaching 120 feet in hight. It is soft, close grained, easily wrought, and remarkably free from knots. Its use, therefore, is extensive for cabinet makers' work and house fittings. The New South Wales Government Statistician mentions several of the more useful of the soft and fancy woods of the State. They include the beech, which attains a hight of 100 to 150 feet, with a diameter of 3 to 5 feet, giving a strong, white, close grained and durable wood, easily worked, and greatly valued for decks of vessels, flooring, turnery and furniture making; the black bean, growing to a hight of 120 to 130 feet, with a diameter of from 4 to 5 feet, with a handsome, close grained, dark colored, durable wood; the black oak, used for bullock yokes, tool handles, shingles, &c., and the blackwood, resembling walnut, and highly valued for making furniture.

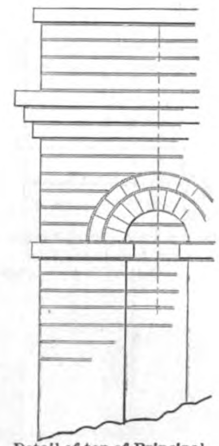
Another valuable timber is the rosewood. It is strong



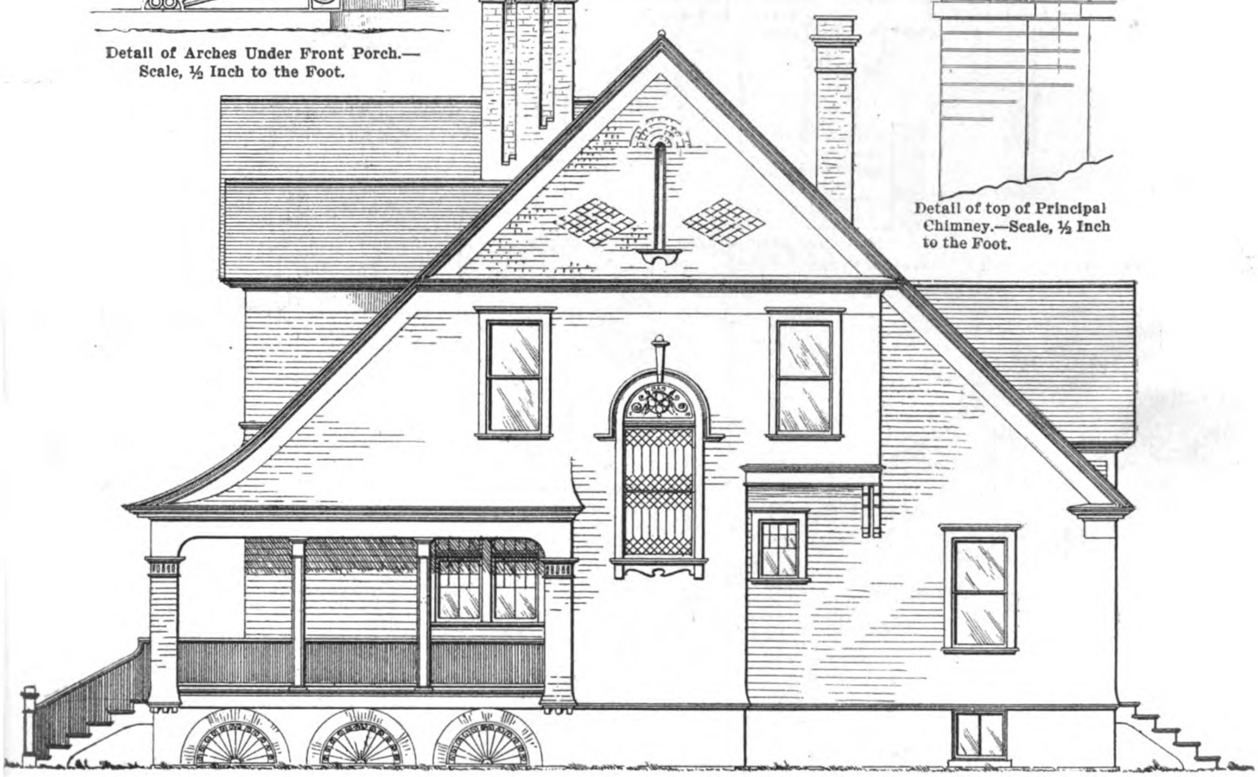
Detail of Arches Under Front Porch.—Scale, ½ Inch to the Foot.



Detail of Corner of the House.—Scale, 1 Inch to the Foot.

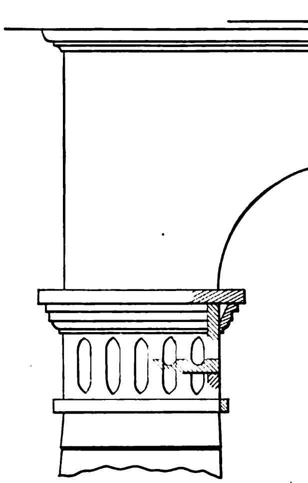


Detail of top of Principal Chimney.—Scale, ½ Inch to the Foot.

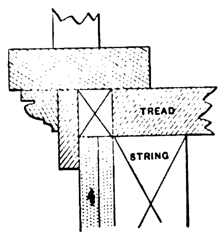


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

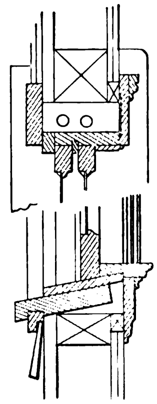
Design for a Suburban Home.—Elevation and Miscellaneous Details.



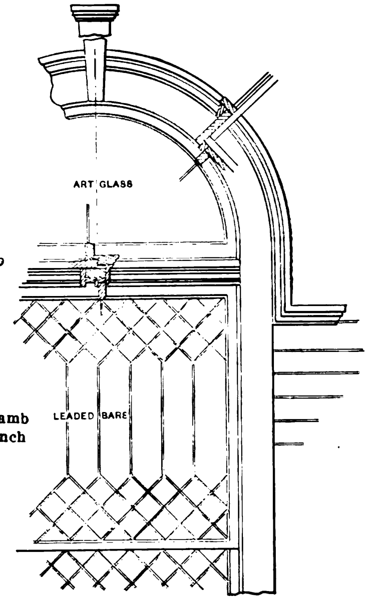
Details of Front Porch Finish.—Scale, ¾ Inch to the Foot.



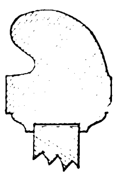
Section through Stairs.—Scale, 3 Inches to the Foot.

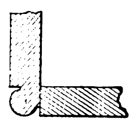


Details of Window Jamb and Sill.—Scale, 1 Inch to the Foot.



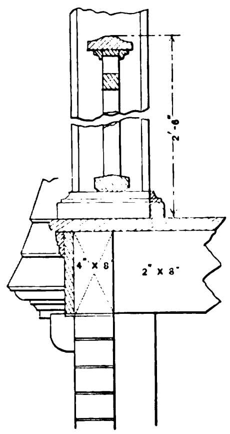
Details of Window on Main Stair Landing.—Scale, ½ Inch to the Foot.



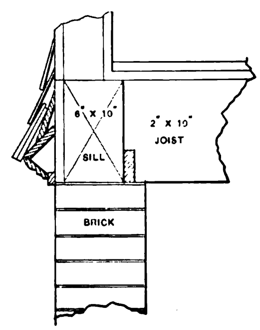


Section of Hand Rail. Corner of Newel.

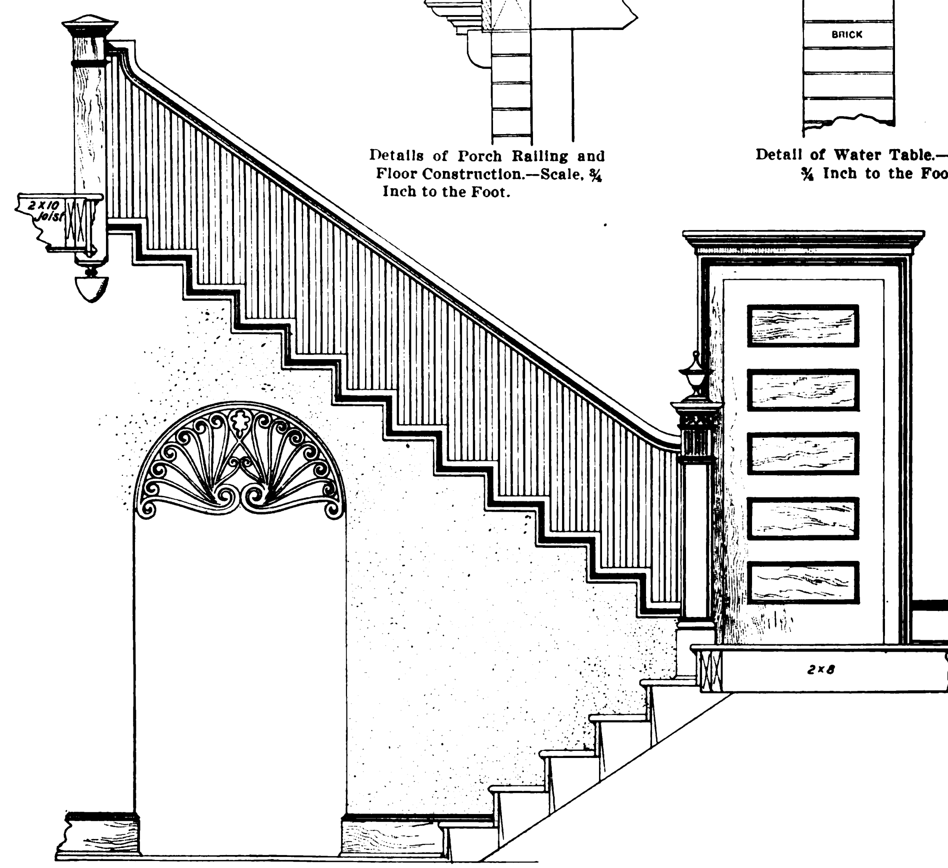
Scale, 3 Inches to the Foot.



Details of Porch Railing and Floor Construction.—Scale, ¾ Inch to the Foot.



Detail of Water Table.—Scale, ¾ Inch to the Foot.



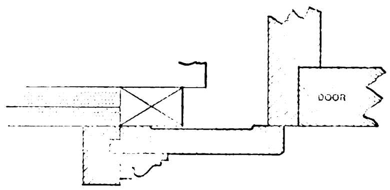
Elevation of Staircase in Reception Hall.—Scale, ¾ Inch to the Foot.

Miscellaneous Constructive Details of a Suburban Home.

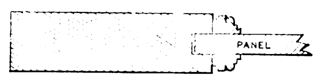
grained and durable, with a color resembling Spanish mahogany. Among other woods may be mentioned the silky oak, which attains a hight of 70 to 80 feet. The color is a light gray, beautifully crossed with silvery waves, and when polished the surface has a delicate lustre. Bedroom suites made from this wood possess a dainty appearance. Satinwood is another useful timber, yellow in color. It is soft and silky to the touch, close grained, easily wrought and is also suitable for cabinet making.

The English and the American Way.

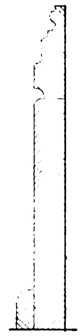
The following interview will be appreciated as coming from the *Engineer* of London in a series of articles



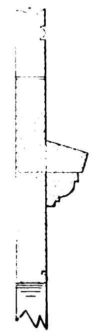
Detail of Casing for Doors and China Closet.



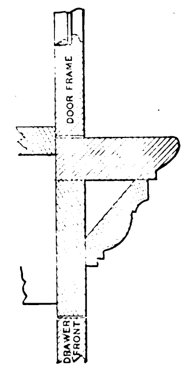
Section through Door Stile and Panel.



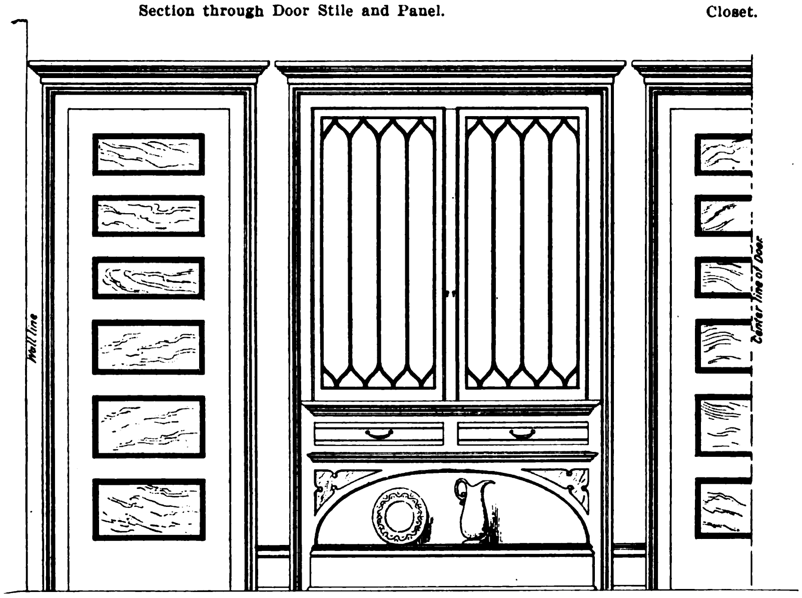
Base.



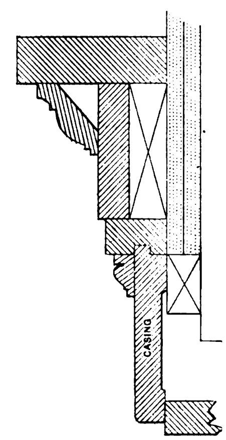
Detail of Mold Under Drawers of China Closet.



Counter Shelf for China Closet.



Elevation of End of Dining Room, Showing China Closet.—Scale, ⅜ Inch to the Foot.



Head Casing and Cap for Doors and China Closet.

Miscellaneous Constructive Details of a Suburban Home.—Scale, 3 Inches to the Foot.

on "South Africa from an Engineer's Point of View":

Let me quote a characteristic example of the manner in which we lose business here. A large importer told me the other day that year in and year out he sold a wind mill every day. These plants are required by farmers for private irrigation purposes and domestic water supply. The importer took me to his stores, and there I saw quantities of American wind mills with their tanks and accessories. There was nothing from England.

"Why do you not buy these things in England?" I asked.

"I went to England on purpose to make arrangements a year or two ago," he replied; "but although I found plenty of good wind mills it was impossible to do business."

"Why so?"

"Firstly, of course, there was the question of price. But this could have been got over for if I could have got what I wanted, I should not have objected to pay rather more for the English wind mill. As a rule, it is superior in make."

"Then what was the difficulty?"

"When I told the maker that I must have galvanized iron tanks with these mills his reply was that he never made them. I said that this was a necessity on account of our climatic conditions. The only offer I could get from him was that if I would guarantee him a certain number of orders during a certain period he would entertain any proposal I might have to make. I told him that it was not for me to give any such guarantee, as I could get what would answer my purpose elsewhere without any such stipulation. And so I buy my wind mills in America."

Gypsine—A Fire Proof Material.

One of the latest combination materials designed to add to the fire proof qualities of the buildings in connection with which it may be used is known as Gypsine. It is made of plastic hydraulic lime mixed with coke, sand and asbestos, the mixture being compressed into bricks. In a recent test by British fire commissioners a partition about 8 x 10 feet in size was built of bricks, laid in hydraulic mortar, the exposed side being coated with a thin layer of hydraulic clay. The fire was kept up for an hour. The temperature rose to 2050 degrees F., yet the material is said to have been unaffected, and the surface opposite the fire remained so cool that matches held against it would not ignite, even when the temperature was highest.

LAYING PORTLAND CEMENT WALKS.

THE following comments regarding the details of construction of Portland cement flagstone walks are from the pen of F. H. Crafts of the New York State Engineer Corps, Rochester, and will doubtless prove of interest to many readers of this journal:

The materials required for a small job are six or eight scantlings of the best white pine, 2 x 4 inches x 16 feet, dressed on all sides; half a dozen cross heads, 2 x 4 inches and as long as the walk is wide; some ash or oak ribbons, 3½ inches wide and 10 or 12 feet long, ¼, ⅜, and ½ inch thick, to be used in place of scantlings on curved walks. A small round screen having 64 meshes to the square inch; a large screen, 22 inches wide by 6 feet long, having 16 meshes to the square inch; an iron shod straight edge, 1½ feet longer than width of walk; many iron pins and wooden stakes; also shovels, hoes, axes, picks, steel squares, iron wheelbarrows, rakes, hammers, pounders, carpenter's level, finishing tools and a tool box.

Experienced Man in Charge.

A careful and experienced man should have charge of the work, as errors and mistakes in this business are very costly and there are many ways of ruining a walk. It is possible that a wrong grade has been used. It makes a very great difference about the cost of a walk whether there is good or bad management. It is of great advantage to have skilled help, especially a skillful finisher, in putting down cement walks.

Street walks should be made 4 inches thick. Inside walks are narrower and may be thinner.

One barrel of cement is sufficient for 45 square feet of walk. Only very high grade slow setting Portland cement is suitable for cement walks. One cubic yard of gravel is necessary for 75 square feet of walk and must be clean and sharp. Sand is screened from the gravel with the large screen and should be coarse.

On wet and heavy ground, or where the winters are very severe, a foundation 5 or 6 inches thick made of gravel or of soft coal cinders sprinkled and well tamped is necessary. Cinders make the best foundation.

A stout chalk line of seine twine is used in checking grades and lines when setting scantlings for a walk. Street walks have a slope of ¼ inch to the foot toward the curb, sometimes more. In parks and some other places instead of a side slope the walk is made crowning in the center. If there is a lawn between the curb and walk the drainage and appearance will be greatly improved by setting the walk 1 inch higher than the curb for each foot of width of lawn.

Proportions Used.

Concrete is mixed 1 part of cement by volume to 6 of gravel; top mortar is mixed 1 part of cement by volume to 2 of sand; separator is mixed 1 part of cement by volume to 4 of sand; dryer is mixed 1 part of cement by volume to 1 of sand.

For the concrete a good sized box is used, the gravel and cement placed in it, and this is all mixed up dry, turned over four or five times, but not wet until ready for use, then sprinkled, and turned over until all is damp; then immediately put in place with wheelbarrows. The top mortar is prepared at the same time in another box and in the same manner. The separator is mixed in a wheelbarrow dry. The dryer is obtained by screening equal quantities of cement and sand through the small screen and mixing it dry and using it dry at the proper time.

In steps, driveways or crossings where walks will have very hard usage concrete should be mixed 1 to 5.

The scantlings are placed in position with cross heads between and plenty of stakes outside to hold them securely. Surveyors' stakes are good. Spaces are marked off on the scantlings indicating the joints of the blocks, which should form rectangles (not squares) for good looks. Wire nails are driven in part way, on outside, opposite the joints, to refer to later. The cross heads are then placed at the joints and secured with iron pins driven into the ground.

The concrete is packed in and well rammed until 3¼ inches thick, as shown by passing the straight edge over the frame, which is outside of the walk, and enough concrete is usually laid to make five or six blocks at once, if one has a large contract. This leaves ¾ inch for the thickness of the top mortar. The iron pins holding the cross heads are all taken out long before the concrete is all in, and the cross heads are held by concrete packed around them. After enough concrete is in place the cross heads are gently rapped with a small hammer, taken out carefully and the moist separator brought in with a shovel and well packed into the spaces left by the crossheads, then rammed a little with a pounder. "Moist" means just wet enough to pack well.

Top mortar is next wheeled in and spread over the concrete quite soft and wet as compared with the concrete, which just shows moisture when pounded; but the top mortar should not be pounded and must be wet enough to be worked easily under the trowel and straight edge. The latter, moved by a man on each side of the walk, pushing it back and forth, up and down the length of each block, renders it smooth and true; trowels are used all the while to prevent the waste or loss of good mortar over the sides of the scantlings.

A steel trowel rubbed over the walk soon brings water to the surface, or at least moisture, which is taken up by a liberal sprinkling of the dryer. The dryer is carried in a pail and scattered by hand, then rubbed in with a float or wooden trowel.

Making the Joints.

The straight edge (1½ inches thick) is laid flat across the walk with the iron in line with the wire nails in order to be exactly in line with the joints. A man standing on this and using a stout pointed trowel, keeping the trowel always against the straight edge, cuts down through the walk, working all the way across, and finally passes his trowel back and forth from one side to the other, making a clean cut joint, and does the same with the other joints. When clapboards or tar paper are in the joints they are cut only 1 inch deep. Some one follows after with the finishing tools, jointer and edger and polishes up the edges. A plasterer's trowel is now used to give each block a fine finish. If the blocks happen to be wet one must wait awhile, for a walk must not be finished wet. The atmosphere will quickly dry up some of the moisture.

When the dot roller is to be used on a walk it looks better to have a border all around each block 4 inches wide. A chalk line held taut on the walk at points already marked with a pair of steel compasses and pressed down firmly by passing a steel trowel carefully over it makes a very clean cut line. The chalk line is then taken away. The walk should be rolled crosswise, not lengthwise.

Walks must be well protected for several days after laying, and ought to be frequently sprinkled in very hot weather if exposed to the sun. Wooden covers are often used. Sprinkling is a benefit in all cases.

A very small steel trowel is useful in touching up bad spots. A bricklayer's trowel is the kind with which to cut joints. At the beginning of the day's work a clapboard or a piece of tar paper 3 inches wide may be used against the walk laid last, or against any block that has been laid long enough to get very hard. Wet sand is good to place between a curbstone and cement walk or against the stone walls of a house where a walk would otherwise touch them. Very wide walks are laid in several courses, but it is bad practice to break joints; blocks ought not to contain more than 40 square feet unless made extra thick in the middle. It is better not to have more than 30 square feet in each block. Scantlings should not be removed until the day after the walk has been laid, and then rapped downward until loose, after which they may be carefully taken up.

Very fine, broken quartz is sometimes mixed with the sand in the top mortar of cement walks to improve their wearing qualities.

CONVENTION OF NATIONAL ASSOCIATION OF BUILDERS.

IN accordance with the programme previously announced in these columns, the thirteenth annual convention of the National Association of Builders was held at the New Willard Hotel, in Washington, D. C., on Tuesday and Wednesday, October 28 and 29. Representatives to the number of half a hundred were present from builders' associations in Boston, Mass.; Baltimore, Md.; New York City; Philadelphia, Pa.; Louisville, Ky.; St. Paul, Minn.; New Rochelle, N. Y.; Wilkes-Barre, Pa.; Washington, D. C.; Wilmington, Del., and other places.

The meeting was called to order with President John S. Stevens of Philadelphia in the chair. The chief business of the convention was the discussion of labor issues in their relation to the building trades, but several minor matters were also considered. A committee which had been appointed at the last meeting of the association prepared a revision of the constitution and made a report which comprehended principally such modifications as were made necessary by changes in the basis of representation and yearly dues. The report of the committee was accepted and its recommendations adopted. Specially prepared papers were presented by Thomas F. Armstrong of Philadelphia and by William H. Sayward of Boston, secretary of the National Association of Builders, relating to the general topic of discussion.

Mr. Sayward's Address.

The paper of Mr. Sayward was quite an exhaustive discussion of the subject. At the outset he referred to the almost universal condition which confronts the practical student of labor issues as exemplified in the failure of the employer to act in the matter of labor as he does in all the other relations connected with his business, pointing out the results of this policy and indicating in what way the dangers which now threaten could be avoided. Attention was called to the difficulties and dangers inherent in all associated effort and the temptation to exercise undue power and to force, by means of concentration, that which can only safely come by natural growth.

The labor problem, he said, comprehended three distinct interests--those of the workmen, of the employers and of the public, and intimated that the movement of these interests up to the present time has been largely in the order named, while the characters of the movements, stated in the same order, are "aggressive, defensive and passive." Mr. Sayward then traced the route which the labor movement has followed, indicating its growth from "feebleness to uncontrolled and apparently under the present *régime* uncontrollable power." This movement was described as following the same route as natural forces—the line of least resistance, which in this case was the employer. The character of the forces operating was clearly shown and how the employer as an agent of the community was often subjected to innumerable difficulties and more than his share of risk and ultimate loss. The speaker then addressed himself to those specific manifestations of labor issues with which builders are familiar, and endeavored to show how they may modify their attitude so that more satisfactory conditions may prevail at least in their specific business. In further discussing the subject, he said:

Building Business and Labor Disturbances.

The business of building in any or all of its branches is peculiarly open to disturbances arising from agitation of labor. The simplest structure, the least important undertaking in the building line, calls into operation —on the premises—many distinct trades, all of them practically essential, the absence of any one making a gap which cannot be filled by any substitute, while in the more elaborate undertakings so common under the demands of modern business or domestic life the trades which contribute to complete such buildings sometimes number more than two score. This great diversity, this specialization, which splits up building work into so many parts, with a distinct employer and a distinct set of workmen for each part, invites disturbance, by the ease with which the whole machinery of operation toward a completed structure may be blocked. A portion of the work which in its relation to the whole may be absurdly insignificant may become the focal point upon which all the rest depends, and a labor holdup in that trade may in practical result operate as effectively upon the whole building as in the relatively larger trades. The sympathetic movement, of course, becomes peculiarly significant in the building business, whether it is operated upon a single building, to bring either a general contractor or a subcontractor to terms, or whether it is applied to a general group in a community, to bring all to terms.

One of the newer and most trying developments in later years is that arising from the conflicting claims of rival unions in the same trade. With no grievances against the employer by either of the rival bodies, their grievances against each other are made to result in mere injury to the employer—an injury from which even the most easy and conciliatory of employers can find no escape.

It seems to me that what I have said, coupled with what you, as practical men, engaged in carrying on the various branches of building work, know from your individual experiences and observation, indicates beyond question that as the case stands at present the relations of employer and workmen in the building trades are far from ideal; indeed, they are full of danger as a business proposition, not to say anything of unsettling, undermining and possibly destroying the inspiration, satisfaction, pleasure, delight in working out problems of construction or decoration upon which depends the development of power and ability to these ends in both employer and workman.

There is much, however, in the attitude of antagonism of these two elements that tends to breed deterioration in quality of work; the workman, who is constantly urged through unwise and inflammatory counsels, in his sorganization or elsewhere, to seek solely what he can get—the uttermost—without much consideration as to what he shall give in exchange, gradually loses all other purpose and by the inevitable working of the law of cause and effect the question of quality in what he does drifts, without his deliberate intent, into the background and finally disappears; while the employer, gradually ceasing to expect that which he is forced to believe he cannot get, lapses into the same attitude of get as much and give as little as possible. Under such conditions as these, the ability to execute becomes gradually a lost art. This is no fairy tale, as many of you can testify, who already find it difficult to secure skillful hands to manipulate stone and iron and wood and all the materials for building into structures and things of usefulness and beauty.

The Business Aspect.

The business aspect of the situation is most appalling. I can conceive of no more threatening condition than that which grows more and more impressively evident as ultimately possible with every new phase of the labor problem, now rapidly developing in every direction. While the disturbances, which quickly reach the individual, so that he personally feels their sharp pinch, like the recent coal strike, appeal glaringly to the public and result in volumes of wise and unwise discussion, mostly from those who have no practical experience in the fields of work involved, "who never set a squadron in the field and no division of a battle know more than a spinster," the disturbances that take place in the building and other trades are none the less destructive, though the public, from the smallest and most insignificant consumer up to the President, be not keenly on the alert and insistent that "something be done" to ameliorate the conditions.

Labor issues in the building trades are fully as difficult to meet as those of any business, not excluding the business of mining coal—indeed, I think more so—and as respects the extent or volume involved, either in money values or number of workmen affected, there is but little question that it, the difficulty, is equaled in few callings. The building business is not—like mining or manufacturing—concerned principally with one general movement and one product, but is made up of many independent parts, independently conducted. The independently conducted parts of a whole movement, as in the building business, make possible a pressure upon the whole through some comparatively insignificant part. This interdependence is suggestive. It suggests weakness, and, strangely enough, it suggests strength; and, most of all, it suggests obligation. It suggests weakness because insufficiency in any one part blocks the wheels of all parts, and it suggests strength because under intelligent direction, based upon a proper principle of action, all parts may act together to defend any one or more parts from attacks that may be instituted against them. The suggestion of obligation is the strongest, because each part may not, with a proper sense of its duty to the other parts, pursue a course which may result in injury to all, and for this reason, in the building business more than any other, each of the blended trades should, in these labor issues, feel its obligation to so arrange its affairs that others may not be made to suffer on its account.

Reasons for Consistent Policy.

Three compelling reasons exist for the adoption of a consistent policy as regards labor issues in this business which immediately concerns us:

1. Obligation of each part to every other part.
2. Weakness, which prevails most peculiarly in the building business where there is no common policy.
3. Strength, which is peculiarly available for the building business when a common policy is positively adhered to.

Now, what policy is possible? It would be a useless consumption of your time and mine if this discussion should not bear fruit in the shape at least of a suggestion of possible remedy for what I believe to be a most serious mistake in the attitude of employers generally toward the labor problem, and especially our labor problem.

Attitude of Employers.

I am of the opinion that the attitude of employers generally in all kinds of business where labor is an issue should be radically changed. Instead of holding themselves, as they too often do, either indifferent or opposed to organizations of workmen, I feel that they should take the matter up with liveliest interest and determination and insist that workmen in their various trades shall be organized; that they, the employers, will have no settled policy with them until they be organized —and organized in such fashion as will produce and therefore safe bodies to be recognized; that they, the employers, will co-operate with the workmen to this end, and that the organizations thus formed will be treated with in fullest, freest and most open manner, so that agreements shall be made at seasonable times of the year, governing terms and conditions of each coming year, or series of years, these agreements to be made public so that the community may know what the contract is and where to place blame if contracts are not kept.

Such a policy of participation will render it practically impossible for the affairs of labor organizations to be one-sided or to drift into the hands of unworthy or dangerous men. The one safeguard that workmen's organizations need, to make them wholly valuable, is the co-operation of employers. I will not say they are entirely helpless without this co-operation, but I may say with truth that this co-operation will be their greatest defense against those evils which now most glaringly assail them and so often discredit them in the eyes of the public. At all events an intelligent recognition by employers of the fact that they are a part of the labor problem, that no inattention or discrediting on their part can alter the fact, but, on the other hand, that frank and complete co-operation insisted upon as not only a duty but a right, will furnish the element so greatly needed to balance a machine which often has seemed ill-adjusted for the work it aims to accomplish.

Difficulties in the Way.

There are many difficulties it is true, but none I believe so great that they may not be surmounted. In the first place, we have the difficulty arising from the prejudice which an untenable attitude and unwholesome action on the part of labor organizations have engendered, and from the fact that in many cases their leaders have been irreconcilables and wholly unworthy of the important offices they have been permitted to fill; but I wish to make my belief entirely clear that this prejudice will vanish when co-operation modifies the action taken, and puts that power of selection back into the hands of the conservative rank and file which has ofttimes been wrested from them, for be it also clearly understood that when I say that "labor must be reckoned with," I do not mean any and every thing which presents itself as labor or as a representation of labor—it may be a counterfeit presentment—but until employers put themselves in a position where they can participate in the issues they cannot tell the true from the false and cannot help the true to oust the false. Employers must get near enough to the problem to be able to understand the difficulties which the honest and true men in labor organizations have to struggle with, and it is only by so doing that they can help the good element to overcome the dangerous and bad. Wherever you find a labor organization which constantly assumes the attitude and acts upon the assumption that the employer is an enemy to be attacked—alas, this is too often the sentiment which prevails—there you will find an organization which has drifted away from wise counselors and into the hands of demagogues and dangerous men, and that is the organization which more than any other needs the help of the employer to rescue it from the danger into which it has fallen, for an organization which fosters this sentiment of antagonism widens the breach, increases difficulties and deteriorates character. It needs help! Shall it be denied?

On the other hand, I wish to express with equal emphasis that when you find an organiation of employers which goes no deeper into the labor problem than to resist indiscriminately all measures sought by labor, and fails to address itself to the more significant and promising effort of co-operating with labor in an intelligent way, so that labor may be saved from its self-inflicted errors—and, alas, too many organizations of employers and too many individual employers seem to have no clearer vision of their opportunity and duty than this—there you will have an element which tends to increase rather than diminish the conflict between capital and labor, that conflict which has no sane reason for existence.

Another difficulty to be overcome is that sentiment so often expressed by employers that they will not treat with unions until they reform themselves and become proper bodies to deal with. This must be met by showing that the chief hope of reform lies in the introduction of that element which the employer alone can furnish, and that to demand that the reform be effected before this element be introduced is of the same nature as the restriction placed by a mother on her child, whom she insisted should not go into the water until he had learned to swim!

Another, and one of the greatest, of difficulties in the way of setting up new and more wholesome relations is the unfortunate attitude which unions have assumed toward nonunionists, and which they seem disinclined in most instances to either abandon or modify.

Faith in Unions.

We must grant that the great bulk of those who are members of trade unions believe in them thoroughly as their only hope for betterment of conditions, and in this view our intelligence and our fairness compel us to concur, even though we may severely condemn some general principles of action and many specific acts—for it is plain that employers or the public generally would not of their motion have brought about the changes which the unions have secured—and we must also admit that nonunionists have participated in the general improvement. Is is not easy, therefore, to understand why the union man, as a rule, looks with contempt upon the man who sneers and flouts him, refuses to pay his share of the bill of expense, and yet takes all the gain that others have won? It is easy of comprehension, I say—this deep-rooted antagonism of the union man against the nonunion man—and yet, twist it how we may, there is a still deeper rooted feeling which compels us to say that, however galling it may be for a group of men to see others profiting in an increase of wages or by a reduction of hours secured through their concentrated efforts, the inherent right of the individual to work or not to work must not be interfered with.

This principle is so based in the very foundation of our faith in independence of action, that independence for which this country stands, that it cannot be successfully assaulted, therefore it is the hight of unwisdom for labor unions to make it an issue. As has recently been well said by a sociological writer, "Unions have rights to be as exclusive as they please, and are within their rights so long as they control only the labor and movements of their own members, but they pass the limits of right and common justice the moment they use their organizations either directly or indirectly to exclude even one human being from the chance to make his own livelihood in his own way."

This right to make a livelihood is inalienable in every human being, so long as he does it within the law, and any man or any group of men who set themselves up against it injure their own cause by so doing. They injure their own cause also by setting up an argument which, if tenable at all, is equally tenable against themselves, for if the nonunion man cannot, without interference, pursue any lawful course under any agreement or condition agreeable to him, then the union man must submit to the same injustice. It is time for unionists to drop this most unfruitful endeavor; it is time for them, for their own good, to quit claiming that they have the right to work or not to work, and then, by the measures they adopt or support their members in adopting, practically deny that right to others.

It is my thorough conviction that the quickest road out of this folly is to co-operate with unions to help them, among other things, to see that this nonunion opposition is wholly untenable; it will then soon cease to be a factor. As the attitude of resistance has created evils and dangers, so will co-operation banish them.

If employers abandon their distrust of unions and enter into friendly business relations with them, unions must abandon their distrust of nonunion men and concede the right of their fellow workmen to join or refrain from joining their bodies. If a labor union is recognized as a fit and proper representative body to act for the class—and it must be fit and proper and representative or it cannot be dealt with—then all is gained which it may properly seek, and by the abandonment of its attempt to coerce people into joining it opens the surest road for accession to its ranks for those who may come of their own accord, but won't be driven. Relieve the unions of unworthy methods (and co-operation by employers will accomplish this more quickly than anything else), and those who now object to joining will be much more ready to do so, but if they will stay outside and no notice be taken of them it will soon be demonstrated that they are entirely harmless, because they have no effect. When employers and employees take each other into their confidence and thoroughly discuss matters of mutual concern antagonism to labor unions, to employers of labor and to nonunion men will soon disappear; and I further believe, and my belief is based upon actual experience, that if a dropping off of nonunion opposition be made a pre-requisite of recognition it will be dropped without hesitation.

Two minor difficulties should be mentioned. One is the trouble connected with joint committee work, which every employer holds up as a bugbear, and the other the claim that labor organizations should be incorporated so that they may be held financially responsible for their acts, even as the capital of employers is the basis of their responsibility. As to this last feature I must confess that I see very little real increase of responsibility, such responsibility as is argued for, financial responsibility through incorporation, unless the capital of such corporations should be very great (a practical impossibility) and made available only for damages under broken agreements, but I do think that employers and workmen alike should seek to put their respective organizations on some legal status which should result in making them subject to removal of rights granted under State charters when failing to adhere to agreements, or causing stoppages of work, or creating interference with privileges and rights of others. As to the objection that any form of co-operation entails trouble, I can only reply that this is a most unworthy plea; better any amount of trouble to defend ourselves and the community from the harassment and larger trouble which is inevitably connected with strikes and lockouts.

In summing up,it may be said that in labor issues, either for the building trades or other lines of work, these intricate and involved matters will not take care of themselves; they cannot safely be intrusted to one of the interested parties alone; both parties must have equal concern, must act jointly, not only in their own interests but in effect in the interest of the community. This being done and agreements formally made and legally entered into, if contracts are then broken it will be penalty, not arbitration, and the community will be the chief factor in imposing the penalty.

Advantage for the Building Trades.

In conclusion I wish to point out what seems to be a peculiar advantage for the building trades in carrying out this policy, showing, as I have previously indicated, the strength given by the very conditions which primarily seem a cause of weakness. It will be remembered that I endeavored to show that the diversity of trades involved in each and every building operation, each trade standing by itself, with a distinct employer and a distinct set of workmen, gave opportunity for almost limitless interference, in some cases a small and comparatively insignificant trade blocking progress of work as effectually as a larger trade. This may be turned to advantage by so concentrating the action of employers that any strike in any single trade, even on the work of a single employer, shall result in a lockout of all trades by all employers. This is coercive action, and it should be the study of employers to avoid it. But it would be legitimate under certain conditions, which I will endeavor to indicate in describing specifically how I think these labor issues can be most effectively met on the lines of the policy I have been discussing.

I should begin by having employers in the various building trades, the best, the most responsible in each branch in every community, united together for the specific purpose of dealing with labor issues. I should have this central body, acting in the general interest, at a seasonable time in each year, issue a call to all organizations of workmen in these various trades, requesting that they formulate their desires as to wages, hours and general conditions for the coming year and transmit them to the central employers' organization, this latter organization committing itself to laying the desires of the workmen thus expressed before the employers' organizations in each respective trade, and engaging still further to bring about agreements between the employers and workmen through joint conferences. All conferences to be upon a uniform plan and all agreements to be under the observation of the central body in order that there may be no conflict in the terms and conditions of the various trades.

These agreements being effected and made public so that the community may understand exactly what has been done in its interest, the central body will then be in a position to demand and secure observance by both parties of the terms of the agreement.

For instance, should any branch be embarrassed by stoppage of work in apparent violation of the agreement the central body will immediately take it up, make public investigation and fix the blame and penalty. Should the blame be upon the employers' organization it would have to withdraw from the position taken, or lose affiliation with and the support of all the rest of the central body, a serious matter. Should the blame be upon a workman's organization it would have to withdraw from the position taken, or the central body would at once cause all work to be stopped in all trades, an equally serious matter, and one which would speedily end the recalcitrancy of the guilty organization.

If it be too difficult to get a central body thus effectively organized, the same thing can be accomplished by the most prominent general contractors banding themselves together for the same purpose and the same policy of action. In some respects this is the more attractive form, inasmuch as it limits those who must be in harmony to a much smaller number. But in any event this line of action gets all its strength and value upon the setting up of preliminary agreements to settle all matters of mutual concern by and through joint committees, these joint committees to formulate working rules under said agreement.

With these agreements existing it will be hard for either party to evade the penalty which will result from breaking the contract, hard for the guilty parties to avoid the just condemnation of the public. But, in my opinion, and this opinion is based upon many years of experience, the discipline spoken of will rarely, if ever, have to be applied, for agreements fairly entered into and made public are seldom violated.

The members present listened with deep interest to the remarks of the two speakers, and after the papers were completed a very interesting discussion ensued. This was participated in by John S. Stevens and Frank Harris of Philadelphia, W. B. Speir of Washington, D. C.; A. N. Struck of Louisville, John H. Donohue of St. Paul, Alonzo Guest of New Rochelle, A. S. Reed of Wilmington, and many others.

Second Day's Session.

The second day's session was opened at 11 o'clock with a full attendance, and was devoted chiefly to a discussion of the papers read the day before concerning the relations of labor with the building trades. The discussion covered a wide range, and resulted in the reaffirmation of the recommendations for the establishment of joint committees of conciliation originally made by the association at its fifth annual convention, held in the city of New York in 1891. These recommendations are as follows:

Joint Conciliation Committees.

Form of Agreement recommended by the National Association of Builders to secure the establishment of Conciliation Committees, with Plan of Organization of the same, for the use of Associations of Employers and Associations of Workmen in all branches of the Building Trade.

AGREEMENT.

For the purpose of establishing a method of peacefully settling all questions of mutual concern, ... [Name of organization of employers] .... and .... [Name of organization of employees] severally and jointly agree that no such question shall be conclusively acted upon by either body independently, but shall be referred for settlement to a Joint Committee, which committee shall consist of an equal number of representatives from each association; *and also agree that all such questions shall be settled by our own trade, without intervention of any other trade whatsoever.*

The parties hereto agree to abide by the findings of this committee on all matters of mutual concern referred to it by either party. It is understood and agreed by both parties that in no event shall strikes and lockouts be permitted, but all differences shall be submitted to the Joint Committee, and work shall proceed without stoppage or embarrassment.

In carrying out this agreement the parties hereto agree to sustain the principle that absolute personal independence of the individual to work or not to work, to employ or not to employ, is fundamental and should never be questioned or assailed, for upon that independence the security of our whole social fabric and business prosperity rests, and employers and workmen should be equally interested in its defense and preservation.

The parties hereto also agree that they will make recognition of this joint agreement a part of the organic law of their respective associations by incorporating with their respective constitutions or by-laws the following clauses:

A. All members of this association do by virtue of their membership recognize and assent to the establishment of a joint Committee of Arbitration (under a regular form of agreement and governing rules), by and between this body and the .... for the peaceful settlement of all matters of mutual concern to the two bodies and the members thereof.

B. This organization shall elect at its annual meeting...... ....delegates to the said Joint Committee, of which the president of this association shall be one, officially notifying within three days thereafter the said................ ....of the said action and of the names of the delegates elected.

C. The duty of the delegates thus elected shall be to attend all meetings of the said Joint Committee, and they must be governed in this action by the rules jointly adopted by this association and the said...

D. No amendments shall be made to these special clauses, A, B, C and D, of these by-laws, except by concurrent vote of this association with the said.............................., and only after six months' notice of proposal to so amend.

The Joint Committee above referred to is hereby created and established, and the following rules adopted for its guidance:

ORGANIZATION OF JOINT COMMITTEE

AND RULES FOR ITS GOVERNMENT.

1. This committee shall consist of not less than six members, equally divided between the associations represented. The members of the committee shall be elected annually by their respective associations at their regular meetings for the election of officers. An umpire shall be chosen by the committee at their annual meeting, *as the first item of business after organization.* This umpire must be neither a workman nor an employer of workmen. He shall not serve unless his presence is made necessary by failure of the committee to agree. In such cases he shall act as presiding officer at all meetings and have the casting vote, as provided in Rule 7.

2. The duty of this committee shall be to consider such matters of mutual interest and concern to the employers and the workmen as may be regularly referred to it by either of the parties to this agreement, transmitting its conclusions thereon to each association for its government.

3. A regular annual meeting of the committee shall be held during the month of January, at which meeting the special business shall be the establishment of "Working Rules" for the ensuing year; these rules to guide and govern employers and workmen, and to comprehend such particulars as rate of wages per hour, number of hours to be worked, payment for overtime, payment for Sunday work, government of apprentices, and similar questions of joint concern.

4. Special meetings shall be held when either of the parties hereto desire to submit any question to the committee for settlement.

5. For the proper conduct of business, a chairman shall be chosen at each meeting, but he shall preside only for the meeting at which he is so chosen. The duty of the chairman shall be that usually incumbent on a presiding officer.

6. A clerk shall be chosen at the annual meeting, to serve during the year. His duty shall be to call all regular meetings, and to call special meetings when officially requested so to do by either body party hereto. He shall keep true and accurate record of the meetings, transmit all findings to the associations interested, and attend to the usual duties of the office.

7. A majority vote shall decide all questions. In case of the absence of any member, the president of the association by which he was appointed shall have the right to appoint a substitute in his place. The umpire shall have casting vote in case of tie.

The above form of agreement should first be adopted in due form—by vote of each organization proposing to set it up, care being taken to have the action upon a legal day, and its officers authorized and empowered to sign all necessary papers to put the agreement in force. The instrument of agreement should then be drawn up in full for signatures, and should be duly executed and acknowledged in such form as required by law in the States where the parties have their usual place of business or headquarters.

Uniform Contract.

The Committee on Uniform Contract reported that in conjunction with the committee appointed by the American Institute of Architects a thorough revision of the uniform contract blank had been made, which it was hoped would meet requirements for many years to come. The contract for publishing this form has been renewed with the Inland Publishing Company, who have heretofore had the distribution of the blanks. Copies of the revised form were distributed to all the delegates present.

Stephen M. Wright of New York City, chairman of Committee on Nominations, submitted a report, which was adopted, and Samuel B. Sexton of Baltimore presented a favorable report as chairman of the committee appointed to audit accounts.

Election of Officers.

The report of the Committee on Nominations, which was unanimously adopted, recommended the election of the following officers: President, John S. Stevens of Philadelphia; first vice-president, Charles A. Cowen of New York City; second vice-president, Samuel B. Sexton of Baltimore; secretary and treasurer, William H. Sayward of Boston.

Place of Next Convention.

It was decided to hold the next convention in the city of St. Louis during the year of the World's Fair. Preference was expressed that the convention be held in the month of February of that year, although the exact date was left to the discretion of the Executive Committee.

At the close of the Wednesday session a committee consisting of John S. Stevens of Philadelphia, chairman; Samuel B. Sexton of Baltimore, William H. Sayward and David W. Farquhar of Boston, George Watson, John Atkinson, John R. Wiggins and Frank Harris of Philadelphia, John H. Donohue of St. Paul, Alonzo Guest of New Rochelle, N. Y.; A. N. Struck of Louisville, and Stephen M. Wright of New York City was appointed to call upon President Roosevelt and present him with copies of the special papers which had been read dealing with the labor issues.

The Banquet.

In the evening the annual banquet of the association was held in the Red Parlor of the hotel, President John S. Stevens acting as toastmaster. The table was tastefully decorated with candles shaded with red, chrysanthemums of various colors and autumn leaves. Before the toasts were announced the silver loving cup of the New York members of the association was passed around the banquet table and each of the guests drank from it. The NewYork members numbered seven, and their loving cup bears the insignia, a goat's head, about which are the words, "We are but seven." The addresses of the evening were confined to subjects of special interest to those engaged in the building trades, the tenor of the remarks being in the direction of the necessity for thorough organization of builders. Those making short addresses were John S. Stevens, William H. Sayward, Frank Harris, George Watson, Richard Watson, David W. Farquhar, Stephen M. Wright, W. E. Speir, A. N. Struck, S. B. Sexton, William A. Conover and others.

The banquet closed what every one felt to be a very important meeting, and one of great significance in the history of the association, arousing as it did deep interest in a question of such importance to the building fraternity. It is earnestly hoped that the recommendations made looking to the establishment of peaceful and businesslike methods of adjusting matters of mutual concern to employers and workmen in the building trades may not only be effective in these trades, but be adopted in other branches of business where labor issues are a factor.

A New Hotel for Philadelphia.

A handsome addition to the architecture of the city of Philadelphia will be the new structure that is rising on the site of the old Stratford Hotel, the demolition of which began a few months ago. The new building is to be known as the Bellevue-Stratford, and will have a frontage on Broad street of 186 1-3 feet, and on Walnut street of a trifle over 122 feet. The style of architecture will approximate the modern French and the finish throughout, with the exception of public rooms and a few private rooms, will be in mahogany. The main dining room will be 49 feet wide and 81 feet long, and the grand ballroom on the first floor will be 104 feet long by 60 feet in width, and with the ceiling 30 feet high. There will be 544 sleeping rooms and 350 private bathrooms.

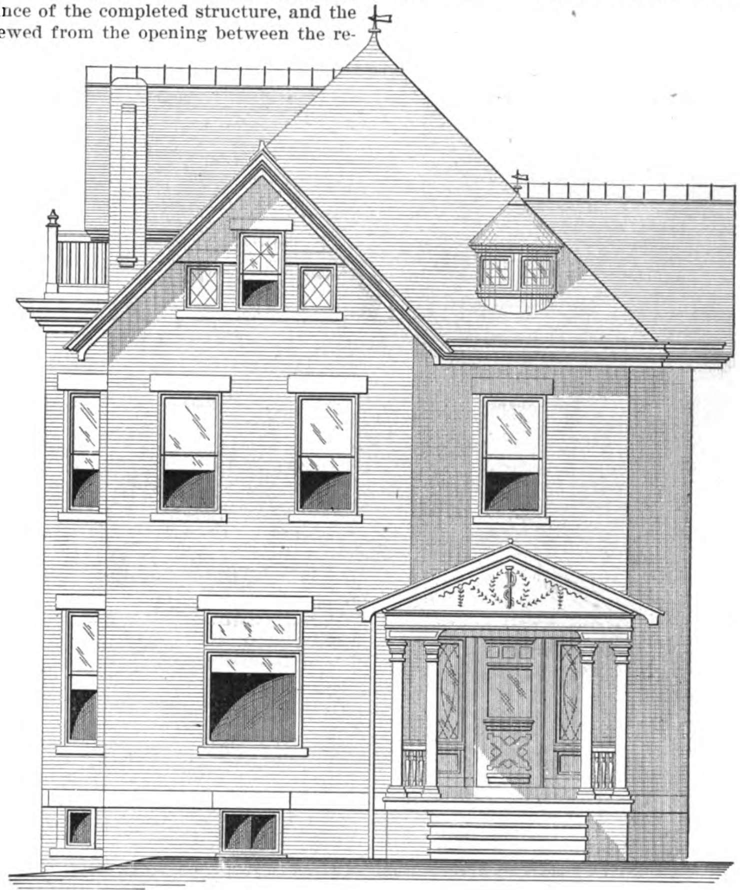
The architects of the structure are George W. and William D. Hewitt of Philadelphia, and the contract, which is being executed by the George A. Fuller Construction Company, calls for the completion of the hotel by the autumn of 1903.

BRICK RESIDENCE IN A CINCINNATI SUBURB.

(WITH SUPPLEMENTAL PLATES.)

WE take for the subject of our half-tone supplemental plates this month a two-story brick residence lately erected in Westwood, one of the many beautiful suburbs of which the city of Cincinnati can boast. The walls are of Akron hydraulic pressed brick with buff Rock Castle stone trimmings and with foundations and underpinning of Hill limestone. The roof is covered with Virginia slate surmounted by a neat cresting. The floor plans and details presented herewith give an idea of the general arrangement and construction of the house, while the half-tone plates, which are direct reproductions from photographs taken especially for the purpose, show the appearance of the completed structure, and the main stairs as viewed from the opening between the reception room and parlor. The picture of the interior also gives an excellent idea of the finish of the stairs, as well as a glimpse of the furnishings and interior trim. This stairway was made a distinctive feature of the house, the design involving much careful workmanship with minute carvings by hand, as may be seen from the detail of the newel appearing on another page. The plaster arches and capitals add much to the general effect. The platform of the main stairs is lighted by a large window of delicately tinted glass wrought after intricate and artistic patterns by skilled artisans.

A careful study of the main floor plan shows an arrangement involving features which cannot fail to interest a large class of readers. From the porch one enters a reception room, immediately beyond which is the staircase hall, while to the left is the parlor, communicating by means of folding doors with the dining room. From the staircase hall one passes to the kitchen through the serving room, which also communicates directly with the dining room. The cellar is reached from the kitchen pantry and also from the back hall, while over the cellar stairs is a flight leading to the second story. In the parlor and dining room are open grates for auxiliary heating, if necessary. A door from the dining room opens directly upon the rear porch, so that this room may be reached without the necessity of passing through either the kitchen or the front hall. On the second floor are three sleeping rooms, a sewing room and a bathroom. The latter is fitted with a Wolfe bathtub and a Crane-Hawley wash bowl. The plumbing is of the exposed type, and the trimmings are nickel plated. A commendable feature is the placing of the water closet independently of the bathroom. In the three sleeping rooms are open fire places, as well as radiators for hot water heating. A linen closet is in the rear portion of the house near the back stairs, while close at hand is a clothes chute running to the laundry in the basement.



Front Elevation.—Scale, 1/8 Inch to the Foot.

Brick Residence in a Cincinnati Suburb.—Dornette & Sheppard, Architects, Cincinnati, Ohio.

According to the specifications of the architect the floor joist are 2 x 12 inches, the studding 2 x 4 inches and the rafters 2 x 6 inches. The attic is entirely finished, with plastered partitions and the basement is cemented.

The inside finish of the house is long leaf Southern curly yellow pine, selected dark, giving an effect almost equal to hard wood. Door panels and architraves on the first floor are carefully matched in color and grain to secure uniformity. The inside walls are tinted in water color and sand finish plastered. The pantries and sewing room are fitted with glass china cases and every convenience is supplied to reduce care taking to a minimum.

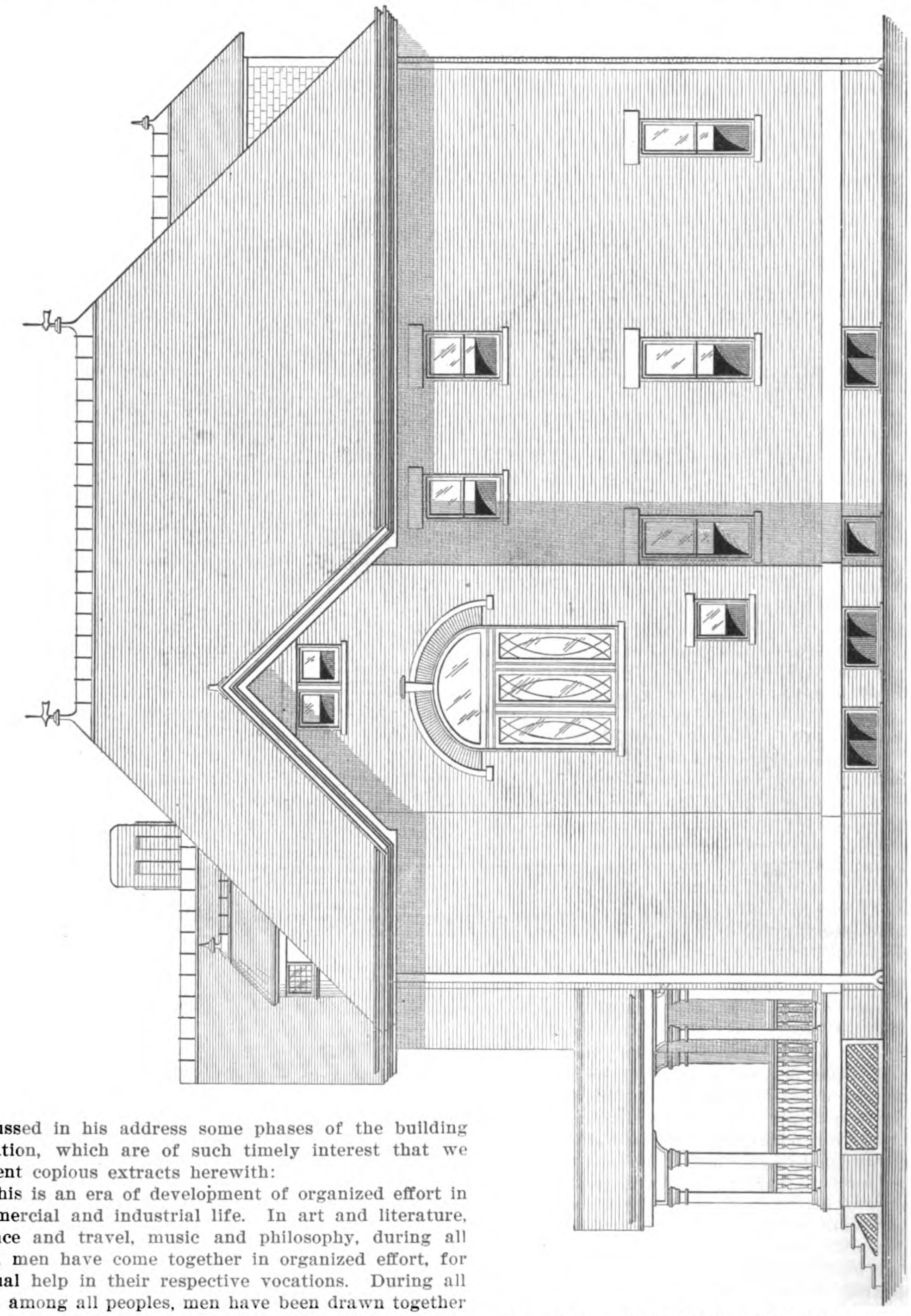
The house is piped for gas and wired for electric lighting, and is heated by a Cottage hot water boiler made by the H. B. Smith Company, Westfield, Mass.

The house was erected on Harrison avenue in Westwood, a beautiful suburb of Cincinnati, Ohio, for William Rickel, in accordance with plans drawn by and under the supervision of Architects Dornette & Shepard, Rooms 56 to 58 Pickering Building, Cincinnati, Ohio.

The Builder and the Builders' Exchange.

At the annual meeting of the Cleveland Builders' Exchange held on October 6, President William H. Hunt discussed in his address some phases of the building situation, which are of such timely interest that we present copious extracts herewith:

This is an era of development of organized effort in commercial and industrial life. In art and literature, science and travel, music and philosophy, during all ages, men have come together in organized effort, for mutual help in their respective vocations. During all time, among all peoples, men have been drawn together in response to a feeling of common interest in a given cause. With the world's progress in business development, with the great industrial awakening in both Europe and America, have come by natural impulse the organization of labor and the organization of the employers of labor; labor trades councils and centralized labor bodies on the one hand and the organizations of labor employing bodies on the other. This it would seem is but a continuance of the Divine order of things.



Brick Residence in a Cincinnati Suburb.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

The spirit of fraternity and dependence upon co-operative effort for mutual protection and advancement is an irresistible force in man. These qualities must be capable of the greatest development only with men of kindred mind and kindred vocation. It would seem to be a righteous cause when men, actuated by correct principles and a just regard for the rights of others, unite with the common object of mutual improvement.

The home means more to the man whose interest is lively in securing comfort and happiness for his family. The church means more to the man whose heart and soul are in responsive touch with the great principles of truth for which the church stands, unchallenged, except for the voice of the demagogue. Trades councils and business organizations mean vastly more to the man who believes in his trade or calling as an institution demanding ceaseless vigilance that nothing may assail its character or make it less honorable in sight of God or man.

Of all the pursuits of men which contribute to the world's progress and improvement, the vocation of the builder would seem to be pre-eminent. Our trade is made honorable and distinctive by Divine example. "Builder" is significant of creation and development, of growth and advancement; hence in choosing our occupation, with its consequent responsibilities, our unique position among the trades of men makes our possible power or influence for good in every direction immeasurable.

The builder occupies the middle ground between the producer and the consumer. He stands between the architect, manufacturer and dealer on the one side and the artisan and owner upon the other. His example should be the standard of principle, insuring fair dealing and unquestioned business practice. Unfortunately there are evils peculiar to the building trades, evils which beset the path of the architest, the dealer and the contractor, offering to some irresistible temptation for larger profits and unfair advantages.

The voice of this exchange is expressed in earnest protest against these evils, and every member should support the exchange in its determination to maintain the dignity and honor of our trade.

Charity and generosity, virtues commonly conspicuous in man's relation with his home and his church, are ofttimes disregarded in his business dealings with his fellow men. Nothing is proof against human frailty, an element which must be reckoned with in business competition. The mental capacity, or mental horizon, if you please, of men is hardly alike in two cases—particularly among contractors, men who have come into the trade from every possible condition and environment of earlier life. Many good contractors are of foreign birth and training and are handicapped by natural conditions which do not lend themselves to a ready understanding or practice of the methods and customs of our country. It is not the rule that the man with the best education makes the best contractor.

Again some men do not reach the front rank of popularity because of inherent personal characteristics. Business cares and responsibilities do not disturb the mental poise or personal bearing of some men. It is not fair to take as the true measure of a fellow contractor or dealer his natural characteristics alone. If he has a proper regard for good principles in business practice, coupled with responsibility and a sufficient knowledge of his chosen trade, he is entitled to just consideration.

In no other branch of business is competition more sharply waged than with the contractor and builder, hence the spirit of fair dealing and fraternity should never be ignored. The influence of the Builders' Exchange in sustaining these virtues is conceded and appreciated by all branches of trade.

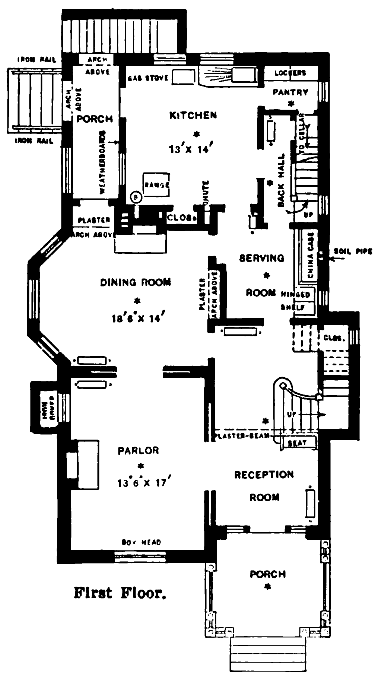
Let us avoid unjust criticism and fault finding. Our exchange and every member is benefited by honest criticism which exposes weaknesses and suggests remedies. Let us not be destructive by fault finding, but rather constructive by seeking the strength and the weakness of our organization and assisting to find a remedy for what is weak, and joining with others in wisely directing its strength for our greatest mutual benefit.

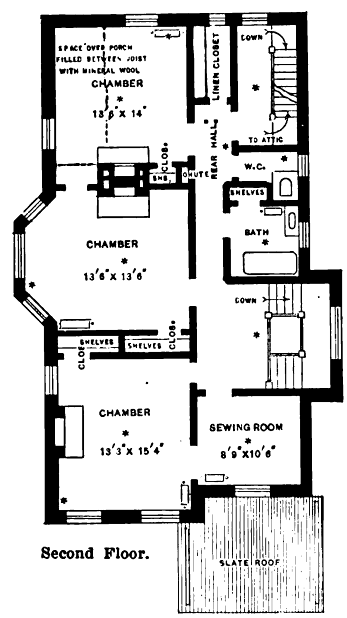
Every member has some ideas of value to the organization. The man who can give his ideas to others can better appreciate what he receives in return. I am hopeful that in the future a larger number of valuable, heretofore silent members will take an active part in exchange affairs.

Let us regard the fundamental elements of our exchange—its declared principles; determine, each and every one, to stand by these principles; to have the same fealty and respect for the principles of our exchange that we accord the general laws of the land, which protect our property and society. Let the principles of our exchange be the law that protects and dignifies our trade or calling, and insures to us the peaceful and profitable enjoyment of the results of our labor.

If the principles of the exchange radiate and their light of precept and example permeates the individual acts of every member, the full measure of inspiration will follow for the greatest enjoyment of the practical and social features of our organization.

The past year has been one of unusual activity in exchange affairs and one productive of results beneficial to its members and to the trade generally. What has been accomplished must not lead to a feeling of undue satisfaction. With our largely increased membership and consequent added strength and prestige the necessity is the greater that our forces be wisely directed, that our organization and our trade, we as individuals, and our city, may profit in greater measure.



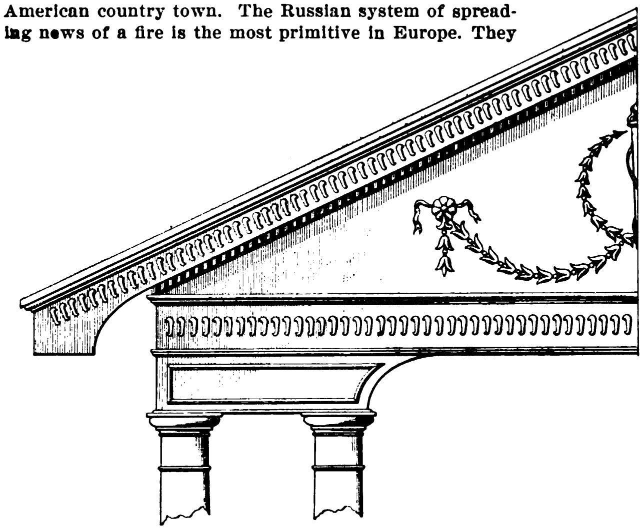


Brick Residence in a Cincinnati Suburb.—Floor Plans.— Scale, 1-16 *Inch to the Foot.*

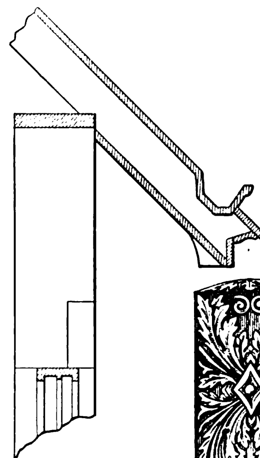
THE new Hotel Belvidere which is to be erected at the corner of Charles and Chase streets, Baltimore, Md., at an estimated cost of about $1,000,000, will be a fire proof structure 12 stories high, with basement and subbasement, and will cover an area of 185 x 100 feet. The plans were drawn by Architects Parker & Thomas of Boston, Mass., and the general contract has been secured by the Wells Brothers Company of Philadelphia, Pa.

Fire Protection in Russia.

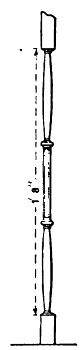
Russia does not take kindly to modern inventions, says *Fire and Water*, and even in the capital, with a population of 1,000,000 and buildings of great value constantly exposed to the ravages of fire, there is no fire alarm system that would be tolerated in an ordinary American country town. The Russian system of spreading news of a fire is the most primitive in Europe. They do not send out any fire alarm at all in St. Petersburg until the fire has blazed out fierce and strong. In fact, the fire department does not know of it. One fireman comprises in himself the St. Petersburg alarm system. At all times a fireman is on duty in the tower of the City Hall. He watches the city and when the fire burns up he notices it, or is expected to do so. If it is in the daytime he runs up a number of black balls on the outside of the tower. If it is in the night he uses red lanterns instead of the balls. The number of the balls or lanterns indicates the district in which is the fire. On seeing the signal the firemen turn out.



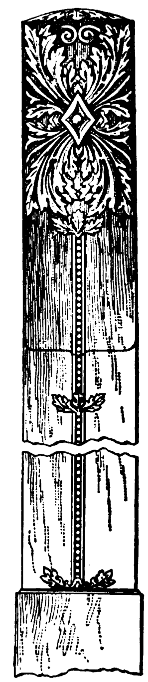
Detail of Front Porch Column, Cornice and Pediment.—Scale, ½ Inch to the Foot.



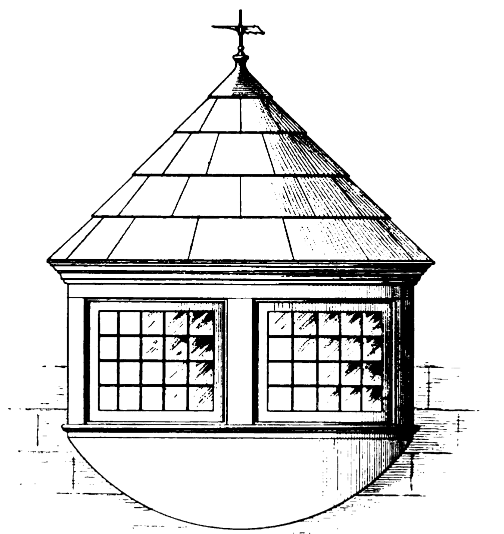
Section of Main Cornice.—Scale, ½ Inch to the Foot.



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



Detail of Newel Post.—Scale, 1½ Inches to the Foot.



Dormer Window Over Sewing Room.—Scale, ½ Inch to the Foot.

Miscellaneous Constructive Details of Brick Residence in a Cincinnati Suburb.

Housekeeping Made Easy.

An interesting enterprise is about to be initiated in Birmingham, Ala., where a corporation, under the name of the Modern Dwellings Company, have just been chartered, with the object of building 96 dwelling houses, all of which will be furnished with light, heat and other conveniences from a central plant. S. Montgomery Smith of Birmingham, in a letter to the *Manufacturers' Record* of Baltimore, gives some interesting details in regard to this undertaking, from which we extract the following:

The buildings to be put up by the company include 12 eight-room houses, 16 seven-room houses and 68 six-room houses, each having spacious halls and porches, modern bathrooms and oak floors and finish. All are to be supplied from a service plant with hot and cold filtered water, steam heat and electric light. The kitchens will be furnished with gas ranges, and in each house there will be but one fire place, equipped with a gas log. No coal will be used about the premises. Sixty-four of these houses will front on four small parks. All the service pipes will be carried through the alleys. The service building will provide laundries, storage rooms, a heated playroom for children and a swimming bath. The rates of rental will be $35, $40 and $45 a month, including heat, light and water. The total cost of the undertaking will be $354,000. W. C. Weston, who has planned many of the large business buildings in Birmingham, is the architect, and T. C. Thompson & Brothers are to superintend the construction of the houses.

FRAMING ROOFS OF EQUAL AND UNEQUAL PITCH.

BY MORRIS WILLIAMS.

NOTICING the interest taken in roof framing, I have prepared a few diagrams with explanatory text, confident that a studious perusal of them will be of benefit to the young and ambitious among the readers of the paper. My endeavor will be to demonstrate the meaning of lines and angles, rather than to propound new methods of construction. Roof framing at present is as simple as it possibly can be, so that any attempt at new methods would be superfluous. There may, however, be a certain way of presenting the subject that will carry with it almost the weight assigned to a new theory, making what is already simple still more so.

The steel square is a mighty factor in roof framing. It works miracles. Without it the American carpenter would have to be satisfied with the methods in use centuries ago, and which are conservatively adhered to, even to this day, in all European countries. In this country, however, they are obsolete, and will be for evermore. The steel square is here, and here to stay, as is due the greatest tool in practical potency that ever was invented. With its use, the lengths and bevels of every piece of timber that goes into the construction of the most intricate design of roof may be easily obtained, and that with but very little knowledge of lines as taught in books, schools and colleges.

The few problems absolutely required as preliminaries to efficient manipulation of the steel square I will now demonstrate: Considering all roofs as more or less combinations of oblique planes, it follows that the problems to be solved will be those that pertain to such planes, but as points and lines are contained in them, the problems will resolve themselves into those that deal with the projections and intersections of planes, lines and points.

In Fig. 1 let *a c d* 8 represent the plan and *a b* 8 the elevation of an oblique plane; *a b* is the vertical trace of the plane and *a c* the horizontal trace. The line *a b* may be considered as a rafter of a "lean-to" roof, and the bevels at *a* and *b* to be the top and bottom cuts for such rafter. If drawn to a scale it is evident that the drawing would indicate the correct length and bevels of a rafter having *a* 8 for the run and 8 *b* for the rise. Fig. 2 will illustrate this more clearly.

Let *a c d* 8 in Fig. 3 represent the plan and *a b* 8 the elevation of another oblique plane. It is required to find the length and bevels of a line lying in this plane plumb above the diagonal line *c* 8 in the plan. Applied to roof construction, it would represent a hip intersecting two sides of unequal pitch. One pitch is shown at *a b*, the other having the run of *d* 8 and 8 *b* for rise; therefore of much less pitch than *a b*.

To find the length of the line revolve the diagonal line *c* 8 to X Y, as shown at *c'*. Connect *c'* and *b*, which will be the correct length of the line or hip. The correct bevels are shown at *c'* and *b* respectively.

Fig. 4 is presented merely as an illustration. It shows in perspective the two sides of the roof intersected by the line *b c*. Nothing can possibly be desired more simple than this solution to find the length and inclination of a hip or valley. Worked to a scale, say 1 inch to the foot, it is even more desirable than stepping with the steel square. It takes less time and is more accurate, and, furthermore, it is applicable to all conditions of designs, equal and unequal pitch.

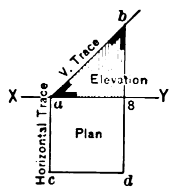


Fig. 1.—Plan and Elevation of Oblique Plane.

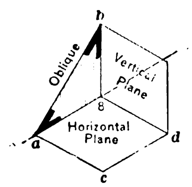


Fig. 2.—Another Illustration of Fig. 1.

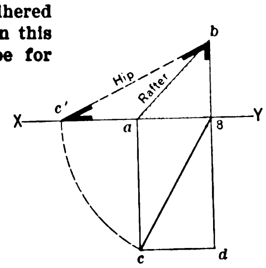


Fig. 3.—A Second Example of an Oblique Plane.

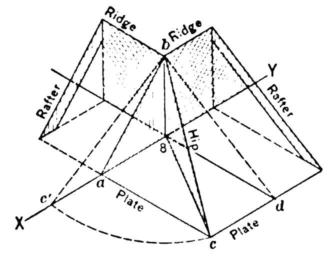


Fig. 4.—Perspective Showing Two Sides of Roof Intersected by the Line *b c'*.

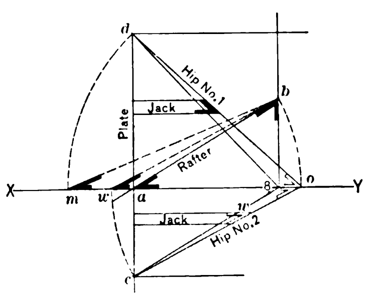


Fig. 5.—Determining the Angle Between Two Lines Lying in an Oblique Plane.

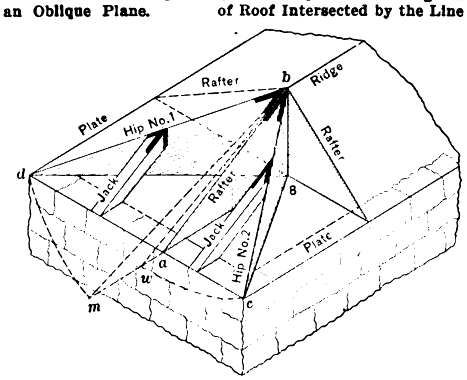


Fig. 6.—Showing the Hipped End of a Roof with Every Timber in Proper Position.

Framing Roofs of Equal and Unequal Pitch.

Fig. 5 illustrates the method of determining the angle between two lines lying in an oblique plane. The plan of the lines is shown at *c* 8 and *d* 8 respectively. The inclination of the plane is shown at *a b*. To find the angle between the two lines *c* 8 and *d* 8 when lying in the oblique plane *a b*, it is required to revolve the line *a b* to *o*, as shown, and to connect *o d* and *o c*; the angle will be at *o*.

Applied to roof construction, this angle represents the angle the two hips make with one another when in correct position above their respective plans. If the two hips are to be mitered the bevels shown at *o* will be the bevel required. It is also the bevel that would fit the two hips against the ridge and by drawing jacks as shown to intersect the hips the top bevel for same is found, as shown at *w*. The hips when in this position are said to have been constructed into the horizontal plane—that is, the hips and the plane containing them—viz., the total end of the roof is revolved from its inclined position to a flat plane (on the ground, as might be said), and when in this position every line and angle are represented accuratly in full size and form. This figure gives the length and inclinations of the common rafter, as at *a b;* the two hips, as at *b w* and *b m*, and all the jacks if spaced from the plate *c a d* to the hips *d o* and *c o*. If worked to a scale it would be all that is required to find all lengths and bevels for a hipped end of a roof having these unequal pitches.

To find the lengths of these hips and their respective top and bottom cuts, make 8 *w* on X Y equal to 8 *c* and connect *w b*. The hip now, as shown at *w b*, is in its vertical position, as it will be in actual construction; therefore, the top cut will be that shown at *b* and the bottom cut that shown at *w*. For the length and cuts of hip No. 1, make 8 *m* on X Y equal 8 *d* and connect *m b*. This will be the length of hip No. 1, and it is also in its vertical position. Bevel *b* will cut the top and bevel *m* will cut the bottom.

Fig. 6 represents every line that is contained in Fig. 5, showing a hipped end of a roof of unequal pitch and every piece of timber in its actual position. A comparison of the two figures will do wonders to demonstrate the meaning of the construction shown in Fig. 5.

From this construction it is evident that points, lines and figures may be found in an oblique plane indefinitely. In Fig. 7 is presented a plan and elevation of an oblique plane, containing a plan of four lines of an oblong form. It is required to find the elevation of these four lines and their true shape in the oblique plane. Let *a c d* 8 represent the plan, and *a b* the vertical trace of the oblique plane, and 1 2 3 4 the plan of

The next process is to revolve the roof down to a flat surface, as shown by the arcs *w n* and *o′ m*. The points *w* and *o′* are evidently now at *m* and *n*. From *m* and *n* draw projectors to *h g* and *f*.

Connect *h f*, *f* 8 and 8 *h*, forming a triangle, which will be the exact form of the projection of the lines *e a c* of the plan. If the roof is revolved back to its inclined position, as at *a b*, these last points would stand plumb above their respective plans, *h* would be above *e*, *f* above *a*, and 8 above *c*; so also would be the lines *h f* above *e a*, and *f* 8 above *c a*, &c. All the angles would also coincide, thus demonstrating that the process effectually determines the exact projections of points and lines from a plan to an oblique plane, and also ascertain the correct angles between inclined lines on an oblique plane, as at *e f* 8. In the illustration the triangle *e a c* represents the plan of two valleys. It follows that the triangle *h f* 8 represents the valleys themselves in full lengths, correct inclination, and in their exact position, intersecting the main roof. From this triangle, therefore, all lengths and all bevels may be measured. The bevel at *f* will miter the two valleys.

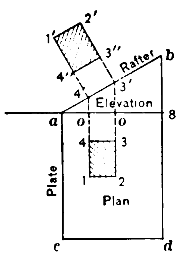


Fig. 7.—Oblique Plane Containing Plan of an Oblong Form.

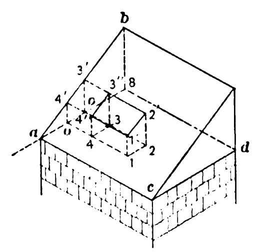


Fig. 8.—Perspective of Fig. 7.

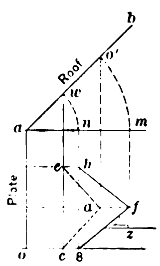


Fig. 9.—Another Method of Solving the Problem.

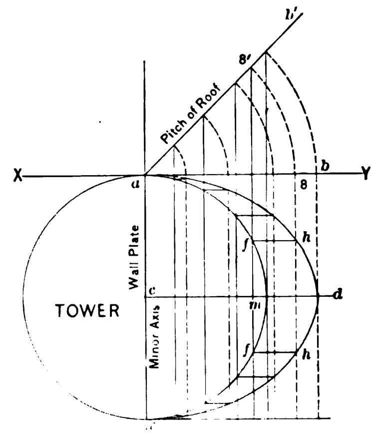


Fig. 10.—Method of Finding Curve on a Roof Where a Circular Tower Intersects.

Framing Roofs of Equal and Unequal Pitch.

the oblong figure. Draw projectors from 4 and 3, cutting the inclination of the plane *a b* in 4′ and 3′. From these points and at right angles to the line *a b* draw other projectors as shown. Make 4′ 4″ 1′ equal to 1 4 *o* and 3′ 3″ 2′ equal to 2 3 *o* of the plan. Connect 1′ 2 and 4″ 3″. The shaded portion, 1′ 2′ 4″ 3″, will be the true shape of the oblong figure when lying in its position in the oblique plane directly above its plan.

Fig. 8 will more clearly demonstrate the solution, being as it is a perspective view of Fig. 7. Besides obtaining the true shape, it will be seen that the elevation of the lines in the oblique plane is also obtained. In Fig. 8 they are shown to be plumb above their respective plans. This and similar problems may be of value in roof construction where the elevation of points and lines is to be found in a roof, and especially where a complete figure is to be projected from the plan to the plane of the roof. In such a case the correct length of each timber is found as well as all the bevels that will be required to cut the timbers.

Another method is presented in Fig. 9, to obtain the same results. Let *o a* represent a plate and *a b* the pitch of a roof, and assume a dormer window to have its plan as shown at *e a c*, and that it is required to find where on the roof the points *e a c* are located and what form the lines *e a* and *a c* will assume when tilted to the pitch of the roof.

Draw a projector from each point. The one from *a* will cut the roof in *o′*, thus determining the elevation of point *a*. The one from *e* and *c* will cut the roof in *w*, determining the elevation of the two points *e* and *c*. These two points have the same elevation, owing to their being at the same distance from the plate *o a*.

The bevel at *z* will be the bevel to cut the jacks across the back to fit against the valleys.

Fig. 10 illustrates the same method applied to circles. Let *e c a* represent the plate of a roof, and *a b* the pitch. From *c* describe a circle to represent a circular tower, half of which will intersect the plane of the roof. It is required to find the contour of the curve on the roof that will fit the sides of the tower as it protrudes through the roof. In other words, it is required to find the shape of the hole in the roof that will closely fit the protruding tower.

Let *a m e* represent the plan of half the tower that intersects the roof. From *m* draw a projector to *b′*, revolve *b′* to *b* on X Y, and from *b* draw a projector to *d*. It will be seen that in this process point *m* was first projected to *b′*, which is a point in the roof; secondly, it was revolved or tilted flatways to *b*, which is a point in the plan of the roof; thirdly, it was projected to *d*, which is a point parallel to the center of the tower, as shown by the line *c m* continued to *d;* therefore, if tilted back to the plane of the roof, it would be plumb above point *m*. A repetition of the same process, with any number of points in the circumference of the circle, will determine points on the roof that will be plumb above the co-related points in the plan. Let *f* be a point in the circumference of the circle. Draw a projector to 8′ intersecting the roof; revolve 8′ to 8 on X Y, and draw a projector to *h*, which is the point required as the one contained in the contour of the curve on the roof that will, when in position, stand plumb above point *f* in the plan. The process may be repeated with any number of points, and through the points found the curve may be traced. This curve, as is seen in the

figure, is a semiellipse, and it has therefore semiminor and semimajor axes. The semiminor will be the portion of the plate from *c* to *a*, and the semimajor the line from *c* to *d*, which is the same length as the line from *a* to *b'* in the roof, having been tilted flatways to the horizontal plane or plan.

It may not be out of place here to illustrate a method of describing an ellipse on the principle shown in Fig. 10. Let *a b*, Fig. 11, represent the major axis and *c d* the minor axis. From the center *m* describe two circles, one having the diameter of the minor axis, *c d*, and the other the diameter of the major axis, *a b*. From the center *m* draw radial lines, as at *m n*, *m n*, &c. From *n* in the larger circle draw vertical lines, and from *o* in the smaller circle draw horizontal lines, intersecting the lines drawn from *n* in *o'*, which

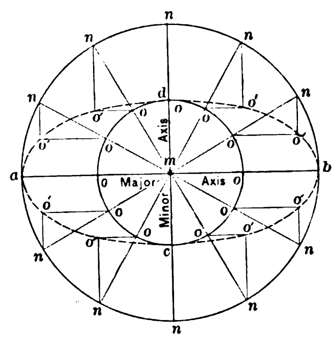


Fig. 11.—Describing an Ellipse on the Principle Shown in Fig. 10.

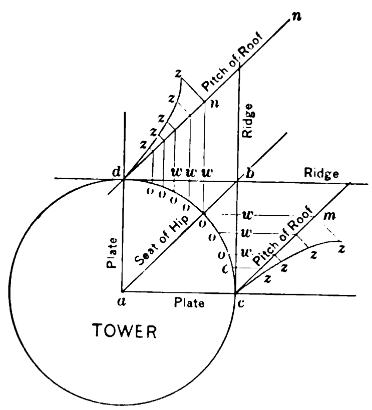


Fig. 12.—Diagram Showing Tower at Corner of a Building and Intersecting a Hip.

the reference letters being the same as in Fig. 12. The projectors *w n* in both figures determine the hight of points *o*, *o*, *o*, &c., of the plan in the intersecting roofs and the projectors, *n z*, *m z*, &c., as here shown folded exhibit points *z*, *z*, &c., to be plumb above the points *o*, *o*, *o*, &c., which are points in the curve of the plan showing that the curve shown at *z*, *z*, *z*, &c., on the roofs will closely fit the sides of the protruding tower.

(To be continued.)

Painting Structural Iron.

John Murphy of Montreal writes to the *Painters' Magazine* as follows: The most effective method that I think of at present for the prevention of rust would be: After having cleaned the metal thoroughly from all loose dirt, scaling or grease, in the factory, to give a liberal coating of boiled oil, applied hot. This would find its way into all the crevices, cracks or holes in the iron, where paint could not enter on account of its thickness and incapability of running, not only in cracks and holes, but on perfect surfaces, where little lumps or roughnesses are found. If the painting is done carelessly the brush slips over these places and leaves around every little protuberance a mass, be it ever so small, perhaps imperceptible to ordinary eyesight, but sufficient to furnish a growing place for rust. I have never seen the process I recommend specified by any of our architects. I am sure that it would be a great improvement on the present method of painting iron, and it would furnish a fine preparation for future painting or covering with cement coating, such as has been suggested. To make "assurance doubly sure," I should recommend two coats of the hot oil instead of one.

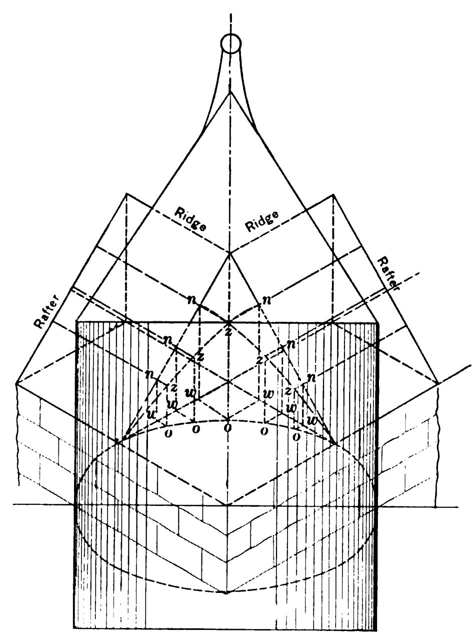


Fig. 13.—Perspective of Hipped Corner Intersected by a Tower, Showing Method of Describing the Curve on the Intersecting Roofs that Will Fit the Side of the Tower.

Framing Roofs of Equal and Unequal Pitch.

will be a point in the curve of the ellipse. A line traced through the points thus found will describe the ellipse.

In Fig. 12 a tower is placed in the corner of a building, intersecting a hip. It is required to find the curve on both the intersecting roofs that will fit the protruding tower. Let *a d* and *a c* represent the plates of the respective roofs, *a b* the seat of the hip, *d n* the pitch of one roof and *c m* the pitch of the other roof. From points *o*, *o*, *o*, &c., on the curve draw *o w*, *o w*, &c., continue these lines to the pitch of each roof, as shown at *n* and *m* respectively; draw *n z* and *m z* square to the pitch of the respective roofs; and make them equal to their plan lines, as shown at *o w* and *o w*. Draw the other lines parallel to *m z* and *n z* respectively, and make each equal in length to their respective plans, *o w*, *o w*, &c., and trace the curve through the points thus found, as shown at *z*, *z*, *z*, *z*. If the two rafters *d n* and *c m* are revolved to stand above their respective plans, *d b* and *c b*, and the curves folded to the plane of the roof, the points marked *z* on the curves will stand plumb above the points marked *o*, *o*, &c., in the plan.

The folding process is shown executed in Fig. 13,

IN the tower elevator of the Philadelphia City Hall a severe test of the safety air cushion, manufactured by the Ellithorpe Safety Air Cushion Company of New York, was recently given. The elevator was allowed to drop 400 feet, and within a distance of 84 feet from the ground the speed was gradually reduced until the car came to a complete stop without perceptible jar. Inside on the bare floor were placed eggs and glass bulbs, but only a few of the former were cracked in what is claimed to be the greatest elevator drop ever made.

READING ARCHITECTS' DRAWINGS.

THE builder should be, and I think you will find that in most instances the successful builder is, more than a mere machinelike man who carries out the plans without putting his own thought and study into them. The architect without the full sympathy and co-operation of his builder can never hope to see his conceptions carried out as intended by him. There must be a full sympathetic correspondence and an equal pride in the success of the work, not only from a point of good, honest workmanship, but from an artistic side as well.

Therefore, see to it that slots for plumbing and soil pipes are started in the basement and carried up all the way, whether shown on all ground plans or not; see that the smoke flues are started and carried up properly; in making a revision of the plans these often mysteriously disappear from some of the drawings. The special pressed brick to be used on a building are very often not decided on until just before they are wanted; as the size and the shape of the cut stone which adjoins it are dependent on the exact size these brick will lay up to (you know they always vary); see to it that the stone is arranged to fit—the figure on the plan may be in a case such as this only ¼ inch out of the way. The architect or his superintendent will be grateful to you if you can show him in time that by some mischance a beam or truss on an upper story floor plan is shown to come directly over a flue, window or other weak support, as happens at times in making hurried or revised plans. In this clerical work of figuring a plan errors are more than possible, and if you will go over the different drawings and check up these figures, and thus possibly avoid an error before additional expense or stoppage of work is caused by it, I am sure it will be appreciated by all who are in any way connected with the work.

Never consider an error too slight or too self evident not to call the attention of the architect or his superintendent to it.

Again, if you knowingly pass by such errors you will find that later some one else will call attention to them, and the architect will question how it happened that you could have missed so evident a matter.

You will find, too, that you are not infallible; be equally sincere and open about your own mistakes, so that the architect can pass them, or rectify them in time if necessary.

Points to Be Noted.

When you begin building operations, see to it first that the survey marks have not been tampered with, verify the last measurements and see if they correspond to those on the plans, and, first of all, be certain that you propose to put the building on the lot it is intended to go on. You have doubtless heard of buildings placed on the wrong premises, and I know of several cases where the building was partly placed on adjoining lots on account of carelessly looking after survey marks, to the joy of the ever-ready lawyer. It might not come amiss to tell you of how in one such case, the building being under roof, the contractor got out of the difficulty by immediately, on discovering that he was a foot on the neighboring lot, and before the neighbor was aware of it, buying the property and deeding a foot of it to the owner of the building. Go over your general building lines again and again. They are easily displaced. Verify your right angles more than once. You know the simple rules of getting a right angle by using a triangle, the measurements of which are three, four and five respectively, or multiples of these.

Again, pay special attention to your grade lines. Through circumstances, the architect may be misinformed about the condition, and you, being on the ground, can correct otherwise serious difficulties by calling attention to discrepancies and oversights.

Where openings are intended by the scale of the drawings or the figures on the plan to be in the center of the room, take special pains to see that they are placed exactly in that position. Or if two windows are to balance in a room, the wall spaces on either side being intended to be alike, see that they are so to a hair's breadth. Door and window openings that are meant to be on a line at the top, fire places which are shown in the center of a wall, pilasters that balance each other, should be built exactly as called for and intended.

As the mason is generally through with his work and away from the job when the inside finishers start in, he has no conception of the trouble, annoyance and expense to which he puts others by not taking pains in having built his work exactly as called for.

While an inch out of the way may in your work seem of little importance and very difficult to detect, it becomes of the utmost importance and very noticeable when, for instance, the carpenter finds that he can place only half a trim on an opening when a full one is intended; when he discovers, in placing his cornice over windows and doors, that they do not line up, and when adjoining panels vary in hight and width just enough to be unbalanced and annoying. An unskilled or careless mason puts the plasterers to uncalled for expense and annoyance by not having his work plumb and true; and, by not carrying his walls and piers to the proper hight and the exact levels for joints and rafters, the carpenter is unjustly treated. It is equally important to follow the plans and specifications in all matters. The method of communicating an architect's ideas to the builder by the use of plans and specifications does not necessarily give the reasons of things, but simply dictates the work to be done. In other words, the plans do not always explain to him why this window should be that particular hight from the floor, why this foundation is of concrete and that of stone, why this particular brick pier is to be laid up in cement and this one in common mortar, &c. But rest assured that the architect has good reason for desiring work built to the letter, just as called for, and that, not considering the question from a point of integrity and ethics at all, it is necessary, for reasons that are not made plain to you, to carry out the work just as called for.

Follow Plans and Specifications.

Then again, let me assure you that it will not pay to do your work differently from what the evident intention of the architect is, or what the plans and specifications may call for. You may do faulty work and be able for a time to cover and hide it, but your misdeeds will sooner or later come to light. A fire will disclose your poor brick work, a new adjoining excavation will show where you slighted the foundation work, &c. Such misdeeds are sure to come to the ears sooner or later of all of those interested, and to make relations between you and desirable prospective builders impossible. Honesty, therefore, in your work and in your dealings is as essential for your well being and welfare as it is in any other business or profession.

In closing, let me repeat again in a few words what I have said. Study your plans most carefully, especially during odd hours, so that you can read them intelligently and can know the full meaning of features that can be only partly indicated. When the meaning and intention of the plan is fully and thoroughly understood, carry out the work honestly and as well as you know how, no matter at what cost. Do just a little more than your agreed duty. Do your work just a little better than any one else. Do it so that you can forever after point to it with just pride.

Your material reward and continuous rise in the world are sure to follow. From a preferred workman to an appreciated foreman is only a short step, and the rise from this stepping stone to a successful and favored master builder, honored and sought for by architect and owner alike, is a matter of only a very short time

* Continued from page 270, November issue.

A BUILDING operation which is designed to provide dwellings for employees of the Standard Steel Car Company is under way at Butler, Pa., and will involve an expenditure of about $120,000. There will be 100 houses, each dwelling containing from four to five rooms, and these will be rented to employees of the company.

CORRESPONDENCE.

WE have a letter from " F. E. S." of Marshall, Texas, asking for certain information which we shall be glad to give him if he will kindly furnish his full name and address. We have often called attention to the necessity of correspondents signing their communications with full name and address in order that the editor may communicate with them direct should such a course be desirable. The absence of this information will explain the apparent lack of attention to communications which reach us with no indication from whence they come or by whom they are written.

Tool Chest Construction.

From A. S. M., *Dover, Mass.*—In looking over an old copy of the *Builder and Wood Worker*, I found the inclosed illustrated description of a tool chest which may be of interest to some of the craft at the present day.

Note.—From the clippings sent us we have had the accompanying engravings prepared and give herewith the description contributed by E. A. Wheeler, who originally designed the tool box. Fig. 1 is a view of the chest at the front. In each corner there is a cleat glued

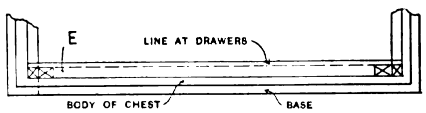


Fig. 1.—Plan View of Chest at the Front.

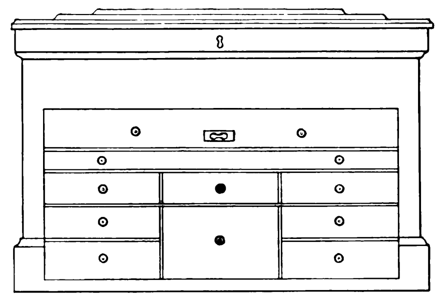


Fig. 5.—View of Chest with Front Open.

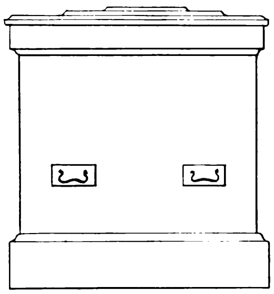


Fig. 2.—End View.

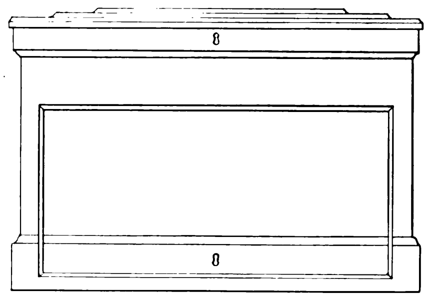


Fig. 3.—Front View.

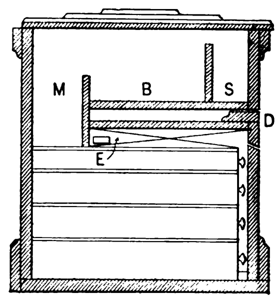


Fig. 4.—Cross Section.

Tool Chest Construction.

on end, which answers the double purpose of keeping the ends of the chest from splitting, and serves as a post. At E there is a cleat glued on at right angles on the cover, and which forms a space of 1 inch between the line of drawers and body of chest for drawer pulls. Let a piece of iron into each top corner, projecting ½ inch, to prevent the front from coming out when locked.

Figs. 2 and 3 show end and front views of chest when closed. Fig. 4 shows cross section and the arrangement of drawers, &c. M. shows the till in top part for molding tools, &c. B. shows till for bench planes, &c. S. is a till for saws, &c. Fig. 5 shows front of chest when open and front slid back. The top drawer is full length to receive long tools, such as steel, square, spirit level, panel gauge, &c.; center drawer at bottom is made deeper, so as to hold plow, fillister and other deep tools. The chest is to be set up on 2 x 8 inch blocks, so as to be in a position to get at easily.

It will be seen that a chest built after this plan has every inch of available space put to useful service, and that any part of it can be reached without disturbing or interfering with any other part.

Give the Young Men a Chance.

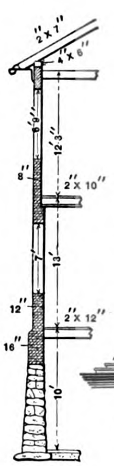
From WANDERING WOOD BUTCHER, *Shreveport, La.*—I wish to say a few words to " C. W. B." of Reading, Pa., who evidently feels a little hurt at the attitude of " A. L. W." of New Hampshire. I can fully sympathize with him, as his remarks about the boss carpenters and foremen bring to my mind many bitter recollections of former days when I was struggling and groping in the dark with the mysteries of butchering wood and spoiled good material with poor workmanship. I wondered why such " brutal bosses" were put in charge of work or men. I then thought if I ever attained sufficient knowledge of the trade to be a foreman I would do differently by those working under me. Strange as it may seem, a few years later some of those same bosses were working under me, but I treated them with kindness and respect, as well as other men who deserved it. No matter how well my resolution was founded, I would often hurt the feelings of some one by the remarks I was obliged to make, some men being more sensitive than others.

As " A. L. W." says, some of those men turned out contractors in six months and before they could properly frame a saw horse. They were the ones with whom I had the most trouble. Some of them were forced to contract at a low figure, but they could not work for any one otherwise. Their troubles then began to increase and many of them had to leave town in the night and with bills unpaid. They led that sort of a life for years and never became good mechanics.

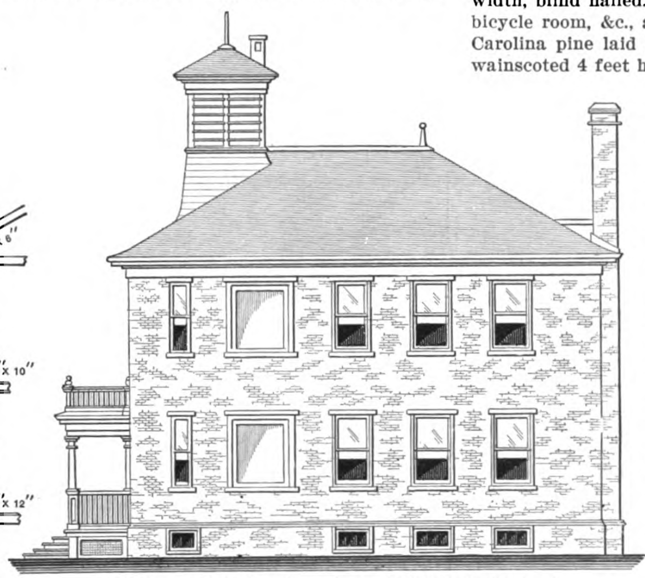
I had a liking for the trade from boyhood and my first master was one who had learned his trade in Ireland. He was a fine draftsman, a good carpenter and joiner, and a gentleman withal; but, as every one knows, an Irishman is often apt to be short on patience. He sometimes gave me a severe jacking up, which I suppose I deserved, and I now find I must do the same thing with some of my young men. We lived in a small country town, where the work consisted of building dwelling houses, graneries, barns, &c., and I obtained an insight into the various branches of the work and not in a special line, as is the case with young men in the cities. However, I never learned how little I knew about the trade and how much I still had to learn until 1881, when I first made the acquaintance through a friendly carpenter of *Carpentry and Building*, and that was my turning point. It inspired me to admire and love the trade of a carpenter. At that time they were as a class probably the most temperate and moral tradesmen in the country, but now I am sorry to say they are evidently trying to catch up with the bricklayers. In the columns of the paper I found advertisements of books, drafting tools and everything that goes to assist in making a mechanic by home study, and I took advantage of them and increased my wages, advancing by promotions from $900 to $1500 per year. I have had offers of $1800 and expect to reach these figures in a short time. I owe the Correspondence columns for the suggestions that have helped me on to this point. I would say to "C. W. B." and others of his disposition, never look to bosses and foremen for your information, for as a general thing they have enough to worry them without being masters of an industrial school without pay. Get books and study them for yourself and you will then be independent, serve your foreman better and gain his confidence. All foremen, however, are not like those to which you allude, but I do know they exist, and too often they are put in charge of better men than themselves.

Trouble With a Chimney.

From G. H. C., *Sag Harbor, N. Y.*—I have taken *Carpentry and Building* for the last nine or ten years and now come to the readers for suggestions as to the best way to remedy a troublesome chimney. It is an old four-flue chimney with four fire places connecting with it. One of the fire places has been done away with and the flue is now used for a smoke pipe from the hot air furnace. In damp weather, or when a storm is coming on, it shows a stain on the wall and the paper loosens and hangs down. I am sure that the chimney does not leak, for the stain only shows on one side of the chimney. I have an idea that there must be some soft brick and that the creosote works through, thus making a stain. I would say that the stain shows on the ceiling and not on the sides of the chimney.



Section.



Side (Right) Elevation.—Scale, 1-16 Inch to the Foot.

Design for Two-Story Brick School House.—Architect, G. J. Kellemen, Providence, R. I.

Design for Two-Story Brick School House.

From GEORGE J. KELLEMEN, *Providence, R. I.*—In answer to "O. A. G.," Dresden, Tenn., who asked not long ago for plans of a two-story brick school house to cost about $4000, I submit the accompanying drawings, which may be of interest to him as well as to other readers. The foundations are of stone and brick, the walls beginning with a thickness of 16 inches, reducing to 12 inches and finally to 8 inches. The footings are of stone, and the cold air duct, furnace foundations and partition wall in the cellar are of brick. The outside walls of the building are of Tennessee brick of a light yellow color. The panels shown on the side elevation are to have terra cotta fancy scrolls, while the caps and sills of the building are to be of limestone. The panels can be filled in by the correspondent with inscriptions to suit the location.

The first-floor joist are to be 2 x 12 inches and the second-floor and ceiling joist 2 x 10 inches, all placed 16 inches on centers. The hip rafters are to be 3 x 8 inches and all jack rafters 2 x 8 inches, placed 20 inches on centers. The girders are to be 4 x 6 inches; the plates 4 x 6 inches, and the porch rafters 2 x 5 inches, the latter being placed 20 inches on centers. All studding is to be 16 inches on centers, doubled at the openings.

The porch is to be finished in cypress, except the floor, which is to be of grain way North Carolina pine; the columns are to be of Koll's patent, made by Hartman Brothers, and the roof is to be covered with cedar shingles laid 4½ inches to the weather. The interior finish is to be of white wood, except the stairs, posts, rails and balusters, which are to be of North Carolina pine. The doors are to be of the five-panel variety, except the front doors, which are to have two panels with glass panel above. The floors throughout the building are to be of strips of North Carolina pine not more than 3 inches in width, blind nailed. The floors in the cellar, play room, bicycle room, &c., are to be of ⅞-inch grain way North Carolina pine laid over concrete. The rooms are to be wainscoted 4 feet high. The clothes closets are to be of the Flexifold variety, made by the Flexible Door & Shutter Company.

The building is to be piped for gas, and the plumbing is to be of good quality. The bowls are to be 14 inches, with marble slabs. The soil and drain pipes are to be of cast iron in the building and connect outside with salt glazed pipe. All conductors are to run from gutters to drain, the gutters and conductors being of galvanized iron. The heating is to be done by a Forbes furnace, made by the Tubular Heating & Ventilating Company, and the ventilation is to be accomplished by using, in connection with the windows, the protective ventilators made by the Protective Ventilator Company.

All the exterior wood work, except the saddle boards on the main and lower roofs, is to be painted two coats of lead and oil, while the rest, except the porch floor, which will have two coats of oil, is to be filled and given two coats of spar varnish. The conductors, gutters, vent, tower and tin roof of porch are to have two coats of United States marine paint. All the interior wood work is to be finished natural throughout, except the floors, which are to be filled and given a coat of oil finish. The side walls, except where used as blackboards, are to be painted a light buff color.

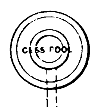
Should Carpenters or Sheet Metal Workers Do the Work?

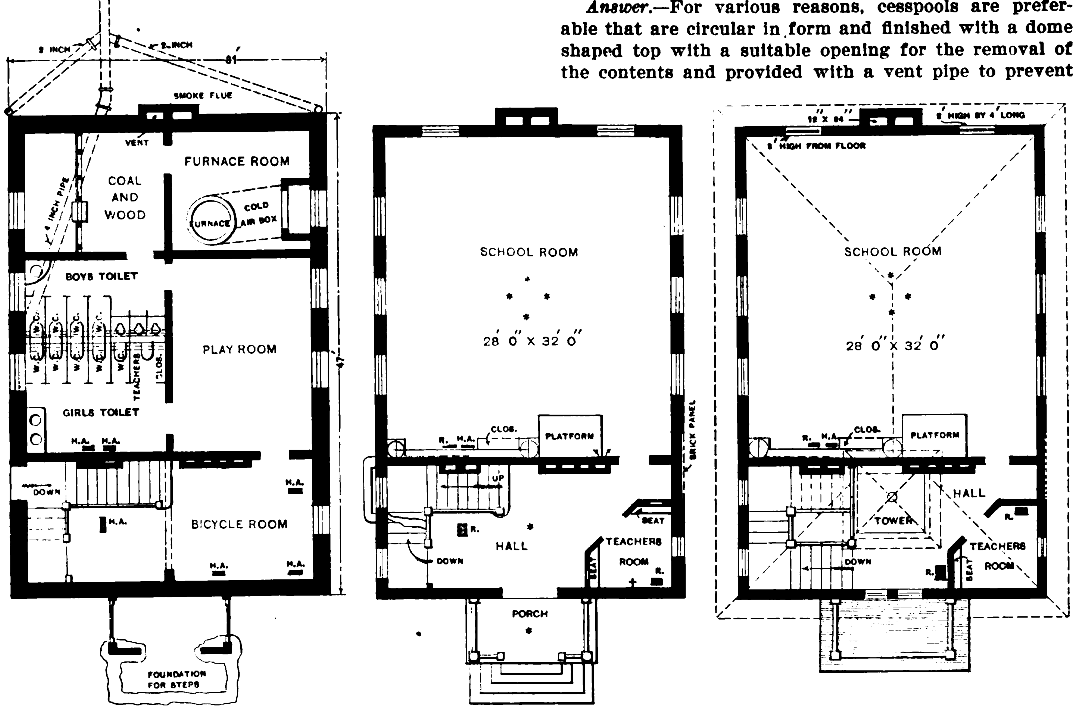
From D. D. HUGHES, *Titusville, Pa.*—In the September issue of the paper there appeared a communication from "F. T. P." of Dallas, Texas, relative to the putting up of steel ceilings. He asks whether the carpenter or the sheet metal worker would be the proper person to do this work. As a metal worker of over 50 years' experience in the trade it is my opinion that the question never should have been brought up by the trades unions for settlement. It is too ridiculous for mechanics of common sense to discuss the matter as to which class—carpenters or sheet metal workers—belongs the right of putting up steel ceilings, sheet metal cornices, roofing and siding, &c. The writer is the senior partner of a sheet metal working firm which in the past 12 or 15 years has put up a vast amount of steel ceilings of the Kinnear & Gager Company's make, and we have yet to learn when or where a carpenter or other mechanic, outside of the sheet metal worker, has ever laid claim to placing in position a steel ceiling, sheet metal cornice, siding or roofing, or any other kind of sheet metal work, and made a satisfactory, artistic or mechanical job of it.

The question raised seems more than strange and should not be entertained for a moment. Any person of common sense and a little good judgment must know that the sheet metal worker, while being the proper person to put up a steel ceiling would not shine as a stair builder or carpenter and joiner, and *vice versa*. By way of illustration, we will suppose that in putting up a steel ceiling a carpenter has to cut a lot of deep panels to fit angles where it might be necessary to make changes in the plan or style of ceiling as made out at the factory. Then the carpenter is in a sorry plight and will have to seek a sheet metal worker if the work is to look neat when done. It is not to be supposed that the hammer, hatchet and saw of the carpenter can be used to as good advantage as the hammer, shears and soldering implements of the metal worker.

Again, many of the ornamental center pieces of metal ceilings are made from galvanized iron and zinc, and should any change be required to be made in them the handiwork of the sheet metal worker would be necessary to make the work presentable and substantial. I have seen in my time a few cheap steel ceilings put up by carpenters and it was annoying to see how the work was done. The marks of the hammer and saw were plainly visible throughout the whole job. No, it is far from being the work of a carpenter to do the work of a practical sheet metal man, and the carpenter or decorator, so called, who tries to do this work is an interloper and is very apt to be a poor carpenter.

A word to the trades unions, in conclusion. Let men who have spent an honest apprenticeship at the trade work at it and do it alone. Do not try to make poor sheet metal workers out of carpenters. You will have no trouble placing a good carpenter. He knows his business and can always find work at his trade. If a person wants a neat fitting suit of clothes the practical merchant tailor is the proper one to apply to and not the shoemaker.





Foundation. First Floor. Second Floor.

Design for Two-Story Brick School House.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Finishing a Roof Ridge.

From F. P. M., *Florida, N. Y.*—Can any one tell me how an imitation French tile roof is finished at the ridge line, where the two sides come together? I was told to cut the sheets between the corrugations for the ridge roll, but that does not seem to make a good job. The sheets are 2 x 3 feet.

Building a Water Tight Cesspool.

From C. E. B., *Brampton, Canada.*—Will some one please explain how to build a cesspool that will prevent soakage from the inside or outside—one that will be proof against the liquids penetrating the walls?

Answer.—For various reasons, cesspools are preferable that are circular in form and finished with a dome shaped top with a suitable opening for the removal of the contents and provided with a vent pipe to prevent the cesspool becoming air bound and to afford ventilation. Naturally the cesspool should be located at some distance from any buildings, so that the air or gases emanating from it may produce no bad effect upon those who may occupy the buildings. The size of the cesspool, of course, should be determined by those who build it, but in the first place care should be taken to have the bottom level and well supported. The bricks should be laid in a good cement mortar, using the best grade of Portland cement. Every brick should be thoroughly imbedded in this mortar so that there will be no spaces between them. The walls should be coated, both inside and out, with this cement to make them absolutely impervious to the escape of liquids from the inside or the entrance of surface water from the outside. The pipe through which the sewage is to enter should be well supported on the outside of the cesspool, and its connection with the walls of the cesspool should be strongly and securely made, care being taken to apply the cement so that no leakage can occur at this point.

Our Book Department can furnish a littl work entitled " Disposal of Household Waste," which gives valuable information on this subject. We are glad that our correspondent intends to construct a water tight cesspool, as the contamination that is likely to come from leaching cesspools has made their construction in many districts a violation of the health laws, and it should not be tolerated. Some better method of disposing of the waste should be obtained, even though it may entail a slight increase in the cost.

Finding Bevel in Truss Construction.

From FLOOD CITY, *Pa.*—Referring to the question of "O. D. S.," Whatcom, Wash., in the September edition with regard to the bevel at the hip of truss, I inclose some sketches and formulas which I hope will be of benefit to him and possibly to other readers of the paper. While I have been a subscriber only since the first of the present year, I have been deeply interested in the questions that have come up from time to time, and feel it my duty to do what little I can in making the paper more interesting. I am afraid, however, the editor of the Correspondence columns will think I have made my remarks entirely too lengthy, but, nevertheless, I shall risk it. I will endeavor to make the rules as clear and simple as possible, and while a great many of the readers may thoroughly understand them, I feel sure there are some who will be benefited by them.

In his letter "O. D. S." says "I can find all bevels of any rafters without scaling them," and from this I understand he must either draw them or figure them, or perhaps does both. I should suppose from his request that he wanted to get the bevel under discussion in the same manner. If so, it is always well to first understand the fundamental principles. We will begin by bisecting a given angle, as illustrated in Fig. 1 of the sketches. To do this, place one leg of the dividers at the apex of the angle and strike an arc of any radius, as B C; then place one leg of the dividers at B and strike an arc at D. Again, with one leg of the dividers at C strike an arc intersecting the one already drawn at D and a line drawn through the intersection of the arcs and through the apex of the angle A will bisect the angle—that is, will divide it into two equal parts.

In Fig. 2 is shown a right angled triangle. In order to find the tangent or rise in 1 foot, we divide the perpendicular F by the base E. Suppose, for example, Fig. 2 represents the half of a roof truss, the hight F being 10 feet and the length E being 30. Then the rise in 1 foot would be 4 inches.

Example: $\frac{10}{30}$ = 1-3 foot; one-third of 12 inches = 4 inches, or 10 ÷ 30 = 0.3333.

Referring to the table of decimals of a foot, we find 0.3333 = 4 inches.

In Fig. 3 is shown how the bisecting rule indicated in Fig. 1 is employed to find the bevel at the hip of a truss. The drawing is so clear and self explanatory that comment is unnecessary. In Fig. 4 is represented the section of truss in its proper position. No scaling is necessary. Draw a straight line for the top chord and draw the incline of the post from this line; then draw the width of the members. This will give the distance "X" in width of member, also the bisecting line *a a*. Fig. 5 shows a truss with inclined chords. The bevels at A A and B B are found by the same methods as those used in connection with Figs. 3 and 4.

In Fig. 6 is shown a corner of an octagonal figure, for which we will find the miter. When one side of an octagon is 17 inches, then the two corresponding sides are each 12 inches. Subtract the base line, 12 inches, from the hypotenuse, 17 inches, and the result is 5 inches, in the hight, 12 inches; therefore the miter of the octagon is 5 inches in 12 inches. To prove this, project the bisecting line in Fig. 6 until it strikes the line A B and measure the distance from where it strikes the line A B to the line at right angles to A B, which will measure just 5 inches. Take a truss of 45 degrees pitch, which will form one side of an octagon, and the miter will be 5 inches in 12 inches. This rule applies to any pitch of truss. Take Fig 7, for example. Here is a truss 20 feet high, with 15-foot end panel and a 25-foot end post. Now to find the bevel at the hip, subtract the panel length, 15, from the length of the post, 25, and the result is 10; which is the bevel in the hight of truss, or 10 feet in 20 feet. To find the rise in 1 foot we divide 10 feet by 20 feet, which gives us 6 inches, as indicated in Fig. 8. The miter therefore is 6 inches in 12 inches. To prove this, the same rule can be applied as in Fig. 6. The same rule can also be applied to Fig. 5 at the point B B. The explanations given in connection with Figs. 6 and 7 so fully cover Fig. 9 that further comment is unnecessary. I might say that if the rise in 1 foot is given, and it is desired to find the distance "X," multiply the rise in 1 foot by the width of the truss member.

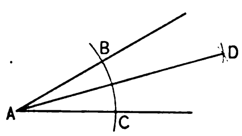


Fig. 1.—Bisecting a Given Angle.

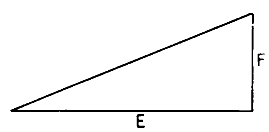


Fig. 2.—Diagram for Finding the Tangent or Rise in 1 Foot.

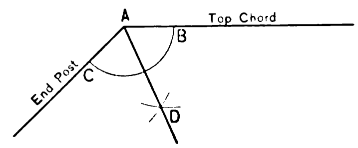


Fig. 3.—Bisecting Truss Lines to Get Bevel at Hip.

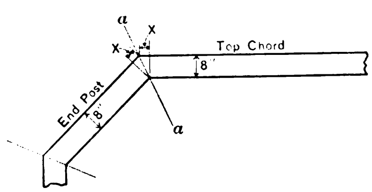


Fig. 4.—Finding Bevels at Hip and Heel by Intersecting Lines the Width of Members Used in Truss.

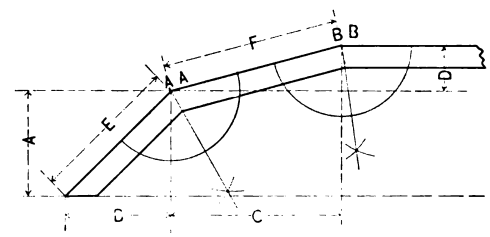


Fig. 5.—Finding the Bevels for Truss with Inclined Chords by Means of Bisecting or Intersecting Lines the Width of Members Used in Truss.

Finding Bevel in Truss Construction.—Contributed by "Flood City."

To find the bevel at the hip:

$$\frac{H}{D - L} = \text{Rise in 1 foot.}$$

$$\frac{D - L}{H} \times C = \text{Distance } X.$$

To find the bevel at the heel or shoe:

$$\frac{D - H}{L} = \text{Rise in 1 foot.}$$

$$\frac{D - H}{L} \times C = \text{Distance } X.$$

When a shoe plate is fastened to an end post of a truss that is cambered it is necessary to allow for the camber, so that when the truss is in position the shoe plate will rest in a horizontal position. The bevel at the point A A, Fig. 5, should be figured by trigonometry; also trusses where the chords and posts are different widths.

If there are any template makers among the readers of *Carpentry and Building* I should like to have their views and suggestions on hip, valley, purlin and other work.

Sharpening a Hand Scraper.

From C. C. H., *Brookville, Pa.*—I make a specialty of laying and finishing parquet floors and am obliged to do a great deal of scraping by hand, which necessitates frequent sharpening of the scraper. I would like to have some of my brother chips who have had experience with this tool tell me the best way of sharpening it. An early reply will be greatly appreciated.

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

From HEE H. SEE, *Montreal, Canada.*—With reference to the amount of work an average carpenter can do in a day I would say that another man and myself once made, fitted and hung 12 doors in less than five hours. The explanation and reason of it is as follows: They were what are known around here as batten doors, and were fitted in the floor openings of a freight elevator. We had been working about a week on the elevator, had all the doors made and fitted and had just received the drum. When putting the drum in place at the top (of course it was the other man's fault) one end of it got off the frame work and the whole 600 pounds went through every door we had made and buried itself in a heap of ashes in the cellar. The former elevator had been burnt out; hence the ashes. We both seemed to have a sort of presentment that if the boss came and saw what had happened we should spend most of the winter looking for work, so while the man who caused the trouble gathered up the splinters and stored them carefully away in the coal box I made new doors. They were made full length of the sheathing, and after putting on four cleats I then cut through the middle, thus making two doors at once. The way my "Yankee" screw driver put the screws in was a caution. I may say that what is known here as a "Yankee" screw driver does not bear any resemblance to the patented article of that name.

After we had carried the last pair of doors up the six flights of stairs and taken our breath we proceeded to dig out the drum, and only those persons who have tried to pull 600 pounds of cast iron up seven stories can think of half the names we called it. Perhaps some of the readers would like to know how we got it up. I would say that we had a set of chain blocks and a rope. The chain blocks would just about reach from one floor to the other, and we lowered the rope from the top, hitched the blocks to it, then we pulled the drum up one story, where we let it rest lightly on the doors in the floor, during which time one man let out the chain blocks and the other pulled up the rope to the next floor, and this operation was continued to the end. It is no wonder that the air should be blue at having these performances to go through time and again.

Now, Mr. Editor, I started out to show how "A. P. R.'s" man could fit and hang (?) his 15 doors, but I have gone a long way round to show it. In conclusion I might say that I have done a little of all kinds of wood work, from bridge building to cabinet making, and working with one of the large railways here I have seen carpenters from almost all parts of the North American continent. I have often met those 15 and 16 door-a-day men and others in their class, but I never yet saw any man do it. I did see one of them hang 12 doors once, and he very nearly got hung himself when the boss saw his work. I myself think that to fit and hang (not trim) a 3 x 7 x 1¾ inch door in an hour is a very good average. Men will be found who can do a little better, perhaps, but hundreds will be found who cannot do as well, especially if they have to carry the doors from the place where they are stored to where they are to be hung. As for putting on trim, three-quarters of an hour is a fair average for a mortise lock. In this again there are men who can beat it, but the man who can do it cannot be considered a slouch.

While we are ventilating this question, it would perhaps help us poor snails if some of those fast men would explain their methods. I have noticed that almost every man has a different method—some putting the sill in before fitting, some afterward; some putting the door up to mark the hinges on the jambs, some using the rod to mark both door and jamb. My letter is already far too long, so I leave my method out of it until our next meeting.

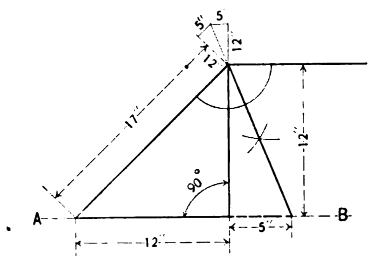
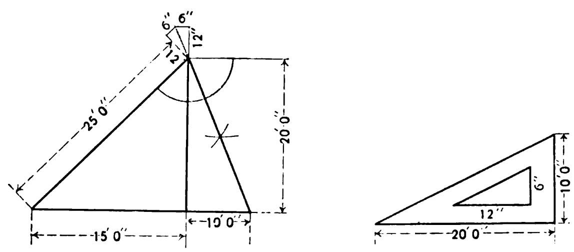


Fig. 6.—Finding an Octagon Miter, or the Bevel at Hip for a Truss of 45° Pitch.



Figs. 7 and 8.—Finding the Bevel at the Hip in the Width of Truss and Subsequently the Rise in 1 Foot.

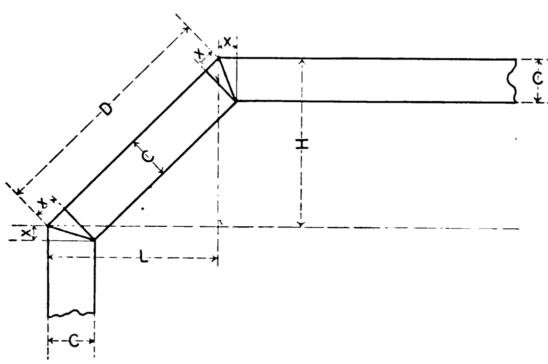


Fig. 9.—Finding the Bevel at Hip and Heel of Truss in the Width of Member Used in Truss and the Rise in 1 Foot.

Finding Bevel in Truss Contruction.—Contributed by "Flood City."

From F. K. W., *Lake Providence, La.*—The November issue of *Carpentry and Building* is just at hand, and is, if possible, more interesting than its predecessors. I was about to lock my chest and lose the key and get into the insurance business, after reading what some carpenters can do, but Mr. Kingston's very sensible and reasonable letter induces me to try again. I think the best way to arrive at a solution of the problem of what constitutes a day's work for a carpenter is for each one to tell what he himself has accomplished, rather than what some one else can do. So here is my record: If *I* (and you will note that the personal pronoun is underscored) make a set of frames for inside doors, hang them, put down threshold, put on mortise lock and cut in stops on five door in ten hours, each door measuring 3 x 7 feet in size and 1⅜ inches thick, I consider I am doing very well, especially as the doors and jambs are of hard pine. A short time ago I had a straight day's work on a pair of glazed store doors. They were 6 x 8 feet x 1¾ inches with transom, over 6 feet by 20 inches. The transom was hinged and fitted with transom lifter. Each door had three hinges, chain and foot bolt, rim dead lock, Yale night lock and thumb latch, and the job kept me as busy as I want to be for ten hours. I went home and went to sleep without any rocking. Do not forget it was all yellow pine. Since this controversy began I have not had a plain roof with all conditions favorable, but this week I reshingled a small roof on a two-story building, flashed two chimneys and two valleys about 12 feet each, and with two average shinglers took off the old shingles, carried up and laid the 7500 new ones, put on saddle boards and straightened up the eave troughs all in 15 hours, working as hard as any one ought to.

Now, according to Mr. Odell, and my near neighbor, the "Wandering Wood Butcher," I thought it time to close the shop, but Mr. Kingston stepped in, and after what he has said I shall try it again. Another experience I had was in connection with a roof that required 7000 shingles, 208 feet of hips, a half octagon about 15 x 7½ feet, and two small valleys about 6 feet each, the building being one story in hight and 20 feet to the eaves. Three good men and myself averaged a trifle less than 1600 per day per man. Here we generally use three-penny nails, run three courses, use one nail to a shingle in the two bottom courses and two nails to a shingle in the top course, all hip and valley shingles cut before being carried up, and make Boston hips. All the men wear rubber soled tennis shoes and can and do move. It is not quite clear to me how many shingles Mr. Kingston means by seven bunches. As I remember them, in his part of the country they run four to the thousand. When I came South more than 20 years ago they were using the split shingles here and packed 500 in a bundle. They were very hard to get on the roof when green, as they were very heavy. I seldom see any split shingles now, as they are all sawed and packed 200 in a bundle, making very neat little packages, quick to lift and easy to carry. They are all one width (nearly), being either 4, 5 or 6 inches, so you see some of those 80 cents per 1000 chaps could have lots of fun if they were here. As to shingling in Canada in zero weather, as the darkies say: "I'se bin thar," when two men would have to hold up a bundle of shingles as high as their heads and let it fall to separate the shingles which were frozen together; and then talk about 3500 per day sitting on an iceberg with some one to warm the nails—rats! I can do a little better with white pine or cypress doors, and can make better time at shingling in favorable weather, but in extremes of heat and cold I have to make allowances. These things should be taken into consideration, as well as all local conditions, in a controversy of this kind.

Under the caption "Reading Architects' Drawings" one paragraph is headed, "General Knowledge Required." This to my mind is a thing much needed, as well as a general or technical name for things around a building. One man calls a trestle a horse; another speaks of stair strings as horses, and now "T. J. La B." speaks of staging a roof and swinging a door. As Mark Twain would say, this is "English as she is spoke." If the editor gets this before the coal strike is over he has my permission to make a fire with it if he prefers that to printing it.

From R. N., *Stockton, Cal.*—I notice in the September issue of the paper, which I take great interest in reading, that some of my fellow craftsmen in the East express doubts as to a man's ability to lay from 2500 to 3500 shingles in a day of ten hours. Well, out here in California we think 3500 shingles a small day's work. I will say that I have had men working for me who laid 7500 shingles in nine hours, and I have seen men lay 10,000 shingles in ten hours. It may be my brother carpenters think I am stretching it a little, but I am not. Out here we lay shingles differently than they do in the East, for I have worked there and know the methods which prevail in both places. We stretch a line at the eaves, and after that we use neither straight edge nor line, but have a hatchet with a gauge set 4½ inches from the head, and we carry along from 6 to 12 courses at a time. We use no scaffold, but instead sit on a roof jack, which we move back as we shingle toward us. When the wages were $3 a day we paid 50 cents per 1000 to lay the shingles, two nails in every shingle, and a good job, too. There are men out here who make a business of laying shingles, the same as lathers make a specialty of their line. The fast work was done on straight barn roofs, ranging from 100 to 200 feet in length, and with rafters from 20 to 30 or 40 feet in length. What we call a thousand shingles are four bundles, which will lay about 925 feet exposed 4½ inches to the weather. I do not intend to convey the impression that men who can shingle at this rate are carpenters, for they are not by any means. They are to all intents and purposes professionals who make a specialty of the work.

With regard to the matter of hanging doors—that is, fitting the door to jamb and hanging it—I would say that I had a man hang 23 doors of redwood, each 1 1-3 inches thick and 2 feet 8 inches by 6 feet 8 inches in si e, in nine hours and he did a good job.

From F. L. B., *Blue Earth, Minn.*—The above topic seems to be the prevailing subject of discussion just at present, but no one so far has given us the answer to the query and I for one doubt whether it can be answered. A man may hang 15 doors in nine hours, but I doubt it, and in other work fall far below the average carpenter who does all kinds of work. A professional shingler is not a carpenter and could not hang three doors in a day. No man can become a professional fast workman on all kinds of carpenter work. I know a man who put on a church roof in this town 9500 cedar shingles and nailed them in 10 hours and 20 minutes. A number of citizens witnessed the job. He was a professional in his line, and so is the 15-door man; but where shall we strike an average for the two? I say it cannot be done. The professional stair builder will put up more stairs than a common man, and so it goes with other branches of the business, but you cannot strike an average. I will say, however, in answer that ten hours of good, first-class work is as near as one will get to it, and a first-class workman will do an average day's work.

Mr. Odell of Lincoln, Neb., seems to think that a man becomes a carpenter simply to work, not because of love for the trade. In this part of the country this is not the case, for nine out of every ten young men carpenters of this town are taking courses in some correspondence school, striving to become first-class workmen. The man who loves his trade will do a good average day's work, and if you put a workman on a job that he likes he will go above the average. Experience is what gives us our first-class workmen, and the man who works under a swell head contractor will never know or do much. I hope some wise reader of the paper will figure the average and I will wait for his answer. I will not blow about what I can do, because every man's work is his best reference.

Will "Wandering Wood Butcher" send me his address?

From C. C. H., *Brookville, Pa.*—In regard to the question that is up for discussion, I would say that I have worked with a good many carpenters and under a good many foremen. I am classed as one of the speedy carpenters in our place, but if I was compelled to either fit, hang and put the hardware on 20 1⅜-inch soft wood doors or lose my kit of tools, I surely would lose my tools. The man about whom "F. G. O." tells would be a wonder to us. As for the man who can carry 4000 shingles up a 20-foot ladder and lay them straight, better even than a man with a line, he is a hustler, for here we think a man who can lay and properly nail 3000 is a good one. From 2000 to 2500 is about the average day's work in this part of the country, and six to eight 1¾-inch doors with mortise locks is the average in the door line. I will say this, that to fit and trim 20 doors, as stated by "F. G. O.," would require, according to my way of thinking, three men on the average to do it. As to the amount of work for a day in fitting sash and weighting them, 16 to 18 two-light windows, 28 x 28 and 28 x 30, is a day's work.

PLAN OF A "MODEL" KITCHEN.

IN a recent issue we laid before our readers some very interesting suggestions relative to the arrangement and appointments of a "model" kitchen as presented in an article contributed by Nina C. Kinny to a late issue of the *American Kitchen Magazine*. In addition to what we gave, the article also considered the plan of a kitchen where the servant question was eliminated, and this portion we present herewith. It will be observed from an inspection of the plan that the room is not large, but is such a one as would likely be found in a small one and a half story house, where it serves as kitchen and dining room combined:

The "passage" near the center of the house connects the three rooms on the ground floor and the stairway to the second floor. Entering the kitchen from this passage, the first closet at the left is the broom closet, like the one described in the first plan, except that it has a sliding instead of a swinging door.

The second division is the baking nook of this kitchen. It is similar to "Cupboard and drawers" in the first plan. The lower section is of the same hight and the drawers are of the same depth. The floor space here is 30 inches wide by 32 inches deep. The two bottom drawers are 24 inches wide by 27 inches long—the full available width and 4 inches shorter than the depth of the space. The remaining drawer space has four drawers, two on each side, 10 inches wide. The slab topping this lower section is of glass or marble and fills the whole space, projecting 4 inches beyond the drawers below—or, if shelves are preferred to drawers, 4 inches beyond the doors inclosing them. To the under surface of the bottom shelf of the upper cupboard two small flour bins are hung. A gas jet projects from the wall 6 feet from the floor at the left. This lights the baking nook when daylight fails.

The third division is the passageway for the lift going from the cellar to the garret. This shaft and the car should be enameled in white.

The fourth division is for the refrigerator, which is "built in" and is of the same materials and general arrangement described for the other kitchen. The ice is put in through a door opening to the basement entry. The top of the refrigerator, with the space above it, serves as sideboard.

The fifth division is the passageway to the cellar and to the basement door.

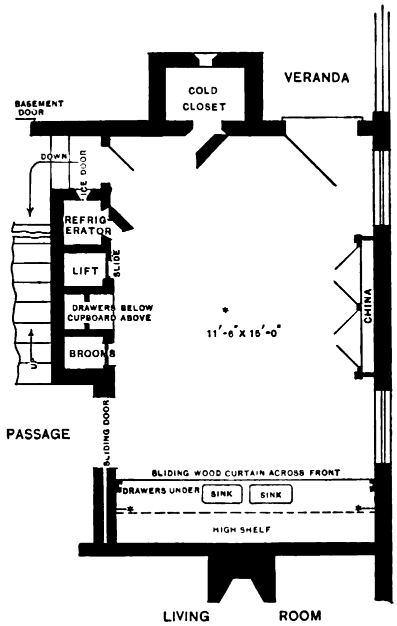
Opposite the inner door of the cold closet are two small outer fresh air doors, one near the top and one near the bottom. These should be fitted with strong wire netting screens. When open these doors insure a circulation of fresh air through the closet. In cool or cold weather this closet may serve as refrigerator without ice. Its interior should be finished in white enamel, and it should have strong, removable woven wire shelves. At all seasons the cold closet may hold the bread and cake boxes, and it will always be a convenient, airy place for keeping other small food supplies.

The china cupboard has glass doors, and below it are drawers for table linen and small silver.

Across the whole end of the room opposite the cold closet and piazza is the remaining kitchen part of the arrangement. It is a space 12 feet long by 32 inches wide. At a hight from the floor of 36 inches is a shelf or table, like the sink shelf described in the other plan, except that it is larger. Its top surface should be of rubber tile or of wood finished in white enamel. Dividing its length into three equal portions of 4 feet each, in the central portion are two small sinks—one for washing and one for rinsing dishes. Two swinging faucets, one for hot and one for cold water, are placed just in the rear of the space between the two sinks. Back of the right hand sink is the stationary bowl for carrying off water and at the upper right hand corner of the sink is the stationary soap dish.

On the rear of the left end of the sink shelf, resting on a zinc mat which has rubber castors, is a portable three-burner gas stove. The gas feeding pipe projects from the wall at the left. To this pipe the stove is attached by 12 or 18 inches of flexible pipe to permit moving the stove forward. One might have an electric cooking apparatus here instead of gas. On the rear of the right end of the sink shelf, upon a second mat, is an Aladden oven.

Here all the cooking and dish washing for a small family may be done with dispatch and exquisite neatness, provided the family live simply and do their own work. When not in use the whole space is shut off by a sliding wooden curtain. Standing at the center, in front of the space between the sinks, with the curtain lifted, and looking up, you may see that the ceiling is an oblong cone with a 6-inch opening in the center. This is the base of a 6-inch ventilating pipe which enters and forms a flue of the one chimney of the house. Two shelves run along the back wall the whole length of the space, giving 24 feet of shelf room for cooking pots and kettles. Below the shelves are hooks and racks for pot covers, broiler, toaster, skimmer, long cooking forks and spoons, strainers, masher, dipper, cups, &c.



Plan of a "Model" Kitchen.

When the curtain is dropped all this is shut from view. The whole interior of this place is enameled white.

The space under the sink is also divided into three equal parts. The front edge of the sink shelf projects 5 inches beyond the front of the under finish. The right and left divisions are filled in from the floor to the shelf with drawers, or, if one prefers, with shelves shut in by wood paneled doors. If the cupboards are preferred to drawers the entire inner surface should be finished in white enamel. The central portion directly under the sinks is left a clear space, enameled in white, and it should be inclosed by doors. A rubber or zinc mat should be placed on the floor of this closet, upon which the sheet iron oven for quick baking on the gas stove can be placed when not in use.

Stage Floor Construction.

It is well known that as ordinarily constructed the stage of a theater has a number of openings which a carpenter is called upon to make, and that in many instances more or less difficulty is experienced in accomplishing this. In the Academy of Music in the city of Baltimore, Md., a novel idea has been introduced by which the multiplicity of openings in the stage floor is done away with. A space in the center of the stage 32 x 34 feet was left open, and into it the joists were swung in iron stirrups, making it possible to slide all of them to the back should a large open space be required. The floor was built in sections and laid on these joists, fitting flush with the rest of the stage. In case a small trap is needed a section of the flooring can be lifted out, the joists moved aside and the open space not needed may be filled with small boards. This does away entirely with the old fashioned custom of sawing into the stage every time a trap is needed and which at the same time tended to greatly weaken the floor construction.

SUGGESTIONS FOR OUTSIDE PAINTING.

IT has often been noticed that in perhaps a majority of cases painters when at work upon a house paint the body, or at least a course of it, before they begin to put on the trimming color. It is proper to trim some parts of a house last, but on other parts it is more convenient to put on the trimming color before the body color is applied. To illustrate what I mean, says R. H. Forgrave in a recent issue of the *Painters' Magazine*, we will take a house that is to be repainted in two coats. The priming, or rather the first coat, has been applied all over, as is done in many instances, and the house is ready for the second and last coat, consisting of two colors—the body a light color, the trimming darker. In this case the cornice is of wood, and plain, as is usual with country houses. Before any of the weather boards are painted paint the cornice with the trimming color. You will find it is then much easier and more convenient to paint the weather boards underneath, which should be painted next. After this is done paint the corner strips and frames.

As a general rule, in putting a coat of more than one color on a house at one operation, paint the cornice first, the body next and lastly the corner strips and frames. Ofttimes it happens that a house is so constructed that it is more convenient to paint some of the other parts of the trimming before the body color is applied. By adopting the practice of painting the parts of a house in such a way the paint is most conveniently applied, no matter which is put on first. The painter will soon learn which parts should be painted first and which should not. There is another reason why the cornice should be painted before any of the body. If any of the trimming color should happen to drop or drip on the light paint underneath, after the finishing coat is on, it is sometimes troublesome to obliterate. This is a small matter and seems to be not worth mentioning; still there are many who put on all the finishing coat before they do any trimming. Many allow the body coat to dry before trimming. In either case it requires moving and placing the ladders and scaffolds twice where once would do if they finished as they went.

A Coat of Paint.

A coat of paint is a coat of paint to the majority. It is scarcely to be believed, nevertheless it is a fact, that most of them cannot understand why one coat will not cover the same as another. If black covers white, they cannot understand why white will not cover black. Then once in a while one comes up who is so sublime in his ignorance that he really believes he knows as much about the different trades as the mechanics he employs to work for him. If he only had a little practice and the necessary tools he could do the work just as well. The painter tells such a man he cannot do him a good job with less than three coats. The man concludes that the painter is only trying to get more money out of him, for don't he know of a dozen different jobs in the neighborhood that have been done with two coats. The outcome is that the customer demands that it must be done as he desires. In such a case the only way the painter can do is to adopt heroic measures, mix his paint heavy and flow it on thick.

The majority of property owners in the country are advocates of two-coat work in repainting. They believe it takes far less paint for two coats than for three, and that if the wood be well covered two coats will last as long and look as well as three. And there is the extra cost of putting on the third coat. It has been my experience that three thin coats are far better than two heavy ones and will last a third longer. This should be evident to all, as there is more oil to withstand the elements, protecting the pigment. I have repeatedly noticed that three-coat work will show gloss longer than two.

I have a couple of customers who believe in one coat of paint every two years. They have followed this method for several years. I have never tried to argue the matter with them, for if they are satisfied I certainly should be. But it is wrong both in theory and practice. It would be much better did they repaint every four years instead and use two coats. No one can get a first-class job with one coat over paint which has been exposed for two years. It will show brush marks, particularly close to the frames and corner strips where there is no chance to brush them out. Other objections are, the old paint underneath absorbs the oil and the gloss soon fades. There must be a certain amount of oil in the last coat. If there is not the pigment soon begins to chalk and wear off. Considering the time that paint should look well, I do not believe that two coats, applied two years apart, will look as well for as long a time as two coats applied every four years.

Painting a Brick House.

Painting a brick house is a job the country painter does not like to run up against. The owner is nearly always dissatisfied because of the larger amount of material it takes as compared to a frame house of the same size. As it generally happens, too, the painter underestimates the amount of material required. Then there is more dissatisfaction. The painter thinks he ought to be paid for the extra material while the owner thinks he has used more than he should. I do not believe I will ever attempt to do any more brick houses in oil paint. If the owner will not consent to let me use one of the cold water mixtures for exterior work I will let such jobs go. No doubt other country painters have had the same experience. Now some of these cold water preparations are admirably adapted for brick painting. They will last and look well on oil paint for a long time. If the brick is painted for looks only one coat well brushed in will do fair work. Two is better. While if the intention be to keep out moisture a coat of cold water paint, followed with a coat of oil paint, is all that is required. A coat of oil paint over cold water paint on brick holds out nearly if not quite as well as two coats of oil paint, while the difference in cost is considerable.

I find that property owners are afraid of the cold water preparation. They seem to think because there is no oil in them, that they are of the nature of whitewash—will scale and rub off easily. The first I ever used I put on an old barn about three years ago. At present the surface looks about as well as if it had been painted with oil paint and stood for that length of time. If mixed right and well brushed on none that has come to my notice shows any signs of scaling. Neither does it rub off like whitewash. They will rub off to some extent when wet, but will not rub up under the hand any more than oil paint when dry. Nor do they wash off by the rain beating on them. However, I do not advise the reader to use something on good work, such as a nice brick house, without first becoming acquainted with all its characteristics by trying it in different ways. There are chances for failure when working with material or on a kind of work with which one has had no experience. Cold water paint might be used in place of oil paint in many instances and give just as good satisfaction. I have used with good results common pavement cement mixed in water for filling old boards preparatory to painting with oil paint.

It matters little what is used as a size on old boards so it fills and sticks and the boards do not draw an excess of moisture from the ground or the interior, as the oil paint on the outside will protect it from external moisture, and it cannot or will not flake off unless the oil paint, being the stronger, draws it off.

CORROSION OF STEEL FRAMES OF BUILDINGS.

THE following extracts from the report of expert Charles L. Norton to the Associated Factory Mutual Fire Insurance companies of tests of the corrosion of steel frames in connection with building construction and made at the Insurance Experiment Station of the companies referred to may not be without interest to many of our readers:

There can be no question that moisture and carbon dioxide are the active agents in causing much of the rusting of steel. To what an extent the two are relatively responsible and in what measure they need renewal, to keep up the process, is uncertain. It has been held that the formation of a coat of rust upon the surface of steel was the beginning of a progressive action whereby the rust, or iron oxide, acted as a continuous carrier of oxygen to the steel beneath. This process seems to require only moisture and atmospheric air containing carbon dioxide to start it, but as to the depth of penetration of the process I know of no assignable maximum in any given time. It is extremely probable that in a comparatively dry place the process is exceedingly slow.

There can, of course, be no question as to the ease of access to the steel, in many cases, of both moisture and carbon dioxide. When steel is bedded in the wall of the building, as is almost always the case, the changes in temperature from time to time, as well as the more or less constant difference in temperature between the two faces of the wall, tend to cause a condensation of moisture in the wall at different points. Further, the necessary carbon dioxide is most plentiful in the large cities, where the steel frame is most common.

Brick and Stone Walls.

When the walls of the building are of brick or stone moisture and carbon dioxide may usually enter at the joints and, to a greater or less extent, through the body of the stone or brick. Few stones are, however, porous to such an extent as to allow an appreciable penetration. Terra cotta tile is of itself porous, and the existence of air passages tends to increase the condensation of moisture and absorption by the terra cotta and possible contact with the steel. Concrete, made of Portland cement with sand and either cinders or stone, would seem to offer more protection to the steel than any of the materials just mentioned; yet we hear from time to time of the loss by corrosion of steel bedded in concrete.

A study of the action of Portland cement concrete on steel was begun under my direction by P. C. Pearson in December, 1901, and it is my purpose to report upon this and some later observations as a preliminary to more work of the same nature now under way.

It has been held by several engineers that the mere alkaline nature of Portland cement was a sufficient guarantee of its protecting steel from rusting. There is, of course, good chemical reasoning for this, the familiar use of strong alkaline solution in boilers to prevent the formation of scale being based upon the same principle. This would seem to settle the matter once and for all, were it not a fact that steel bedded in concrete has corroded very rapidly, while other steel in a different concrete of the same kind of cement stands without change for ten years or more. The investigation was started not to find out that steel could not be protected by concrete or that it could be, for on that point we were sure, to start with, but we have tried to find a reason for occasional failure and to suggest a remedy.

An examination of several cases where expanded metal had been imbedded in concrete showed plainly that rusting began wherever the steel was exposed through cracking, even though the cracks were very fine. It would seem that the alkaline nature of the cement would be sufficient to prevent corrosive action occurring within a few hundredths of an inch on the moist surface of the steel, but such is not always the case.

To study the matter systematically, two brands of American Portland cement, Alpha and Lehigh, were selected; two kinds of cinders, one from the sugar refinery, the other from the Boston & Albany locomotives; a sharp, clean beach sand, and a hard, clean broken stone, the larger part being fragments of flint and trap rock. Concretes were made up in bricks about 3 x 3 x 8 inches, with the steel specimens near the center.

The following mixtures were tried at first. Neat cement; cement, 1 part, to 3 of sand; 1 part of cement and 5 parts of broken stone, and 1 part of cement to 7 parts of cinders. All briquettes were made in duplicate with both cements. There were later made up briquettes of 1 part of cement to 2 parts of sand and 5 parts of cinders, and of 1 part cement to 2 of sand and 5 of crushed stone.

It was hoped to vary the density, the porosity and the nature of the contact with the steel, as well as the chemical composition of the concretes. The cements were tested chemically and physically and found good. The cinders, when washed down with a hose stream and dried, tested distinctly alkaline, and analysis revealed very small amounts of sulphur. The stone and sand were thoroughly washed and clean. The ingredients were mixed dry in every case and, when wet, thoroughly mixed and tamped until wet on top.

The cleaning of the steel was the most troublesome problem met with. It was necessary to scour the pieces, then pickle in hot dilute sulphuric acid, and finally dip into hot milk of lime. When cold the lime was removed with a wire brush. This left the steel clean and bright, ready to be put into the test bricks.

Specimens Used.

The specimens used were a mild steel rod 6 inches long and ¼ inch in diameter, a piece of soft sheet steel 6 x 1 x 1-32 inch, and a strip of expanded metal 6 x 1 inch, all three pieces being put in each brick. Since time would not permit of our exposing these specimens to natural conditions, we inclosed them in several large tin boxes, sealed tightly, and subjected one-quarter of them to an atmosphere of steam, air and carbon dioxide, a second quarter to air and steam, a third to air and carbon dioxide, and a fourth stood upon the table of the room, with no special care as to their temperature or dryness. Of the entire number about one-half were set in water for one day, the rest for seven days, before sealing up. At the end of three weeks the briquettes were carefully cut open and the steel examined and compared with specimens which had lain unprotected in each of the tin boxes. Those specimens which were mixed of neat cement can be dismissed without discussion, for the protection was perfect. The steel was as bright as when put in.

The unprotected pieces were found to consist of rather more rust than steel. The steel was wrapped about pieces of uralite, to serve as a means of identifying it by number, the stamped numbers being nearly obliterated by the rust. Of the remaining specimens hardly one had escaped serious corrosion. The location of the rust spot was invariably coincident with either a void in the concrete or a badly rusted cinder. In the porous mixtures the steel was spotted with alternate bright and badly rusted areas, each clearly defined. In both the solid and the porous cinder concretes many rust spots were found, except where the concrete had been mixed very wet, in which case the watery cement had coated nearly the whole of the steel, like a paint, and protected it. Some briquettes made later of finely ground cinders and cement, in varying proportions, when exposed to moisture and carbonic acid, showed how effectually the presence of cement prevented rusting, even in a highly porous mass—1 cement to 10 of cinder—provided there were no cracks or crevices or distinct voids.

Conclusions Reached.

From the examination of these several hundred briquettes we were able to draw several conclusion:

1. Neat Portland cement, even in thin layers, is an effective preventive of rusting.

2. Concretes, to be effective in preventing rust, must be dense and without voids or cracks. They should be mixed quite wet where applied to the metal.

3. The corrosion found in cinder concrete is mainly due to the iron oxide, or rust, in the cinders and not to the sulphur.

4. Cinder concrete, if free from voids and well rammed when wet, is about as effective as stone concrete in protecting steel.

5. It is of the utmost importance that the steel be clean when bedded in concrete. Scraping, pickling, a sand blast and lime should be used, if necessary, to have the metal clean when built into a wall.

In the matter of paints for steel there is a wide difference of opinion. I cannot believe that any of the paints of which I have any knowledge can compare with a wash or painting with cement. Moreover, if paint does disintegrate, it leaves a thin void next the steel, the worst possible condition. I examined some steel Z bars not long ago which were exposed in process of altering a building five years old. It was clear that the steel was rusty when painted and that moisture had penetrated through the paint, caused the rust to increase and split off the paint. This was a case where the steel was built into the brick work with no attempt at any protection other than the paint.

It is, in my opinion, perfectly clear that the coating of all steel work with cement before applying the concrete or tile or brick, as the case may be, is an absolute essential, if the formation of rust and consequent weakening of the steel is to be prevented. The thickness of the cement layer need not be great, but it should be a continuous coating, without cracks. The steel should be perfectly clean; but if, as if often the case, the choice is between paint and rust which accumulates during construction, the paint is to be preferred.

TREATMENT OF DAMP SURFACES.

THERE are a variety of preparations for the treatment of damp surfaces, each material having its own particular advantage. None, however, possesses the properties of entirely obliterating the evil in all cases, says a writer in the *Decorators' Magazine*. But when we possess a knowledge of the preparations suitable for the different causes, we may generally obtain very successful results. Any disintegrations caused by atmospheric influences in stone buildings, brick walls, gable ends, &c., may be effectually filled with oil mastic. This mastic may be prepared by mixing equal parts of red lead and sand with one-third of the weight of quicklime. Mix into a paste with boiled oil and fill up all cavities.

A good remedy for porous surfaces is to allow the wall to become thoroughly dry, then apply a coat of hot boiled oil, which should be laid on lavishly with a large paint brush until all suction is stopped. This will effectively prevent the absorption of damp, but will require renewing about every two years, unless the work be afterward treated with two oily coats of white lead, when it would last a considerable time longer.

Varnish and rosin paints are very effective for preventing dampness striking through highly absorbent brick work. These varnish preparations contain a large proportion of resin (which is a valuable damp resister alone), and are preferred by many painters to the system of tacking lead foil over the affected parts. It is essential, however, when using these preparations to thin the first coat in order that the liquid will penetrate the porous surface, which should not be damp or wet, otherwise the preparation will not remain on the surface but eventually shell or flake off.

Preparations of this description vary but little in composition. The following may be taken as the average composition of this class of damp resister: Glass or pale rosin, 9 pounds; boiled oil, 1 pint; solvent or coal car naphtha, 1 gallon. These are dissolved and mixed by frequent agitation. Zinc white and other pigments are often added to these preparations, forming a priming for the subsequent coats of paint, but where the natural color of the surface is to be retained it is used colorless.

Rubber varnishes form very useful preparations for both interior and exterior walls, upon which they form a hard, tough and elastic coat. Compositions of this class, in order to penetrate the affected surface, should be thinned down with coal tar naphtha or turpentine.

Shellac or spirit varnishes form very effective damp resisters for newly plastered interior walls, as they resist the action of any alkaline matter present, and form a very tenacious layer upon the plaster, which dries immediately and causes only a slight delay in proceeding with the ordinary work.

Treating interior walls with a copious supply of vinegar will neutralize any surface alkali, and often prevent the wall papers being bleached.

When dampness occurs above the skirting boards and near the floors it is very difficult to eradicate, as it is often due to bad ventilation or a faulty damp course, and at times can only be remedied by structural alteration or troweling with a smooth coat of Portland cement, afterward applying a coat of rubber solution. When this proceeding cannot be adopted, owing to existing surroundings, the most effective and reliable method is to apply a coat of asphalt or tar varnish diluted with benzine; a strip of lead foil may then be tacked or plastered on with flour paste mixed with glue and alum. The coat of tar varnish will prevent the damp affecting the paste, thus insuring the stability of the lead foil. This method is very effective in bad cases, and is far better than using damp proof papers.

Washable distempers of a good quality prevent absorption of moisture upon plaster work, and are very suitable as damp resisters, and also for the decoration of newly plastered work, if prepared from pigments which are of a lime resisting nature. But in the use of damp resisting preparations experience is the only reliable guide, and their efficacy can only be determined by the careful treatment of each particular case.

A Point in Slow Burning Construction.

A feature of building construction for architects to consider developed in connection with the recent partial destruction of a large building in Pittsburgh of the slow burning type. The floors, which were of heavy timbers, covered with 3-inch plank, and this with 1-inch maple flooring, resisted the flames very well, but the water thrown on the fire swelled the maple flooring to such an extent as to push out the brick walls several inches. It seems that in some of the floors the maple flooring was simply lifted in ridges from the planking by the effect of the water, but in certain stories, where a heavy load of boxes of glass prevented the boards from buckling upward, the whole movement was lateral. Architects may well reason from this occurrence, says the *American Architect and Building News*, that maple upper floors in warehouses, if of large extent, ought not to be too dry before laying. In most cases kiln drying is avoided under such circumstances, but it is important to keep the floors tight, and these boards if not kiln dried seem to have been laid with very close joints. It may be observed that many architects who use the slow burning construction pitch their floors slightly and provide outlets by which water thrown upon them to extinguish fire may escape without soaking the boards, and if, as is sometimes done, a little gutter is contrived in the flooring at the two sides of the building parallel with the floor boards the swelling of the latter will not affect the walls.

AN illuminated tracing table has recently been installed in a Boston drafting room for making tracings on thick paper or from drawings having weak lines. A large drawer fits under the top of the table, a rectangular hole being cut in the latter and a large piece of French plate glass set in. In this drawer is a cluster of incandescent lights with a white porcelain reflector. This cluster may be moved to any portion of the drawer, so as to come under that part of the drawing which has most need of it, the illumination not being uniform all over the drawing. A great variety of uses have been found for this equipment, such as comparison of alternative designs, and the tracing of additions directly on brown paper drawings or blue prints.

WHAT BUILDERS ARE DOING.

AN interesting development of the building situation of the city of Boston is found in the agreement of the Master Carpenters' Association with the United Carpenters' Council, representing 27 unions of journeymen carpenters, establishing a permanent joint committee to settle all affairs of mutual concern to employers and workmen in that trade, thus tending to avoid strikes and lockouts.

The agreement is based on three fundamental principles:

1. No question of mutual concern shall be conclusively acted upon by either body independently, but shall be referred for settlement to a joint committee of an equal number of representatives from each association.
2. All questions of mutual concern shall be settled by their own trade, without the intervention of any other trade.
3. The findings of this committee shall be binding upon all members.
4. In no event shall strikes and lockouts be permitted, all differences shall be submitted to the Joint Committee.

The parties also "agree to sustain the principle of absolute independence of the individual to work or not to work, to employ or not to employ, is fundamental, and should never be questioned or assailed, for upon that independence the security of our whole social fabric and business prosperity rests, and employers and workmen should be equally interested in its defence and preservation."

The Joint Conciliation Committee of six members will at once choose an umpire. This umpire shall be neither a workman nor an employer of workmen, but he shall not serve unless his presence shall be made necessary by failure of the committee to agree. The umpire shall have the deciding vote in case of a tie in the committee.

This agreement is largely the result of the efforts of William H. Sayward, secretary of the Master Builders' Association of Boston, who is also secretary of the National Association of Builders. The aim is to bring employers and workmen in the various building trades into better business relations, thus solving, as far as may be, the labor question of these trades.

This agreement is similar to that which for the past 12 years has been operative between the Mason Builders' Association and their men.

Chicago, Ill.

There continues to be a great deal of activity in the building line in and about the city and operations have recently been conducted upon a scale which has broken previous records. This activity has no doubt been stimulated in some degree by the repeal of the city ordinance which limited the hight of buildings. In the month of October the value of the building improvements, for which permits were issued exceeded that of any corresponding period in the past ten years. Permits were taken out for 563 building improvements, having a frontage of 17,579 feet, and involving an expenditure of $4,056,205. As compared with the corresponding month of last year this is a decrease of 23 in the number of permits, an increase of 379 feet in frontage and an increase of $1,103,545 in the cost.

A number of important building improvements are under way or in contemplation, involving an expenditure of money running well up into the millions. The scene of some of this prospective activity is the vicinity of Michigan and Jackson boulevards, the projects embracing a new hotel costing for land and building $3,250,000, the Standard Office Building, to cost about $3,000,000, and an edifice on the Whittemore property, in which the Thomas Orchestra, Central Church and School of Music of the University of Chicago will find a home, the cost of the latter being estimated at over $1,000,000.

Taking the figures of the Building Bureau for the ten months of the year, it is seen that permits were issued for 5324 buildings, having a frontage of 161,350 feet, and costing $42,529,740. These figures compare with 5300 permits issued for buildings having a frontage of 149,559 feet and costing $30,026,875 in the first ten months of last year.

Cleveland, Ohio.

The annual meeting of the Builders' Exchange was held on November 6, when various reports were presented and directors chosen for the ensuing year. The polls were open from 11 a.m. until 8 p.m., and regular election laws were observed during this period. The retiring Board of Directors presented a comprehensive report of the last year's work, showing the exchange to be in good financial condition and that the cash reserve fund had reached the sum of $5184. The report also indicated that a great deal of practical work had been done for the building interests of the city. The meeting comprised a business session, at which the chairmen of the various committees presented their reports, and a social session at which upward of 100 members sat down to luncheon, after which President William H. Hunt delivered his annual address, which we present in another part of this issue. Speeches were also made to many of the members. Among the new enterprises to be taken up by the exchange the ensuing year is the consideration of a new building project which has many enthusiastic supporters. As the Cleveland Exchange has a membership of over 300, and is one of the largest in the country, some of the members feel that the organization should own a home of its own, and the scheme which is now being agitated is to erect an office building, to be occupied exclusively by the exchange and by people interested in the building trades.

The directors elected for the ensuing year were William H. Hunt, John Leese, E. W. Palmer, Henry Wattison, Henry T. Williams, L. Dautel, E. W. McCormick, H. C. Bradley, Guy Gray and Henry A. Taylor. The board organized by electing William H. Hunt, president; John Leese, vice-president; E. W. Palmer, treasurer, and Edward A. Roberts, secretary.

Los Angeles, Cal.

The building record of this city for the month of October eclipsed all previous figures, the total amount involved by the building permits aggregating $954,613. This exceeds by a large sum the best previous months. A special feature of the October building and of that still in progress is the number of one-story frame residences. During October 257 permits for this class of residences were obtained, calling for an outlay of about $300,000. The two-story frame residences for which permits were obtained in October numbered 83, at a total cost of $253,455. From this it is seen that more than half of the total for October is accounted for by one and two story frame residences.

Notwithstanding the immense amount of building now going on in the city, it is claimed by contractors that the present high prices of labor and materials are acting as a serious check. One contractor says that within his personal knowledge buildings aggregating between $30,000 and $40,000 have been abandoned, because of the prevailing high wages and cost of materials.

Milford, Mass.

The Master Builders of Milford have recently held several meetings with a view to forming an association, and about the middle of October they perfected an organization, known as the Milford Master Builders' Association. The officers elected were: President, Frank D. Dillon; vice-president, George S. Whitney, and secretary and treasurer, Eugene F. Lynch. The directors chosen were W. N. Weed, H. H. Lent and G. A. Goodrich.

It was decided that on and after November only eight hours should constitute a day's work, and that the members should pay wages for eight hours, the same as last season. Whether or not an eight-hour day with full pay will be granted next spring has not yet been decided.

Milwaukee, Wis.

The formal opening and dedication of the new quarters of the Builders' and Traders' Exchange was celebrated on October 11 with appropriate ceremonies. The new structure is centrally located at 456 Broadway, and is known as the Builders' Club Building, the club being a new organization and auxiliary to the Builders' and Traders' Exchange. On the first floor of the new building are located the exchange rooms, on the second floor the Builders' Club, while the balance of the building—that is, the third and fourth floors—are divided into offices. It may be stated in this connection that the object of the Builders' Club is to provide suitable quarters for the builders and material men having membership in the Builders' and Traders' Exchange, and to arrange entertainments for the members of both organizations and their friends.

The present officers of the Builders' Club are: President H. Ferge; first vice-president, Pattek; second vice-president, George Schwarz; treasurer, John Bennett, and secretary, Joseph P. Sherer.

Newark, N. J.

A short time ago we referred to the fact that the Builders' and Traders' Exchange of Newark, N. J., were contemplating the erection of a building especially adapted to meet their requirements. Contracts have recently been awarded for this new building, which will be located at 45 Clinton street, and will be of fire proof construction, six stories in hight. It will cover an area 25 x 95 feet, have 38 suites of offices, each equipped with all the modern improvements, and will be completed in accordance with drawings prepared by Architect Charles P. Baldwin of Newark, N. J. The contract for the carpentry work has been awarded to H. M. Doremus & Co., the mason work to Charles S. Cooper, the iron work to Albert Smith's Sons, the cut stone work to George Brown & Son, the painting to Charles Stopper, the elevators to the Storm Mfg. Company and the electrical work to the Electrical Motor & Equipment Company. It is expected to have the building ready for occupancy by May 1 next.

Oakland, Cal.

Preparations are being made by Woodward, Watson & Co. to erect 16 modern dwelling houses ranging in cost from $3000 to $4000 each on the block formerly occupied by the Tubbs Hotel and grounds. The houses will vary in size, and will contain from seven to ten rooms each. Eastern ideas will be largely followed in the construction of the houses. The total outlay will amount to about $90,000.

On October 15 the Oakland Lumber Exchange, composed of the wholesale lumber dealers of the city, gave a banquet at Maple Hall to the building contractors of Alameda County. The hosts and guests at the table numbered 200. George H. Payne, president of the exchange, acted as toastmaster. Speeches were made by Vice-President G. W. Fischer, Secretary Henry W. Taylor, S. L. Everets, editor of *Wood and Iron*, F. M. Delaney, Hugh Hogan, Robert McKillican, P. J. Brophy and others. The matter of forming an organization of contractors and lumber dealers was taken up and a temporary organization effected, with F. M. Delaney as chairman.

Ogden, Utah.

Indications now point to a long and continuous building season this winter. A number of early landmarks, consisting of old frame and adobe buildings, have been torn down, preparatory to the erection of large, substantial business blocks, and throughout the city a large number of modern cottages and residences are in course of erection. The past 30 days have seen the completion of a number of business blocks and the beginning of as many more.

San Francisco, Cal.

With the approach of winter there is something of a cessation in the number of small building enterprises, but the construction of large hotels and office buildings is progressing as fast as material can be obtained. The work of excavation for the Fairmount Hotel on California street will require the removal of about 75,000 cubic yards of earth. Building contracts aggregating more than $1,500,000 have already been awarded on this structure, and other contracts yet to be given will bring the total cost up to $2,000,000, exclusive of furnishings. Herman Oelrichs is supervising the work.

Among the other large buildings which are now planned for the near future are a seven-story, semi-fire proof office building at the corner of Sutter and Stockton streets, to be built by John Rosenfeld Sons; the Armand Cailleau Building, a six-story structure on Sutter, near Powell, and a large hotel building, to be built at the corner of California and Jones streets by John Rosenfeld Sons.

On October 13 Judge William B. Gilbert rendered a decision on appeal in the United States Circuit Court of Appeals declaring that the Washington Red Cedar Shingle Manufacturers' Association was a trust. The decision holds that the association is an unlawful combination in restraint of trade, and has the effect of diminishing production, abolishing competition and enhancing prices.

St. Louis, Mo.

The building boom which was confidently expected to grow out of the location of the World's Fair in St. Louis has not yet materialized in the city, and although there are a large number of dwellings in process of erection the volume of building is not up to original expectations. This condition is said to be occasioned in a large measure by the uncertainty of labor and wages, as well as the advance in the cost of materials entering largely into building construction. Capitalists are not inclined to invest their money at present in building improvements, but intimate that they will wait until the time wages and materials will have appreciably declined.

The carpenters have made a demand for 55 and 60 cents on April 1, and builders are strongly of the opinion that this will be followed later by another demand for an increase. At present the demands of all the crafts are being granted. The gas fitters, who a short time since were willing to accept $2.50, now demand $5, and so it goes down the line of trades. The chief complaint of the contractors is not the amount of wages, but the other conditions and rules imposed by the Building Trades' Council, some of which are regarded as unreasonable, and from mutterings now heard are likely to be protested in the spring.

In order to provide facilities for the inrush of visitors expected during the World's Fair, an ordinance is being considered designed to permit of the erection of temporary frame buildings within specified limits. These temporary structures are to be used for the purposes designated by general ordinances touching buildings of the first and second class, but shall conform to all provisions of such ordinances with respect to strength, means of egress and protection against fire. The ordinance also provides that such temporary buildings as may be erected must be demolished and removed within six months after the closing of the Louisiana Purchase Exposition.

Notes.

The Building Material Men's Association of Westchester County, N. Y., recently perfected their organization by electing the following officers: President, A. F. Hitchcock of Mount Vernon; vice-president, Edward L. Thomas of Yonkers; secretary, William Halley of Yonkers; treasurer, Rockwell Young of White Plains.

The directors consist of Frank M. Dain of Peekskill, S. W. Wood Cornell of Pleasantville, Charles H. Tibbitto of Portchester, Alonzo Guest of New Rochelle and J. W. Hartman of Mount Vernon.

A large amount of building is in progress in Belleville, Ill., and notwithstanding the high prices of building materials the outlook is very encouraging. Labor is also high, carpenters receiving from 35 to 43 cents per hour; bricklayers, 45 to 50 cents; plasterers the same, and plumbers, 40 to 45 cents.

LAW IN THE BUILDING TRADES.

WHEN OWNER CAN COMPLETE BUILDING.

The owner of a building, on the failure of the contractors to substantially complete its erection, and on their abandonment on his consequent refusal to pay an installment of the contract price, may complete it and hold the contractors for the necessary expense.—Hansen *vs.* Hackman, 75 N. Y. S., Rep. 296.

MEASURE OF DAMAGES FOR NOT COMPLYING WITH SPECIFICATIONS.

The measure of damages for failure to construct a building according to the specifications is the difference between the value of the building as constructed and delivered and what it would have been worth had it been constructed according to the specifications, and not the cost of altering it so as to make it conform to such specifications.—Walter *vs.* Hangen, 75 N. Y. S., 683.

CONTRACTOR EXCUSED BY DEFAULT OF OWNER.

Though a building contract provided for the payment of rent by way of damages if the contractor should fail to complete the building within 90 days, the owner cannot complain of the failure to complete within the time where he failed to make the payments in accordance with the contract.—Harris *vs.* Gardiner, (Ky.), 68 S. W., Rep. 8.

WHAT DELAY WILL NOT FORFEIT CONTRACT.

Where a building contract gave the owner, in case of unreasonable delay, the right either to complete the work or to terminate the contract, a delay of three weeks, because of a strike, will not prevent recovery on the contract, where the owner took no steps at the time, and there was no time limit in the agreement.—Happel *vs.* Marasco, 75 N. Y. S., Rep. 461.

LIABILITY FOR EXTRA WORK.

Where a subcontractor for a building was required to omit work called for in the contract or do extra work when so directed by the owner or architects, but the contract provided for a deduction from the contract or extra pay, as the case might be, such provision did not preclude the contractor from doing extra work.—Isaacs *vs.* Dawson, 75 N. Y. S., Rep. 337.

WHEN CONTRACTOR MAY RESUME WORK.

Where a contractor has unadvisedly refused to perform his contract, he may, while the situation of the same is unchanged, retract the refusal and go on with the work, though the other party has notified him that he will hold such refusal to be a default and will sue to dissolve the contract.—Perkins *vs.* Frazer (La.), 31 So., Rep. 773.

WHEN PARTY CANNOT ARBITRARILY CANCEL CONTRACT.

Where a contract for work to be done on a building dictates the requirements to be observed by the contractor, and provides that, after due notice that the work is not progressing rapidly enough, or is not in accordance with the specifications, the contract may be canceled, such provision does not give the other party the sole prerogative of determining whether the work is being properly performed, and he is not justified in canceling the contract if the work is in fact being performed as called for by the contract.—Hoyle *vs.* Stellwagon, (Ind.), 63 N. E., Rep. 780.

WATER CLOSET FLOOR SLABS.

SOME residences, and nearly all public buildings, of whatever character, have tile, cement or mosaic floors in the toilet rooms. These floors need nothing better on which to set the closets, but the majority of residences have wood floors throughout, usually soft wood, and a wood floor of any kind is not a good basis for a closet, hence the use of floor slabs. Yellow pine, known as "hard pine" in the Northern and New England States, is even worse than white pine, on account of its inability to withstand dampness without rotting.

In Fig. 1 is shown a section of a type of slab called a floor slab by the "scrimp" element, says a correspondent in *The Metal Worker*, writing under the *nom de plume* of "Helmar." It is square edged, plain faced, ⅞ inch thick, set dry, rocks over one or two points like a five-leg table with the middle leg on a hump, and its dimensions are—too small. On cheap contract work the writer has seen the slabs all sizes, from just the size of the closet flange to 18 x 24 inches.

The purpose of a floor slab is not merely that the closet be "set on marble." The idea is to have the closet over a nonabsorbing surface that will catch and hold accidental dripping, leakage, &c., and which can be sponged clean with no injury to it or the surroundings. A small slab will not catch drippings or slight leakage effectively, whether plain or countersunk. If small and set back it raises the closet uncomfortably high. If set forward it does not reach the wall behind and the front edge is just far enough forward to make a stumbling place for the feet. If the closet room is to contain no marble except the floor slab the right way is to have it reach smooth around the edges with cement for a cement wall or plaster of paris for a plastered wall. If the room has a wood baseboard set in a shoe the slab should reach flush with the face of the base, which will require cutting off the shoe front. A strip to match the shoe front should be fitted all around the wall edge of the slab and properly membered with the shoe. The slab should never extend less than 12 inches forward from a line drawn down from the front of the flush rim.

A slab similar to the one in Fig. 2 is shown in Fig. 3. It is sunk so that the countersink is level with the top of the floor and the front edge chamfered down nearly to the floor level. If the house has no deafening floor it is best to cleat the joists and lay a floor low enough to receive the slab and a good bedding of cement, as shown in the sketch. If there is deafening it is only necessary to

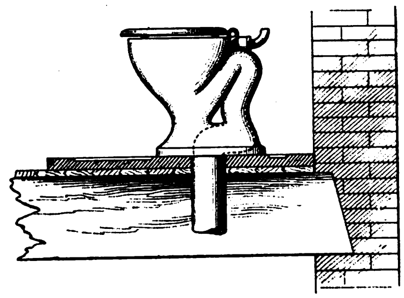


Fig. 2.—Countersunk Slab Placed on Floor.

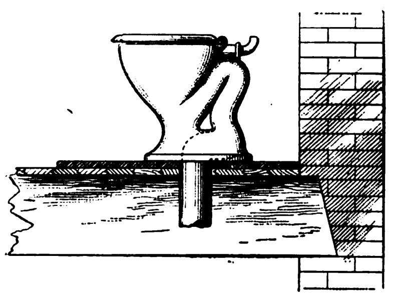


Fig. 1.—Plain Thin Slab on Floor.

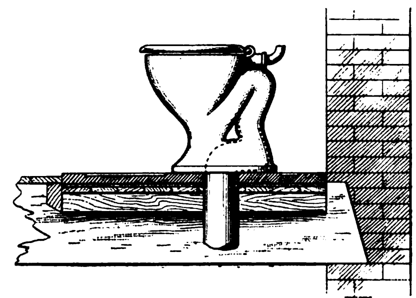


Fig. 3.—Countersunk Thick Slab Sunk to Floor Level.

Water Closet Floor Slabs.

the wall behind, before shoe sham is put down, and extend far enough forward to make good foot room; and unless the room is very large it should go to the wall at both sides of the closet.

All slabs should be countersunk all around, leaving a boss the shape of the base of the closet to be used, except about 1 inch larger for a margin. A drip pipe from a residence floor slab is of but little consequence. It will not have the chance to take care of any considerable leak, and the room is cleaned so regularly that a small leak is discovered through the water in the countersink before it does much damage. When a drip pipe is put in it should discharge into the outer air or with open end over a sink or in basement, covered by a gravity flap to keep air from circulating freely through it.

In Fig. 2 is represented a slab set on the regular floor. It is countersunk ¼ inch, is 1½ inches thick and has a chamfered front edge. It is flat on the bottom side. Every projection above the level on the floor covered by the slab was removed before setting the slab. A ring of creamy cement or plaster around near the edge of the slab and a few bars across and along the floor, about ⅛ inch deep, are sufficient bedding. The floor should be well dampened where the cement is placed to keep the cement from setting too quick, and the slab settled into place by jostling and pressing down. No screws are necessary to hold the slab in place. If the slab sets against a plaster or cement wall it should be flushed full and cut out enough of it to admit the slab and a bedding for it. In any case a strip should be put in to fill from the deafening or subfloor to the regular floor a little back under the regular floor line, to retain the bedding and make a good joint under where the slab joins the regular floor. The floor board which joins the slab along the front should be perfectly straight along the edge and without either groove or tongue, as shown. Slabs should never be less than 1½ inches thick, and if larger than 3 x 3 feet should be more—1¾ or 2 inches, according to size.

It is scarcely necessary to say that slabs should be set level. When slabs are sunk in the floor the writer leaves the depth of the countersink above the floor level. They are apt to settle slightly and the floor may not be perfectly level to start with. The slab being a little high provides for these deficiencies.

Test for Slate.

A simple and effective method of testing slate is given by Professor Brunner of Lausanne, Switzerland, as follows: A piece of slate measuring 7 cm. by 3 cm. (2.7 inches by 1.18 inches) is hung by a cotton thread inside a glass vessel so as to be just above, but not touching, 100 c. cm. (0.176 or 1-10 pint) of water saturated with sulphurous acid. The vessel is closed up, and if bad the slate in a few days becomes exfoliated; if it remains compact, it will become very friable and spongy. Good slate will remain unaffected for from four to six weeks, while superior slate has no sign of decomposition after several months. The rapid decomposition of bad slate is due to the presence of iron pyrites, carbonate of lime and magnesia. The iron pyrites under the action of the sulphurous acid gives off sulphuric acid, which decomposes the other minerals, while the carbonate of lime under the influence of humid air and carbonic acid gas is transformed into the soluble bicarbonate of lime.

The Strength of Ferro-concrete.

In a recent communication to the Paris Académie des Sciences M. Considère describes a series of valuable experiments carried out by a commission appointed by the Ministre des Travaux Publiques, with a view to ascertaining the precise role played by the metal in ferro-concrete constructions. The specimens tested by the commission were generally 6.56 feet long, and had a cross section 3.94 square inches. Each of these concrete bars was reinforced at the corners by four steel rods, having a total section of 0.177 square inch. The concrete employed was made by mixing 661 pounds of Portland cement with 1.04 cubic yards of gravel, passing a 0.98-inch screen, and 0.52 cubic yard of sand, passing a 0.19-inch screen. It was found that in setting the contraction of the concrete gave rise to an initial compression in the steel reinforcement amounting to 2.86 tons per square inch of the metal. The corresponding tensile forces simultaneously called forth on the concrete amounted to 74 pounds per square inch. Tested in tension, it was found that the specimens stretched rapidly until the stress on the concrete was practically equal to the ordinary tensile strength of this material. From this point the tested bar stretched much less rapidly, and throughout this period the tensile stresses in the concrete remained constant, the whole increase of load being taken by the steel bars. It follows, therefore, that during this period the elastic modulus of the concrete was zero. In one case the test bar was subjected to a load of 2060 kg., equivalent to a stress of 292 pounds per square inch of cross section, under which the total extension of the specimen was 0.024 inch. The reinforcing rods were then cut out, and the + shaped bar left was then tested in cross breaking, and in spite of being somewhat injured in the cutting out of the reinforcing bars, only failed under a calculated stress of 128 pounds per square inch.

Summing up, M. Considère states that ferro-concrete submitted to tension acts precisely as ordinary concrete, so long as the tensile stress does not exceed the usual breaking stress of ordinary concrete. Under higher stresses it will support without breaking extensions which in the case of specimens hardened under water have been as great as one five hundredth the total length; and in the case of air hardened concrete have ranged between one two thousandth and one eight hundred and fiftieth of the total length. When the ferro-concrete is stretched beyond the usual elastic range of ordinary concrete the tensile stress on the concrete remains constant up to the ultimate breaking point, the whole of the additional load being taken up by the metal. When subjected to repeated tensile stresses, however, the fraction of the load carried by the metal tends to augment, and that of the concrete to fall, until ultimately the working stress on the concrete is only 70 per cent. of its original value. If finally, after a series of loadings and unloadings, the maximum load is raised 30 per cent., the concrete again exerts a tensile resistance equal to its primitive value. It may be added that the modulus of elasticity in compression of a ferro-concrete bar is reduced on stretching the latter.

THE Illinois building at the St. Louis Exposition will be of the French renaissance style of architecture, festive in design and highly decorative in detail. The exterior will be of staff treated in pure white. The building, which has been designed by Watson & Hazleton, Chicago architects, will cover an area 165 x 145 feet, and the first story will comprise a rotunda 60 x 60 feet, a room of State 50 x 60 feet, the executive suite and the men's lounging rooms.

IN looking over his grandfather's account book not long ago a builder in this city came across an old building contract so curiously worded that he made a copy of it thinking it would prove interesting reading for architects and builders of the present day. The contract is as follows: "Know all men by these presents that I, Salmon Hummiston of Harwinton, in the County of Litchfield and State of Connecticut, am holden and firmly bound unto Isaac McNeile of Litchfield Town and County aforesaid in the sum of £100 lawful money, for which payment well and truly to be made to the said Isaac McNeile, his heirs, executors, administrators or assigns. I, the said Salmon Hummiston, bind myself, my heirs, executors and administrators firmly by these presents, sealed with my seal dated the first day of November A. D. 1794."

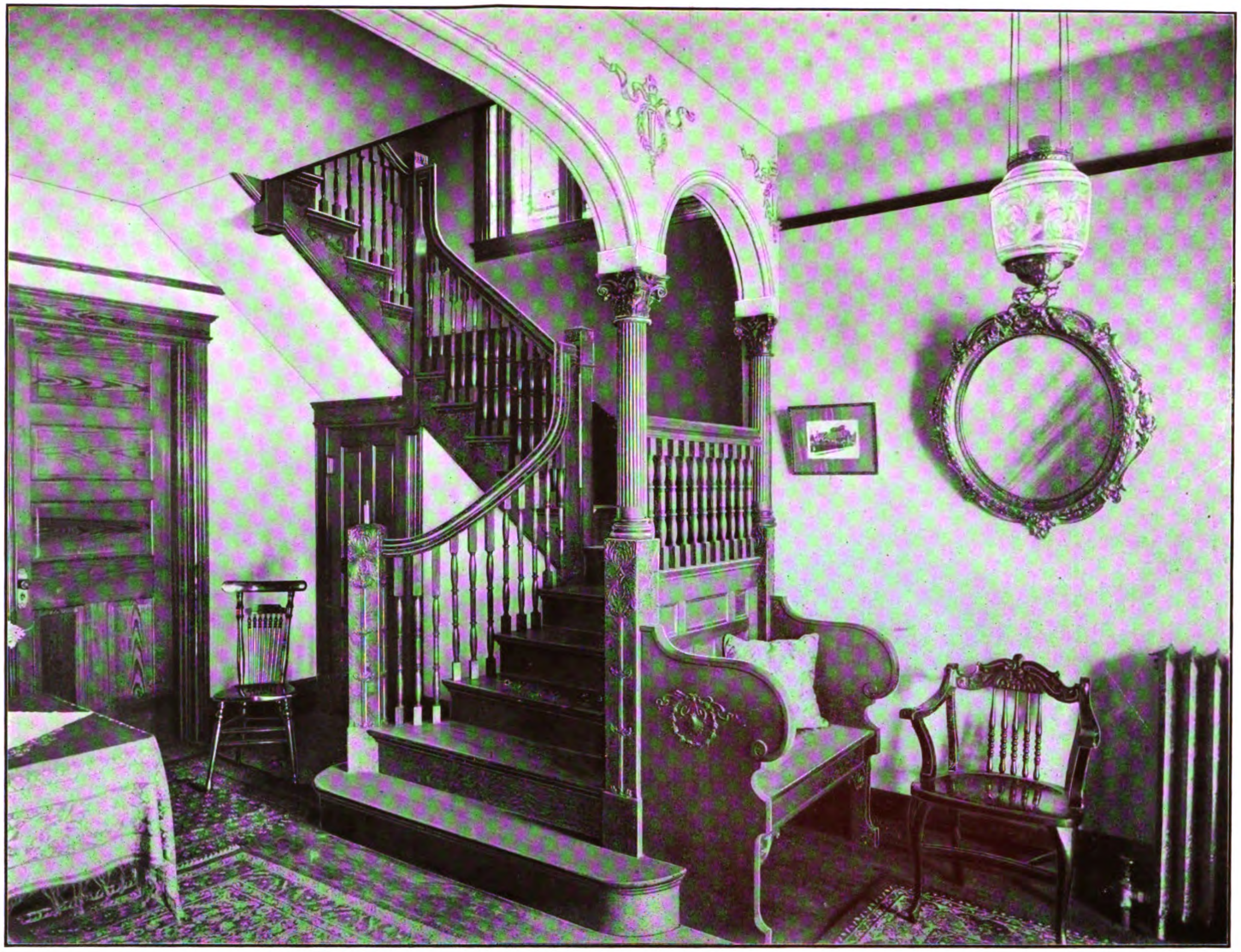
CONTENTS.

BRICK RESIDENCE OF MR. WILLIAM RICKEL ON HARRISON AVENUE, WESTWOOD, CINCINNATI, OHIO.

DORNETTE & SHEPPARD, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1902.

[FOR PLANS, DETAILS ETC., SEE PAGES 299-302.]



VIEW IN STAIR HALL IN RESIDENCE OF MR. WILLIAM RICKEL ON HARRISON AVENUE, WESTWOOD, CINCINNATI, OHIO.

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