CARPENTRY AND BUILDING

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INDEX.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR
96-102 READE STREET, NEW YORK.

JANUARY, 1895

Conciliation and Arbitration.

The recommendation of a National Board of Conciliation and Arbitration by Hon. Carroll D. Wright and his associates on the Strike Commission, in a bill to be presented to Congress under that name, will bring the subject under more authoritative consideration that has yet been accorded to it by the Government. The voluntary function of conciliation and arbitrarion is not assailed by the proposed bill, as the board is given only authority to mediate between parties at issue when possible, and when mediation fails to produce the desired result, to investigate fully and report to the Attorney-General of the United States, who shall take such action as may seem necessary. The action of the board may be obtained at the solicitation of either employers or employees, and may make investigations without the specific demand of either. The first duty of the board shall be to endeavor to effect an amicable settlement of such differences as require its action. The operation of this board, as contemplated in the bill mentioned, will be restricted to the service of common carriers, but if its feasibility is demonstrated in this connection, the creation of similar boards to cover other avenues in which the relationship between employer and workman exists need be but a question of time. Several of the States have already inaugurated boards of this character whose operation is not restricted, making them available for the settlement of labor troubles in whatever trade or calling they may occur. The move is a significant one and if successfully established its operation will be watched with intense interest. The fact that the plan comprehends the introduction of members from both the employer and the employee classes, together with the approval of Mr. Wright, will secure for it a most careful hearing.

A New Trades School.

A trades school has been started at Springfield, Mass., as a department of the Christian Industrial and Technical School, founded by the Rev. David Allen Reed. This department is under the superintendency of L. P. Strong, and comprises classes in five different trades, in which instruction is given by competent master workmen. The class in wood carving is taught by J. Desoe and has six pupils. There are six pupils in the carpentry class, taught by Chas. McGregory. In the bricklaying there are seven pupils under the charge of Lewis Hunt, and Frank Steel has six pupils in a sign painting class. Our New England readers have an opportunity of receiving instruction in plumbing from F. M. Tower, the Plumbing Inspector of Springfield, and this class already has 14 scholars, about half being helpers in the local plumbing shops. Some increase in attendance is expected at the plumbing lectures, which have been prepared with some care, and are said to be exhaustive in their treatment of the practice and theory of plumbing. The classes opened on the night of November 12, and will run three nights a week until April. This is the first year for this school, and every effort will be made to advance the pupils, so that in future the school will have a larger attendance, and if possible support a day class, for which some demand has been found.

Special Tools and Dull Times.

A peculiarity of dull times, with their resulting sharp competition, low prices and meager demand, has always been the fostering of special machines and appliances of every description. At such periods there is a vigorous call for tools that will produce more of a certain article; that will do the work better, and that will require less attendance. This is true even though, as now, wages have been reduced to a low level and the price of raw materials has struck bottom. In modern times there is, of course, a constant cry for special tools, but there is an uncommon impetus given to this demand during a period of stagnation. When the demand for any product is in excess of the output, and prices are such as to yield the maker a handsome profit, then it is only the progressive and aggressive manufacturer who thinks of the advisability of perfecting his equipment by the introduction of special machinery designed to do his particular work. Those builders who follow in the rut, taking no thought of the changes to be wrought by the morrow, rest contented with things as they are. The result is that when prices fall and trade nearly vanishes, the progressive man controls the market because of the facilities he possesses. He also has the experience and skill and can cope with reverses. His neighbor has two courses open to him: to perfect and bring his plant up to standard, or to attempt to meet the reduced prices by the use of inferior material or cheap and unskilled labor. He has not time, and perhaps not money enough, to accomplish the former, and therefore he, of necessity, has recourse to the latter. During periods like this the shop and business methods of the progressive man assume the greatest prominence. Invariably the establishments watching for and anxious to obtain special appliances are those in which the best shop methods prevail and where the business department is managed well. The same spirit pervades and animates each branch of the concern, and from an inspection of one of them an accurate estimate can be formed of the composition of any other. A collection of tools in the shop, fit only for the scrap heap, means an aggregation of beings in the office for whom, unfortunately, there is no scrap heap in this world.

Theater Ventilation.

Notwithstanding the present demand for improved ventilation in our halls of assembly and amusements, there still exists a lack of appreciation of the difficulties attending the proper installation of a system for this purpose. As a rule, the cubic space per occupant is less in a theater or hall than in any other ordinary apartment, while its complete inclosure, the usual absence of windows, the arrangement of balconies and galleries are all against the adoption of the same methods that may be employed in the school house. In the latter, with its exposed wall and window surface, the air becomes cooled in transit and may therefore be widely admitted above wood base in the warm inner wall and thence allowed to pass to the cold outer wall, where it becomes slightly cooled and falling returns to the inner wall and escapes by a vent register at the floor. In the theater, however, the air is almost certain to be warmed in transit. The animal heat of the occupants, supplemented by the thorough heat insulation of the walls, is usually sufficient to raise to a considerable degree the temperature of the air within the room unless it be frequently renewed by the admission of cold, fresh air. If this air be admitted through the side walls, thorough distribution is almost an impossibility, and there is therefore presented for the purpose of air admission only the floor and the ceiling. The former is the better and simpler as regards mere coincidence of natural currents due to the animal heating of the entering air and of the general direction of the air movement from the floor upward.

Methods of Supply.

Ventilation to be satisfactory must be imperceptible in its manner of accomplishment, but evident in its results. The difficulty of introducing through the floor of a theater a sufficient volume of air to meet all the requirements of successful ventilation, and yet without producing objectionable drafts, can best be shown by conconsidering an auditorium seating 2000 persons. At 30 cubic feet per minute per person there will be required a total volume of no less than 60,000 cubic feet of air per minute. It is extremely difficult to admit this volume through the floor without some currents passing directly from the entrance openings toward the persons of the occupants. At all events it is unwise to figure on a velocity through inlet openings exceeding 100 feet per minute. Obviously, to secure this velocity with the above named volume there will be required an aggregate area of opening equal to 600 square feet. This can only be secured by almost a complete honeycombing of the floor. The most common method consists in perforating the risers of the amphitheater steps upon which the chairs of a theater are usually placed, or even making the entire face of such risers of wire netting or register facing, the air being admitted to them from a plenum chamber beneath the auditorium floor. Admission through specially constructed chair legs, through nosings along the steps or through numerous specially constructed downward deflecting outlet pieces, have all been tried and with varying success. The imperceptibility of the current of air admitted depends not only upon its velocity but also to a large degree upon its temperature. The necessity of supplying the air at a temperature slightly less than that desired within the theater, in order to allow for its heating by the persons of the occupants, is largely the cause of failure in some otherwise perfectly planned systems of floor supply. A radical departure from this method consists in admitting all the air through a perforated ceiling and removing at the floor through openings similar in arrangement to those provided for floor admission. With ceiling supply the direction of movement of the air volume is directly opposed to that naturally taken by it, due to its being warmed in transit, and consequently mechanical means are required to compel it to pass downward. In fact, to insure its removal through the desired channels an exhaust as well as a supply fan is necessary.

The Functions of Organization.

The following quotation from one of the daily papers is strongly indicative of failure to comprehend the principle by which organized effort should be controlled:

> A committee of three was appointed to persuade the proprietor of Clarendon Hall to have his electric light wires taken out and put in again by union men. On this the committee subsequently reported that he had agreed to do so.

This action was taken by one of the unions of the city and seems to indicate a desire on its part to take advantage of its strength in a manner that seems to go outside the functions of organization. It is hardly to be supposed that the cause of organized labor is to be advanced by action of this character. The destruction of certain work in order that it may be reconstructed in the same fashion by union workmen cannot possibly produce the ultimate gain which the union seeks to accomplish. Owners and employers are antagonized by the method of procedure, and the possibility of harmonious action is further postponed by such attempts, which are shortsighted and without foundation in justice. If the purpose of a union is to improve the conditions under which its members perform their labor, ultimate improvement based upon legitimate growth and mutual understanding by employers and workmen of the justice and fairness of the demands of the latter must be self-evident, and everything that tends to establish the opposite impression must inevitably result in injury. It is too often a fact that what seems to be a temporary gain is in reality no gain at all, but an ultimate loss, for the reason that the temporary gain is obtained at the sacrifice of much more important, but less conspicuous, benefits. The greatest care should be used in exercising the power of an organization, in order that that power may be used only to obtain just and equitable ends.

Cost of Wire Nails.

A very striking illustration of what the low cost of manufactures of iron and steel really means is furnished by a remark incidentally made by William Garrett of Joliet, the famous inventor of the rod mill which bears his name. In a lecture at Joliet he stated that "wire nails are sold so cheaply that it is estimated that if a carpenter drops a nail it is cheaper to let it lie than to consume the carpenter's time to lift and use it, and it is claimed by good authority that one keg out of five is never used but goes to waste." We have had the curiosity to do some figuring on the proposition made. Assuming that it takes a carpenter 10 seconds to pick up a nail which he has dropped, and that his time is worth 30 cents an hour, the recovery of the nail would cost 0.083 cent. There are 200 sixpenny nails in a pound, which is worth at 90 cents base and 65-cent average per keg 1.55 cents per pound. This would make the money value of the individual nail 0.0077 cent. Or in other words it would not pay to pick up ten nails, if it took ten seconds of time worth 30 cents an hour in which to do it.

National Convention of Manufacturers.

The Committee from the Manufacturers' Association of Cincinnati and Hamilton County, Ohio, issued under date of December 13 a circular announcing the assured success of the meeting which will be held in Cincinnati January 22. The circular states that the result is largely due to the generous and unreserved support which has been accorded to the movement by the industrial periodicals of the country and the press at large. The good work is now fairly started, and efforts for its promotion will not flag. The invitation to meet at Cincinnati is prompted only by the highest motives of hospitality, patronage and a desire to foster the industrial enterprises of the country. The gentlemen who will come together on the date named will not be committed to any policy other than the promotion of the general welfare. It is hoped that by their combined thoughtfulness and wisdom a framework may be constructed upon which shall rest an organization whose force for good will be felt throughout every section of the land.

A Letter from Abroad.

At this time, when so many workmen in the building trades are out of employment, the conditions under which similar work is conducted in foreign countries will be of interest. A letter was recently received from an ex-president of the National Association of Builders, written at Carlsbad, in which he gives the following description of the manner in which labor is performed in and out of the building trades by the women of that country. After commenting upon the difficulty of accepting the fact that women are required to do the most rugged work in order to obtain "the thing which they substitute for a livelihood," he says: "They perform the duties of common laborers, carrying mortar to masons and plasterers. They carry the mortar on their backs up runways and ladders until they reach the staging on which the masons are at work, frequently as high as five stories. The mortar is carried in a tublike receptacle about 2½ feet high, 18 inches across the top, 12 inches at the bottom, and elliptical in plan. It has, projecting from the bottom, four short stubs, serving as legs, on which it stands while being filled. When filled by themselves, they swing it upon their backs, where it is held by straps passing over the shoulders and under the arms. Thus loaded they trudge up runways, and finally up the ladders to the staging, where the mortar is deposited in the mason's mortar box. The tub is unloaded by the carrier bending forward until her head is nearly on a level with the edge of the mortar box, and the greater part of the mortar is thus shunted into the box. After the tub is partly unloaded it is unslung, and the carrier scrapes out the mortar which remains, much as our hod carriers do to get all the mortar out of the hod. There were three houses being erected near the hotel at which I stopped, and all work of this character thereon was done by women. The hours were from daylight until dark, and the time worked in winter was not ascertained. For this work and these hours the women receive one Austrian crown (20 cents) per day."

In speaking of other kinds of work done by women, the writer says: "They drive teams with immense wagons loaded with coal attached, carry the coal from the streets into the buildings, saw, split and carry in wood, as well as carry on their backs great milk cans from which they serve out the milk to their various customers. They attach themselves in company with a dog or two to push carts which they propel, heavily loaded, up and down the hills. In fact they are employed in all the lowest forms of labor and among this class none are exempt. For example, I saw yesterday morning, some distance in the country, a girl not more than 16 years old driving to town with a wagon that must have contained 4 tons of coal, which she herself probably unloaded when it reached destination. Again, I saw a woman so broken and distorted by labor that she looked as though she might have been 80 years old, toiling up a hill, which I at the same time found quite fatiguing to climb unencumbered, with a roll of matting on her back which must have weighed not an ounce less than 75 pounds. Thus from the girl of tender years to the withered and deformed old grandmother, all are made beasts of burden."

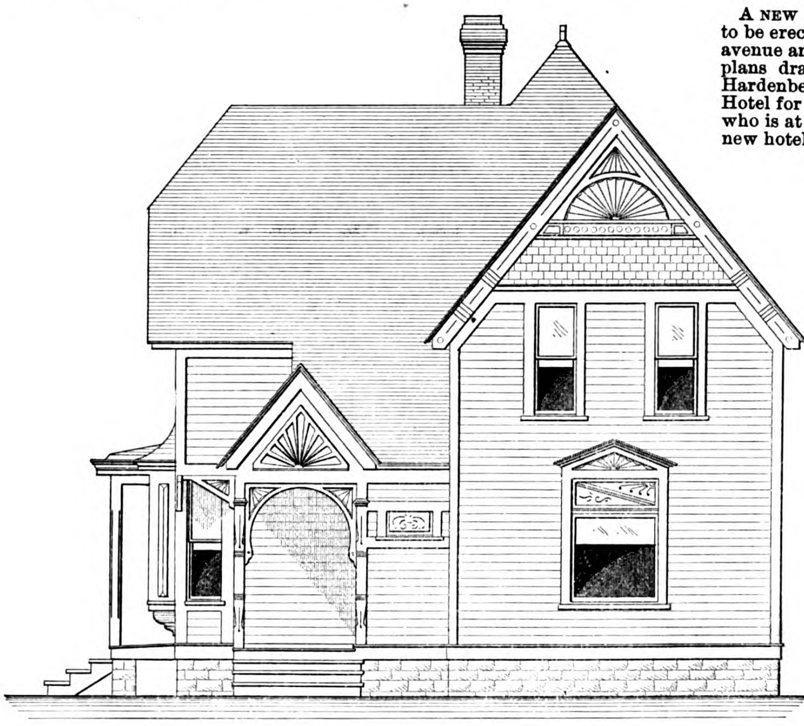
DESIGN OF A SUBURBAN COTTAGE.

THE elevations, floor plans and constructive details presented herewith, together with the supplemental plate which accompanies this issue of the paper, will doubtless appeal to those of our readers who are interested in dwellings which can be built at a moderate cost. The design is of a character which renders it suitable for erection on a suburban lot, and if painted with some degree of taste will give rather picturesque effects. The house contains all the essentials of a home for a small family, the rooms being of fair size and well arranged for use. There are on the main floor parlor, dining room, kitchen and bedroom, besides a convenient pantry and commodious bathroom. The entrance from the front porch is through a vestibule into either the dining room or parlor. Back of the parlor is a sleeping room, communication between the two being by means of sliding doors. Beyond the dining room is a pantry equipped with all the modern accessories and through it the kitchen can be conveniently reached. The bathroom is so situated as to be readily accessible from the kitchen and also from the sleeping room. The stairs leading to the second floor rise from the dining room and terminate in a small hall from which three sleeping rooms are accessible.

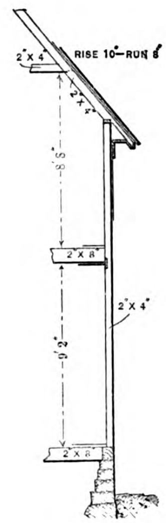
There is no cellar provided, but in case one is wanted it can be had under the rear portion or under the entire house at a little extra expense. Access to the cellar in that case would be by means of stairs leading down from the kitchen under the main stairway.

From the specification of the architects, George W. Payne & Son, Carthage, Ill., we learn that the foundation walls of the cottage are constructed of rubble stone in rock faced range work. The outside walls are of 2 x 4 studding, sheeted with ship lap and building paper, on which is placed ½-inch white pine siding. The roof is covered with cypress shingles, laid on No. 2 sheeting and well nailed. The sills are 6 x 8 inches, the first floor joist 2 x 8 inches, the second floor joist 2 x 10 inches, and the studding, rafters and collar beams, 2 x 4 inches, all spaced 16 inches from centers. The floor joist are well bridged. The outside of the house is painted three coats. The hight of the stories is clearly indicated in the sectional view presented on page 3.

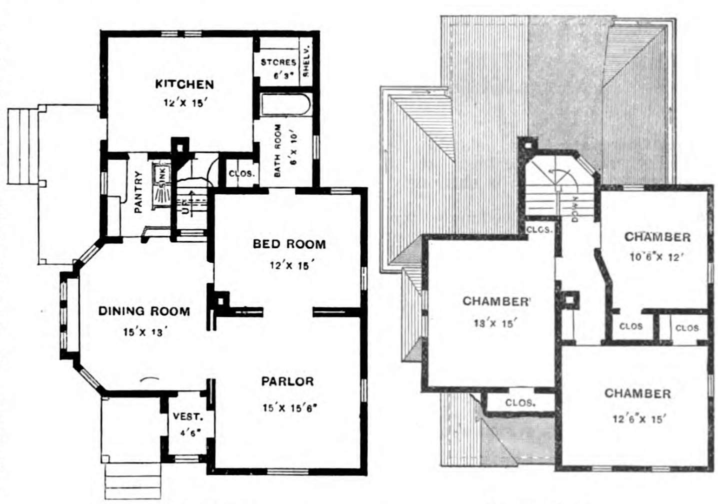
The floors throughout the house are of white pine and the walls and ceilings are plastered three coats. The trim of all the rooms is white pine, smooth wrought and finished natural. The doors on the first floor are five paneled and on the second floor four paneled. The outside and sliding doors are 1¾ inches thick, while the others are 1⅜ inches thick. There are transoms over the principal doors. The dwelling here shown was erected not long since at Carthage, Ill., for Mr. W. O. Sharp, at a cost of $1428, and cottages have been built after the same plans in several other places in the West at a cost ranging from $1250 to $1400.



Front Elevation—Scale, ⅛ Inch to the Foot.



Section.



First Floor. Second Floor.

Scale, 1-16 Inch to the Foot.

Design of a Suburban Cottage.—George W. Payne & Son, Architects, Carthage, Ill.

A NEW 12-story hotel building is soon to be erected at the corner of Madison avenue and Forty-second street from plans drawn by architect Henry J. Hardenberg, who planned the Waldorf Hotel for William Waldorf Astor and who is at work on the design for the new hotel for John Jacob Astor to be erected at the corner of Fifth avenue and Thirty-fourth street. The new 12 story structure referred to will differ in some respects from other hostelries in the city. The restaurant proper will be 116 feet in length by 85 feet in width. Another feature will be the construction of the bathrooms, which, in every case, will have a window opening to the outside air. The building will be erected by the present proprietors of the Windsor Hotel.

Cauls for Veneering

There are two processes of "laying" veneers, termed cauling and hammering. Both are performed with the aid of heat, and may be distinguished as the dry heat and wet heat processes, cauling being the former and hammering the latter. The first is of glue, which chills almost as soon as laid on. The glue thus remelted runs evenly over the surface between the veneer and the ground wood, and when it comes out all round the edges shows that sufficient heat and pressure have been applied to bring the veneer and ground in close and perfect contact; for the more glue runs out at the edges the more surely will the veneer be properly laid, there being always sufficient left to effect a perfect adhesion of the two woods. The whole is then left to dry and harden.

For laying veneers of small dimensions and on flat surfaces, wood cauls are generally used. To make a caul take a well seasoned, straight piece of cedar or pine, rather larger than the surface intended to veneer, and plane zinc; cut the metal large enough to cover the face of it, with sufficient to turn over the edge and ends, and fasten it on with flat headed copper nails. If wooden cauls are used they should remain not over two hours in the screws, as any glue adhering to the caul makes it difficult to move, and some of the veneer is apt to peel off in the removal. Glue does not adhere to zinc in the same way that it does to wood. Cauls of zinc ¼ inch thick are better, but very good work may be done with well oiled pine cauls. Zinc cauls are made both for flat surfaces and for curved, such as hollows, rounds, ogees, and even moldings.

The zinc cauls are from ¼ inch to ⅜ inch thick, with smooth surfaces. They absorb heat quickly, and are, therefore,

Design of a Suburban Cottage.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

greater importance, and should be adopted wherever practicable; but in certain cases the second is extremely useful.

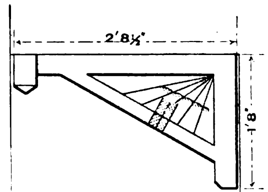
All veneering should be done by the cauling process except on those rare occasions when it is not practicable. It is mostly when the cost of cauls and other necessary appliances is altogether out of proportion to the job in hand that hammering is resorted to. This latter process, says the *Canadian Furniture and Upholstery Journal*, requires so much water applied to the veneer that it is greatly swelled, and, in many cases, in drying it shrinks, leaving open joints, which spoil the work.

In cabinet maker's shops cauls are adopted. They may be made of wood, the shape and size of the surface to be veneered, or, better still, of rolled zinc plate. They are made very hot in an oven, or before a good blaze of shavings; they are then clamped down on the work, when the veneer is got into its place, having been previously soaped or oiled to prevent them sticking to the veneer. The heat from the caul penetrates the veneer and remelts the it up true on both sides if the work is flat; or, if not, make it the requisite shape, hollow, round, or whatever it may be, to fit the work. The face of the caul is then toothed and saturated with linseed oil. The oil prevents any glue sticking to the caul. If the caul has to be shaped use thicker stuff, and it is advisable to screw two or three battens on the back. When making shaped cauls it is best at the same time to get out the pieces of wood necessary to form a flat back surface to the work when it is put in the caul.

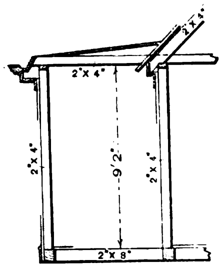
To veneer work having a rounded surface on one side and a hollow one on the other, make a hollow caul to correspond with the rounded surface, having its full back flat. Put the round side of the work in the caul and shape pieces of wood rounding to fit the back of it. If one side only of the work is shaped these pieces of wood are unnecessary. If the wood is not wide enough to form the caul, make a good joint, dowel it together, and glue the dowels into one side only, so that it can be taken to pieces for heating. If likely to be much in use the wooden caul should be covered with sheet easily heated. In veneering a large surface it is not necessary to have the zinc caul in one sheet, because it would be very unwieldy, and also it would not be serviceable except for large work. A caul may be in several pieces—for example, two in length and two in breadth. So long as the sheets are all of one thickness, and join closely edge to edge, they serve the purpose as well as the whole caul. Each piece is also serviceable for cauling all kinds of work within its dimensions. Two pieces can be placed end to end to form a long narrow caul, and two placed side to side to form a broad short one.

An important consideration is that in laying veneers of a soft or porous nature, where the glue is apt to exude through to the caul, it does not stick to the zinc, so that zinc cauls are removed with freedom. Wooden ones very often adhere to the veneer from the glue having exuded, and sometimes it is impossible to remove them without lifting away portions of the veneer, and thus seriously damaging the job; in the case of root walnut and other veneers of a like nature, it is very unsafe to attempt laying them with cauls of wood.

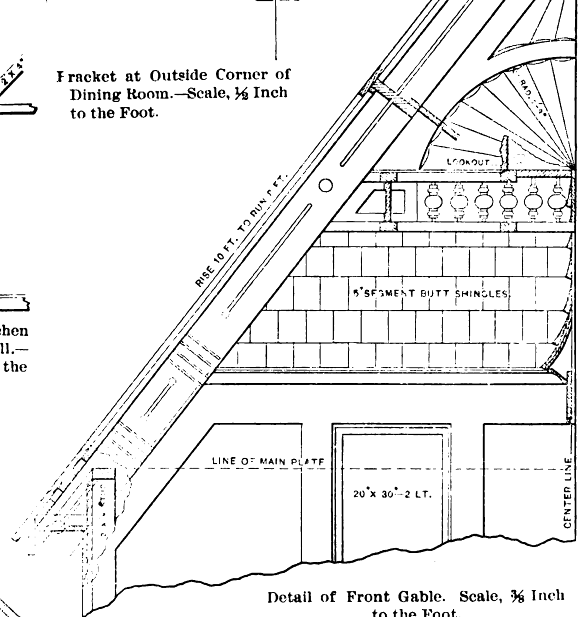
To veneer large flat surfaces, such as plain panels, wardrobe ends, sideboard tops, &c., by the cauling process, other into which a jet of steam is allowed to pass, and the work to be veneered placed upon the table, veneer downward; then cross bars are brought down with a strong pressure. The table constructed of 8000 pieces of snakewood, a tree that is found in Lamar County, Texas. Seven years were spent in perfecting the wood, to make it manageable for the construc-



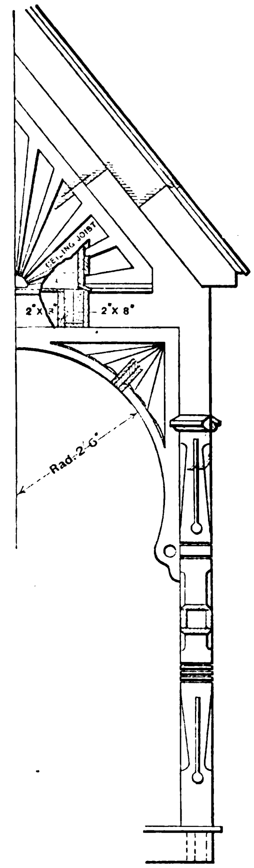
Fracket at Outside Corner of Dining Room.—Scale, ⅛ Inch to the Foot.



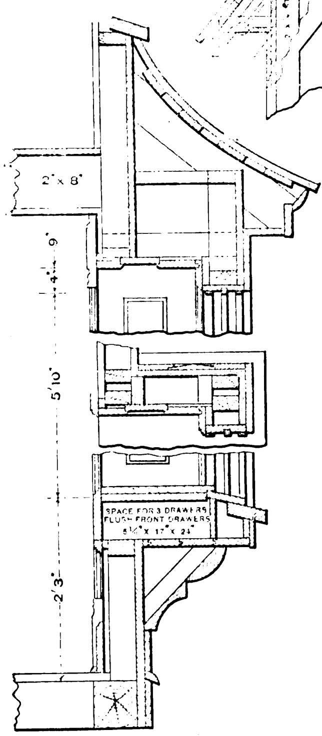
Section Through Kitchen and Bathroom Wall.—Scale, ⅛ Inch to the Foot.



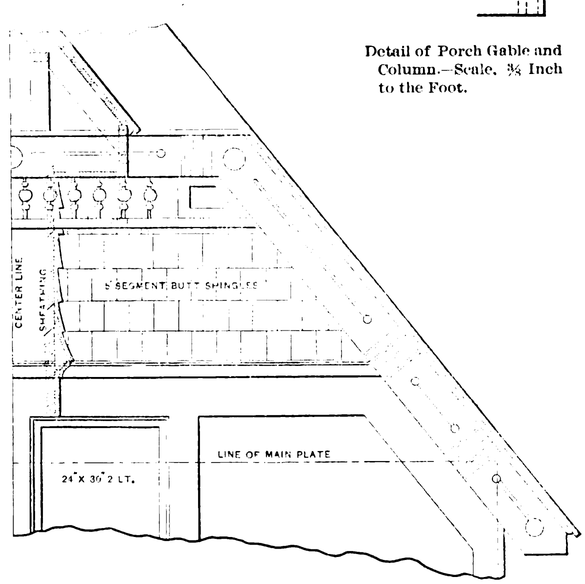
Detail of Front Gable. Scale, ⅜ Inch to the Foot.



Detail of Porch Gable and Column.—Scale, ¾ Inch to the Foot.



Detail of Bracket Window in Dining Room.—Scale, ⅛ Inch to the Foot.



Detail of Right Gable.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of a Suburban Cottage.

and somewhat costly appliances are preferable, and various devices have been tried to communicate the desired amount of heat expeditiously. A steam chest is one of these. This is a large iron table the top of which is truly planed in the form of a shallow box, heat in the iron penetrates the veneer and melts the glue. This contrivance is of use only where steam is at hand.

THERE has recently been on exhibition in a window in Philadelphia a tion of elegant and durable furniture, says the *Cabinetmaker*. It is claimed that in order to give this wood commercial value it has to go through a process of heating three times, when color and durability become its permanent qualities.

HINTS ON WOOD CARVING.*

By CHAS. J. WOODSEND.

THE design of corner block shown in Fig. 19 of the illustrations is somewhat difficult to cut, but if the reader has profited by the exercises and explanations already given, he will have but little trouble in executing the design here shown. Commence with the parting tool near the center and cut toward the outer edges of the block. Cut nearly to the end of each line and trim out the angles with a sharp chisel. This design is an excellent one for testing the accuracy of the hands and eyes. In Fig. 20 is shown a section on the line A B of the previous figure. The corner block illustrated in Fig. 21 is cut with a tool with which it is supposed all carpenters and joiners are familiar and know how to handle—a chisel. Unless the mechanic is perfectly sure of his eye—that is, that he is sure his eye unaided can detect any little irregularity—he had better make a small thin template to fit in the broadest and deepest parts of the cut; then gradually shave the rest until all are uniform. An idea of the cutting can be obtained from Fig. 22, which represents a section on the line A B of Fig. 21. There is presented in Fig. 23 another rather neat design for a corner block and one which does not require unusual skill to execute. The corner block shown in Fig. 24 is designed to be cut with gouges. Mark the outline of the design and then cut the outer edges as shown, by means of the section, Fig. 25, on the line A B, using gouges of proper sweep. After this has been done run the gouge around to form the boss in the center, cutting straight down. Next proceed to shape the leaves, and after they have been worked smooth finish the boss as shown, using the concave side of the gouge for the purpose. Do not use a chisel, as that leaves a multitude of small facets or flat surfaces, which do not appear workmanlike. The whole of the design shown in Fig. 24 can be cut with three gouges. A section taken on the line C D of this design is shown in Fig. 26.

A rather attractive design for panel decoration is that indicated in Fig. 27. It is not especially difficult in the cutting, as the lines, except where otherwise noticed, are cut with two sizes of veiners. I desire to state here that the cross sections represented in Fig. 28 apply with equal force to other similar parts of the design, as well as to those specially indicated. I have omitted to mark all the places where the same section applies, for the reason that it gives the mechanic a little more to study and prevents the design from having, at first view, a too complicated appearance. In Fig. 29 is represented one half of a design suitable for panel decoration. the enlarged sections being shown in Fig. 30. The outline portions of this design are cut with a fine veiner, the center shaft running the entire length being cut with a veiner of a little larger size. The portions marked C–D, E–F, &c., are cut as follows: In the first place gouge out the hole, and then with the parting tool start from the hole, cutting in the direction of the arrow on the line I. Notice particularly the section C D, as it will serve to indicate the proper position in which to hold the tool; the bevels for

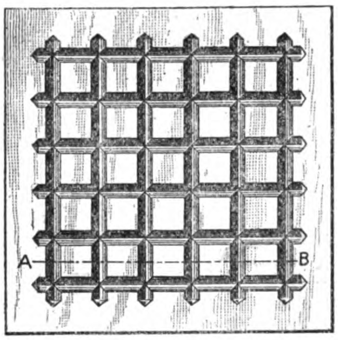


Fig. 19.—A Neat Corner Block.

Fig. 20.—Section on Line A B of Previous Figure.

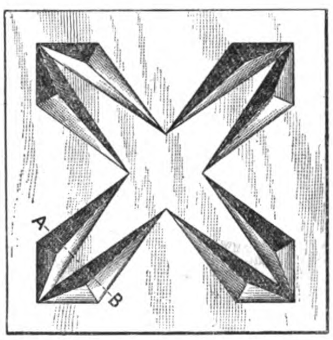


Fig. 21.—Corner Block Cut with a Chisel.

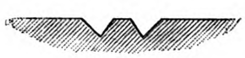


Fig. 22.—Section on Line A B.

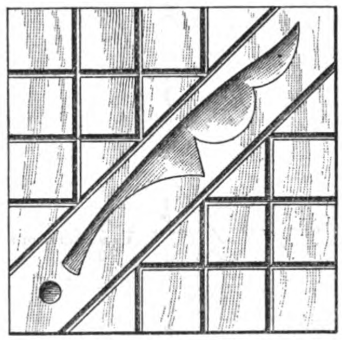


Fig. 23.—Another Design for Corner Block.

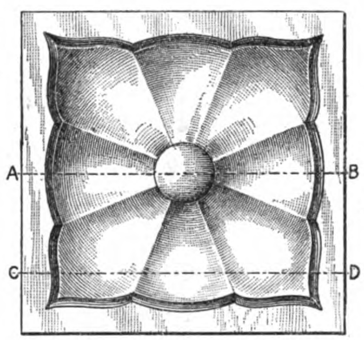


Fig. 24.—Design Cut with Gouges.

Fig. 25.—Section on Line A B of Fig. 24.

Fig. 26.—Section on Line C D of Fig. 24.

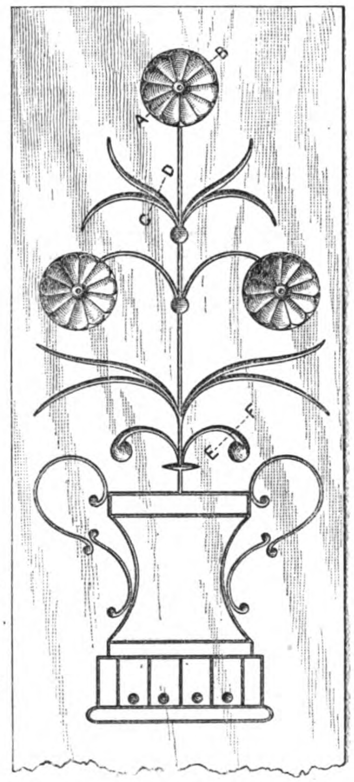


Fig. 27.—Design for Panel Decoration.

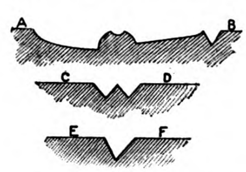


Fig. 28.—Enlarged Sections of Portions of Design Shown in Previous Figure.

Hints on Wood Carving.—By Chas. J. Woodsend.

the two not being equal. After cutting down the line I, shave the other parts with a gouge until they conform to the sections given in Fig. 30.

Another half length design for panel decoration is represented in Fig. 31, while enlarged sections are given in Figs. 32 and 33. This design is also easily adapted for pilasters. In cutting the portions shown in section on the line A B of Fig. 32, run the gouge around as if an ordinary hole was to be cut, taking care not to chip up the center part. Then take the concave side of the gouge and run up as marked. All the tapered lines except where noticed hereafter and the lines that join them are cut with a parting tool. The center portion on section C D is cut with a large veiner. Start in as if one was going to gouge quite a piece of the stuff, pushing the tool along, and gradually lower the handle while the cut is advancing. The result will be a figure similar to that shown. I would advise practicing the forego-ing on a separate piece of stuff, otherwise the mechanic may spoil the other parts of the work. It requires a little knack to make both sides straight and tapering as nearly as possible to a point. A little practice, however, will soon set the student right. The other parts have already been described so that I think the operator will experience no difficulty.*

(*To be continued.*)

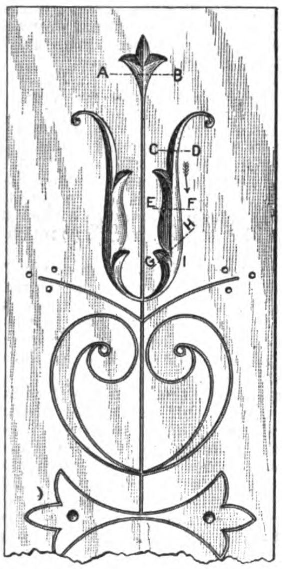


Fig. 29.—Half of a Design for Panel Decoration.

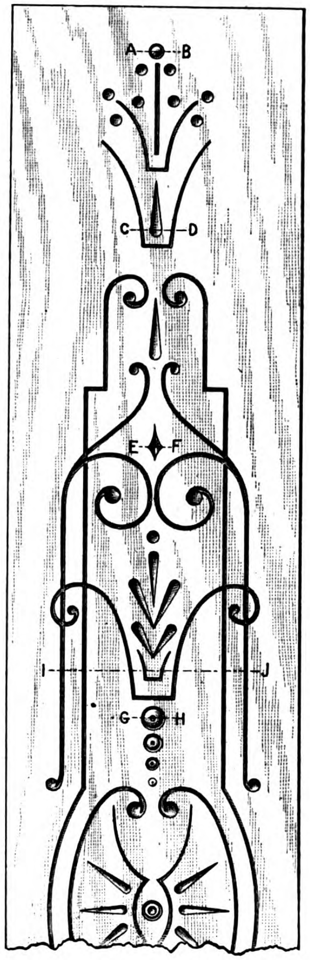


Fig. 31.—Another Half Length Design for Panel Decoration

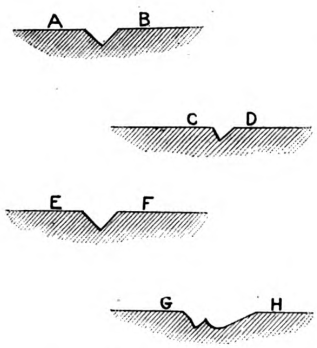


Fig. 30.—Enlarged Sections of Design Shown in Fig. 29.

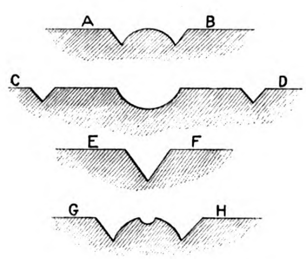


Fig. 32.—Enlarged Sections of Design Shown in Previous Figure.

Fig. 33.—Enlarged Section on Line I J of Fig. 31.

Hints on Wood Carving.—By Chas. J. Woodsend.

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

How They Build at Nice.

A correspondent of the London *Builder*, writing to that journal from Nice, tells in a rather interesting manner some of the peculiarities of building to be noted in that place. Among other things he says: Nice, as every one knows, is the little Paris on the Mediterranean, where the residents of northern climes who possess cash and leisure betake themselves to avoid the rigors of winter and to enjoy themselves.

The bulk of the building work is done during the summer, between the months of May and October, when the visitors have flown, the hotels closed, and the town is left to its normal population. There is more than one reason for this. In the first place, most of the building work consists of repairs and additions to hotels, boarding houses, shops and the villas of winter residents. This, of course, can only be done during the time the buildings are unoccupied; but, apart from this consideration, any builder who should be venturesome enough to carry on building operations in the winter, except, perhaps, in a back street, would have an agent of police told off for his special benefit, and a single stone left for a moment outside his boundary would be quickly followed by a *contravention* and its consequent *amende*. Therefore it is not surprising that contractors prefer to indulge themselves in a little *dolce far niente* rather than to see all their profits eaten up by *amendes*.

CONSTRUCTION.

The outside walls of most of the structures in Nice are built of rubble masonry and finished in stucco, the elaboration varying, of course, with the class of building. There are, however, some buildings having dressed stone throughout, but these are few and far between. The rubble work is solidly put together, but has not the workmanlike appearance of work done by English masons. Too many spalls are used to pack the courses, the masons not having the knack of fitting irregularly shaped stones one in the other. Good bricks are only obtainable from Marseilles, and are, therefore, expensive and little used for thick walls. Inside partitions are mostly put up with hollow bricks. These are about 9 x 4 inches, and vary in thickness from 1¼ inches to 4 inches, the ordinary thickness used being 1½ inches or 2 inches. Fine mortar is used for this work, and partitions of, say, 15 x 10 feet are run up without any wood framing or binders whatever. To look at these partitions when being built, one would think that a vigorous push would cause a collapse, but in reality it would take a Sampson to bring them down. The so-called fire proof floors in good buildings are formed with iron joists about 3 feet apart, arched between with 2-inch brick on flat, the haunches being filled in level with concrete. The floor is ordinarily tiled with 4-inch red pentagon tiles. It is, however, sometimes of cement or wood. The ceiling is formed with lath and plaster on joists in the usual way. Coke breeze and cement concrete floors have, however, been recently introduced. The roofs are covered with red tiles. This gives Nice a very pretty appearance when viewed from the surrounding hights. The old buildings have the old fashioned taper tiles, met with all over France, but these are being rapidly replaced by Roman tiles.

CARPENTER WORK.

The carpentry and joinery are much the same as English. The timber used is mostly Baltic; red Mélèze (larch) is, however, largely used for roofing. The roofs are not very scientifically framed, parts often being in compression when they ought to be in tension, and *vice versâ*. Pretty heavy scantling is, however, used, so that the roofs hang together by brute force. The flooring is always in narrow widths, grooved and tongued. For good floors solid oak parquet is used, laid herring bone wise.

The joinery is, generally speaking, very good; on the whole, better than what is turned out of English workshops. The doors are not usually so thick as we make them, but the moldings are struck on the solid and mitered, not planted on, as is usually the case here. The windows are generally casements, opening inward and great pains are taken to make these weather tight. Venetian blinds are usually fixed outside, and often inside shutters as well.

Plasterers' work is pretty much the same as in this country. The outside stucco work is, perhaps, better finished, marble powder being used for the best work. Marble is extensively used for staircases, window sills, floors, &c., and exclusively for chimney pieces. Smiths' work is done at Nice in an excellent manner. Cast iron work is, however, mostly imported.

The gutters, flats, &c., to roofs are of zinc, and are fairly well done, but the Nice craftsmen are no good at lead work (nor, for that matter, Frenchmen generally). If lead work is required to be done as it ought to be, English plumbers are indispensable. The French ideas of sanitary work are also very crude and behind the age.

PLAN OF CONTRACTING.

Building work is carried out on a different system from what obtains here. There the general contractor is not often met with, there being usually a separate contractor for each trade. A contract for a lump sum is seldom made, each trade working on a fixed tariff, and everything being measured up on completion. When a job is given out to be tendered for each one tenders so much above or below the tariff. Little or no machinery or appliances are used (except for joinery) either in the preparation of work or on the building itself, all the materials, even for buildings four or five stories high, being carried up on men's shoulders.

THE WORKMEN.

The laborers are almost without exception Italians and are fairly hard-working. They are paid about 2½ francs per day. A large number of masons are also Italians or of Italian extraction. These are not bad workmen, but do not kill themselves with hard work. "Why does not that man take a heavier hammer?" I observed to a foreman, pointing to a mason engaged in cutting out an opening in an old wall and who was leisurely tapping a stone with a brick hammer. "Oh, I suppose he thinks it would be too fatiguing," he replied in his best French, and then he mildly remonstrated with that mason in choice *patois*. Contractors and foremen have to be careful how they speak to their workmen, as these latter have their "syndicates," and if an employer gets on their black books he may have some difficulty in obtaining good workmen in a busy time.

At Nice it is the mason who fixes all window frames and door casings, &c., as well as floor joists and rough roofs. The ordinary plastering is also done by masons.

The joiners are, as a rule, fair workmen, the bench work especially being turned out very clean and strong, but the fixing is not done so well. Roofing and flooring are done by distinct sets of men who do nothing else. The roofers do their work very rough, and the floorers (*parquetiers*) are not as good workmen as they might be. The plasterers proper do only fine work in plaster or stucco. They are excellent workmen; no better could be found anywhere.

The fresco painters and the ordinary painters are fair workmen.

TOOLS AND HOURS OF WORK.

A great drawback with all the workmen is want of proper tools. You never see a joiner with a good kit, and it is very rare that a mason has a spirit level—or, indeed, a point or chisel. Many joiners hire their tools from the master, paying so much per week.

Like the British workman, his Nice brother often goes on the spree on Sunday, and does not turn up on Monday. The "Festal" is his great temptation. All trades receive from four to six francs per day of about ten and a half hours.

In summer the hours are from six to seven, with half an hour for breakfast (eight to half-past) and two hours for dinner (twelve to two), but as the winter approaches the day is shortened and the dinner time curtailed. There is no half holiday on Saturday. The Nice workman does not care to work on Sunday, but will do so if required.

FRENCH CHIMNEY FLUES AND PIPES.

THE methods of constructing smoke flues or chimneys differ to such an extent in various sections of the world as to make a comparison of them more than ordinarily interesting to the student of architecture and building. In Paris and the larger towns of France the use of earthenware pipes for constructing the flues of chimneys is very common, so much so that about the only places where brick is employed for the purpose is in the case of party walls or in that of small houses. The pipes or flues are regarded as permitting of much more rapid work, the flues are clean and sound and plastering the inside is unnecessary. The chimney breast is not used and there is therefore no necessity for foundations for the latter. There are a number of systems of piping, says Arthur Vye Parminter, in a late issue of the *Building News*, each one claiming perfection and having its partisans. A few of those most generally employed in Paris are shown in Figs. 1, 5, 10 and 11. All of these are roughly fluted on the two outer surfaces, in order to firmly hold the proper thickness of plastering. The interiors are purposely left rough, to afford a proper hold for the soot, and in the case of the rectangular pipes the corners are slightly rounded.

Some years ago it was the custom generally at Paris, on the construction of a new building, to form the necessary flues in the thickness of the party wall, the first owner of the wall building at the same time as his own flues a similar number of flues for the use of the building which would eventually be built against the party wall. This manner of building flues in the thickness of the party wall was soon, however, forbidden by the building regulations; but after a certain time the prohibition was withdrawn and it was left to the party owners to construct the joint wall as they might agree upon. The insurance companies, however, then decided that they would take no responsibilities for houses of which the party wall was thus built, for it was evident that a wall pierced in a large portion with chimney flues was not sufficient protection against fire, and did not form a sufficient division between the two properties. This being the case, although the construction of flues in party walls is not forbidden, and is in some cases found necessary, it is now the custom to build the chimney flues against the surface of the wall by means of the hanging pipes shown in Figs. 12, 13 and 14.

The "wagons," or pipes for building into walls, are made of dimensions suitable for walls of the thickness of one brick to two and a half bricks. The walls of the Paris houses are generally built of a thickness to allow a 14 x 9 inch flue; in the case of other walls the hanging pipes are generally employed.

Fig. 1 is a system of pipe made by the Vaugirard Brick Co., and presents many advantages over some of the other systems. The flue is rectangular, with rounded angles; the exterior is provided with projections the size and shape of an ordinary brick. These projections are so arranged as to allow one pipe to fit against the other, as shown in Fig. 2. The joints, as will be seen by Fig. 3, representing the grouping of three inclined flues, are broken horizontally and vertically. These pipes in all systems are made for inclination at various angles; the angle may not, however, be more than 30° from the vertical. The system as shown in Fig. 3 has many merits; the putting together is very simple, the pipes are well bedded together; the joints being well broken there is little danger of leakage. Again, the rectangular projections allow proper bonding with brick work of the wall. In case that any of the iron joists of the floor require support on the portion of the wall pierced by the chimney flue, by employing two inclined pipes, Fig. 4, sufficient room is obtained for the passing of the joists, and a firm bedding is obtained on the projecting edge.

Another system, shown in Fig. 5, is the "wagon solidaire Lacote," having a hight equal to four bricks. The ends are alternately convex and concave, the pipes are fitted together, as shown in Fig. 6, where two flues, one inclined and one vertical, pass up from the floor below, and two others inclined, supported by a bar, take the smoke from the two chimneys on either side of the wall. This system is much employed, but an inconvenience is that of joining the rounded end of the pipe with the square brick work of the wall.

Another system is that of Fig. 10. The objection that the projecting ties are weak disappears when the pipes are placed together and well jointed.

Fig. 11 shows the system Duprat, of the hight of three bricks. The outer walls are hollow and are supposed to afford greater protection and solidity. In these last two examples the horizontal joints are not broken.

of making a neat jointing in cases where the wall is left unplastered.

Hanging pipes, or pipes fixed to the wall, are much employed, and are most useful and convenient, either in the case when the available portion of the wall is already filled with flues, or in the case of thin partition walls, or, if necessity is found, to add one or two flues to those already existing. The regulations allow these pipes to be fixed to walls of not less than one regulation thickness is a little over 3 inches, including the thickness of the pipe. These pipes are fixed against the wall with plaster, as in Fig. 14, showing three flues from the lower floors, and one to take the smoke from the chimney of that floor.

The pipes are further firmly fixed to the wall by means of iron straps, placed about every 5 feet, and the whole is properly covered with the regulation thickness of plaster. These

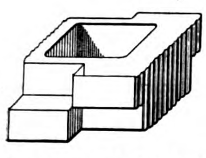


Fig. 1.—View of Brick Used in One System of Piping.

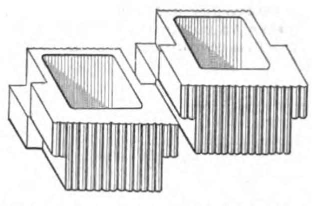


Fig. 2.—Showing How One Brick Fits Against Another.

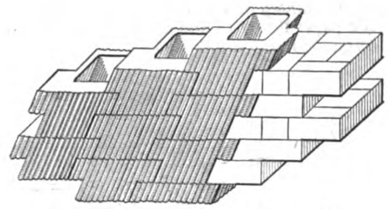


Fig. 3.—Manner of Forming the Joints.

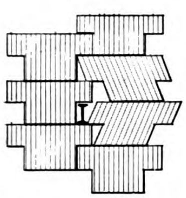


Fig. 4.—Method of Supporting Iron Floor Joist.

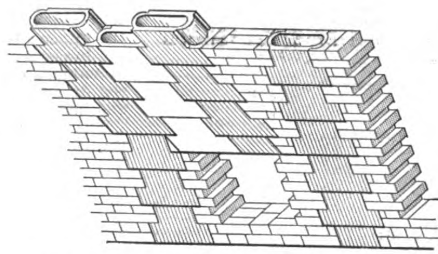


Fig. 6.—Appearance of Flues Formed According to the System Indicated in Fig. 5.

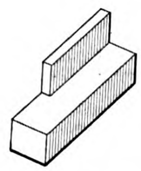


Fig. 7.—A Chimney Brick "Lacote."

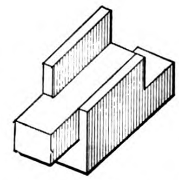


Fig. 8.—Two Bricks Joined Together.

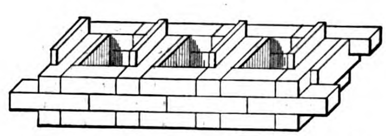


Fig. 9.—Appearance of Brick When Formed Into Flues.

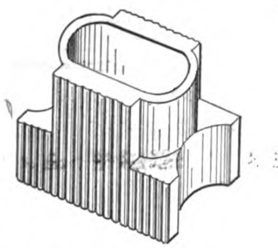


Fig. 5.—The "Wagon Solidaire Lacote" System.

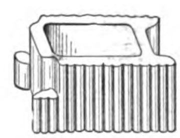


Fig. 10.—Another System of Flue Construction.

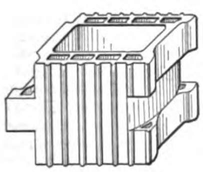


Fig. 11.—The Duprat System.

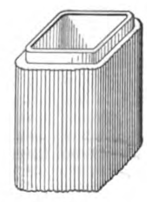


Fig. 12.—The Boisseau Gourlier System.

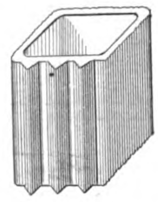


Fig. 13.—The Lacote System of Hanging Pipe.

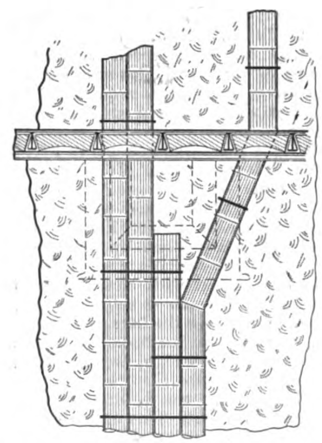


Fig. 14.—Showing Application of Hanging Pipe.

French Chimney Flues and Pipes.

The system of chimney bricks Lacote is also much employed. This brick, shown in Fig. 7, is of the hight of two bricks, the upper vertical projection forming the thickness of a brick. The length of this brick is of the thickness of the wall less one-half brick. When two are fitted together, as in Fig. 8, they form the thickness of the wall, the extremity of each resting on the wall, the remaining portion on the lower one. This special brick forms a secure joint and has the advantage brick thick; for the topmost story, however, they may be fixed against partitions of $\frac{1}{2}$-inch thickness. The ordinary form known as the "Boisseau Gourlier" is that of Fig. 12, of the hight of six bricks, with rough surface for plastering and ribbed end. That of Fig. 13 is known as the "Lacote," and has, on the side toward the inside of the wall three angular projections, called witnesses, intended to oblige the plasterer to cover with the regulation thickness of plaster. This pipes are most convenient, for they can be inclined in any direction to avoid doors or windows; they are very light, and economize space. Most of these systems are patented in France and abroad, and form a source of large profits to brickmakers. The wall pipes cost from £3 to £4 10s. per 100, and the hanging pipes from £2 to £3 10s. per 100, less trade discount. There is, therefore, a great economy in employing them, both as regards cost and labor.

DRAWING BOARD AND BLUE PRINT FRAME.

In the early part of last month the American Society of Mechanical Engineers held a meeting, at which A. W. Robinson of South Milwaukee, Wis., read a paper entitled "Drawing Office Appliances." It consisted of a description of a drawing board, easel and blue print frame, accompanied by several illustrations. As the subjects treated are of interest to many readers of *Carpentry and Building* we publish the paper herewith and also some of the discussion which followed.

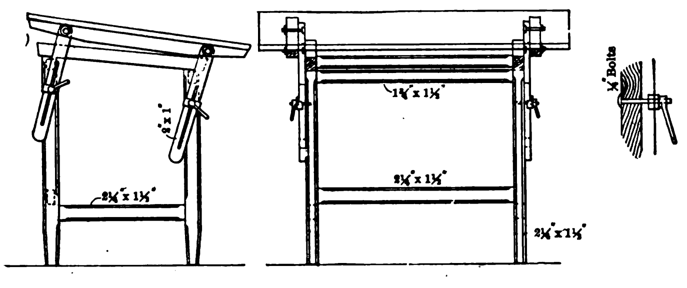


Fig. 1.—Front and Side Elevations of Drawing Board.

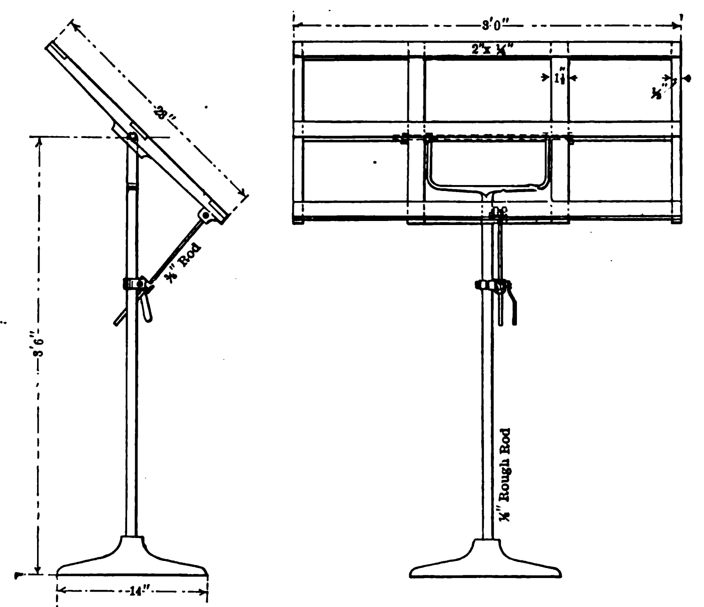


Fig. 2.—Side and Front Elevations of Easel.

Making a Drawing Board and Blue Print Frame.

The drawing board shown in Fig. 1 has a top 36 x 54 inches, glued up with saw cuts on the back in the usual way. It is of this size to suit standard sheets 28 x 36 inches. The top is made adjustable for slope and hight by the slotted supports, as shown. This allows every draftsman to suit himself in this regard. The lower frame and legs are of oak, neatly chamfered. These tables complete were made by a carpenter and cost $7.50 apiece.

Each draftsman needs besides his board some convenient means of holding drawings for reference. The easel, Fig. 2, fills this need. A number of drawings can be attached to the top edge by spring clothes pins or clips, and turned over the backs as required. This easel was also "home made" and cost $6 each.

The blue print frame shown in Fig. 3 is 25 x 38 inches inside. It is carried on two pairs of small grooved wheels attached to the side, and upon which it is reversible, as shown. The tightening of the back is done by three cross bars, pivoted at their centers. The ends of the bars engage with cleats screwed to the inside of frame at a slight angle, so that they wedge the bars to any desired pressure on the back. It is not considered necessary to provide for a double swing support so that the surface of the frame can be brought normal to the sunlight. This undoubtedly allows of quicker printing during morning and evening hours, but the saving is not great, and is obtained at the expense of simplicity. This frame cost about $18, including iron track and plate glass ⅛ inch thick.

In the discussion which followed the reading of the paper, C. J. H. Woodbury described a simple way of copying a drawing on ordinary white drawing paper. A hole is cut in a drawing board, and in this hole is inserted a glass plate. The hole is made of a size sufficient to cover the drawing to be copied, which is placed against the under side of the glass. An incandescent lamp is placed under the board, and is so arranged that its light falls on the drawing. The drawing paper is placed on top of the glass. The lines of the original drawing can be distinctly seen through the upper paper, upon which they can be accurately traced. A reflector should be arranged beneath the lamp.

Derrick for Rapid Building.

The rapidly increasing use of structural iron and steel in connection with the towering office buildings which are being erected in the leading cities of the country has created a demand for improved hoisting apparatus capable of quickly lifting heavy loads and depositing them in any desired position within the area of the structure. A derrick which possesses many features of novelty, and which is probably the largest ever built in the immediate vicinity of New York for the purpose of handling structural iron and steel, is that used at the corner of Nassau and Spruce streets in connection with the new building of the American Tract Society. It represents the design of F. S. Harrison, superintendent or the Atlas Iron Construction Company, who are doing the work. Our readers are likely to be interested in a description of this derrick, and we therefore present the following particulars taken from the *Times*. It consists of four upright pieces 42 feet high, joined together in a square by wood beams and diagonal guy ropes. Each upright is made in two pieces, because it was found to be nearly impossible to get timber of the length required without a flaw. The upper 25 feet are of solid 10 x 10 Virginia pine. The lower consists of two pieces of T iron held 4 inches apart by iron straps riveted to the sides. Into the top of the beam thus formed the 10 x 10 pine timber is mortised, bolts being used to fasten the two pieces securely together.

Just above the junction of the iron and wood parts of the upright is the first cross tie. These ties, extending from corner to corner, are made of two pieces of 3-inch Virginia pine, spread to 16 inches at the center, so as to give strength and lightness. There is another set of wood cross ties at the top of the derrick. Diagonal guy ropes of wire extend from upright to upright in the upper and lower sections, those in the lower section being made easily removable, so as not to interfere when the derrick is raised from one story to another.

The lower cross ties are 22 feet above the base of the derrick. The hight of two stories of the building is 21 feet, so that there is no obstruction, except the removable guy ropes, to the moving of beams to any part of the building within or without the space covered by the derrick up to the hight of two stories.

Four booms, each 50 feet long, are set into the four uprights. Each upright, with its boom, turns in a bearing at the base of the derrick, giving to each a range of 270°. Each boom can be detached from the outside and fixed to the inner side of the upright, so as to cover the other 90° of the circle. In practice, however, a fifth boom at one corner is used to do all the work inside the area of the derrick.

In planning the derrick, the longest

diagonal distance in the building was divided by three, and the length of the booms was regulated by this measurement, so that the two booms on diagonal corners can cover the most remote spot on the building in a line with their bases. The arrangement is such that, by means of this derrick, iron which is deposited by the trucks in Spruce street is raised and put into position with not more than one change in handling. Much of it can be placed without any change.

There are 88 columns in the American Tract Society's building. Those on the first floor, one story high, were put in place in one day. The iron above the first story is two stories in hight. It takes no longer to raise a two-story column than a one-story one. The Atlas Iron Construction Company are under contract to erect two stories every week. With this derrick they will be able to put up four stories.

One reason for this is that it takes less time to raise this immense derrick, which weighs 16 tons, from one story to another than usual. It requires two days to raise the derricks heretofore used for similar purposes, but it takes only one day to raise this derrick. In raising it two tall poles are placed on opposite sides of the derrick, block and tackle are brought into play with steam power, and the derrick is hoisted up to the top of the columns which it had just hoisted into position. To accomplish this without interference, the guy ropes in the lower section are removed temporarily, leaving only the uprights below the hight of the second story above the base.

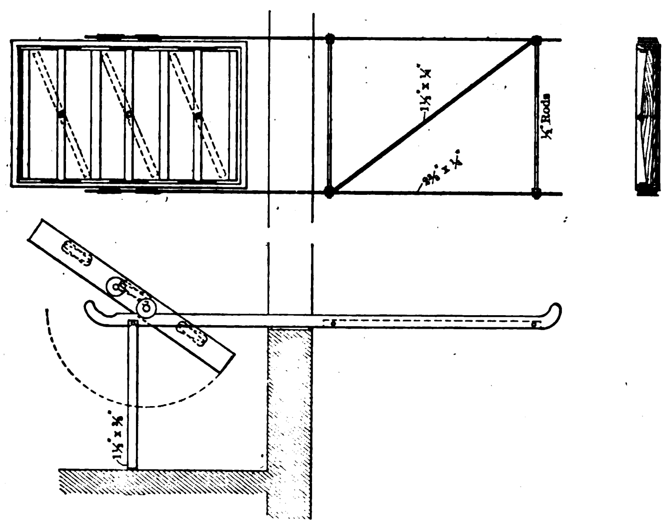


Fig. 3.—Details of Blue Print Frame.

Making a Drawing Board and Blue Print Frame.

A National Board of Arbitration.

The National Strike Commission appointed to investigate the recent Pullman boycott and railroad strike, which has just finished its labors, has prepared a draft of a bill for national arbitration. The measure was drawn by Hon. Carroll D. Wright, United States Commissioner of Labor, and his associates on the Strike Commission, and follows the line of arbitration suggested by their report on the recent strike. The title of the bill is "A Bill Concerning Carriers Engaged in Interstate Commerce and Their Employees." It is modeled after the Interstate Commerce act, as that act has received judicial sanction in almost every section. It provides for the appointment by the President, with the advice and consent of the Senate, of a commission consisting of five persons, to be known as the "United States Board of Conciliation and Arbitration."

Not more than three of the commissioners shall be appointed from the same political party. One of them shall have had experience in the management of railroads, and others to be selected from some incorporated association of railway employees. The commission shall have authority to inquire into the terms and conditions of all employees subject to the act, and shall have the right to obtain from common carriers all necessary information. The salary of each commissioner shall be $7500 per annum; the secretary, to be appointed, shall have a salary of $3500. The principal office of the commission shall be in the city of Washington, where its general sessions shall be held, but special sessions may be held anywhere in the United States. An annual report shall be submitted, and the publication of the reports and decisions may be authorized and shall be competent evidence in all courts of the United States.

The bill provides that the system of arbitration and conciliation shall apply to common carriers engaged in the transportation between the States of passengers and property by railroad and by water, and to all persons and corporations leasing cars used for such transportation and all their employees.

Whenever it shall come to the knowledge of the commission that a strike or controversy between those subject to the act is threatened, or has occurred, it shall be its duty, as soon as practicable, to put itself in communication with both parties and endeavor by mediation and conciliation to effect a settlement. Likewise, upon the request of employees or corporations, as well as of its own volition, it may make an investigation.

All reports of investigations and mediations, and the findings of facts therein, shall be *prima facie* evidence as to each and every fact, and be given due weight in all judicial proceedings, and the Attorney-General of the United States, to whom the same shall be transmitted, shall take such action as is necessary.

Early Brick Work in Rome.

Suetonius, in the life of Augustus, tells us, says a writer in the *Architect and Contract Reporter*, that that emperor boasted he had found Rome of brick and left it of marble. We must not take this expression too literally, but merely as a description of increased magnificence. The words attributed to him by Dion that he had found it of earth and left it of stone are nearer the truth if we suppose the term "stone" to be applied to all materials of a durable nature, as that of "earth" would certainly imply what was soft and easily perishing. The expression of Suetonius has been taken as the literal description of a fact; but of the monuments remaining known to be prior to the time of Augustus not one is of brick, while on the contrary, from his time downward, brick was evidently used in the greatest abundance. Vitruvius, who certainly did not publish his work before the time of Augustus, is diffuse in his account of unburnt bricks, but says nothing about the formation of burnt bricks, which seems to prove that they were not then in common use at Rome. He proceeds to state that very good and durable buildings may be made of burnt bricks and cites as examples several buildings in old Greece and in Magna Græcia. Another circumstance which indicates that bricks were little used at that period is found in his account of pozzolana, *pulvis puteolana*, which he describes as an excellent material for building, and as found about Baia and Mount Vesuvius, while in fact this substance is very abundant about Rome, and nearly, if not quite, universal in the ancient brick and rubble work there. If, however, there are no brick monuments remaining which date certainly before the time of Augustus, there are many such which have been supposed to be of republican times. The Circus Maximus is attributed to Romulus, and some brick work may be observed among the trifling fragments which are shown as its ruins, but as no one can believe that these are of the time of Romulus, we may as well suppose them after as before that of Augustus, especially as the work is of the same nature as that of the palace of the Cæsars just behind it. The earliest aqueducts were of the time of the republic, but these form a curious lesson against the early use of brick work, although sometimes quoted in its favor. The Temple of Saturn is also said to be ancient, but whether the lofty brick wall just by the arch of Constantine be a part of the temple, and whether, if it be so, the temple was not rebuilt under the emperors, are both disputable points. It exhibits an abuse of the use of arches, which in this example occur in the solid of the wall when there are no openings below, or none which at all correspond with the upper arches. Such an abuse does not seem likely to have been introduced very early, yet we find something of it in the Pantheon, as has been already noticed. Another edifice which pretends to an early date is that usually called the Temple of Rediculus, built to commemorate the retreat of Hannibal. But Hannibal, according to the antiquaries, approached Rome, not in this quarter, but in the neighborhood of the Porta Salaria, and such a temple would probably have been built near the spot where he advanced nearest to the walls. The present building is in a valley far from the old circuit of the city, and not at all suited to a reconnoitering position, and the character of the work does not announce an early period of the art of building or of brick making.

WHAT BUILDERS ARE DOING.

THE condition of the building interests remains practically the same as reported in this department in the last two issues of *Carpentry and Building*. Reports from the various sections of the country show that the season opened with a gloomy outlook for the year's business, and that this condition, with but few exceptions, was general. As the season advanced, however, confidence returned and work was begun that had been withheld until the situation seemed less hazardous. Some of the cities, especially in the east, have steadily gained; the proportion of new work commenced after the season was well advanced being much greater than usual. With the increase of work has grown a more healthy feeling among builders generally, this increase being accepted as an indication of a restoration of the normal amount of activity.

The workmen in the building trades have been seriously affected throughout the Western States, the stagnation of business in so large an area preventing them from seeking work in new localities. Many men from the smaller cities beyond the Mississippi river have drifted into St. Louis, Chicago, and even further east, in search of work. The report from St. Louis shows "a large influx of workmen from other localities." In the cities east of Detroit or Cleveland the condition has been the best, although it seems to be conclusive that even the best is below the average of former years.

Builders everywhere are looking hopefully to the coming year, but seem to have the best reasons for doing so in the large cities and particularly those of the East. Indications promise well in New York, Boston, Philadelphia, Baltimore, and some of the smaller cities in this general locality. While Chicago, Cincinnati, Cleveland and Detroit show a tendency to recovery, the evidences are not so plain as in the other cities mentioned. The prospect for St. Louis is good, while in Omaha, St. Paul, Minneapolis and the northwest the amount of prospective work is still, relatively, very small.

Boston, Mass.

In view of the outlook at the beginning of the year, the past season has proved to be fairly satisfactory to the builders of Boston. The total of work done has been less than the average of the last few years preceding 1893, and even though a decided improvement over 1893 has been made, the amount is still below the high water mark of previous seasons. Builders generally have been surprised at the steady increase in work that has prevailed since the opening of the season, and though there is an occasional cry of hard times the majority of the contractors feel very well pleased with the situation. The number of men employed has been less than usual, but there has been little or no suffering on account of lack of work, owing to systematic efforts of various kinds to provide employment for those known to be steady and reliable men. A committee was appointed early in the year by the Master Builders' Association to investigate the condition of affairs among workmen in the building trades, and to act in connection with the employers, to provide work for the needy. The committee rendered considerable valuable assistance. The condition of affairs between employers has been remarkably free from disturbances, and such strikes as have occurred have been of short duration and have not extended beyond the trade affected. The operation during the year of the joint arbitration between the Mason Builders' Association and the Bricklayers' and Stone Masons' unions has further substantiated the value to all concerned of preventing rather than settling labor troubles. The plan has proved most conclusively its practicability ever since it was put in operation, and time only serves to show more clearly the wisdom of its adoption. The journeymen carpenters are seeking to secure the establishment of a joint committee between their union and the Carpenter Builders' Association. Wages have been generally kept up to the union standard in the building trades, although some of the contractors have been working their men at less.

The annual meeting of the Master Builders' Association was held on December 19, the following officers being re-elected: President, E. Noyes Whitcomb; vice-president, C. Everett Clark; secretary and treasurer, Wm. H. Sayward; trustees for three years, Wm. H. Mitchell and Walter J. Connery. The report of the secretary showed the organization to be in a most satisfactory condition. The membership has been steadily and carefully increased; several members have been given places of public honor at the instance of the authorities, subject to the approval of the association, and the position of the organization as an influential and representative business body has been more widely and firmly established. During the year the use of the Uniform Contract has been extended through the influence of the association, a code of practice, based upon the form recommended by the National Association of Builders, has been formulated and adopted, a thorough revision of the building laws of the city has been made and published for the benefit of members and others, and other matters of importance to the building interests have been acted upon. The treasurer's report showed the association to be in excellent condition financially. The organization is so formed that arrearages in annual dues are impossible, and the administration of its affairs has been such that notwithstanding many additions and improvements to the conveniences of the exchange, the treasury shows a gain apart from the very substantial gain resulting from the ownership of its building.

The outlook for the coming year is very good, there being already in the market and in the hands of the architects enough work to assure a busy season.

Baltimore, Md.

An estimate of the amount of building done in Baltimore in 1894, as compared with previous years, indicates that the total will compare favorably with 1893, though probably less than the year just past. The number of men employed is about the same as during any of the three preceding years, and the average wages have been about the same as usual. The relations between the workmen and their employers is reported as being in a favorable condition and no strikes or lockouts have occurred during the year.

The prospects for the coming year are stated as being good.

The Builders' Exchange has more firmly than ever established itself during the year as an organization of progressive business men, who are capable of conducting the body upon such broad and fair lines that its influence in the city is being steadily increased and recognized. The completion and occupation of the new building erected and owned by the exchange, early in the year, placed the association firmly before the public, even outside the building interests, in an enviable light, and the various matters of general interest upon which it has been called upon to act has further strengthened its position. The recent effort to secure the introduction of trade training into the educational institutions of the city, and which is now a practically assured success, is worthy of the emulation of every similar body in the country. The members have had no trouble with their workmen, their owners or their competitors such as to require the mediation of arbitration, hence there has been no occasion for its use. A plan has been recently adopted by the exchange for bringing it into greater prominence and for increasing its usefulness as an adjunct to the general business of the city. It is proposed that all auction sales of real estate not made upon the premises shall take place in the exchange rooms immediately following the 'Change hour. Besides extending the field of usefulness of the exchange, it is expected that additional revenue will be derived from the plan.

Buffalo, N. Y.

It is impossible, at this time, to secure an accurate estimate of the comparative amount of work done in Buffalo during the past year, as the majority of the contractors and the Inspector of Buildings do not close their books until January 1. General indications, however, point to the fact that while, under existing circumstances, the year has been fairly satisfactory, the total of work done will fall below the average of the past few years.

The Builders' Association Exchange is reported as being in a prosperous condition. A plan has been adopted by the exchange, to be carried out during the remaining winter months, whereby the members and the public generally may attend a course of 12 lectures on architecture, to be given by Cyrus K. Porter, one of the most prominent architects of the city. The lectures will be free, Mr. Porter having volunteered his services without expense, and the exchange has offered its rooms and invited all interested in architecture, especially builders and their employees, members of the Manual Training School, the High School, and all students of the subject to attend. Mr. Porter will consider to a certain extext the general history of architecture—its proper place among the arts and sciences, its history in the different epochs of the world, and the rise and progress of different styles of architecture, and the prevailing styles of our own time; and will give attention to the forms and modes of construction that have prevailed in the past and the practice of the present, the transition from brick and wood to iron, steel, &c., and will discuss the important subjects of heating, lighting and ventilating buildings.

Chicago, Ill.

An estimate, based upon the amount of work begun in Chicago during the past year shows a serious falling off compared with the amount done in average years. It is thought that actual figures, when made up, will show the proportionate amount of decrease to have been greater in Chicago than in any of the large cities. There has been considerable trouble during the year between employers and workmen, perhaps the most serious case of which has been the outgrowth of a fight between the United Brotherhood of Carpenters and the Amalgamated Association and the Knights of Labor carpenters. The Building Trades Council of the city is so organized that but one organization from each trade can obtain representation, and no union men are allowed to work with other men, whether union men or not, unless they can show a working card issued by the council. The brotherhood being a member of the council gave representation to all carpenters so long as the three organizations worked together, but when it separated from the other two the members of the latter bodies could no longer obtain working cards, and were, therefore, the cause of strikes wherever they were employed. The Amalgamated Society and the Knights of Labor carpenters have taken the matter into court, and present indications seem to point to the fact that a precedent will be established making it a criminal offense to procure the discharge of any man simply because of his membership or non-membership in any organization, and whether force is used or not.

The prospect for the coming season seems to be brighter, there being enough new work in sight to warrant the belief that next year will see a general impovement of the building interests of the city.

Cincinnati, Ohio.

The Cincinnati builders feel that they have little cause for complaint, for while the amount of building done during the past year has been much less than the average, the total is so much better than the condition of the early season seemed to promise that they have been pleasantly disappointed. While the number of workmen employed has been much smaller than in ordinary years, there has been a remarkable absence of strikes and labor troubles, such as have occurred having been of minor importance.

The Builders' Exchange has passed through the year in about its usual manner, little out of the ordinary having transpired to occasion comment. The effort to bring the affairs of the exchange into the hands of the builders as distinguished from dealers in building materials was a failure, and the organization stands the same as it always has in that respect. At a recent meeting the exchange approved of the State Board of Commerce, upon hearing the report of its delegates to a meeting of the board. G. F. Neiber, president of the exchange, was elected a vice president of the board. Builders generally look forward to a better year in 1895, present indications seeming to warrant that presumption.

Cleveland, Ohio.

The year, from the builder's standpoint, in Cleveland has not been altogether a satisfactory one. Competition has been universally keen and prices and profits have been correspondingly affected. The total amount of building done will fall short of the average of the past few years, notwithstanding the fact that a considerable amount of work has been carried on during the season. The relations between employers and workmen in the building trades has been less disturbed than in some of the manufacturing interests, which latter were affected by serious strikes during the earlier part of the year. Wages have been held up fairly well through the efforts of the trades unions, and in most cases the union scale was preserved.

The Builders' Exchange is reported as steadily extending its influence for good in the building interests of the city, and as being in good condition financially and otherwise. At the recent annual meeting the following Board of Directors was elected: E. H. Towson, C C. Dewstoe, John Grant, W. H. Fry, G. G. Griese, R. H. Jenks, E. W. Palmer, Jr.; A. T. Caulfield and J. A. Reaugh.

The board elected the following officers for the ensuing year:

John Grant, president.
J. A. Reaugh, vice-president.
E. W. Palmer, Jr., treasurer.
C. C. Dewstoe, secretary.
L. Bonesteel, assistant-secretary.

The new board and officers propose to make things interesting in the exchange during the coming year. One of the first matters of public interest that will be taken up is an investigation of the construction of the public school buildings of the city. There is much interest in the subject manifested by the members of the exchange, and it is expected that that organization may be able to secure needful improvements in future methods of construction. The exchange has secured no radical improvements in the conditions existing in the building business and no cases have been brought up for arbitration, either between members or between employers and workmen.

Detroit, Mich.

The amount of building done in Detroit during the year compares favorably with that of 1893, it being estimated that the total of the money invested during 1894 will exceed that of the preceding year. The work of 1893 was more confined to smaller jobs, while this year the erection of the Masonic Temple, the Chamber of Commerce, the Union Trust building, and others has changed the character of the work. It is impossible to make an accurate statement at this time of the comparative amount of profit to the builders in the season's work, as no data has yet been prepared from which judgment can be made. The general feeling is, however, that work has been taken at too low prices and that profits will prove very small.

The amount of work to be done next year is as yet problematical, with indications that the season will be an average one.

The Builders' and Traders' Exchange is making a steady gain, and is in good condition. The members are drawn from the best builders of the city, and the organization is constantly demonstrating the value of such a body. There has been no attempt to use arbitration in the exchange during the year, and the relations with the workmen have been without general disturbance. Such strikes as have occurred have not been extensive in their operation, and have been confined to trades in which they originated.

Lowell, Mass.

The Lowell builders have had about the average amount of work during the year past, and while the season has not been marked by any unusual features, the contractors generally feel that the year has been better than it promised. There has been employment for more men than there was in 1893, and there has been no trouble between the unions and the employers.

The Master Builders' Exchange is in good condition, and while the close of the year does not show any marked increase of membership, the organization is holding its own and is constantly making itself felt as an influence for good in the building interests of the city. The value of the exchange is shown in one instance in a way to prove the value of organized effort. The case is that of one of the members who has a difference with the city. An arbitration has been arranged whereby the builder will secure speedy adjustment of his claim, the support of the exchange lending strength to his position.

A later estimate of the volume of work done during the year shows a falling off of at least one-third as compared with the total of 1893. The proportionate amount of profits are estimated at 20 per cent. less than for the preceding year. Competition has increased in keenness with the falling off of business.

The present prospect for 1895 is poor, there being no work of importance now in the hands of the architects and little indication that there will be. So far as outward indications may be accepted as being true, the relations between the employers and workmen are satisfactory and unlikely to be disturbed.

Lynn, Mass.

The total amount of new building, together with alterations and repairs done during 1894, in Lynn will exceed but little over one-half the amount done in 1893. Everything in the building trades has been quiet throughout the year between employers and workmen, and the two seem to be harmonious at present. The Inspector of Buildings states that the prospect for 1895 is good, with the outlook favorable to a decided improvement over the past season.

The Master Builders' Association is reported as being in good condition financially and as to membership.

Milwaukee, Wis.

The past year has been one of comparatively little activity among the builders of Milwaukee. The stagnation of business resulting from the disastrous effects of the panic was apparent in the lack of building done. The last few months were the best of the season, and the more hopeful are looking forward to renewed activity in 1895 The Builders and Traders' Exchange has inaugurated methods of improving the conditions surrounding the business of contracting for building work. The uniform form of proposal which was established about a year ago was the first successful attempt of the kind ever made. A standing committee on arbitration, for the settlement of differences between contractors and architects or owners, between contractors themselves, or between contractors and their employees, has been established, and the building public notified of its existance and availability.

The ownership of a building has done much to hold the members together during the stress of the past two years, and it is worthy of note that the whole condition of the trade has been improved by the existence of an organization whose purpose is to define and protect the interests of all concerned.

Minneapolis, Minn.

The general business conditions which have prevailed in St. Paul have also affected Minneapolis, and the builders of the latter city have also had a very dull year. The amount of building done, men employed and profits are estimated to be about alike in both places.

The Builders' Exchange has been unable to withstand the lack of business among its members and has suspended its meetings and closed its rooms, awaiting developments. The organization has not been abandoned and an effort will be made to revive it with the return of more prosperous business conditions.

New York City.

It was expected that the investment represented by the total of building operations begun in 1894 would fall short of the cost of work begun in 1893 and 1892 when the last quarterly statement (September 30) was made by the department; but it is now thought that the new work projected during the last quarter will bring the whole amount up to and possibly exceed the totals of the two preceding years. The estimated cost of work begun in 1894 was, for the first nine months, $38,665,522; for the same period in 1893, $50,558,403; for 1892, $49,974,-616. It is generally conceded that building contracts have been undertaken at a much closer figure than has been the case for several years past, and it may be fairly considered that the profit to the contractor has been reduced in corresponding ratio.

The number of men employed in comparison with previous years may be jointly estimated to have been less than during 1893 and 1892, in the same proportion as the cost of building has been less.

The condition of affairs among the workmen, as regards the relations with employers, has been more satisfactory than for a number of years past. No strikes of sufficient extent to involve general action by all the trades have occurred, and such disturbances as have transpired have been confined to one or two branches at a time. The effort of the journeymen plasterers for weekly instead of bi-weekly payments of wages, which was begun in the spring, has never been fully successful and is said to be still under consideration by the employers. Work has several times been interfered with because of this difference, but temporary adjustment has bridged over the difficulty. Disturbances have occurred several times as the result of factional differences between unions. For example, in the summer about half of the journeymen plumbers joined one of the central labor organizations, which then ordered strikes on jobs where the other half were employed.

The condition at present is amicable, when considered as a whole. Differences between employers and workmen are seldom settled by arbitration, but are temporarily abandoned by a compromise on one or both sides. It is reported that among the brick masons only is there any agreement between the employers and workmen which has proved efficient in fixing the relations on a permanent basis. The lathers are at present disturbed over an effort by the men to stop the custom of having their wages reduced in the winter with no reduction of hours. It has been customary for the employers to reduce the wages every fall and advance them again in the spring; the amount of the reduction in the past seldom having exceeded 50 cents per day. This year, however, the reduction ordered is $1 per day, and the men have refused to accept it, and are now attempting to abolish the custom altogether.

The Mechanics and Traders' Exchange and the Building Trades Club are both in good condition and are gaining in strength and influence. The use of the uniform contract is steadily extending under the efforts of the two organizations, and contractors are beginning to recognize the value of the form as its conditions become better known.

The one hundred and ninth annual election of the General Society of Mechanics and Tradesmen has resulted in the choice of the following officers for the ensuing year:

President, Warren A. Conover.
First vice-president, George E. Hoe.
Second vice-president, William Stoneback.
Treasurer, Richard T. Deaves.
Secretary, Stephen M. Wright.

Philadelphia, Pa.

The *Real Estate Record* of Philadelphia is authority for the statement that the past year has been the worst, from the builders' point of view, since 1887. During the term from January 1 to October 31 the cost of new buildings erected and under way was $18,792,800, a falling off from the amount for the same period in 1893 of $3,299,268. The cost of improvements, alterations and repairs during the same months of 1894 was $5,755,000, an increase of $1,027,000 over 1893. The total for the first ten months of 1894 was $24,547,800 and for 1893 was $26,-820,068, showing a decrease of $2,272,268 in 1894.

New work projected and that already in the hands of the architects, together with prospective investment of capital in buildings, point to a restoration of the volume of business in 1895 to a more normal amount. It is stated that Philadelphia has had fewer labor troubles than any of the great cities, and the situation at present among the workmen seems to promise a continuation of amicable relations between employers and workmen.

The Master Builders' Exchange has been steadily increasing its influence and standing as a representative business body during the year, and has constantly worked to improve its usefulness to its members and to the business community of the city. The exhibit of building materials has been improved in management and makeup and is a more valuable exhibition than ever. The Trades School, under the patronage of the exchange, has had a prosperous year, and its influence is constantly improving the apprentices of the city in the building trades and helping to bring the employers and the labor unions closer together on this question. The exchange has issued, through Secretary Harkness, a blank form upon which architects, after completing plans for a proposed building, will certify the exact weight per square foot which each floor will carry. It is expected that the use of the form will do much toward preventing the overloading of floors, especially in buildings where heavy machinery is used. At the regular meeting of the exchange on November 27, Hon. A. Louden Snowden delivered an address on "Labor," which was received with marked attention and interest. It is expected that the coming year will further extend the influence of the exchange for good and still more improve the conditions under which the business of building is conducted under its influence.

Providence, R. I.

The past year has been up to the general average in the volume of building done in Providence, and although keen competition has had a tendency to lower prices a little, the season has been a satisfactory one. The total amount of work done in 1894 is about $3,400,000, as against $4,000,000 for 1893 and $3,600,000 for 1892 In spite of the close figuring the contractors feel that the profits on work done are fairly satisfactory. No failures in the building trades have occurred during 1894. The number of workmen that have been given employment in the building trades compares favorably with the number thus employed during the past four or five years, although time has been somewhat more broken than usual, and work has been less steady than during 1893.

The prospect for 1895 is good, although there is but little private work projected at the present time. There is sufficient public work in sight, however, to make a good opening for the season. Plans for the new State house have been prepared and are now in the market. The State contemplates the erection of a normal school building, and the city will build four new school houses, which, together with new terminal facilities, already under contract, will furnish work for a large number of men in the early spring. Extensive work will be begun in the spring by the Union Street Railway Company.

Building materials have remained at about the same price that prevailed during the past few years. There have been no disturbances between employers and workmen of any importance, and no occasion for the introduction of arbitration for the settlement of strikes, &c. Workmen have been paid good wages, and a season of contentment has been felt in all branches of the trade.

The Builders and Traders' Exchange has been in a normal condition throughout the year. The membership is being steadily increased, the financial condition and business standing of the organization continually improved. The attendance at the rooms during 'Change hour has been growing larger all the time, and the interest of the members seems to be increasing. No new departure in the administration of exchange affairs has occurred, although an effort to put the recommendations of the National Association into operation is being constantly made.

St. Louis, Mo.

The amount of building done in St. Louis during the year just ended has been estimated at about $12,000,000, which exceeds the amount done the year before. Competition has been so close that it is the general opinion builders' profits have been in nearly all cases very small. While the number of workmen actually employed during the year has been greater than during 1893, the number of men idle has also been greater and has resulted in the impression that the number of men at work was smaller than during the preceding year. This is accounted for by the fact that there has been a large influx of workmen from the cities farther west, where building has been practically at a standstill. The relations between the employers and workmen are very friendly at present, with little prospect of any change in the near future.

The outlook for the coming season is reported to be good, and the builders are looking forward to a busy season.

The Builders' Exchange is in good shape and is gaining ground as one of the influential business bodies of the city. A plan is being considered for protecting the members by placing them in possession of an abstract of title of the lots upon which buildings are to be erected, showing in whom the ownership rests. The members are of the opinion that this plan is a valuable one and will greatly facilitate the acquirement of information necessary before signing contracts. The exchange has strenuously advocated the use of the form of arbitration proposed by the National Association. Copies of the form were sent to the various organizations of employing builders and to the several trades unions, accompanied by a circular letter urging its justice and the benefit that would follow its adoption. No formal action has yet resulted, but the favorable reception of the form argues well for its ultimate establishment as the means for preventing strikes, lockouts and other labor disturbances. An attempt was made to arbitrate a difference between a contractor and an owner under the common law method of procedure, but without satisfactory result. The builder claimed $1800 for extra work ; the owner said that the work was not done according to the contract and set up a counter claim for damages in placing the building in proper condition. The contractor was awarded $700, which was not satisfactory to either party.

The St. Louis *Republic* makes the following statement : "Arrangements are now being made for the construction of 10 or 12 business buildings, to cost from $300,000 to $1,500,000 each. The probability is that every one of them will be commenced next year. Our prospects in the building line were certainly never brighter for the immediate future than they are now. Next year promises to be a record breaker for St. Louis, not only in the number of new buildings erected, but also in the amount of money invested in them."

St. Paul, Minn.

The past year has been one of little activity for the builders of St. Paul. About one-third of the amount of building done in any of the three preceding years is considered a fair estimate of the season's business. No statement has yet been made by the Inspection of Buildings Department, but the estimate by builders generally of the amount of work done is that the total will be two thirds less than 1893. Competition has been exceedingly sharp, and it is the universal impression that profits have been practically wiped out in the effort to obtain work. In fact, many jobs have been reported as taken at a price which will result in nothing but loss. The number of men employed in building operations has been about one-fourth of the number employed in ordinary years. Many of the workmen have left the city or taken to other pursuits, so that the number of men idle has not been as great as might be expected, although much distress has existed.

The prospect for the coming year is very uncertain, as there are many vacant buildings of every character in the city, and new work is felt to be largely dependent upon a marked improvement in general business. There is a feeling of confidence among the business men in all departments of trade that a revival of activity will occur in the spring, and it is only upon the fulfillment of such a prediction that the building business can be improved.

There has been no trouble between employers and workmen during the year. A desire to establish relations between the two, which will be equitable and mutually satisfactory, is manifested by the men, and the employers have shown a disposition to meet them half way. Everything is quiet at present, and the workmen are seeking employment at anything that offers, and on any terms.

The Builders' Exchange has held on through most depressing conditions, and although the membership is small, there is a feeling that the revival of business will restore the organization to its former size and importance. The daily attendance during 'Change hour is double what it was a year ago, and the feeling of fraternity among the members is greater than ever before. The need of an exchange is well recognized, and the future will, doubtless, see a great improvement in the organization. A difference between two contractors who were members of the exchange was settled through the instrumentality of that body, without resort to law and in a thoroughly satisfactory manner. One of the parties involved was a carpenter, the other a mason, and the points at issue were extra work by one which caused delay and damage to the other. On request of the parties the president appointed an arbitration committee, by the decision of which the two agreed to abide. The case was fully investigated, and the decision rendered was fully satisfactory to both sides, who were thereby saved the expense and hard feeling of a trial at law.

Notes.

The North Side Builders' Association is the name of a new organization of contractors in Pittsburgh. Its purpose is similar to that of the Builders' Exchange. It has been intimated that one move of the new organization would be to reduce the wages of workmen in the building trades.

The Builders and Traders' Exchange of Atlanta, Ga., is reported as having passed through the year about as well as was anticipated. The present officers are C. G. Bradt, president, and J. B Walker, secretary. Building for the year appears to have been below the average.

The Builders' Exchange of Duluth has closed up its affairs and been abandoned for lack of interest on the part of the members. The organization had been in existence a little over a year.

Secretary C. E. Ditmeyer of the Mechanics, Dealers and Lumbermen's Exchange of New Orleans, reports his organization as being in good condition, both numerically and financially.

The builders of Des Moines, Ia , have had two very dull years during 1894 and 1893, the amount of work in the market being very small. The journeymen are contracting for building work in competition with the contractors, and being satisfied with day wages, make competition practically without profit. To add to the unfavorableness of the situation the contractors, instead of standing together, are fighting each other. The Builders' Exchange, which has managed to withstand lack of interest and internal dissensions until now, will probably disband, because of the apparent inability to secure harmonious action by the builders.

The Builders' Exchange of Lincoln, Neb., one of the youngest exchanges in the West, is reported, by the secretary, John C. Small. to be in good condition and steadily growing stronger. The past year in the building business has been a dull one, but there seems to be a prospect of improvement in 1895.

The builders of Salt Lake City have been unable to hold their interest in the exchange and the organization is practically dead. A room is still held and some effort is being made to hold the body together, but the dullness of the past year seems to have been too much for it.

A new exchange has just been formed in Lawrence, Mass., of which James Flanagan is president and F. E. Carleton, secretary. The organization is said to include the best builders of the city in its membership, and proposes to make a stand for greater harmony between employers and workmen, and to try to improve the conditions surrounding the building interests generally.

The Builders' Exchange of Albany, N. Y., have held no meetings during the past year and there is no indication of any immediate action looking to its revival. The Master Plumbers' Association is the only organization of builders in the city who have any standing and it is reported as being in A1 condition.

The hard times of the past year are given as the cause for the abandonment of the Builders' Exchange of Leavenworth A struggle was made during the first half of the year to keep the members together, but to no purpose, and the last half of the year has found the organization inoperative. Some of the builders look forward to the re-establishment of the exchange in the future, and intend to persist in their efforts to that end. Times have been vory dull in that city during 1894.

The members of the Builders' Exchange of Wheeling, W. Va., are promoting interest in their organization by such means as seem to promise success. A meeting is soon to be held for the purpose of discussing the benefits of such organization, at which time some one well versed in the subject will deliver an address.

The Builders' Exchange of Bridgeport, Conn., is seeking to extend its influence among its members by demonstrating the value of organizations of its character, by having the functions of such a body defined and the benefit of its existence pointed out. The exchange has been in existence several years, and has been fairly successful since its start.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

A DETAIL of the bay window drawn to a scale of ¼ inch to the foot is shown in Fig. 20 of the engravings. The description and method of drawing the bay window was so thoroughly explained in connection with the front elevation that by comparing Fig. 20 with Figs. 11 and 12 the draftsman will readily understand the course to be pursued. A vertical sectional view drawn to ¼-inch scale, which will serve as an example for practice, is shown in Fig. 21.

We will not give any prescribed method in drawing this figure, believing that it is just as well sometimes for the student to study the drawing and work out the method of procedure for himself. In explanation of the meaning of some of the lines we will say that the outside space represents the middle or corner casings, the second space the outside window casings, third space the sheeting, fourth space the studding, the fifth space the plastering and the sixth space the inside casing. The sections representing the headers, head casings, sills, &c., are plain and easily understood. Fig. 22 represents a horizontal section, drawn to a scale of 1 inch to the foot, and shows very plainly the sections of the work through the bay window. In the engraving M C indicates the middle casing, O C the outside casing, B the blind stop, J the jamb and I C the inside casing. The other parts are fully explained by the wording. Fig. 23 is a detail of porch finish, drawn to a scale of 1 inch to the foot, and is so plain that little description will suffice. The ornaments in the frieze and corner bracket are simply open spaces. The particular point in this drawing, to which it is desired to call the attention of the draftsman, is the side and face views of the cornice bracket and the manner of showing the difference in appearance. Figs. 24 and 25 are details of the main cornice and of the work in the front gable, drawn to a scale of 1 inch to the foot, and need no further explanation. They will serve as examples for practice in drawing details.

(To be continued.)

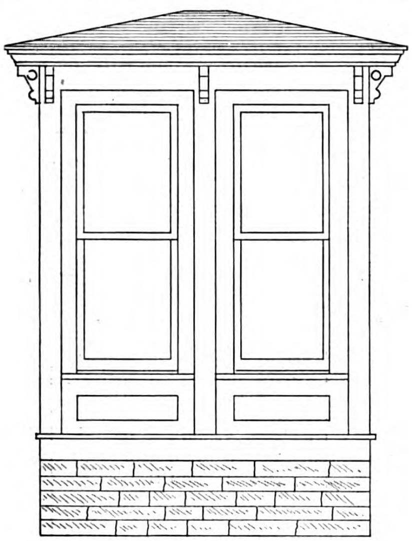


Fig. 20.—Detail of Bay Window.—Scale, ¼ Inch to the Foot.

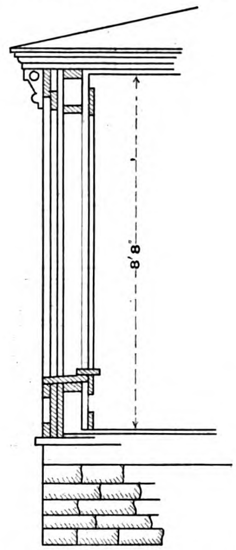


Fig. 21.—Vertical Section of Bay Window, Showing General Construction.—Scale, ¼ Inch to the Foot.

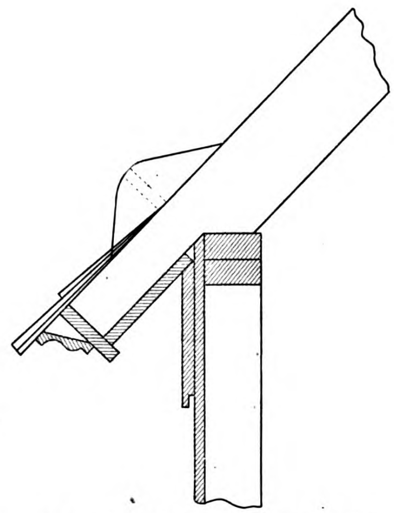


Fig. 24.—Detail of Main Cornice.—Scale, 1 Inch to the Foot.

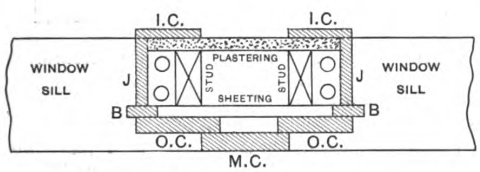


Fig. 22.—Horizontal Section of Bay Window, Showing Casings and General Construction.—Scale, 1 Inch to the Foot.

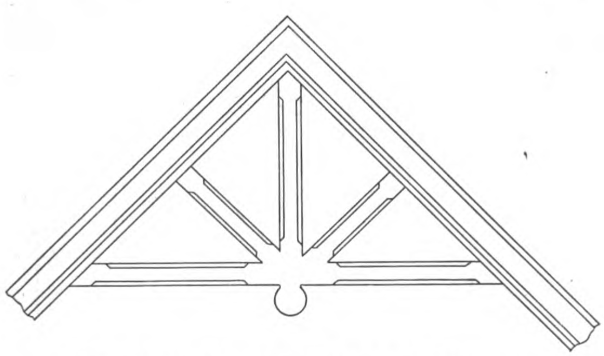


Fig. 25.—Detail of Gable Finish.—Scale, 1 Inch to the Foot.

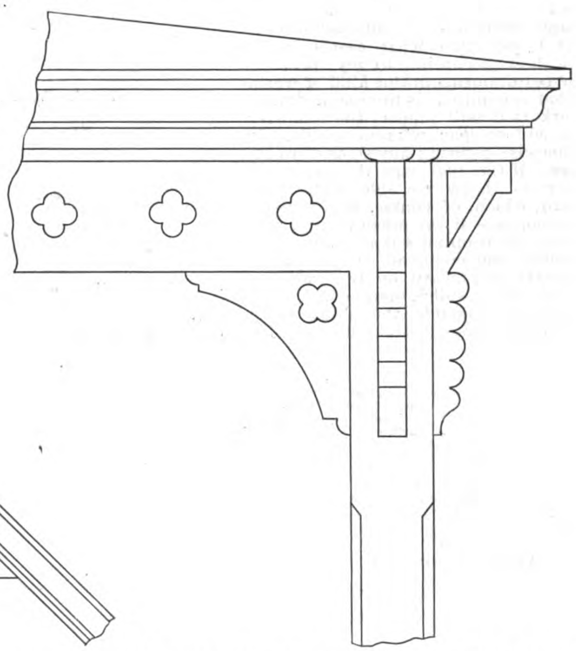


Fig. 23.—Detail of Porch Finish.—Scale, 1 Inch to the Foot.

Architectural Drawing for Mechanics.—Details of Exterior.

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CORRESPONDENCE.

WE take this opportunity of again directing the attention of our readers to the desirability of having, in connection with all communications intended for publication, the name and address of the writer. These are required by the editor, as very often occasions arise where further particulars concerning the subject discussed are essential, and it is necessary to correspond with the writer direct. The omission of the name and address from a letter will often explain why communications reaching us have failed to receive the attention which their contents would seem to demand. At this writing we have at hand a letter requiring answer by mail, but without other signature than "Subscriber," and with no indication of the place from whence it comes. We would therefore ask all correspondents to make sure that they send in connection with letters their full name and address, not necessarily for publication, but in order that we may know to whom to make due acknowledgment by mail.

Self Supporting Roof.

From I. P. H., *Omaha, Neb.*—Replying to "J. H.," Fort Snelling, Minn., I send sketches of two forms of truss suitable for spanning the building in question. The form of roof as submitted is susceptible of about as many changes as a combination lock, but I will give what seems to be the best according to my ideas of the requirements in this kind of work. What is required is to erect a framework that will support the roof over the 50-foot span without sagging or otherwise showing any signs of weakness. If the roof sags it has a tendency to throw the side walls outward, which, of course, would result in a collapse if the pressure was very great. In framing a truss that cannot possibly sag or spread the pressure is directly downward on the wall and the desired result is obtained. According to the sketch, the short rafter would be about 12 feet and the long rafter about 19 feet. Referring to Fig. 1 of the illustrations, it is seen that weakness will show itself in the middle of the long rafter, but with the braces in position and the rods or bolts put through the joints as indicated in the sketch it is next to impossible for the truss to have any weak point. Fig. 2 shows another form of truss which would be suitable for a span of 75 feet. In this form there are the same number of braces differently arranged and having two more rods or bolts, so that the strain is better distributed, making it more suitable for a wider span than the one given by "J. H." I would like very much to have some of the readers express their opinion as to which is the better form, giving their reasons for the same. This is a question of strength, and in constructing large roofs is an important point. An interchange of ideas might prove highly interesting and beneficial to those who are actively engaged in building.

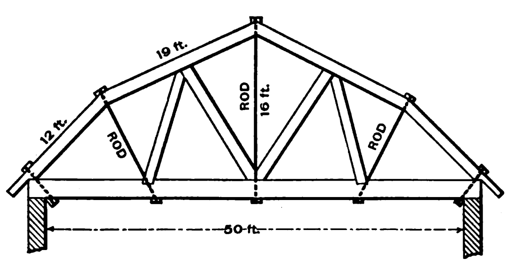


Fig. 1.—One Form of Truss for Self Supporting Roof.

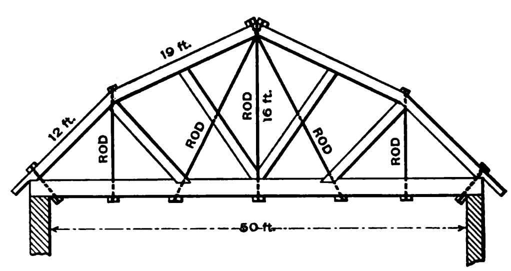


Fig. 2.—Form of Truss Adapted for a Span Greater than that Shown in Previous Figure.

Self Supporting Roof.—Diagrams Showing Two Forms of Truss.

Design for a Pulpit.

From H. F., *Ramos, La.*—I noticed in the March issue a call from "H. W. W.," Washington, Ind., for a design of a pulpit, and in reply I submit sketches, trusting they will prove of interest to him. It is a plain piece of work but has a neat appearance when finished. It could be made out of any kind of wood, either hard or soft. The panels are raised and finished with a raised molding, while the brackets are beaded with a raised panel on the square part of the bracket. The sketches, Figs. 1 and 2, show front and end elevations and so clearly indicate the construction that extended reference seems unnecessary. I would say, however, that the dotted lines indicate a shelf in the center. The base is 1¼ inches thick, as are also the brackets. The raised molding should not exceed 2 inches.

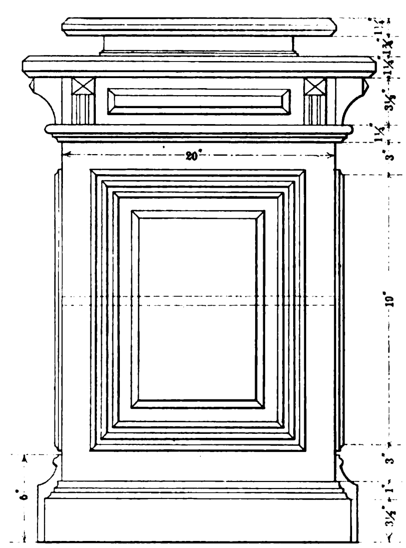


Fig. 1.—Front Elevation.

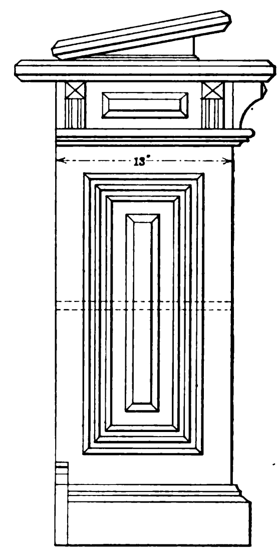


Fig. 2.—End or Side Elevation.

Design for a Pulpit.—Scale, 1 Inch to the Foot.

Setting Plane Bits.

From J. J. D., *Cornwall, Cal.*—Will some reader kindly inform me where to set the top piece on a plane bit when planing hard and soft woods?

Mysteries of the Slide Rule.

From WILLIAM COX, *Stapleton, N. Y.*—I am very sorry to see "W. W's" reply in your December correspondence column to "J. B. H." on the above subject. In the first place, the book he refers to is an old one and is only applicable to what is now an almost obsolete form of slide rule. The rules generally used now are of the Mannheim type, and have the top scales of the rule and the slide alike, and also the bottom ones, the corresponding graduations of the two former being the squares of the two latter, whereas the slide rule described by Charles Hoare in the book recommended by "W. W.," and of which I have a copy, has the three upper scales alike and the lower one a different one, without any complement, so that any one buying this book and using it with the slide rules mostly sold in this country will find himself very much at sea and unable to make any progress.

In the second place, it is very evident that "W. W." has not set himself seriously to the study of this instrument, else he would not depreciate it as he does. I have one always on my desk and use it many times every day, and I could name many machinists, engineers and others whose names are household words in this country who prize it as highly and use it as much as I do.

In conclusion, I would ask if "W. W." or any one else ever got something worth having for nothing? If so he has had more luck than every architect, builder, carpenter, engineer or machinist I ever came across, all such having found that knowledge can only be acquired by study and labor, and that the amount of these is in proportion to the value of the knowledge to be acquired. Fortunately, however, for the slide rule, the study required is not hard, but practice and patience are necessary, and if to these be added a little serious thinking the undoubted merits of this instrument will be recognized and appreciated.

From J. B. H., *Sheldon, Iowa.*—I appreciate the answer of Mr. Cox, given in the December issue of the paper, but beg to differ with "W. W.," who says the slide rule is not a practical instrument. I am, perhaps, a crank on manual schools; but I believe the time will come when it will be necessary to have a diploma from one of them in order to get a job or belong to a union. A practical workman will soon discover imperfections in any tool. Had I been sufficiently careful to purchase my rule from a reliable maker, as for example the Stanley Rule & Level Company of New Britain, Conn., which I could have done through the mails, I would have slept soundly that night after 9 o'clock.

Cleaning Rusty Tools.

From J. J. D. *Cornwall, Cal.*—I will give a remedy for cleaning rusty squares, bits, &c., which may be of interest to readers in other sections of the country. Take fine flour of emery and pure oil and with a flannel rub the tools vigorously. Engineers' emery cloth is also well adapted to the purpose.

Attaching Galvanized Iron Cornice to an Old Brick Building.

From J. H., *Cleveland, Tenn.*—Will *Carpentry and Building* illustrate the proper way of attaching a galvanized iron cornice to a building that is completed, or in other words, an old brick structure?

Answer.—In Figs. 1 and 2 is shown one method by which a cornice can be attached to a brick building, using wooden lookouts for the purpose, the lookouts being secured without removing any of the brick work. In the side elevation, A represents one of the lookouts, which is fastened to B with nails, screws or bolts, as may be desired. To secure the lookout to the wall a hole is first drilled, then the bolt D passed through the piece of wood B and through the wall, being secured by means of the nut. In the front elevation the piece of upright wood is indicated by B′, the bolt by D′ and the lookout by A′. To secure the foot molding to the wall, a strip of board (C) of the proper width can be nailed to the wall and the foot molding nailed to this. If the mortar joints in the brick work are not adapted to holding the nails, it may be found necessary to cut out the mortar and drive in wooden plugs into which the nails can be driven. In some cases it may be found convenient to remove an entire brick, its place being filled with a piece of wood of similar size, the same being held in place by means of mortar or cement. Another method of securing the lookouts is shown in Fig. 3. The top of wall is removed so as to allow the lookouts to be placed in position, when they can be set in brick in the usual manner.

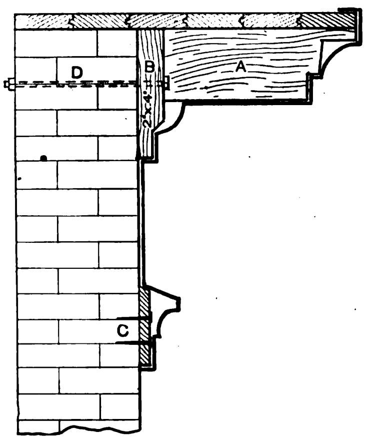


Fig. 1.—Side Elevation of Wooden Lookout Secured to Wall.

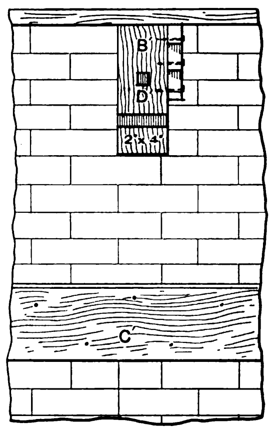


Fig. 2.—Front Elevation of Wooden Lookout Secured to Wall.

Attaching a Galvanized Iron Cornice to an Old Brick Building.

If it is desired to use iron lookouts for the cornice, they can be so constructed as to conform to the general outlines, the cornice being secured to the lookouts by means of bolts. As shown in Fig. 4, at E can be driven an eye for holding the lookout at this point. The eye can be made from 1¼ x ¼ inch iron, and say about 7 inches long, with a suitable hole at the end for a bolt to pass through, and drawn out like a wedge at the other end. The mortise in brick or mortar joint should be cut as true as possible, and only a trifle wider than the eye. Pieces of thin board can be put in above and below the eye so it will hold when driven. When driving the iron eyes a round punch can be put in the hole to prevent its being closed by the force of the hammer blows. The lookout has a hole in its end at E, and is to be secured to the eye by means of a bolt. The top of the lookout iron can extend down over the wall and be secured to the brick or roof as may be required.

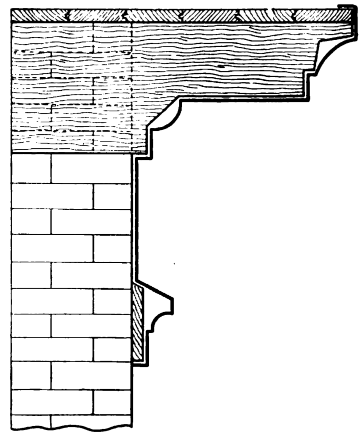


Fig. 3.—Wooden Lookout Placed on Top of Wall.

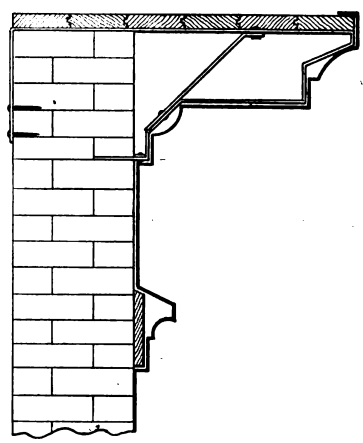


Fig. 4.—Iron Lookout Secured to Wall.

Framing a Cupola With Bell Shaped Roof.

From R. K. H., *Glenside, Pa.*,—Being well pleased with the many answers I read in the paper, I would like to ask a question. I recently put up several cupolas with ogee or bell shaped roofs. The sides of the roof and ventilators were shingled, the openings of the ventilators being so shingled as to carry off the water. I would like very much to have some of the practical readers present ideas as to the best method of constructing the frame work.

Note.—Our correspondent may find suggestions of value in the letter of "A. B. C.," published in another column.

Problem in Board Measure.

From B. R. L., *Napaville, Ill.*—In reply to "E. P.," Gloversville, N. Y., whose problem appeared in the November issue of the paper, I submit the solution given below:

Let x = breadth of the board in

inches: Then $x + 3$ = length of the board in inches; $x(x + 3) = x^2 + 3x$ = area of board in square inches. Under the second condition: $x + 6$ = length in inches; $x - 2$ = breadth in inches; $(x + 6)(x - 2) = x^2 + 4x - 12$ = area in square inches, and since the area is the same in both cases $x^2 + 3x = x^2 + 4x - 12$; $x = 12$, the breadth, and $x + 3 = 15$, the length.

From C. N. C., *Decatur, Ill.*—I inclose an algebraic solution of the problem of "E. P.," Gloversville, N. Y.: Let x equal the length and y the width of the board. Then $x - y = 3$ is the first equation; x, the length, multiplied by y, the width, gives as a result xy, which is the surface of the first board. $x + 3$ represents the length of the other board, and $y - 2$ the width. Then $x + 3$ multiplied by $y - 2 = xy$ or the superficial contents of the board. We have therefore $(x + 3)(y - 2) = xy$. Multiplying and transposing give the equation $3y - 2x = 6$, the second equation. Now, multiplying the first by 2 and canceling the x's we have $y = 12$, which is the width and $x - 12 = 3$, giving x the value of 15, which is the length. Now, $15 + 3 = 18$, which is the length of the second board and $12 - 2 = 10$, the width.

Note. — We have algebraic solutions of the problem giving similar results from "R. S. N.," Minneapolis, Minn.; "R. K. H." Glenside, Pa.; "I. P. H." and "L. P.," Omaha, Neb; and "W. A. W.," Birkenhead, England.

From C. A. S., *London, Canada.*—In the November issue of *Carpentry and Building* I notice the board problem from "E. P.," Gloversville, N. Y., and in reply thereto I would say that the answers are 12 x 15 and 10 x 18, respectively.

Measuring Openings for Windows.

From J. J. D., *Cornwall, Cal.*—Will some brother reader of the paper present a method showing how to measure openings for window frames where weights are used? I would also like to know how an order should be made out when sending to the mill for frames and windows.

Making Flagstaffs.

From C. B., *Norfolk, Va.*—The making of flagstaffs is a job that carpenters are often called upon to perform around public buildings and large structures, and yet I have never seen in the columns of the paper any mention of this sort of work. I take the liberty of sending sketches showing a method by which even a beginner can turn out a fairly good job, and hope what I have to say will draw out those posted in this kind of work. For a spar of, say, 38 or 40 feet, take a piece of timber, Northern spruce preferred, that will square 7½ or 8 inches. Space it into four equal parts, as shown in Fig. 1 of the sketches. Strike a center line and space off, as shown, 7¼, 7, 6½, 5⅜ and 3⅞ inches. Drive nails at these points and spring a batten to mark by. Hew the two sides, after which shoot the corners with the plane and dub to the lines. Turn the stick and treat the other sides in the same way. Strike an octagon at each end of the stick, as shown in Fig. 2 of the sketches; then take a piece of thin board 7¼ inches long and cut small notches at the octagon points, also at the point of the center line, all as shown in the sketch. Spot off the stick for eight squaring by following the center line and edges of the timber, as indicated at 1, 2, 3 and 4 of Fig. 2. Set nails at these points and line off with a batten. After going around the stick, hew to these lines; then shoot corners and dub to the lines. Take a piece of pasteboard and make four half circles, measuring respectively 7, 6¾, 5⅛ and 3⅝ inches, all as shown in Fig. 3, for the purpose of testing the staff at O, P, U, R, of Fig. 4, which represents the finished pole. It will be seen that ¼ inch is allowed for working out all scars. The plane used should be ground slightly hollow and finished with a fine set.

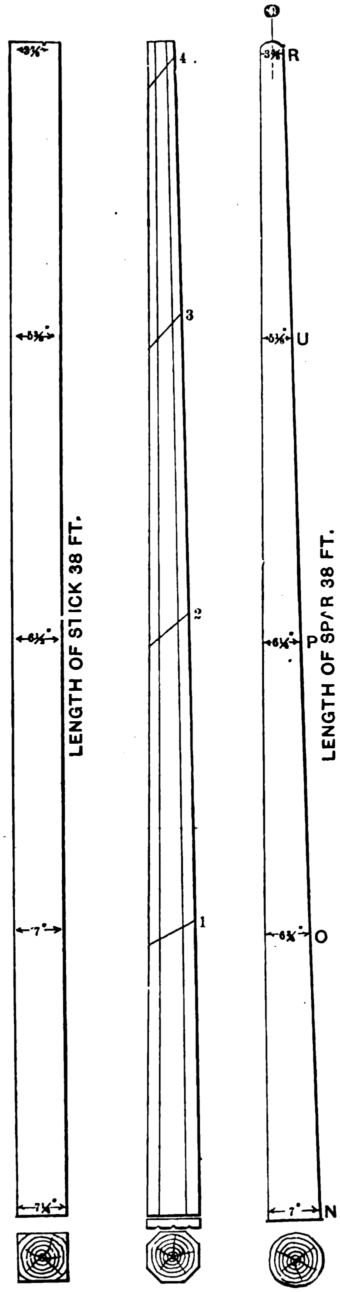


Fig. 1.—The Stick of Timber Spaced into Four Equal Parts.

Fig. 2.—The Stick Lined for Trimming.

Fig. 4.—The Finished Spar or Staff.

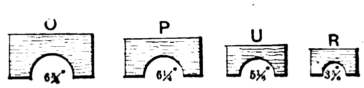


Fig. 3.—Cardboard Measures for Testing the Finished Spar.

Making Flagstaffs.—Sketches Accompanying Letter of "C. B.," Norfolk, Va.

Filling for the Walls of Frame Buildings.

From L. L., *Leroy, N. Dak.*—I would like to have the readers of *Carpentry and Building* inform me through the Correspondence department which of the materials mentioned is the best for warmth, cleanliness and durability for filling up the vacant space between the studs in the walls of frame buildings. The walls are 14 feet high and the studding 1½ x 3 inches, set 1 foot apart. The sheeting employed is sound, well matched ⅞-inch lumber, laid close and well nailed. This leaves a vacant space 3 x 10 inches to be filled with either sawdust or a mortar composed of seven parts sand and one part lime; cement, if that is better, or loose sand alone. The room inclosed must be free from dust for fine varnishing. I think possibly sand would leak, and I have plenty of sawdust very cheap.

Note.—We fear our correspondent will not derive altogether satisfactory results from the use of sawdust as a filling material, for the reason that it will gather dampness and in time become musty. If brick are cheap in his section he will probably find nothing better for his purpose. Lime and sand are also good, provided just enough of the lime is used to make it set and be sufficiently hard so that it will not crumble. If cost is not too much of a consideration he will probably find mineral wool a very good material for the purpose named. This is largely employed for filling in between the studding as well as between floors, on account of its sound, weather and vermin proof qualities. We, however, lay the question of our correspondent before the readers of the paper for such discussion as their experience and the interest of the subject may warrant.

Discoloration of Brick Work.

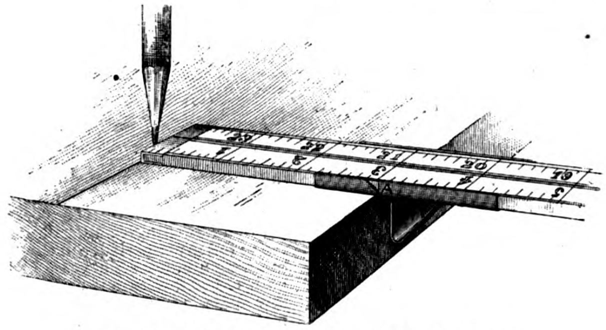
From O. P. G., *Eldora, Iowa.*—Will some one please tell me of a good way to clean pressed brick which has become discolored from the rain washing down over the rock belt course, turning the brick black and streaky? I have tried muriatic acid, but it seems to make the appearance worse than before.

Carpenters' Gauge.

[A correspondent of *The Metal Worker* contributes to that journal the following, which seems fully as interesting to the carpenter as to the tinner, and the idea, if appropriated for use, may avoid some sore fingers.]

From I. D. A., *Punxsatawney, Pa.*—Every tinner has seen a carpenter hold his finger under his rule at 2 or 6 inches, as the case required, and lay it on a board with his pencil against the end and run a mark down the board to make a line to saw to when he wanted a strip. They have also seen him stop suddenly and pick a splinter out of his finger, and both have felt that there was an annoying risk attending the use of such a gauge. Here is a gauge that can be carried in the pocket, is safe, more true than the finger, and is something with which scraps of heavy tin can be worked to a profitable advantage. To make it, take a piece of tin 2 inches long and 1⅝ inches wide. Turn up an edge at a right angle on each side and ½ inch high. In one edge

cut a triangular notch, as at A, ½ inch from the end. On the under side, just even with the upright line of the notch A, solder firmly a stop 1 inch wide. letting it run down straight ½ inch; then turn the end back for a brace and solder fast. In use, a rule is placed between the edges, with the desired measure even with the notch and held in place with the thumb, while the fingers of the left hand grasp the gauge and the rule firmly. The right hand holds a pencil at the end of the rule and a true mark can be made on rough timber with safety, as can readily be seen from the cut. The cost is so little that they can be sold for a dime with a good profit.



Carpenters' Gauge.—Sketch Submitted by "I. D. A."

Modernizing a Dwelling.

From C. T. C., *New Jersey.*—The house in which I have been living for many years was erected at a time when it was the custom to build with a French or mansard roof. This type of architecture seems to have served its purpose and in my section, at least, it is out of date. I want to modernize the exterior of the house at small expense, and without disturbing the interior any more than is absolutely necessary. Knowing that there must be many readers of the paper who have executed jobs of this kind, and who know all about the best methods, I have determined to ask their assistance in my case. I send a photograph of the house and a plan of the main floor. The attic is similarly arranged, except that the rooms are somewhat smaller, being cut off by the roof at the sides, as indicated in the sketch, Fig. 2. Now, I would like to have from the practical readers suggestions as to the best way in which this house can be modernized—that is, brought up to date, as regards its style of architecture. It seems to me this is a good subject for some of the veterans in the trade to work over during the winter evenings when they have nothing better to do.

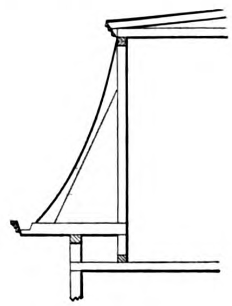


Fig. 2.—Detail of Roof Construction.

Fig. 1.—General View of Dwelling.

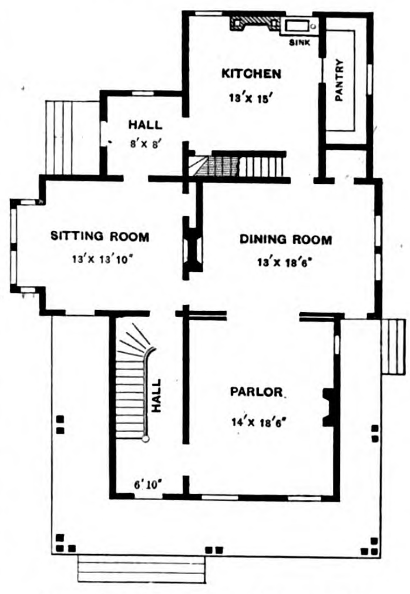


Fig. 3.—Main Floor.—Scale, 1-16 Inch to the Foot.

Modernizing a Dwelling.—Illustrations Accompanying Letter of "C. T. C.," New Jersey.

Arrangement of a Sash, Door and Blind Factory.

From A. H. F., *Charleston, S. C.*—I would like to make a suggestion which may prove interesting to other readers of the paper. As there have been many articles on stairbuilding, framing, &c., could not some one give us a letter on the arrangement and management of a large sash, door and blind factory, describing the arrangement of the machinery, the method of handling the material and the different ways in use for laying out and making sash, doors and blinds? Could not the Editor give a description of one of the leading mills in New York City?

Note.—In the back numbers of the paper some attention has been given to the subject mentioned by our correspondent, but as factories of the kind named are planned to meet specific requirements, we will give some particulars concerning an establishment in this city, and then request the readers to describe the arrangement of mills with which they are familiar. The factory we have in mind is a four-story brick structure, occupying a site 50 x 100 feet in size. The depth of the building is about 75 feet, and there is an "L" used as an engine and boiler room and separated from the main structure by a 16-inch brick wall. The cellar of the building has a 12-foot ceiling and the floor in the engine room is on a level with the cellar floor. The first floor of the main structure is occupied by a band resaw, rip saw, edging machine, cross cut saw, planing machine, general molder, sander and lathe, with plenty of room for piling and handling the lumber. The lighter machinery is placed on the second floor and consists of a jointer, tenoning machine, band and jig saws, rip saw, one cross cut saw, mortiser, friezer and grindstone. The front of the building is used for office purposes, so that it is necessary to group the machines toward the rear. The third floor is taken up by the cabinet makers and carpenters who put together and finish the work, which is carried to them from the machine floors below by means of an elevator placed at the corner of the building, and running from the basement to the top story. The arrangement is such that the finished material can be loaded direct from the elevator to the wagon, and the unfinished material from the wagon to the elevator. The only apparatus on the third floor is a steam box and glue heater, which, of course, are indispensable in an establishment of this kind. The fourth floor is devoted to the storage of molding in racks, trim and other stuff, as well as benches for the sandpaperers, the latter being at the front windows. Everything is arranged to facilitate the handling of material, and all finished stuff passes direct from the hands of the wood workers to the elevator and thence to the wagon.

It is possible that from the above our correspondent may obtain some suggestions, but, as stated at the outset, we shall be glad to have our readers in different parts of the country send us descriptions of sash, door and blind mills, showing convenient and economical arrangement, with which they are familiar.

Roofing an Ogee Tower.

From A. B. C., *Brandon, Manitoba.* —I submit to the readers of *Carpentry and Building* sketches showing method of laying out the hip rafter and also the sheeting for an ogee roof. I have built several towers according to this method and find it absolutely correct. Referring to the sketches, A B E of Fig. 1 represents the common rafter and the elevation from which we are to work. Next, lay down the common rafter as shown by A B E of Fig. 2. Divide the line B E into as many parts as may be necessary, and at each point erect perpendiculars parallel to A B, extending the lines across to the diagonal B D, which is the run of the hip rafter. Next, draw the lines from each of these points on B D, extending them at right angles to it. Set off the rise of the hip B D the same length as A B, the common rafter. Transfer length of each line on the common rafter A B E to the hip B C D. and through these points trace the curve B D. Lay out for the roof sheeting by drawing lines parallel to B E from each point on B D. Transfer the lengths between each number on the curve A E to the line E F, and from each of these points draw lines parallel to E D. Then trace the curve line D F through the intersecting lines E D and E F, which gives the correct shape of the sheeting.

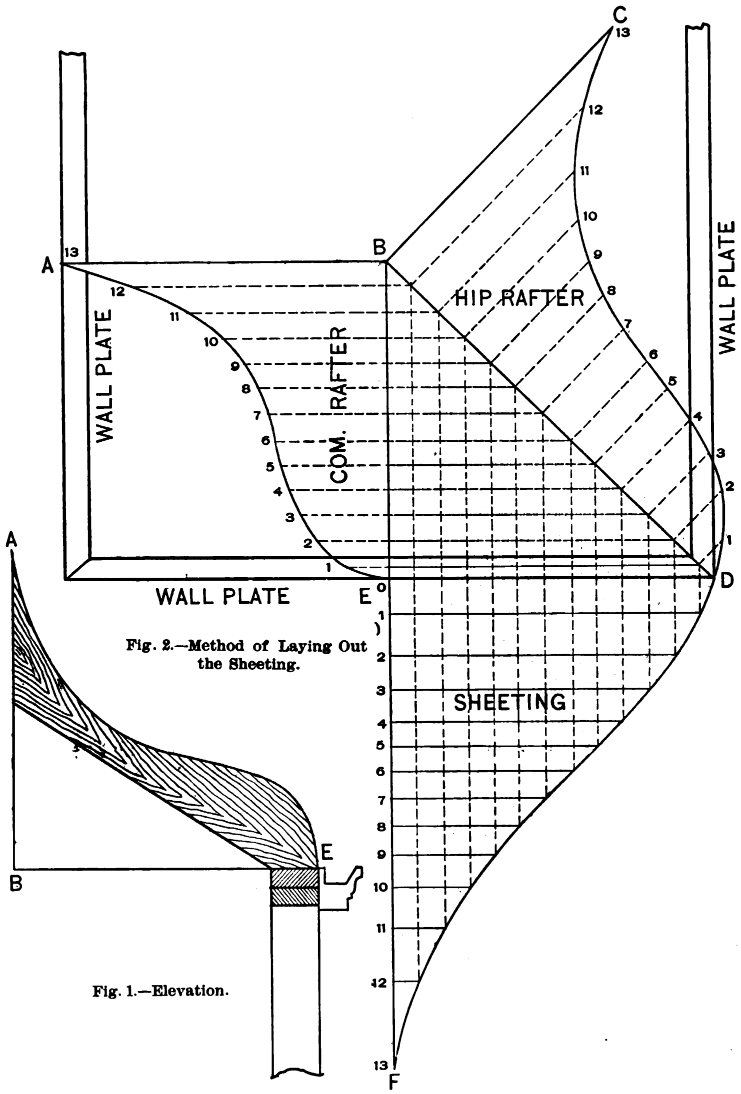


Fig. 2.—Method of Laying Out the Sheeting.

Fig. 1.—Elevation.

Roofing an Ogee Tower.—Sketches Submitted by "A. B. C."

Cut vs. Wire Nails.

From F. K., *Louisburg, Wis.*—I am a constant reader of *Carpentry and Building*, and am very much interested in the wire and cut nail question. The correspondent signing himself "B. F. M." says that about seven years is the life of a cut shingle nail. Please allow me to tell my experience in this line. In building a house some years ago I used both cut and wire nails. There were a few nails left after the job was completed, and the owner put them all together in a nail keg and set them outside of the house. The nails stood in the keg for a few weeks, during which time the rain fell on them and the children put some dirt in the keg and stood it away under a granary. A few years later I had occasion to do some work for the same man and happened to find the keg containing the nails. I examined them with considerable interest and found the wire nails about half eaten through with rust, while the cut nails were only rusted a little on the outside surface, being almost as good as new. I have taken shingles from roofs which were laid with 4-penny cut nails fully 40 years ago, and when the shingles were taken off the nails were in good condition. Another advantage which, in my opinion, the cut nail has over the wire nail is that in winter time it is practically impossible to use wire nails, for the reason that they split the wood when it is frozen. This the cut nail will not do. I therefore say, if a man wants a job that will endure for a long time he should use a good cut nail.

A Noisy Roof.

The roof of the new Thirteenth Regiment Armory in Brooklyn, N. Y., seems to be the source of a great deal of complaint on the part of those living in the neighborhood. The roof is a large one, and when a strong wind is blowing, the tin, which is used as a covering for the building, rattles and roars in a manner strongly suggestive of stage thunder. One of the New York dailies, in referring to the matter, stated that a few weeks ago there was a violent wind one night which caused the big roof to emit a series of most unearthly sounds, driving slumber from the eyes of people living in the neighborhood. A builder living near the armory said that he was unable to account for these performances unless there was something wrong in the way the tin was put on. As to its quality he knew nothing. It seemed to be put on, however, in an entirely new way, which he had observed with interest. Since the wind got under it and shook it so violently he was inclined to think that the new method was not a success.

THE big bronze statue of William Penn that has been standing for the past two years in the courtyard of the public buildings, at Philadelphia, awaiting transfer to its lofty perch on the summit of the City Hall tower, has been taken to pieces and hoisted to the top of the dome, where the work of assembling and fixing it in place will be carried out at once. The statue will stand 542 feet above the ground.

METHODS OF HANDRAILING.*

BY J. V. H. SECOR.

THE SKELETON BOX AND SOLID SYSTEM.

THIS system, in my estimation, has done more to enlighten men on the science of handrailing than any thing else, for it combines all the elements of the art, as it were, in a nutshell. He who can utilize this in the simplest way, giving the reasons therefor as well as the use of each line without employing the blocks in practice, has reached the summit of the art.

The solids used in connection with a face mold are made to conform with the tangents in plan, as shown in Fig. 38. The pitch for the tangents is marked and sawed off, the surface thus made being called the plane. This is then turned down on a board from which the mold is to be cut, thus giving the tangents. Locate the joints and square from the tangent; the curve line can be drawn with the string or the intersection of lines. The bevels are found by squaring over the angle and setting a bevel to fit, as at A A, Fig. 39. In connection with the solids was what is called the skeleton box. This consisted of two pieces of board fastened at the angle to conform to the plan and used the same as the solids, giving similar results. Through this system the surface drawing was developed. Some authors will not admit this, but rather claim it to be the result of much study and testing of lines. The chief points were taken from Nicholson, but the solids gave illustrations which it would be useless to deny. Moreover, were it not for the solids there would never have been a surface system, and we should to-day be plodding on in the same old way of plumb cuts and the falling mold; and all intelligent minds familiar with the subject must admit this. The following is taken from a recently published work: "For these matters should not

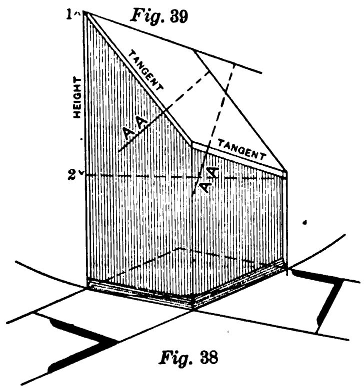


Fig. 38.—The Box Applied to the Plan, the Hight Being Taken at 1 2.

Fig. 39.—Top of the Box Cut Off, Showing the Tangents and Bevels as Found by Squaring Over the Angle, as at A A.

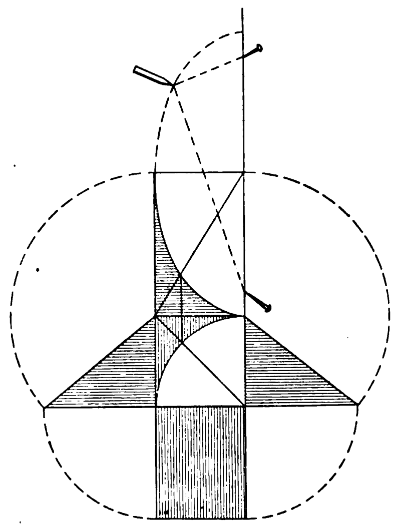


Fig. 40.—A Right Angle Base with Rake and Level Tangents, the Curve Line Being Drawn with a String.

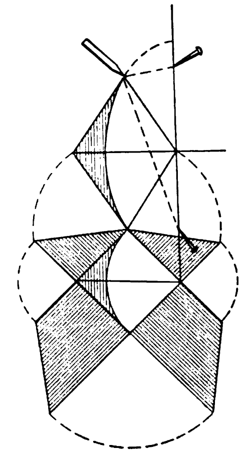


Fig. 43.—A Right Angle Base with Tangents of Equal Pitch.

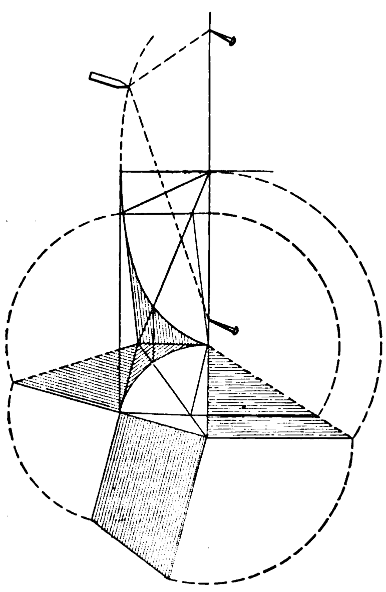


Fig. 41.—An Obtuse Angle Base with Rake and Level Tangents.

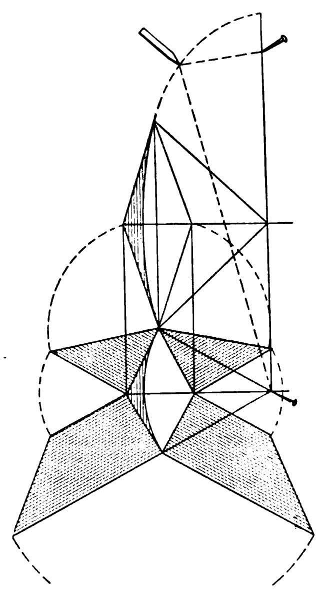


Fig. 44.—An Obtuse Angle Base with Tangents of Equal Pitch.

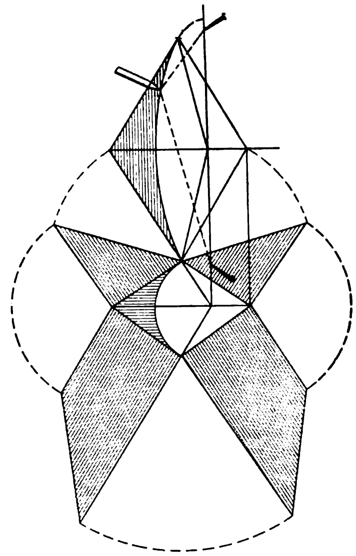
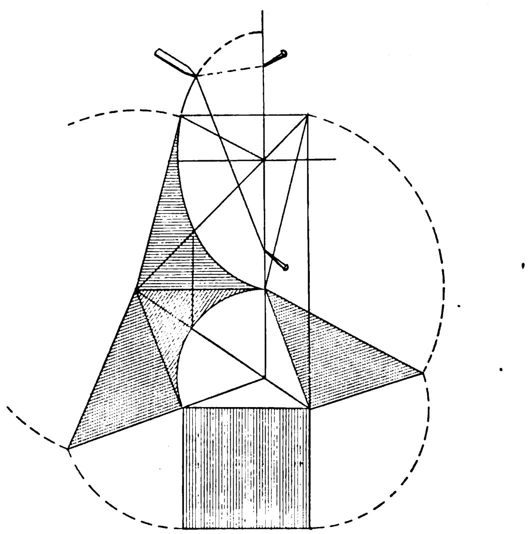


Fig. 45.—An Acute Angle Base with Tangents of Equal Pitch.

Methods of Handrailing.—The Skeleton Box and Solid System.

* Continued from page 283, December issue.

be subject to arbitrary rules, but conducted on general principles, and the mind that cannot break itself loose from rules, after being well stored with general principles, must be barren indeed; for genius is but the natural strength of the soul, subdued and



Methods of Handrailing.—Fig. 42.—An Acute Angle Base with Rake and Level Tangents.

harmonized by facts until reason is enthroned."

(*To be continued.*)

Law in the Building Trades.

Party Walls.

A party wall is a wall on the division line of estates, which each proprietor is at liberty to use as a support to his building. When such a wall stands in part on the land of each it is presumed to be owned by the two, unless the contrary is shown. At the common law no person was under obligation to unite with his neighbor in building a party wall, or even to furnish his proportion of the land for it to stand upon; but an erection might be made a party wall by agreement, and if one person allowed another to make use of his wall for the support of a building, and to continue the use for 20 years, the grant of a right to do so was presumed, and the wall became a party wall by prescription. The inconveniences of the common law rule have been obviated to some extent by statutes which permit a proprietor to build into his neighbor's wall for the support of his own building, provided the wall is sufficient for the purpose, on making payment of the just proportion of the cost. These statutes establish the rule of the civil law. Where a party wall is built by agreement, the strict rule of law requires a deed, but if the agreement was by parol only, the case would be a very strong one for the application of the doctrine of equitable estoppel, and no doubt a dissatisfied proprietor would be enjoined from repudiating the arrangement and interfering with his neighbor's enjoyment of the wall as a party wall afterward. If one erects a block of houses or shops, and then conveys them separately to purchasers, the walls between them become party walls for the mutual benefit. Where a party wall exists each proprietor has an easement in the land of the other for its use, repair and support; but the extent of his rights may be limited by the contract between them with respect to the wall, or by the user or by the statute under which it was built or is owned. Rights in party walls pass with the land to heirs or assignees without being specially mentioned in the conveyance. Each proprietor owes to the other the duty to do nothing that shall weaken or endanger it, and though each may rightfully, when he finds it for his interests to do so, increase its hight, sink the foundations deeper, or on his own side add to it, yet it seems that in doing so he is insurer against damages to the other proprietor. If the wall becomes ruinous and ceases to answer the purposes of support, the easement is at an end, and each proprietor may build as he pleases upon his own land without any obligation to accommodate the other.

Removal of a Building.

The Supreme Court of Pennsylvania holds that where a building is necessarily moved back the jury cannot consider the condition of the property in the rear of the building to determine the cost of restoring it to its former condition, independent of the value of the property taken.—Larkin *vs.* City of Scranton, 29 At. Rep., 910.

Modification of Contracts.

In an action to recover on a contract to make an excavation at an agreed price, where it appears that the character of the soil could be seen within a few feet of where the contractor had to go, and that he had examined it before taking the contract, proof that after work was commenced it was found more difficult than was supposed, resting alone on the testimony of those interested in increasing the pay, and disputed by a preponderance, in part from disinterested witnesses, is sufficient to show consideration to uphold a promise to pay additional price. —Casteron *vs.* McIntyre, Superior Court of Buffalo, 28 New York Supp., 801.

Action for Balance Due on Building Contract.

In an action to recover a balance due on a building contract which provided that one was to contract for the building in all its details with the greatest economy, and charge everything at its exact cost, it appeared that there was no limitation therein that the cost should not exceed any certain sum. A memorandum annexed to the contract contained a list of work and materials, and there were sums set opposite the items which aggregate the amount to which the cost was limited. It purported to be, and the contractor testified that it was, an estimate only, and the finding of the referee that the cost was not limited to the amount shown on the estimate was supported by the evidence. The contractor testified to the cost in gross and in detail and produced vouchers. Bills amounting to nearly two-thirds the total sum were supported by the evidence of the parties, showing that they were reasonable and just. He gave the owner vouchers for each bill. In the absence of proof that the articles were not delivered, a finding for the contractor was supported by the evidence, though he did not personally know that each article was furnished or that each day's work was done.—Blazo *vs.* Gill, Supreme Court of New York, 28 N. Y. Supp., 373.

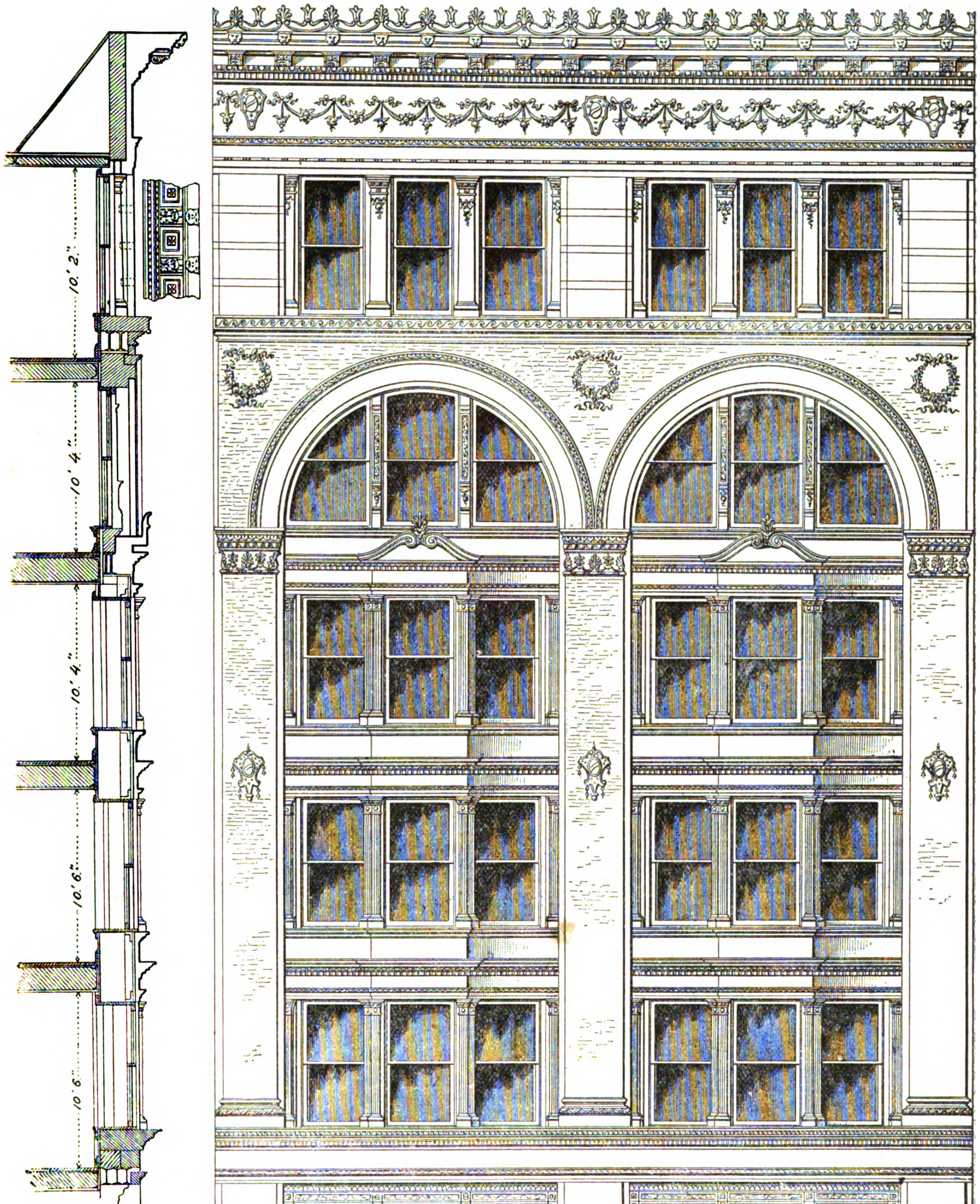
Penalty for Delay in Completing Contract.

The Court of Civil Appeals of Texas holds that in an action on a building contract providing for payment on acceptance by the architect and imposing a penalty of $5 per day for delay in completion of the work, an instruction to find for the contractor at the contract price if the architect accepted the building on June 30 is correct, though the contract calls for completion on January 1, as the contract price is the agreed sum, less the proper deductions for delay. Johnson *vs.* White, Court of Civil Appeals of Texas, 27 S. W. Rep., 174.

SHEET METAL IN BUILDING CONSTRUCTION.

THE employment of sheet metal in the fronts of buildings designed for business as well as dwelling purposes has grown so rapidly during the past few years as to form at the present time a marked feature of the external treatment of structures in many of the cities of the country. This increasing use is due, no doubt, in some measure to the fact that sheet metal permits of ready ornamentation at comparatively small cost, and also constitutes in itself a light form of construction, while at the same time giving bold and massive effects to the completed work. A striking example of work involving the use of copper and galvanized iron in the manner mentioned is found in a building now rapidly approaching completion on East Houston street, New York City. The front of the structure, which is seven stories in hight, is divided above the second floor by a brick pilaster into two triple window bays, the exterior of the bays being covered with 20-ounce copper. The object in view has been to produce rich and massive effects with a light form of construction and in this the concern doing the work, Borkel & Debevoise of 42–44 East Houston street, New York City, have been very successful. The illustrations which we print herewith represent the front of the structure above the second

story, while the section shows the profiles of the copper work at the various stories, together with the appearance of pleasing manner. As stated above, the two bays extend upward for a distance of three stories, and are topped with work which is moored to a rough brick backing. The whole treatment of the front is harmonious, giving to the build-



Section.

Front Elevation of Business Block on East Houston Street, New York City.—Scale, ⅛ Inch to the Foot.

Sheet Metal in Building Construction.—George H. Griebel, Architect, New York City.

the soffit of the cornice. Inspection of the front elevation shows the pilasters dividing the windows of each bay to be fluted, while the cornice of the windows at the different stories is enriched in a broken pediments. The story immediately above the bays is finished in the form of two semicircular arches, which carry the weight of the upper story. The copper is fastened to an iron frame ing a rich and substantial appearance. The architect of the structure is George H. Griebel, of 247 West One Hundred and Twenty-fifth street, New York, who prepared the plans for Emil Unger.

Designs for Cabinet Workers.

Among the readers of the paper there are doubtless many who are interested in attractive specimens of cabinet work, and who often employ their leisure hours in turning their hands to jobs of this kind. Designs offering suggestions, or which may be more or less closely followed in the production of furniture, as well as articles of house adornment, are always valuable to studious mechanics, and they will therefore find interesting the specimens of cabinet work which are here illustrated. The engravings are reproduced from the *Building News*, and represent English and German types of furniture. In Fig. 1 is shown a Renaissance cupboard, architectural in form, and treated with columns resting on bases and crowned with entablatures. The intercolumniations, friezes, spandrels, &c., are richly carved with the allegorical subjects affected by foreign workers of the seventeenth century. Fig. 2 of the illustrations represents a fine example of German chest, it being thoroughly Gothic in style, with traceried panels ornamenting very nearly the entire front surface. The change in ornamentation of the upper and lower portions is somewhat singular in its want of system, although this very thing not only prevents a monotonous appearance, but even adds interest to it. The Jacobean cabinet shown in Fig. 3 is constructed of oak and ebony, and is thoroughly typical of the period.

THE interior finish of the new Planters' Hotel, at St. Louis, Mo., reference to which was made in these columns not long since, embraces about all of the popular hard woods, the finish on each floor being different, and furnishing an excellent example of the possibilities of hard wood as a house material. On the first floor all the wood work is white mahogany. On the second floor birch with ivory finish prevails, and on the third floor antique mahogany is used. On the fourth floor the finish is antique oak, on the fifth natural oak, on the sixth mahogany finished in light shade, on the seventh cherry, on the eighth white maple, on the ninth sycamore, and on the tenth birch.

Paint for Metallic Surfaces.

At the recent meeting of the American Society of Mechanical Engineers a discussion was held on the preservative painting of metals, in the course of which M. P. Wood stated that graphite mixed with pure linseed oil, boiled, to which a small percentage of litharge, red lead, manganese, or other metallic salt has been added at the time of boiling to aid in its oxidation, forms a most effective paint for metallic surfaces, as well as for wood and fiber; and some recent experiments with such paint applied to boiler tubes show it to be very effective in preventing the formation of scale. He commends the system of requiring all iron and steel intended for structural uses to be pickled and cleansed from mill scale, declaring it to be an absolutely indispensable condition for all material of the kind intended to be preserved from rust by painting, and it should then be painted two coats with pure raw linseed oil and red lead, after which the metal will stand the weather for 50 years without further treatment. A gallon of good red lead paint contains 5 pounds of oil and 18 pounds of red lead, and it will cover for a first coat about 500 square feet, and as a second coat about 600 square feet.

The Passing of Red Brick.

In no department of human industry, says the Washington *Post*, has there been greater evolution of late years than in the business of making bricks. Formerly we had nothing but old fashioned red brick that reached its climax of perfection at Philadelphia, and was shipped thence at great expense all over the country where a high grade article was in demand. But the red brick has had its day for architectural use, and in its place has come to stay the brick of lighter hue—pink, buff, yellow, and in fact of nearly every shade.

A brick can be made that is as mottled as a sea gull's egg, or one that will show the various tints of an autumn leaf. It is done by adding certain metallic ingredients to the clay after the latter has been ground to the finest powder. It is the iron in the clay that gives the ordinary brick its deep red. In future most of our city residences are going to be constructed from brick of these pleasing colors. They give relief to the eye and variety. What can be more monotonous than a row of red brick houses? Washington is taking to the new style, and in this clear atmosphere, unspoiled by the soot from soft coal combustion, a house of this beautiful material will stand fresh for a century and be solid years after one made of granite had disintegrated.

Fig. 3.—A Jacobean Cabinet.

Fig. 1.—A Renaissance Cupboard.

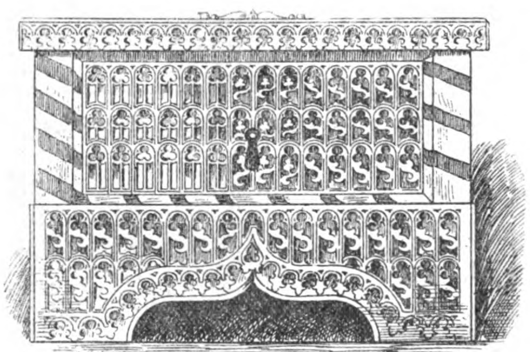


Fig. 2.—A German Chest.

Designs for Cabinet Workers.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President, Noble H. Creager of Baltimore.

First vice-president, C. A. Rupp of Buffalo.

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

LIST OF DIRECTORS.

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Arthur McAllister	Cleveland.
Alex. Chapoton	Detroit.
Geo. W. Stanley	Indianapolis.
E. S. Foss	Lowell.
J. S. Pool	Lynn.
H. J. Sullivan	Milwaukee.
Geo. Cook	Minneapolis.
Stephen M. Wright	New York City.
J. Walter Phelps	Omaha.
Stacy Reeves	Philadelphia.
Wm. H. Scott	Portland.
Thomas B. Ross	Providence.
H. H. Edgerton	Rochester.
Wm. J. Baker	St. Louis.
Geo. J. Grant	St. Paul.
Luther H. Merrick	Syracuse.
A. S. Reed	Wilmington.
Chas. A. Vaughn	Worcester.

Hard Times and the Exchange.

The experience of the past year has demonstrated anew the fact that the possibilities for mutual benefit which lie in organization are very little understood by builders. Instead of standing together in times of business depression, when the need for mutual support is the greatest, and the benefits of organization most apparent and available, builders are most apt to separate their individual interests from those of their fellow builders, thinking thereby to improve their own condition irrespective of the others; or, in other words, at the expense of the others. In times of business depression harmonious action is most needed, for at such a time, when the strength of the individual builder is weakened, everything that tends to destroy the unity of the whole community of builders weakens just so much the position of every individual. When one builder breaks away from the position made strong by the many he does not improve his own condition and makes the strength of the rest just so much less to resist the attack of depression. The man who leaves the ranks to act upon his "own hook" thinks he gains thereby, because he may secure temporary increase of business, but it is clear that his benefit is only imaginary, for all the rest immediately set about protecting themselves against his action, and he finds his benefit gone, because he has made every other builder his avowed competitor, and the only result of his action is that he has imbittered competition, lowered the standard of the whole fraternity and reduced his profit on the business thus gained, which might have been his in any event if he had not broken away. When one member of a fraternity weakens his own position he weakens the position of all the rest, for they are by his action required not only to do his share in keeping up the standard, but are compelled to combat the tendency to reduce the standard caused by his defection.

PERSONAL BENEFITS.

Many of the builders' exchanges throughout the country show plainly the effect of the failure of their members to understand the importance and actual personal benefit of standing together. Reports from secretaries of many of the newer exchanges show that their organizations are practically valueless because of the failure of the members to stand together. Gradually, one after another, the members have drifted away until the building community is entirely without a center, and is virtually at the mercy of any one who chooses to dictate terms or conditions. The fallacy of permitting such a situation to exist is plain; there is only so much business to be done in the community anyway, and it is self evident that it is better to secure that business under fair and profitable conditions than to so scatter the strength of the fraternity that this same amount of business will be done under the most irksome conditions and at greatly cut and underbid prices. A builders' exchange offers the means for holding the builders of a given locality together, and affords an opportunity for protecting interests that are common to all, and so binding the whole fraternity together that no business depression or other adverse condition can alter the fairness of competition or the just methods of conducting business, even though these causes may restrict the amount. A number of builders' exchanges which have almost disintegrated during the year attribute their present state to "hard times." However this may seem, "hard times" is not the cause of the failure to sustain these exchanges, for an exchange is based upon the need of mutual protection and improvement of the conditions surrounding the builder and it is hardly fair to attribute the cause of failure to "protect and improve" in a time when such action is, of all times, most necessary to the times themselves. The true cause is, that the members prefer not to "protect and improve," believing that they can better their own condition by abandoning the exchange and its effort to stem the effect of the "hard times."

VALUE OF ASSOCIATED EFFORTS.

Hard times implies a condition of affairs in which the volume of business shrinks and capital (generally speaking) is loath to seek investment. With the decrease in the volume of business capitalists are aware that builders are anxious to obtain contracts, and, naturally, seek to have their work done as cheaply as possible. This fact makes competition more keen, and the more clearly demonstrates the need of adherence, by the builder, to the methods of competition approved by his fellows. It is by standing fast, at such times as these, that the value of associated efforts is proven and the best possible results obtained from adverse conditions. If the organization breaks down under the strain, it is not the fault of the times but of the members, who fail to comprehend that what affects one affects all, whether it be for good or bad.

The time when an exchange should be the strongest is when its members are assailed by some common condition, for it is then that it proves its benefit. If the defection of the members overthrows an exchange at such a time, the principle that there is strength in numbers is not assailed, but the fact that the members did not know the value of their organization is proved.

To Local Secretaries.

Secretaries of the local exchanges are requested to forward to the National Secretary summaries of their annual reports to their various exchanges, giving as fully as possible the events of the year just past. As full information as possible is desirable in order that the National Secretary may prepare a comprehensive report of the condition of the filial bodies. These reports should be forwarded as soon as possible. Particular reference should be made to any action looking to the adoption of any of the recommendations advocated by the National Association, the use of the Uniform Contract, the establishment and operation of codes of practice, &c.

Andrew J Campbell.

The members of the local exchanges will learn with regret of the recent death of Andrew J. Campbell of New York City. Mr. Campbell was for a long time an active member of the Mechanics and Traders' Exchange of New York City and had attended and taken active part in all of the conventions of the National Association of Builders. Mr. Campbell was born in Newark, N. J., 65 years ago. He was proprietor of the West Side Architectural Iron Works, and was noted for his energy, broad gauge views, and charity. In 1856 he was elected a councilman of New York City, then Deputy Tax Commissioner, and in 1863 he was appointed clerk of the Third District Civil Court. He was president of the Building Trades Club, and had been a member of the State Legislature from the Ninth District. He was elected to the United States Congress from the same district at the last election in November. His death was occasioned by an acute attack of Bright's disease, he being ill only a few days. Mr. Campbell's death will be severely felt by the exchange and by the Building Trades Club, in both of which organizations he was an active factor for progress, and harmonious relationships between employers and workmen.

New Y. M. C. A. Building.

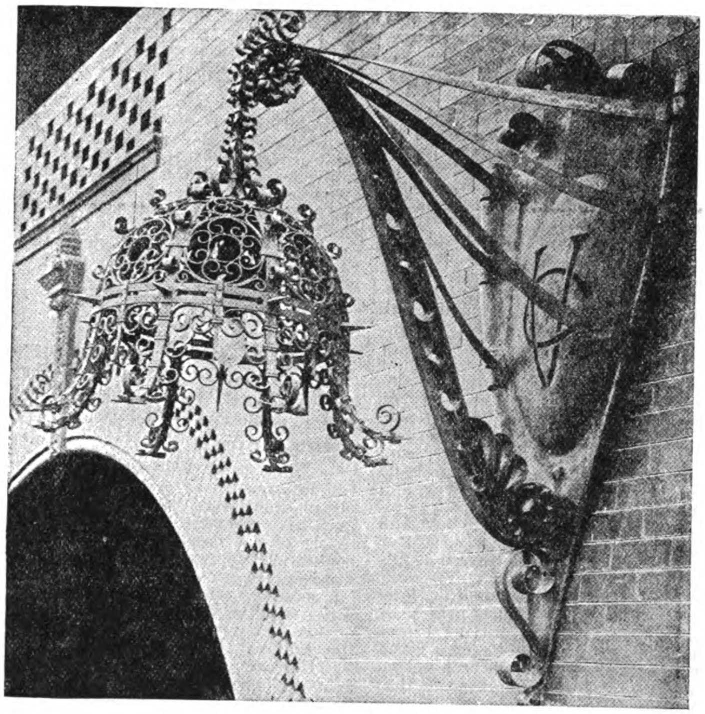
The Young Men's Christian Association has in contemplation early in the spring the erection of a building which will cost in the neighborhood of $500,000, to be located in Fifty-sixth street, between Eighth and Ninth avenues, New York City. It will have a frontage of 75 feet each on both Fifty-sixth and Fifty-seventh streets. The building will be six stories in hight, with the main entrance in Fifty-seventh street. In the basement will be the bowling alleys, bicycle room, shower baths, swimming tank, lockers, &c. On the first floor will be the reception room and gymnasium of the boys' department. On the second floor will be a lecture room, on the third and fourth floors studios and classrooms, while on the fifth floor will be studios, smoking room, dining room and kitchen. The gymnasium proper will occupy the top floor and will be 52 x 107 feet. There will also be a large reading room and space for over 80,000 volumes, the greater part of which will consist of the library at present located in the building of the association at Fourth avenue and Twenty-third street.

Wages of Labor.

United States Labor Commissioner Carroll D. Wright has lately presented some interesting figures showing the changes that have taken place in the wages of labor in the past half century, which exhibit a remarkable improvement in the condition of the wage earner during that period. He shows that wages were much higher and the cost of living materially lower in 1892 than they were 50 years before. Thus laborers in a New York brewery received 62½ cents a day in 1840, 84 cents a day in 1860, $1.30 a day in 1866, and from $1.50 to $2 a day in 1891. Carpenters earned from $1 25 to $1.62 per day of ten hours in 1840, about the same in 1860, and from $3 to $3.25 per day of eight hours in 1891. Wheelwrights received $1.25 per day in 1840, the same in 1860, $2 in 1866, and $2.50 in 1891. Cotton weavers were paid 62 cents per day in 1840, only 54½ cents in 1860, 85 cents to 90 cents in 1866, and $1.05 in 1891. Wool spinners received something under $1 per day in 1840, $1.05 in 1860, $1.80 in 1866, and $1.38 to $1.75 in 1891.

Electric Hanging Lamp.

We here illustrate an electric hanging lamp made for the Union Club of St. Louis by the Ludlow Saylor Wire Company of that city. This lamp is made of wrought iron and given the Bower-Barff finish, which renders it absolutely rust proof. The design of the lamp was furnished by the architect, T. C. Link.



Electric Hanging Lamp.—T. C. Link, Architect.

Cleveland Architectural Club.

The Cleveland Architectural Club was organized in the city of Cleveland, Ohio, on the evening of November 22 with a charter membership of 15. The secretary, Herbert B. Briggs of 40 Blackstone Building, in his announcement of the fact states that the study of architecture and the allied arts will be the obj-ct of the club and that any one interested in this study is eligible for membership. Regular meetings will be held on the first and third Thursday evening of each month, the last meeting of the month being for competitions. The officers are: President, John W. Russell; vice-president, Harry S. Nelson; secretary, Herbert B. Briggs; librarian, B. S. Hubbell; treasurer, E. E. Noble. Members of the Executive Board: W. D. Bents and Wilbur M. Hall. The above, with Robert Allen, Frederick Baird, G. B. Bohm, P. G. Griffin, Williard Hirsh, Ray Rice, C. S. Schneider and Albert E. Skeel, compose the charter membership.

THE system of co-operative building associations has taken very firm root in Pennsylvania. According to the latest returns 250 of these associations have been chartered in the State since June, 1891, and the whole number is now stated to be 1239. The membership is 272 580; cash income in one year is $44,432,686, and the assets, $103,948,364. These assets represent the accumulation of an average period of about seven years, and it is estimated that in the last 10 or 12 years another $100,000,000 has been returned to the members in cash and redeemed mortgages, and nearly 100,000 homes have been secured through these societies.

CONTENTS.

COTTAGE ERECTED FOR W. O. SHARP IN CARTHAGE, ILL.
GEORGE W. PAYNE & SON, ARCHITECTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

96-102 READE STREET, NEW YORK.

FEBRUARY, 1895.

Building Operations in 1894.

The returns of the Department of Buildings of the City of New York for the year ending December 31, 1894, present an interesting study, showing, as they do, the variety of buildings for which plans and specifications were filed, and also the amounts involved in their erection. Considering the extreme business depression during the twelve months covered by these returns, and the gloomy outlook at the beginning of last year, the figures cannot fail to be regarded as better than generally expected. True it is that the total valuation of building operations for 1894 falls a little short of 1893, but on the other hand, the number of plans filed with the department shows an increase of several hundred, which brings the average cost per building considerably lower than for 1893, when it was the highest on record. The returns of the Department of Buildings show that during the past year 2583 structures were planned, to cost $51,678,997, as against 2284 buildings, costing $54,-859,318, in 1893. Considering first the private dwellings, we find that there were 1149 for which plans and specifications were filed, estimated to cost $10,981,095, this being an increase over 1893 in the number of dwellings projected, but representing a slight decrease in the valuation. Of flats and tenements there were 777 projected in 1894, calling for an expenditure of $18,020,500, while for hotels, stores, churches and school houses 181 permits were granted, the amount involved being $9,759,945. The number of office buildings planned last year was 21, being just half the number in 1893, but costing nearly the same. Of workshops and manufactories there were 88 projected last year, estimated to cost $3,899,550, while in 1893 there were 141 projected, estimated to cost $3,296,400. The plans filed for miscellaneous buildings, stables, &c., numbered 367, calling for an outlay of $2,944,757. Of this number 19 were for places of amusement, estimated to cost $1,373,700. The plans and specifications for alterations to buildings filed and acted upon by the Department during the past year numbered 1902, estimated to cost $4,888,610. These latter figures as compared with 1893 show a heavy decrease, especially in the amount of money involved.

The Passing of the Depression.

The New Year starts out with many evidences of improvement as compared with 1894. The most important of these is the increased employment now being given to workingmen. A year ago "the army of the unemployed" was a significant phrase, as every community had its contingent of idle men, who were so numerous and so necessitous that their existence was a menace to the public peace. Thrifty and industrious men, who had scarcely known a day of enforced idleness, found themselves utterly unable to secure work at any rate of wages and were compelled to subsist on charity. The public soup house was for the time a national institution. But since then a very great change has occurred. Disheartened business men and discouraged manufacturers have made a fresh attempt to do something and have gradually brought about a much more active condition of general trade. Thus idle workingmen have again been furnished with employment, and few localities can now be found with any considerable number of unemployed, except from choice. Charitable organizations are continued, as they are needed in even the most prosperous times, but the class of people dependent on them is wholly unlike that of last winter.

Employment of Labor.

The distinct gain that has been made in this respect, which is of prime importance to the welfare of the nation, is apt to be overlooked in the dissatisfaction felt at the unprofitableness of business. But it shows that a very great stride has been taken in the direction of a complete recovery from the depression. The masses of the people must be employed to insure consumption of goods, and all sorts of products must be freely consumed to keep the wheels of commerce moving. The influences which dominate business are now moving in the right way, and will necessarily continue to gather strength as they so move. The employment of additional men in one branch of industry enables more to be employed in other branches. That this movement is proceeding very satisfactorily is shown conspicuously in some instances which are, of course, exceptional. One of these, which happens to be in mind at the instant, is that of a large manufacturing concern, perhaps the most extensive in the country in its line, which had just completed an important addition to its plant when the panic of 1893 set in. The works were run with a light force for the remainder of the year and for the greater part of 1894, the new part being wholly unused from its completion. At the present time the entire establishment is running, including the new part, and the force of workmen employed is greater than ever before.

Progress at Home.

It is a fact to be regretted that economists in writing upon and otherwise dealing with the question of how differences should be adjusted between employers and workmen seem to be ignorant of the practical work already done in this country. In referring to examples of the practicability of arbitration, foreign methods are almost invariably quoted in such a manner as to give the impression that foreign countries alone have put in operation plans whereby the interests of the two may be clearly defined and adopted. The plan of arbitration formulated in England by Mr. Mundella and somewhat amended by Mr. Kettle is frequently mentioned, but rarely, if ever, is reference made to the fact that there is an equally good if not superior method in operation in this country. The National Association of Builders has prepared and advocates the use of a form of arbitration specific in its character and so constructed as to be applicable to the affairs of employers and workmen in any branch of that relationship, although intended more particularly for adoption in the building trades. This form comprehends all the features of the system mentioned, with certain changes and eliminations calculated to make it more practically operative, and to assist at its establishment and availability. As frequently announced in these columns, the most satisfactory results have been obtained in every case where it has been adopted. The effect of continual reference to methods in use in foreign countries is to give an entirely wrong impression regarding the amount of practical work done right here at home. Those not thoroughly familiar with this subject are by this habit led to suppose that American employers and workmen are very much behind the times in treating with this vital question; while as a matter of fact quite as much study and practical progress are being made daily in our own country as in any other.

New Wool Exchange.

The results of efforts which were commenced over a year and a half ago, looking to the founding in New York City of a wool exchange, are seen in the structure now in progress of erection in the lower west side of the city. The building, designed by William B. Tubby, covers an area of about 15,000 square feet, and is bound on three sides by St. John's lane, Beach street and West Broadway. The structure when finished will be eleven stories in hight, the three lower ones being in granite, while those above will be of brick with trimmings of Indiana limestone. The cost is estimated at about $1,000,000. The intention is to have under one roof an immense storage warehouse for wool, a bank that will be primarily connected with wool and woolen interests, the Wool Exchange, a members' club and a large number of offices. The storage room is to have a capacity for 25,000,000 pounds of wool. The Wool Exchange and the bank will occupy the first floor, while the club will use the top floor, which has an area of 12,000 square feet. Work on the building was commenced last August, the intention being that the structure would be ready for occupancy by the first of February of this year. Unfavorable weather, however, has so retarded operations that the date of opening has been postponed to May 1. The builders of the structure are the New York Wool Warehouse Company, which were incorporated in July 1893.

Building Trades Exhibition.

The International Building Trades Exhibition will be held this year in Royal Agricultural Hall, Islington, London, England, from March 25 to April 4. This exhibition is for the purpose of making a representative display of materials and appliances connected with the building trades. Among the subjects specially mentioned by the International Building Trades Exhibition Company of 222 Strand, London, W. C., are brick and tile making, iron work, pottery, terra cotta, wood work, ventilation, heating, sanitary ware, decoration and paving. We understand that all branches of the building trades in London are co-operating in the movement, and it is expected that the display to be held in April next will prove as pronounced a success as the one last held under the auspices of the company named. The consultative council, consisting of gentlemen of high repute in the professional and manufacturing world, are taking special interest in this exhibition for the purpose of securing a greater development of trade in connection with the building industry.

Comfortable Temperature.

In the heating of any building in which persons of various ages and temperaments, conditions of health and home surroundings are congregated, there will always be found a considerable difference of opinion as to the most comfortable temperature. The young, healthy and vigorous may find a temperature of 68° as comfortable as the old and feeble find one of 75°. Just how to meet these diverse conditions and opinions is one of the most serious questions presented to the heating engineer. It is stated that the National House of Representatives is the most difficult room in the United States to heat. There are gathered men from North and South, men brought up under the most varied conditions, and, above all, men who have the right to call the attention of the House to any discomfort of their own and thereby make it the more pronounced. Public opinion, however, seems to accept 70° as a fair average against which no one should complain. The effect of lower temperatures may be easily studied in a crowded theater without personal conversation with the audience. At a temperature of 66° to 67° a few will be noticed as throwing coats or cloaks over their shoulders. At 65° the practice becomes quite general, while at 62° to 63° the general discomfort becomes decidedly evident and its continuance or a still further drop in the temperature is likely to result in unpleasant complaints at the manager's office. In an ordinary theater, completely filled, the animal heat of the audience is sufficient to raise the temperature of the room 6° above the normal—70°. It therefore becomes necessary to admit the air at least 6° lower in temperature than would be the case were the theater empty. When it is warm outside this means a reduction of the entering temperature to 64° or 65° and consequently the greatest care in the introduction of this air so as to avoid drafts or the placing of a person in an atmosphere which has only this low temperature. The most complete subdivision of the air supply is then absolutely necessary to success.

Moving a Brick Dwelling.

We have referred at intervals in the past to novel methods of moving buildings, as well as to the fact that heavy brick and frame structures have been successfully carried from their original foundations to sites some distance away. Another case which comes to our notice is that of the moving of a brick residence, which was not only set back a distance of 60 feet, but was carried sideways 6 feet and then raised up so as to allow an additional story beneath it. The job was done in Knoxville, T-nn., and is described in a very interesting manner by J. A. Reep in a late issue of the *Clay Worker*. From the description there presented we take the following:

The house was two stories and an attic, with a square observatory or tower in the angle, containing in all 12 rooms. It was a modern built house with bathrooms on both floors, pantries, closets, halls, &c., covered with a slate roof. There were also two large brick chimneys in the middle portion of the building with fire places, mantels and grates. The house was 32 x 50 feet in its dimensions, with veranda in the angle. Part of the veranda across the front was removed to facilitate the work.

The estimated weight of the house and contents was 176 tons and required 68,000 feet of timber as shores and foundation sills to carry the structure into place. The building originally stood about 5 feet above the sidewalk. The gentleman in charge of the work raised the house from its foundations with jack screws and placed it upon a solid foundation of heavy timbers with rollers under it. He then moved it back by another system of jack screws; all worked simultaneously, the whole moving by whistle signals.

The building was moved back, in this way, a distance of 60 feet. It was reloaded on another set of timbers, and carried sidewise 6 feet, then it was raised up until it required a 16-foot wall of brick foundation beneath the chimneys and side walls to make the permanent foundation of the house.

To the credit of the mechanic, who has had large experience in this class of work, it is but due him to state that the whole task was performed without serious inconvenience to the family, who all along occupied the house. Not a piece of furniture was displaced, nor a crack of any kind made in the walls or plastering above the lower floor line.

A Four-Story Building on a 9-foot Lot.

Something decidedly novel is about to be added to Chicago's architectural features, says a writer in one of our exchanges. A well known architect has completed plans for a San Francisco man of a four-story building to be erected on a nine-foot lot on Vincennes avenue. The depth of the lot is 125 feet.

This will be the narrowest four-story building ever erected in Chicago. A building at the corner of Halsted street and Boston avenue stands on a 13 foot lot. In building this corner projections in the bays were possible, so that a space 16 feet wide was gained on the second floor. In the projected narrow building on Vincennes avneue no such projections are possible. The lots on either side are occupied by high buildings.

Hollow clay tile will be used in the side walls, and steel beams and iron colums for the supports. The style is Moorish, and highly ornamental details on the front will be carried out in terra cotta.

The front entrance will be occupied by a cigar store, from which a stairway will lead to the second floor. On the first floor, back of the cigar store, will be a bowling alley 70 feet long, with toilet and wash rooms. The dimensions of the first floor will be 8 x 100 feet clear. The three remaining stories will extend back 46 feet above the first floor. The second floor will contain a kitchen 8 x 14 feet, dining room 8 x 14 feet, with china closets and pantries. The third floor will have a parlor 8 x 14 feet, bedroom 8 x 10 feet, and bathroom. The fourth floor will include hall, chamber 8 x 14 feet, bedroom 8 x 10 feet, and closets.

Test of Fire Proof Material.

An interesting test of a recently discovered process for rendering wood work and textile fabrics practically fire proof was given in New York City on Saturday, January 5, before a number of officials of the Fire Department, the New York Board of Underwriters and others interested. On a vacant lot at Fifty-eighth street and Broadway a small frame house was put up for the experiment, and filled with pine shavings and kerosene oil, the greater part of the wood in the structure being covered with the preparation patented by the Electric Fireproofing Company of New York City, who control the new process. Curtains which were hung at the windows had also been treated with the preparation. A fire was started in the building, which burned fiercely for an hour. Only those parts which had purposely been left unprotected by the fire proofing preparation were apparently affected so far as combustion is concerned. The curtains also hung in their places until the whole structure collapsed from disintegration.

HOUSE IN PROVIDENCE, R. I.

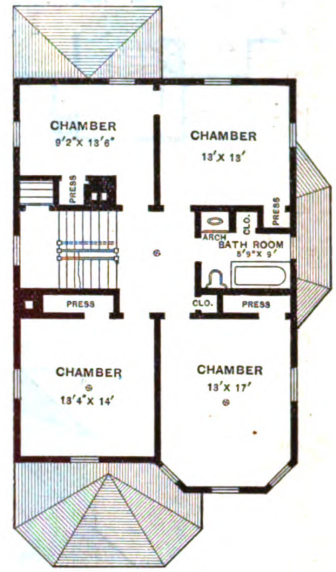
THE two story-and-a half frame dwelling which we illustrate in this issue by means of the accompanying elevations, floor plans and constructive details is situated on the north side of Lexington avenue in Providence, R. I., and was erected last fall for John S. Whitehouse from drawings prepared by Fred. E. Field, architect, of the city named. The floor plan show the general arrangement of the rooms, while the two views on the supplemental plate give an idea of the external appearance of the finished structure. There are four good sized rooms upon the main floor, the arrangement being such as to utilize to advantage all available space. Passing from the front porch through the vestibule we enter a reception hall 13 feet square having in one corner an open fireplace. At the right and left of the vestibule are coat closets. The main stairs are beyond the reception hall and convenient of access from the principal rooms on that floor. The parlor and dining room are separated by folding doors, while communication between the kitchen and dining room may be had by means of a door direct or through the kitchen pantry and china closet. On the second floor are four sleeping rooms and a bathroom, all of which are entered from the hall and are within a few steps of the stair landing. The attic is also finished, affording accommodations for servants' quarters and storage room.

From the architect's specifications we learn that the foundations, cellar walls, &c., are 18 inches thick, built of hard ledge stone, laid dry. The framing is of seasoned spruce, the sills and posts being 4 x 6 inches, the plates 2 x 4 inches double, the studding 2 x 4 inches for all main partitions spaced 16 inches on centers, the rafters 2 x 6 inches spaced 20 inches on centers, the first and second floor joist 2 x 8 inches and ceiling joist 2 x 5 inches, all spaced 16 inches on centers. The joist is double under partitions and at openings, while the studding is double at door and window openings, with truss above. The floors are cross bridged with 2 x 2 bridging and the ceilings are cross furred. Where hot air and plumbing pipes pass upward in the partitions, the studding is 2 x 5 inches. The sheeting for sides and roof is of ⅞-inch square edged hemlock boards, 10 inches wide, laid close and well nailed. The same material is also employed under the floors throughout. The exterior of the sides and ends of the building, including gables, is covered with clapboards laid 4 inches to the weather. The roofs and sides of the dormer windows are covered with sawed cedar shingles, laid 4½ inches to the weather. Under all finish on the perpendicular walls is one thickness of water proof paper, while between the floors is a thickness of deafening felt. The porch columns are 10 inches in diameter with hollow core and square base and cap. The floor is of 1¼-inch white pine square edged boards painted with two coats of pure lead and oil. The ceiling is of ⅞-inch white wood matched and beaded. All of the exterior finish has two good coats of pure lead and oil paint, while the metal work has two coats of metallic paint. The ceiling of the front porch is stained and has two coats of varnish.

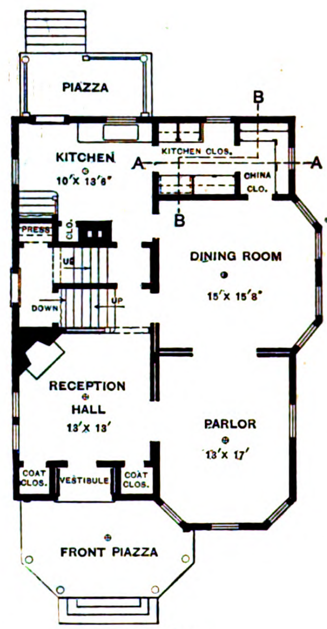
The house is finished throughout in white wood. The bathroom is cased with ⅞ x 4 inch matched and beaded

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

House in Providence, R. I.—Fred. E. Field, Architect.



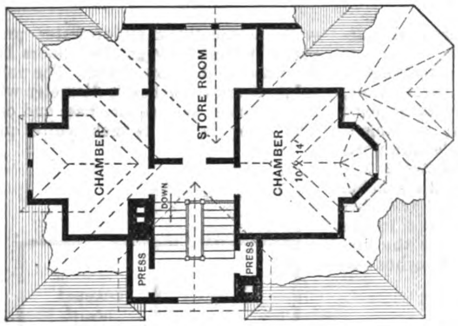
Second Floor.



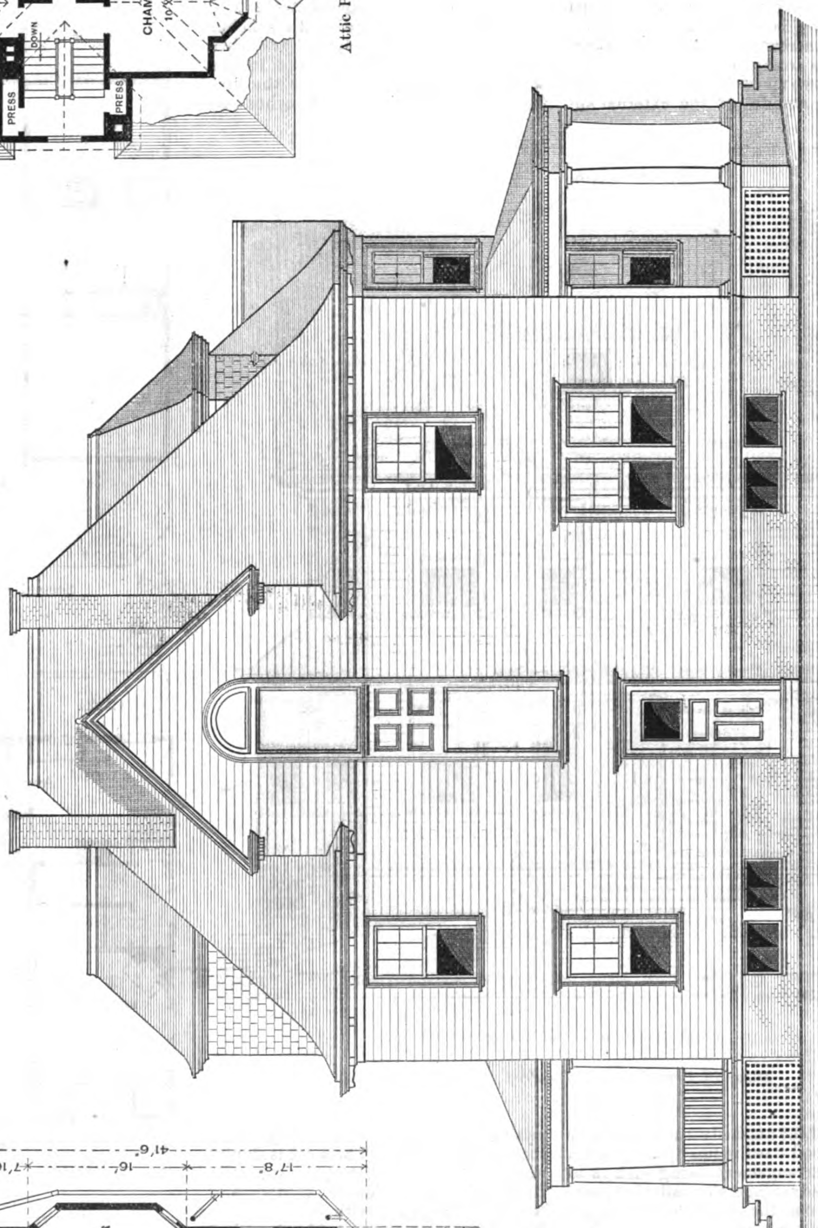
First Floor.

1-16 Inch to the Foot.

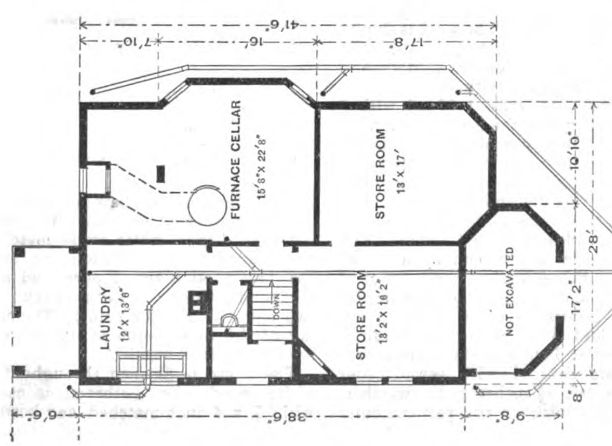
white wood sheeting, put on flush with the plaster and finished with cap mold. The kitchen pantry and china closet are fitted with all necessary appliances, as are all linen closets, ward-robes, &c. The floors, where not otherwise specified, are of spruce, not over 5 inches wide and ⅞ inch thick, tongued,



Attic Plan.



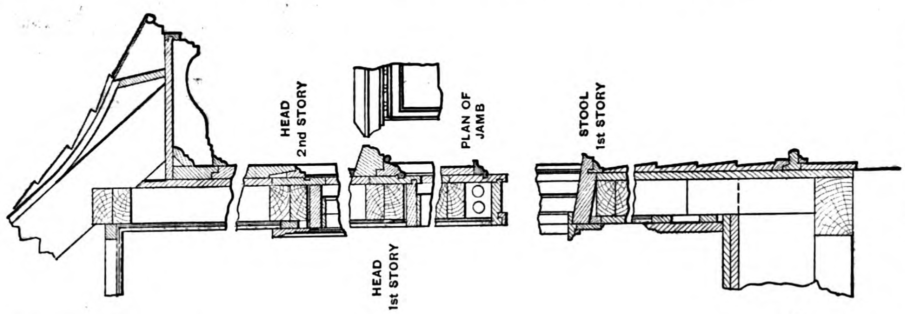
Side (Left) Elevation.



Foundation.

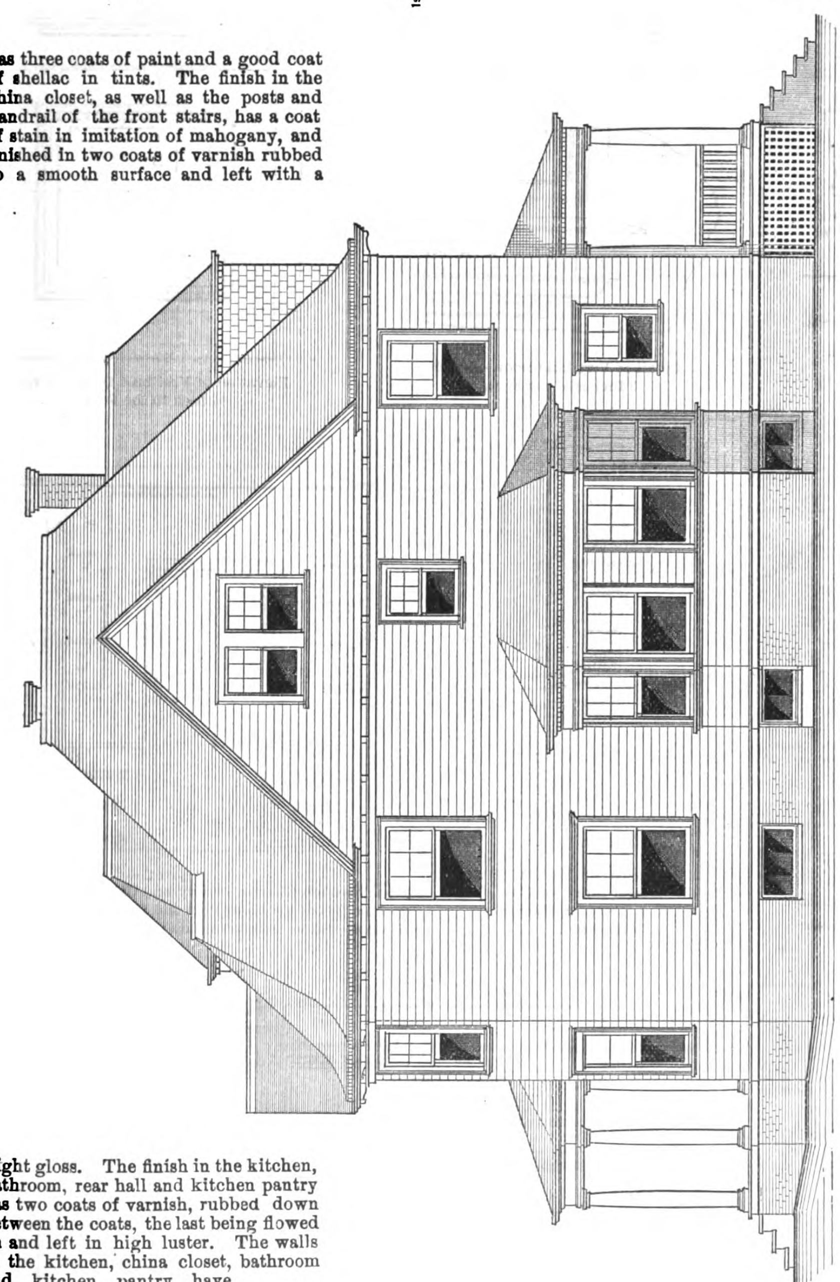
House in Providence, R. I.—Elevation—Scale, ⅛ Inch to the Foot.—Plans—Scale, 1-16 Inch to the Foot.

grooved and blind nailed. The floors in the kitchen pantry, china closet, bathroom and back hall, including the stairs, are of grainway hard pine. The floor in the reception hall is of quartered oak laid in strips about 2¼ inches wide. The front stairs have white wood treads and risers finished with nosing and cove. The posts and balusters, as well as the arch, are of white wood, while the rail is of cherry. All the interior finish above the basement



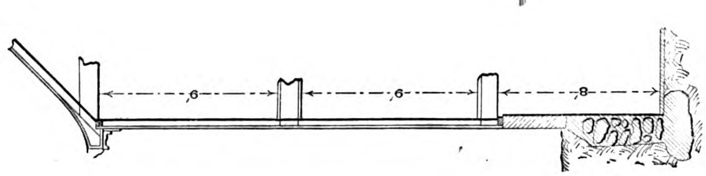
Details of Water Table, Windows and Main Cornice.—Scale, ¾ Inch to the Foot.

has three coats of paint and a good coat of shellac in tints. The finish in the china closet, as well as the posts and handrail of the front stairs, has a coat of stain in imitation of mahogany, and finished in two coats of varnish rubbed to a smooth surface and left with a slight gloss. The finish in the kitchen, bathroom, rear hall and kitchen pantry has two coats of varnish, rubbed down between the coats, the last being flowed on and left in high luster. The walls in the kitchen, china closet, bathroom and kitchen pantry have three coats of paint over a coat of size, the last two coats being stippled. The bathroom is fitted with tub, basin and closet with all necessary connections, and nickel plated trimmings. The house is piped for gas and heated by furnace.

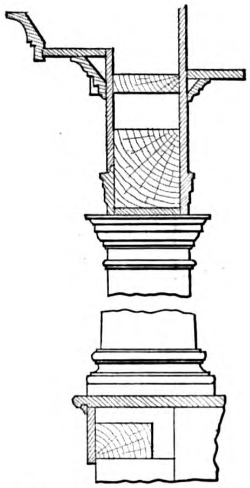


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

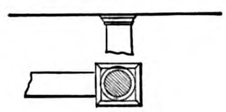
Section, Elevation and Miscellaneous Details of House in Providence, R. I.

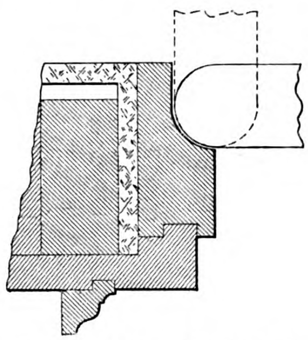


Section.—Scale, ⅛ Inch to the Foot.

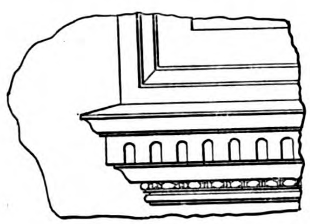


Details of Porch Column and Cornice.—Scale, ¾ Inch to the Foot.

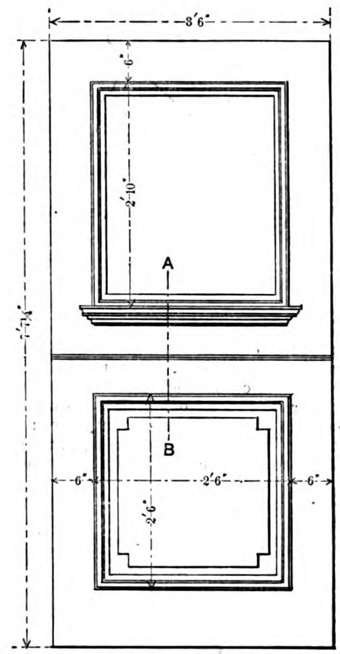




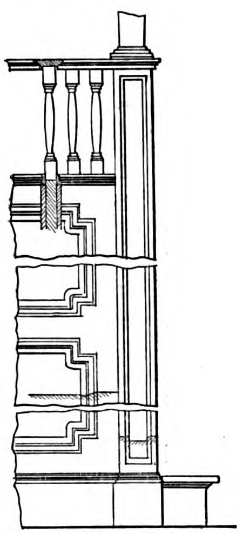
Horizontal Section through Door Frame.—Scale, 3 Inches to the Foot.



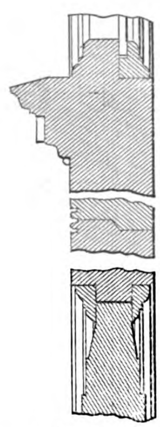
Detail of Vestibule Door.—Scale, 3 Inches to the Foot.



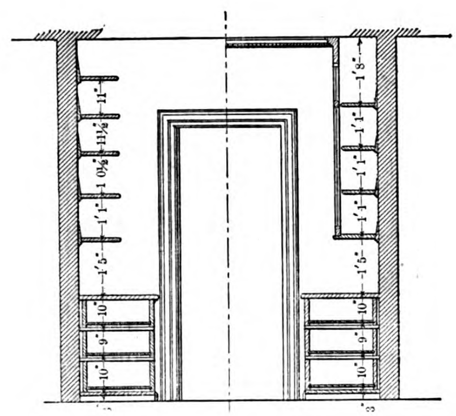
Elevation of Vestibule Door.—Scale, ½ Inch to the Foot.



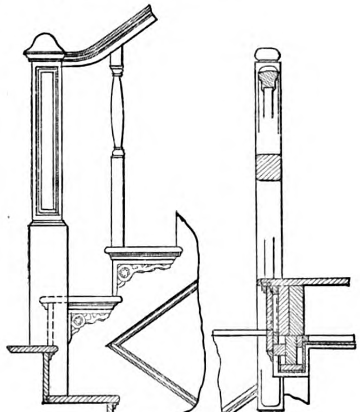
Detail of Main Staircase.—Scale, ½ Inch to the Foot.



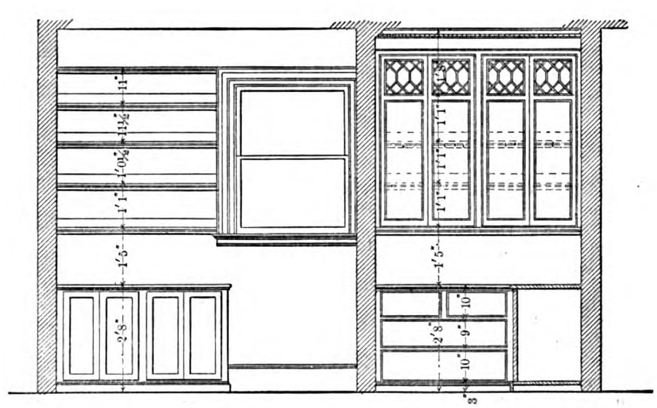
Section of Vestibule Door taken on Line A B.—Scale, 3 Inches to the Foot.



Section through Kitchen Pantry and China Closet taken on Line B B of the Floor Plan and Looking toward the Kitchen.—Scale, ¼ Inch to the Foot.



Details of Stairs at Landings.—Scale, ½ Inch to the Foot.

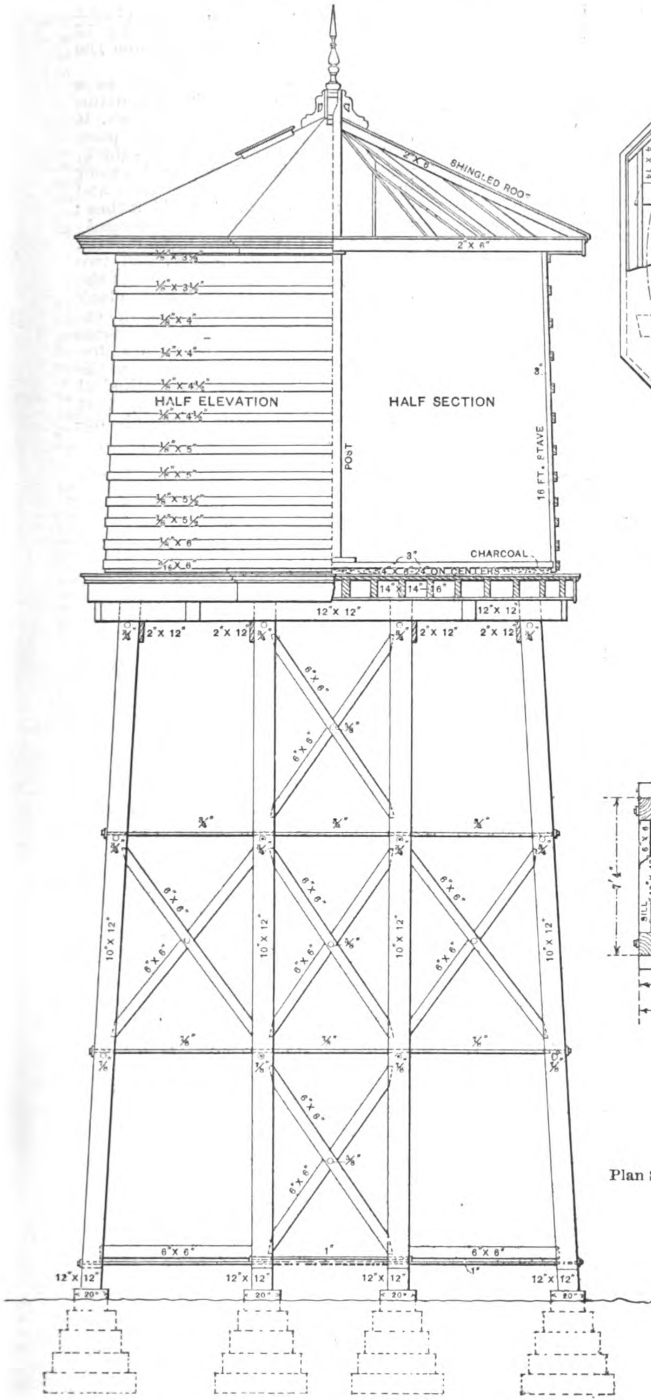


Section through China Closet and Kitchen Pantry taken on Line A A of the Floor Plan.—Scale, ¼ Inch to the Foot.

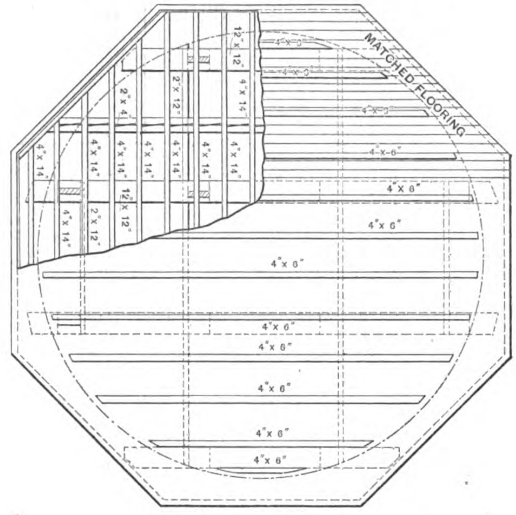
Miscellaneous Details of House in Providence, R. I.

CONSTRUCTION OF WATER TANK AND TRESTLE.

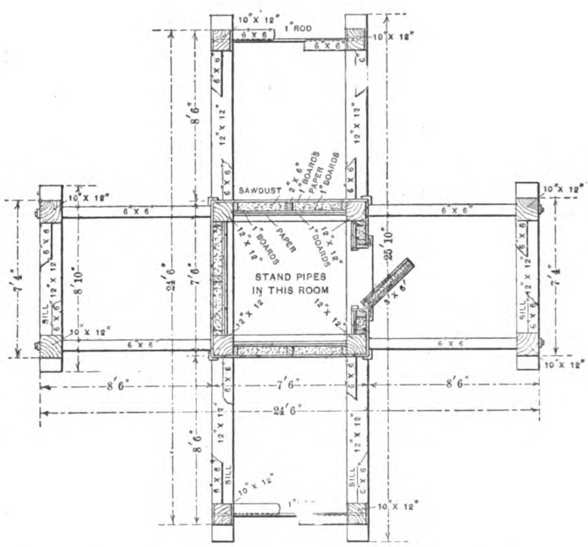
THOSE of our readers who have made inquiries with regard to the construction of water tanks and tank houses are likely to be interested in the description of a piece of work executed upon the United States Military Reservation at Fort Logan, Col. It consists of a water tank and trestle which was put up under the direction of Capt. L. E. Campbell of the United States Army from drawings furnished by Frank J. Grodavent, architect, of Denver, Col. The tank rests upon a substantial foundation of stone masonry laid in cement mortar composed of one part cement to one part lime, by measure. The footings are broad flat stones 24 x 48 inches, well bedded in mortar The wall above the footings is rubb masonry, while the capstones show above the grade are rough hammered to the required size, and finished with smooth level beds to receive the wooden sills. The latter are bedded in mortar, and were pointed up after the tank had been filled with water. The trestle supporting the tank is 34 feet high. The sills, caps and center posts are 12 x 12 inches, while the outside posts are 10 x 12 inches. The frame is strengthened with 6 x 6 inch braces, and secured with iron rods and bolts with cast iron washers at both ends. The posts are mortised into the sills, and caps are secured with hardwood treenails. The timber employed is well seasoned Oregon pine undressed. The platform is framed with 4 x 14 inch Oregon pine joists spaced 16 inches on centers, and well braced



Elevation of Tank and Trestle.—Scale, ⅛ Inch to the Foot.

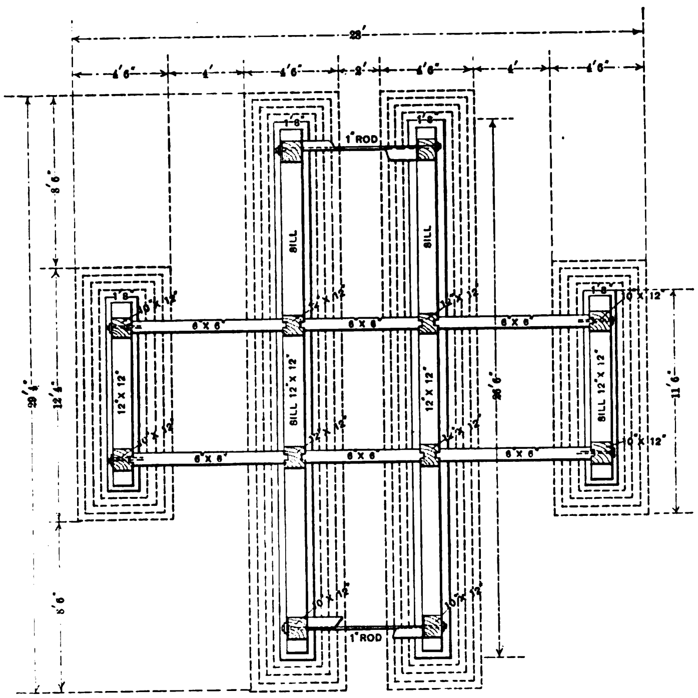


Plan of Tank Platform.—Scale, ⅛ Inch to the Foot.



Plan Showing Sills and Inclosed Room for Pipes.—Scale, ⅛ Inch to the Foot.

Construction of Water Tank and Trestle at Fort Logan, Col.



Plan of Sills and Foundation.—Scale, ⅛ Inch to the Foot.

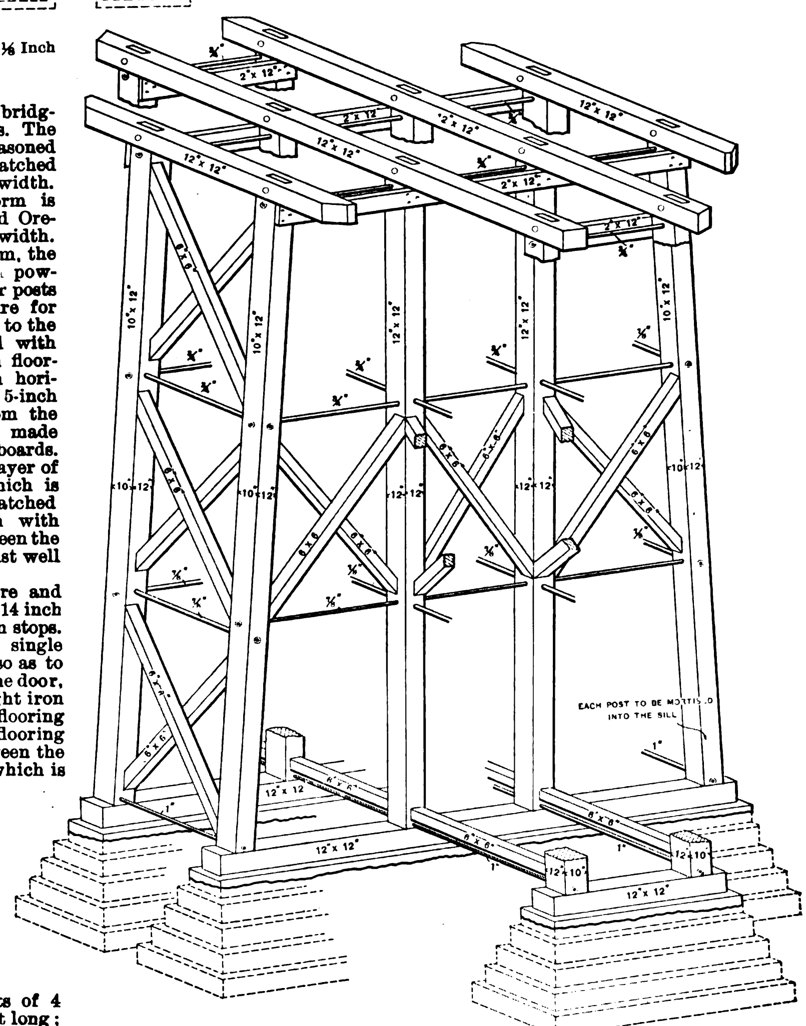
with a row of 2 x 4 inch cross bridging at each tier between bearings. The platform is covered with well seasoned ⅞-inch mill dressed and matched Oregon pine about 5 inches in width. The under side of the platform is lined with ⅞-inch mill matched Oregon flooring about 4 inches in width. The tank rests upon the platform, the spaces between being filled with powdered charcoal. The four center posts under the tank form an inclosure for the supply and discharge pipes to the tank. The exterior is covered with well seasoned matched Oregon flooring 6 inches wide, put on with horizontal joints and finished with 5-inch corner boards. Six inches from the exterior walls is a rough lining made of square edge native pine boards. This wall is covered with a layer of dry rosin sized paper, over which is placed a thickness of ⅞-inch matched Oregon pine flooring put on with vertical joints. The space between the walls is filled with dry sawdust well packed.

In two sides of the inclosure and near the top are four-light 10 x 14 inch double sash held in place with stops. The openings are the size of single sash and the two sash are set so as to leave an air space between. The door, which is hung on heavy wrought iron tee hinges, has double thick flooring on the outside and single thick flooring on the inside, there being between the two walls a space of 2 inches, which is filled with dry sawdust.

The roof is finished with octagon hips and covered with mill dressed square edge pine boards, laid close and covered with dry rosin sized paper, upon which are laid shingles dipped in paint. All the exposed parts of the tank and trestle are painted with two coats of red mineral and linseed oil.

The timber required consists of 4 pieces 12 x 12 inches and 34 feet long; 2 pieces 12 x 12 inches and 26 feet long; 2 pieces 12 x 12 inches and 24 feet long; 2 pieces 12 x 12 inches and 14 feet long; 2 pieces 12 x 12 inches and 10 feet long; 8 pieces 10 x 12 inches and 34 feet long; 48 pieces 6 x 6 inches and 12 feet long; 4 pieces 6 x 6 inches and 8 feet long; 2 pieces 6 x 6 inches and 6 feet long, and 18 pieces 4 x 14 inches, 10 of them being 24 feet long and 2 each of 20, 18, 14 and 12 foot lengths. There are also 10 pieces of 4 x 6 inches, 4 of them being 22 feet long and 2 each of 20, 16 and 12 foot lengths. There are 4 pieces 2 x 12 inches, 2 of them being 8 feet and the other 2 being 22 feet in length.

The tank is what is known as a standard railroad tank 20 feet in diameter at the bottom and 16 feet high. It is made of well seasoned white pine, with staves and bottom 3 inches thick, put together with dowels and patent lug hoops of the following sizes and number: Two hoops ⅛ x 3½ inches; two hoops ⅛ x 4 inches; two hoops ⅛ x 4½ inches; two hoops ⅛ x 5 inches; two hoops ⅛ x 5½ inches, and two hoops ⅛ x 6 inches. The bottom of the tank is reinforced with 3-inch plank secured to the bottom for making connections with the supply and discharge pipes. The drawings which are presented in this connection represent the arrangement of parts and method of construction employed so fully that further remarks would seem to be unnecessary.



Isometrical View, Showing Construction of Trestle.

Construction of Water Tank and Trestle at Fort Logan, Col.

WHAT BUILDERS ARE DOING.

THE present indications for the coming year among Boston builders are even more promising than appeared last month. Many operations that were postponed during the hard times of the past two years have been opened up for operation, and the amount of work already begun is unusually large for this season of the year. It is predicted that the total volume of work in 1895 will compare favorably with the "high water" mark which preceded 1893.

The relations between employers and workmen have been undisturbed for some time past, and there is no prospect of any unfavorable change. The Master Builders' Association is taking active steps to correct some of the evils of competiton for municipal work, and has undertaken to locate the cause of many of the abuses which hamper the contractor.

Cleveland, Ohio.

The Builders and Traders' Exchange of Cleveland is making a strong effort to correct conditions in the building trades which permit the existence of improper construction in public work. It is the purpose of the exchange to make a thorough investigation of the subject, to point out the faults and to advocate such measures as may seem best calculated to secure the desired improvement. At one of the recent meetings the following resolution was adopted:

Whereas, It is the sentiment of the members of the Builders' Exchange that it is to the mutual interest of all persons concerned that all contracts for public buildings should be so specified, let and fulfilled that the work shall in every way be properly executed; and,

Whereas, Under existing conditions contracts are let and executed which are in a manner contrary to the intents of the owners, working injustice alike to owners, architects and contractors figuring to do proper work; therefore, be it

Resolved, That a committee of five be appointed by the chair who shall make such recommendations and prepare such resolutions as shall tend to correct the evils, and bring improved conditions of the specifying, letting, supervising and execution of all contract work.

The following were appointed members of the committee: E. H. Towson, J. A. Reaugh, E. W. Palmer, Jr., C. C. Dewstoe and James Young.

At the last meeting in January the members of the exchange were addressed by Hon. Theodore E. Burton on "Builders' Contracts." Mr. Burton is a prominent lawyer, and one thoroughly capable of dealing with the subject upon impartial grounds, and his address contained much of interest and suggestion. The following portion of the discourse is peculiarly apt and true.

The severe features of the contract appear in the unusual degree of authority given to the architect. By one clause the architect is constituted an arbitrator, by another he is constituted the agent of the owner. The ordinary contract contains the provision that in case of a dispute on the specifications the architect shall settle the matter. Thus he is the arbitrator and his decision is final, but in spite of this he is the owner's representative, depending on the owner for his pay and for future employment. His decision cannot be set aside unless he is proved guilty of some dishonesty. If he makes a mistake and makes it knowingly judicial decisions state that still his decision shall be final. If the arbitrator makes a mistake, therefore, even the mistake is binding. In case an architect fails to approve a final estimate, drawn in the usual form, you cannot bring suit, though the work be done, perfectly done, unless you allege that he does this from fraudulent reasons.

In the work the builder is also submitted to the mercy of men who are not familiar with calculation and who are prone to make inexcusable blunders and place the figures scandalously low.

There is a prevalent idea that there is a very wide range in the price at which men will do a certain piece of work. If the builder knows that he is liable to be subjected to arbitrary action on the part of the architect, if he knows that he must give a big bond, if he is to be subjected to a special risk he will figure that into his contract. This is on the same principle as the fact that the laws to prevent usury have resulted in higher rates of interest. In the long run the people pay the cost.

Time and experience are valuable teachers and these evils will correct themselves. The disadvantages will disappear. I believe it is the wish of all builders and most architects that contracts shall be made more liberal to the builder, so that he may know on what lines he is working and may also know that honest work will bring honest pay.

The new officers of the exchange have outlined an aggressive policy and hope to be able to do some much needed work during the coming year.

Detroit, Mich.

The annual meeting of the Builders and Traders' Exchange of Detroit was held on January 8. The reports of officers showed that the exchange was in good financial condition. The Board of Directors elected are Martin Scholl, Jr., Frank Oliver, James Meathe, Richard Helson, Robert Robertson, Joseph Myles, Conrad Clippert, J. D. Candler, J. M. Spaulding. The directors met subsequently and chose James Meathe president; Martin Scholl, Jr., vice-president; Joseph Myles, secretary; Conrad Clippert, treasurer, and Benjamin F. Guiney, superintendent.

Indianapolis, Ind.

Indianapolis contractors say that they are now doing double the amount of work which they had in hand at this time last year, and every day contracts are being let for houses to cost from $6000 to $15,000. One of the largest contractors states that the prospects for contractors have not been brighter at any time in several years. Another favorable feature is that mechanics and employees who are on salaries are now better employed, and building through the savings and building associations will be resumed in the early spring much more extensively than in the last 18 months. With the large number of new blocks to be erected, the large number of fine residences and the numerous cottages which will go up, the latter through the aid of the associations, the outlook is decidedly more favorable than at the close of the year 1893 and the opening of 1894. Another point in favor of this view of the matter is that so many brick are being carried over and the lumber yards are so abundantly stocked that no marked advance in prices of building material need be looked for, and best of all, the relations between the contractors and the carpenters, bricklayers, stonemasons, &c., are more pleasant than at any time in years, and the leaders of the unions have shown a disposition to act reasonably on the wage question. The number of hours will not form so important a feature of adjusting differences between bosses and employees, since wages being paid by the hour, it is immaterial whether a carpenter, bricklayer or stonemason works eight or ten hours of the day. The understanding between contractors and laborers is that the year will open at about the present scale of wages per hour, and if building operations meet expectations later in the season, there will be a readjustment of wages to suit the more prosperous times.

The Builders' Exchange is in good condition. The members are at present much gratified by the election of one of their number, Justus C. Adams, to the speakership of the Indiana State House of Representatives.

Milwaukee, Wis.

The Builders and Traders' Exchange of Milwaukee held its annual meeting January 9. The reports of the different committees showed the exchange to be in a prosperous condition, the organization now numbering 187 members. The election of officers was the principal business transacted. C. A. Sercombe was chosen president; Henry Ferge, first vice president; C. J. Fox, second vice-president; Louis Clas, secretary; John Langenberger, treasurer; Henry Kemple, C. A. Wollaeger, C. A. Bentley and Henry Mueller, trustees. The treasurer's report showed: Cash on hand January 1, 1894, $1052.97; note to Builders and Traders' Exchange, $1000; cash receipts for year 1894, $2495; total disbursements for 1894, $3286.40; balance, $1261.57; note to Builders and Traders' Exchange, $1000; cash on hand January 1, 1895, $261.57.

During the year in addition to establishing in general and satisfactory use a uniform form of proposal for building work, and adopting the Code of Practice advocated by the National Association, the exchange has done good work in behalf of arbitration as a means for settling differences between contractors and owners. A board has been provided for, which shall be available at all times for the settlement of disputes between contractors, between contractors and owners or between contractors and architects. It is expected the adoption of arbitration as a permanent means for adjusting the differences which continually arise in the building business will do away with much of the friction which seems unavoidable at present.

At a recent meeting of the exchange a committee consisting of James J. Quinn and H. Ferge presented a resolution which was unanimously adopted, expressing the regret of the association at the retirement of Manager Konrad and extending to him the greetings and well wishes of the members in his new field.

New York City.

During the month of December the United Brotherhood of Carpenters of New York City withdrew from the United Trades Council, and it has been predicted that this action will result in another struggle among the carpenters, such as occurred early in 1894. Several strikes involving about 700 men, were begun about the middle of January to compel a concern of plumbers to refrain from employing nonunion workmen. The strikers included steam fitters and helpers, plasterers and helpers, electric wiremen, carpenters, painters and decorators, hoisting engineers and elevator constructors. The New York Life Insurance Company's building, the Hoffman House and the Flower Hospital were among the buildings affected. The strikers stated that the plumbing work on the jobs mentioned was secured by a firm of plumbing contractors because of low bids, and that the low bids were made possible by paying less than union wages. An attempt was begun in the courts during the past month to prove conspiracy against certain walking delegates, for persecuting two nonunion workingmen. It was stated by the plaintiffs that wherever they obtained work strikes were immediately ordered to compel their discharge. It was alleged that strikes were ordered upon five jobs upon which they were employed within a period of six weeks.

The walking delegates were called upon to appear before the grand jury, although the *Evening Post* states that "the District Attorney doubts whether the cases against the walking delegates will be successful in the end, as it has hitherto been found almost impossible to secure a jury that will find a verdict of guilty in a case involving so-called labor principles." A civil suit has been likewise instituted against the two labor unions, the Board of Walking Delegates, and all those who took part in persecuting the unoffending workmen. The present outlook for the building business is good, there being a large amount of new work in prospect.

Omaha, Neb.

W. S. Wedge, secretary of the Builders and Traders' Exchange of Omaha, furnishes some particulars regarding the condition of the building trades of his city.

The election of officers of the exchange for 1895 resulted as follows:

President, J. W. Phelps.
Vice-president, J. F. Smith.
Treasurer, J. W. Percival.
Secretary, W. S. Wedge.

Directors for two years: Chas. Baxter, M. B. Copeland, Thos. Herd. Director for one year: John H. Harte. C. W. Hull and W. M. Dodge hold over from last year.

The new Board of Directors is an unusually strong one, and it is expected that through its efforts the exchange will be greatly strengthened during the coming year. General conditions have been so bad during the past few years that the exchange has had a hard struggle to keep the members together. However, at the present time the organization is in a more promising condition than at any time during its history, as the present membership is composed of men who appreciate the value of organization, and have stood the test of adverse conditions.

The city and State have had, in 1894, one of the most unfortunate years on record ; the building business having been especially dull. The amount of building begun in 1894 compared with that of 1893 shows a serious falling off from even the low total of the latter year. The amount invested according to the statistics of the building inspector's office for the two years mentioned is, for 1893, $975,450 ; for 1894, $611,800 ; a decrease of $363,650.

The condition of affairs between employers and workmen has been undisturbed during the year, and the present feeling between the two is very friendly.

The wage scale in the different branches of trade is as follows:

Class of mechanics.	Hours of labor.		Wages per hour.	
	Summer.	Winter.	Summer.	Winter.
Stone masons	8	8	$0.45	$0.45
Plasterers	8	8	.50	.50
Lathers	9	9	.30	.30
Hod carriers	8	8	.2 ½	22½
Carpenters	9	8	.27½	.25
Rough carpenters	9	8	.2 ½	.20
Regular carpenters	9	8	.27	.27
Finishers' carpenters	9	8	.30	.30
Stone cutters	8	8	.45	.45
General house painters	8	8	.30	.30
Grainers	8	8	.35	.35
Frescoers	8	8	.50	.50
Sign painters	8	8	.45	45
Paper hangers	8	8	.35	.35
Decorators	8	8	.35	.35
Plumbers	8	8	.40	.40
Steam fitters	8	8	.35	.35
Gas fitters	8	8	.35	.35
Helpers	8	8	.12½	.12½
Tinsmith, general	8	8	.30	.30
Roofers	9	8	.30	.35
Slaters	8	8	.35	.35
Composition	8	8	.30	.30
Gravel	8	8	.30	.30
Diggers	8	8	.22½	.22½
Common laborers	8	8	15@20¢	....
Bricklayers	8	8	.50	.50

Bricklayers, 1½ hours' pay for 7 hours' work on Saturday.

For overtime, night work, Sundays and holidays, charge double time

The exchange has been active during the past year in urging the use of the Uniform Contract, which is now sufficiently general to warrant the belief that it will soon be universal. The daily attendance during 'change hour has steadily increased until the majority of the members are now present every day. Nothing has occurred during the year to mar the harmony of the members, and while arbitration of differences is provided for there has been no need of its employment. The members are standing closely together in the matter of giving the preference to fellow members, other things being equal, when work is to be let. The exchange has been highly honored by the election of three of its members to the State Legislature—one, Richard Smith, to the Senate, and Messrs. Benedict and Harte to the House of Representatives. About 40 of the members recently enjoyed a most pleasant visit to Fort Crook in response to an invitation from one of their number, M. P. Keefe, who is the contractor for the Government buildings, now nearly completed. A special train was provided and a dinner awaited the visitors after a thorough inspection of the buildings had been made. The trip was a most interesting and pleasant affair.

The prospects for the coming building season are far from bright, two new opera houses being all the public buildings now in sight. There is some talk of building a large market house, but as yet nothing definite has been done in the matter.

Portland, Maine.

At the annual meeting of the Builders' Exchange of Portland, held at its rooms on New Year's evening, the following officers were elected : President, Henry M. Jones; vice-president, George Smith ; treasurer, James Miller; secretary, C. E. Snow. Directors: Washington Libby, F. R. Redlon, J. C. Ward, Frank True, Melvin Hamblet.

Previous to the meeting a fine spread was served, after which speeches were made by the different members, showing a decided interest in the association and its influence, and it was admitted by all present that the association started the new year with as bright prospects as at any previous time.

Providence, R. I.

The Builders and Traders' Exchange of Providence at its annual meeting elected the following officers for the coming year : William W. Batchelder, president ; Spencer B. Hopkins, James C. Goff, vice-presidents; James S. Hudson, treasurer ; Executive Committee for two years—Charles F. Sanford, Henry R. Chadsey, Edward R. Crowell, John F. Mahoney, Charles E. Pierce ; Delegates to the National Builders' Convention in Baltimore, October, 1895—P. Tierney, Spencer B. Hopkins ; Alternates Richard Hayward, William F. Cady. Reports from the treasurer and secretary were read, showing the exchange to be in a good condition, with a fair balance in the treasury.

After the adjournment of the business meeting the members repaired in a body to a hall in which a banquet had been spread. About 60 in all participated, and a thoroughly enjoyable evening was spent. The speeches were good, and the entertainment provided by the Falstaff Club, which was present for the purpose, contributed greatly to the pleasure of the occasion. The Providence builders are looking forward to the continuance of the business conditions which have prevailed during the past year, with a good prospect for an improvement.

St. Louis, Mo.

The Builders' Exchange of St. Louis is steadily maintaining its position as one of the commercial bodies interested in the welfare of the city. At a recent meeting the exchange thoroughly considered the advisability of the proposed new bridge across the Mississippi to East St. Louis. The Legislative Committee has been considering the national arbitration bill now before Congress and has prepared certain amendments to be sent to the United States Congressmen from Missouri. The annual meeting of the Exchange was held on January 9, with president Jeremiah Sheehan in the chair.

Secretary Walsh's report showed the total receipts of the exchange for the past year amounted to $12,792.14; total expenditures, $8207.16, leaving a balance in the treasury December 31, 1894, of $4584.98.

In the report of the Legislative Committee, which followed, that body heartily indorsed the bill now pending in Congress for the appointing of an arbitration committee to settle all differences between employers and employees.

Delegates to the National Board of Trade in Washington, D. C., January 29 : Patrick Mulcahey and Richard Shinnick.

Nominations for officers for 1895 : President, J. D. Fitzgibbon and Thomas J. Ward; second vice-presidents, J. H. Danes, Jas S. Dowling, S. H. Hoffman, W. B. Philibert and August Pullis. Directors, six to be elected—J. Sheehan, H. W. Ballman, J. L. Guedry, P. J. Moynihan, Richard Miller, George T. Mickle, T P. McKelleget, Adam Bauer, P. Mulcahey, Jos. Ward, T. F. Fitzpatrick, Thomas J. Kelly, J. W. O'Connell and C. Linnenkohl.

Report has not yet been received of the result of the election of officers, but a good time following that occasion was expected by all. A dinner was to have been served and there was to have been music and sundry other things to add to the general pleasure.

Worcester, Mass.

The annual meeting for the election of officers of the Worcester Builders' Exchange was held during the 'change hour on January 9.

There was a large and representative attendance of members. O. S. Kendall received a unanimous re-election as president for the third consecutive time. It was only after seven ballots had been taken that there was an election of vice-president, and Charles A. Vaughan was the one elected.

For directors the voting resulted in the choice of F. E. Powers, J. A. Rankin and L. C. Clarke. F. H. Goddard was re-elected treasurer.

Earlier in the month the exchange listened to a very interesting address on the resources of Michigan from William H. Sawyer. The address dealt most particularly with the lumber and mining resources of the State.

The exchange has made arrangements to give its customary annual banquet some time in the near future.

Building business for the coming season is reported as being of good promise.

Notes.

A prominent firm of architects in Montreal refer to the Uniform Contract as being "just what is required by all concerned in the building trades."

The builders of Marlborough, Mass., are endeavoring to form an exchange. J. E. Warren is one of the foremost in the movement. An effort will be made to organize on the lines suggested by the National Association.

The Lawrence, Mass., builders have perfected their organization under the name of The Master Builders' Association, and elected James Flannagan president, and Mr. B. Mahoney secretary.

Danville, Ill., and Helena, Ark., builders are at work establishing exchanges in their several cities. Applications have been made to the national secretary from these cities for information regarding the best form of organization and other advice of a similar character.

On January 11 the Builders and Traders' Exchange of Jackson, Mich., tendered its members and their guests a very enjoyable banquet. Robt. Lake, the president of the exchange, presided, and among the speakers were Messrs. Chas. E. Townsend, Hon. Eugene Pringle, W. J. Heyser, E. R. Warner, Justice Worch, H. J. Adams, E. M. Jackson and others. The exchange is about two years old and is in good condition.

The Builders' Exchange of Wheeling has prepared a lien law which is to be recommended to the State Legislature for passage.

Dayton, Ohio, builders have formed an exchange and elected the following officers and directors : E. E. Talbot, president ; J. E. Peirce, first vice-president; C. H. Lyon, second vice-president; Chas. H. Ware, treasurer ; directors, Christian Poock, Walter C. Shafor, J. W. Boren, Samuel D. Trone, T. W. Beachem, E. E. Buvinger, J. H. Pardonner, A. G. Feight, M. J. Gibbons and J. E Lowes. Nearly 50 concerns have joined the new organization and indications point to a successful and beneficial exchange as the permanent outcome.

At the annual meeting of the Builders and Traders' Exchange of Kansas City, W. A. Kelly was elected president for the fourth time The other officers are: A. A. White, vice-president ; Jerome Twichell, treasurer and W. A. Bovard, secretary. J. G. Turner will retain charge of the building. It is the custom at the annual meeting for those members who desire to retire to hand in their resignations. This year there were fewer resignations than there have been for three years.

The following is from the Pittsburgh *Leader* of January 3 : The Builders' Exchange held its annual meeting yesterday, which was the largest in point of attendance for many months. The treasurer's annual report shows the exchange in a good financial condition. W. R. Stoughton was elected president, S. A. Steel and W. P. Getty vice-presidents. The exchange has more firmly than ever established itself during the year as an organization of progressive business men, who are capable of conducting the body upon such broad and fair lines that its influence in the city is being more steadily recognized. The prospect for the coming season seems to be bright, there being enough new work in sight to warrant the belief that a general improvement of the building interests of the two cities is at hand.

A permanent organization under the title of the Allentown, Pa., Brickmakers' Association has been formed in that city, a constitution and by-laws adopted and the following officers elected : President, Walter P. Huber; vice-president, Edwin Kichline; secretary, John J. Yingling; treasurer, Fred. S. Roth; Executive Board—W. P. Huber, John J. Yingling, Jacob W. Grim, Charles C. Sensenbach and John H. Nonnemacher, Jr. The association will meet monthly. The first meeting was held in the office of H. B. Yingling & Son. The following scale of prices was adopted: Kiln run and sink brick, $6 per thousand; hard, half-hard and clinkers, $6.50; paving brick, $7.50; pressed brick, $12.

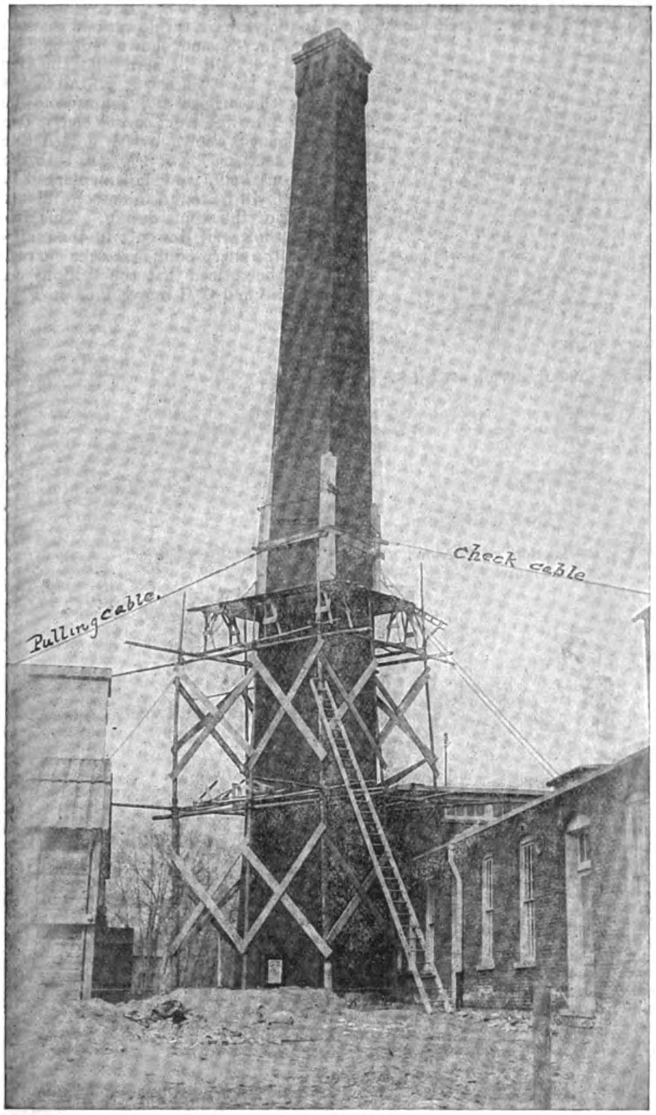
At the annual meeting of the Builders and Traders' Exchange of Newark the following were elected officers for the ensuing year: President, George S. Clark; vice-president, Hugh Kinnard; treasurer, A. C. Courter; secretary, W. W. Schouler; Board of Managers, John J. McGrath, George A. Smith, Thomas Boyle, James H. Van Houten, Theodore G. Gibson, Henry Dickson and J. D. Higbie.

Straightening a Leaning Chimney.

In a paper recently read before one of the engineering societies J. C. Platt of Waterford, N. Y., describes the method by which a brick chimney 100 feet high, which leaned about 28 inches, was made plumb. The account is of such general interest that we present it herewith:

This chimney was erected in 1893. Soon after its completion it was found to be considerably out of plumb; and when first measured, in November, was found to lean about 16 inches, and a few days later 22 inches. Then the rate of increase of inclination became less, but in March, 1894, it was 28½ inches out of line, and it was decided to attempt to straighten it. The factory to which the chimney is attached stands on the north side of the north outlet of the Mohawk River, and distant perhaps one-third of a mile from the west bank of the Hudson. The underlying rock in this part of the country is the Hudson River shale.

The chimney proper is rectangular in plan, is built of brick, is 9 feet 6 inches square at the bottom and 5 feet 4 inches square at the top; it is 100 feet high and has a central flue 3 feet square. The estimated weight of this is 206 tons. It stands upon a foundation which is 14 feet deep, the lower 4 feet being of concrete about 14 feet square, on which rests heavy stone work 10 feet high, 14 feet square at the bottom and 9 feet 6 inches square at the top. The weight of the foundation is about 149 tons, making a total of 355 tons resting on 196 square feet, about 1.8 tons per square foot.



Straightening a Leaning Chimney 100 Feet High.

Before commencing the work soundings were made on all sides of the proposed site. These varied from 20 to 38 feet in depth below the natural surface of the ground, and indicated the same character of soil as its surface, a soft, alluvial deposit with streaks of sand, but with no hard material or rock or bowlders. The chimney was built upon this soil without the use of any piles. Two similar chimneys had been built in the immediate vicinity on what appeared to be similar material, and no trouble had been experienced with these. The bottom of the concrete is about 2 feet above normal summer level of the Mohawk River, but at the time of sounding in March it was submerged about 4 feet, it being found that the water rises and falls in the soil in the vicinity with the rise and fall of the river.

The work of straightening the chimney commenced on March 19, 1894. A scaffold was erected about the chimney and eight oak timbers, 6 x 10 inches x 10 feet, were placed vertically at the corners at a hight of 42 feet above the stone work and 4½ feet below the center of gravity of the brick work, the object of the oak timbers being to spread the bearing of the wire ropes over as large a section as practicable.

Wire ropes were passed around the timbers and another wire rope 2¼ inches in diameter, with an eye in each end, was fastened to the first mentioned ropes at its upper eye. The lower eye was connected with a system of pulleys secured to the dock at the river edge, at a point 78 feet distant and directly opposite the direction in which the chimney leaned, the pulleys being made up of three sets of double and single blocks connected together in series, having three points of fastening to the dock and having 11 pulleys in the system. Cables were also put out from the chimney on each side at right angles to the main cable and having turnbuckles to tighten them; also a guard cable in the rear.

The earth was then excavated on the high side of the foundation nearly half way around to the bottom of the foundation (a depth of 13 feet) and the main cable put under strain with the pulleys. By this means, in the course of three weeks, the chimney was brought back about 4 inches. Then, with a post hole digger 8 inches in diameter 11 holes were sunk vertically in the bottom of the trench around the foundation, principally at the highest point, to a depth of 5½ to 6 feet. At this time the water in the river stood up to within 1½ feet of the bottom of the foundation, the ground being soft to a depth of 4 feet; it then became very hard, showing that the strata supporting the chimney had been reached. No movement or flow of the soil was discovered until the eighth hole was sunk 4½ feet and the tool withdrawn for clearance, when it could only be reinserted readily about 3 feet and headway made very slowly.

From this removal of the earth there resulted within a few hours a righting of the chimney to the extent of 5 inches. This increased to 8 inches by the next morning. The slack of the pulling rope was taken up as fast as the chimney moved, and the rope was kept under strain. By tightening up the pulley rope two or three times daily, in a week the chimney was brought back to 8¾ inches.

At this point, in similar manner, the post hole diggers being reduced to 6 inches in diameter, about one-fifth as much more material was removed, immediately followed by righting the chimney to 4 inches, and from that point, after filling the holes with fine broken stone and gravel, thoroughly rammed, by continued daily strain on the main cable, the chimney was brought back to plumb at the rate of ¼ inch per day. The turnbuckles in the side cables were occasionally used to control any tendency toward lateral inclination.

The work has been accomplished without injury to the structure. Time alone can tell whether it will permanently retain its position. It is stated that some chimneys at Louisville, Ky., which were straightened in a similar manner, have remained in proper position. This chimney settled in all 0.598 of a foot.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

IN describing the method of cutting the portion of the design for panel decoration shown in section on line A B of Fig. 32 and presented in the last issue, a slight error was made which detracts somewhat from a clear understanding of the sentence in which it occurred. In place of the word "run," which appears in the fifteenth line of the first column on Page 7, substitute the word "round," so that the sentence will read "take the concave side of the gouge and round up as shown." In the illustrations presented with this article Fig. 34 represents a design for a panel decoration of a class different from any before given. Treated carefully it is very effective, and is not difficult to cut. It should be very carefully outlined, and after the block intended to be cut is marked use a fine and somewhat hard pencil, so that the lines may be as fine as possible. Bear in mind that in a design of this description the cutting on one side of the line or the other of even a very fine line often marks the difference between a well cut design and one that is crippled and stiff. After all has been properly marked cut the main stem throughout, commencing at the upper end and cutting toward the lower end. The reader will see from an inspection of the cross sections shown in Fig. 35 that the stem enlarges as progress is made downward, and that the lower end swells to some extent. The greater part of the whole design is cut with parting tools, although chisels and gouges are required for some portions.

In the enlarged view of the leaf G, represented in Fig. 36, it will be noticed from an examination of the cross sections shown in Fig. 37 that the bevels for the two sides are slightly irregular. On the side that has the greater circle, namely, A C E, the bevel is the same throughout, consequently that should be cut first. Use a tool of the proper bevel, starting at the point of the leaf and cutting toward the main stem. Then shave from the side B D F to complete the leaf as shown. The treatment of the remaining leaves is the same with but slight modifications which will be perceived as the work progresses.

In the view of the flower bud marked I in Fig. 34 and shown enlarged in Fig. 38 it will be seen that the line dividing the two leaves of the bud is below the surface and requires to be nicely hollowed from end to end. The curve of it is shown by the dotted line in the section E F of Fig. 39. In the flower marked J and shown enlarged in Fig. 40 will be found the most difficult portion of the whole design. This difficulty, however, lies only in the merging of the sharp points into the curves. It will be noticed that the sections on lines A B and G H represented in Fig. 41 are V-shaped, while the sections on lines C D and E F are regular curves or hollows. The main difficulty is in not showing where the curve ends and the V begins, or where the V ends and the curve begins. A little practice and gradual shaving down will, however, soon give the correct shape. In producing these conventional flower designs, cut along the lines from end to end; do not cut from the line down. Figs. 42 and 43 represent an enlarged view with sections of the leaf H of Fig. 34, while Figs. 44 and 45 represent an

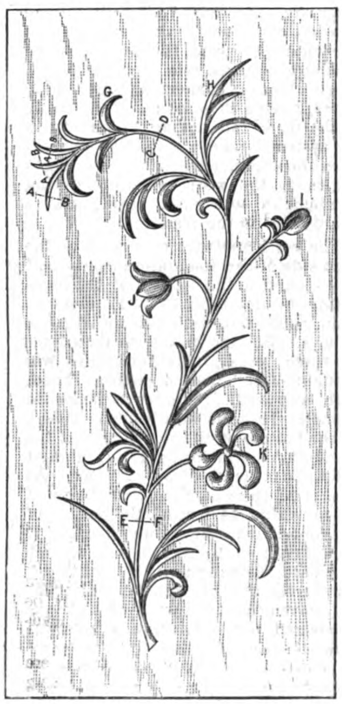


Fig. 34.—Design for Panel Decoration.

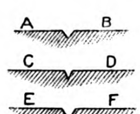


Fig. 35.—Sections of Main Stem of Design Shown in Previous Figure.

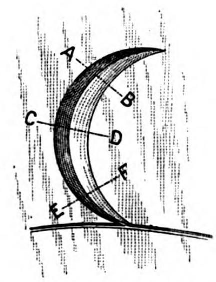


Fig. 36.—Enlarged View of Leaf G.

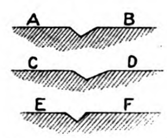


Fig. 37.—Sections of Previous Figure.

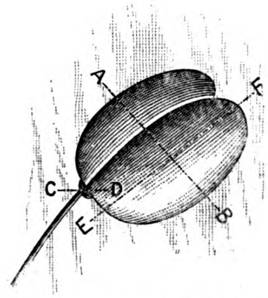


Fig. 38.—Enlarged View of Flower Bud I.

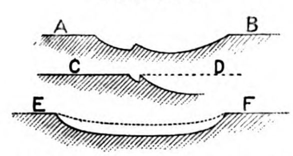


Fig. 39.—Sections through Various Parts of Flower Bud I.

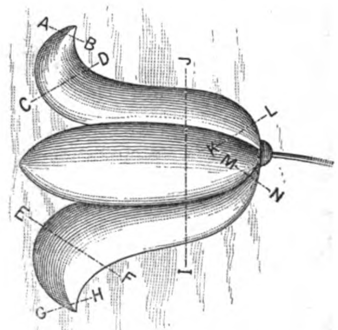


Fig. 40.—Enlarged View of Flower J.

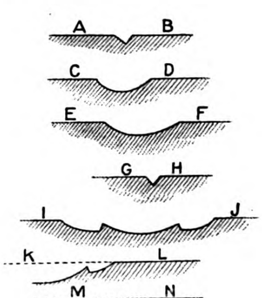


Fig. 41.—Sections through Flower Shown in Previous Figure.

Hints on Wood Carving.—By Chas. J. Woodsend.

enlarged view with sections of the flower marked K in Fig. 34. In producing the designs here shown one parting tool is used to cut and finish the leaf marked G in Fig. 34, one gouge and a parting tool for the flower bud I and so on throughout.*

(*To be Continued.*)

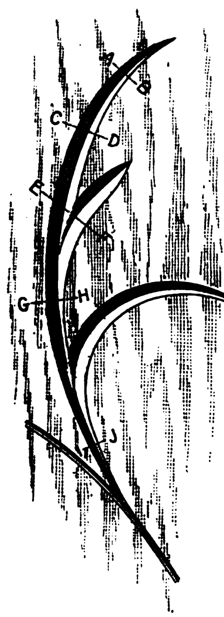


Fig. 42.—Enlarged View of Leaf H, shown in Fig. 34.

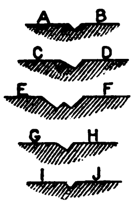


Fig. 43.—Sections of Leaf H.

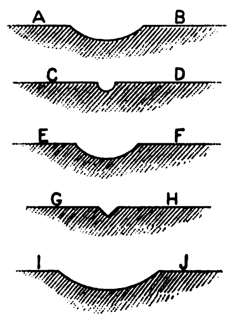


Fig. 45.—Sections of Flower K as shown in Fig. 44.

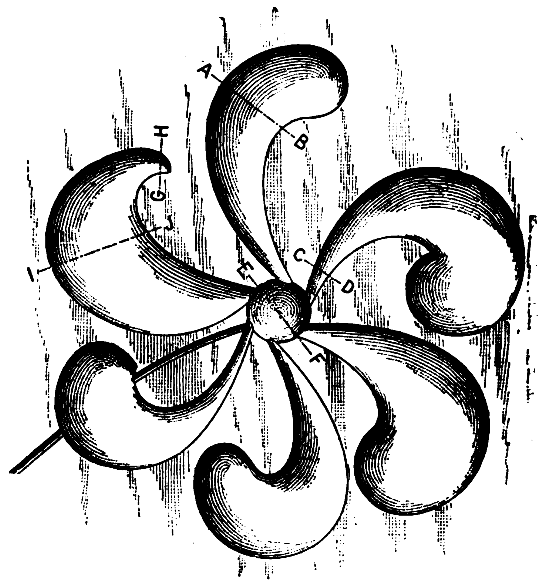


Fig. 44.—Enlarged View of Flower K, Represented in Fig 34.

Hints on Wood Carving.—By Chas. J. Woodsend.

National Association of Iron Roofing Manufacturers.

The ninth annual meeting of the National Association of Iron Roofing Manufacturers convened in parlor A of the Burnett House, Cincinnati, Ohio, Thursday, January 10, with President E. E. Souther of St. Louis in the chair. At 9 a.m., the meeting having been called to order by the chairman, an invitation was extended to the manufacturers of galvanized iron conductor pipe, eave trough, elbows and fittings, who had met on Wednesday for the purpose of organizing an association, to be present, which was accepted by many.

After a speech by the president the report of the Executive Committee was read and adopted, as was also that of Secretary and Treasurer Hyndman. The appointment of a committee to nominate officers to serve the ensuing year, composed of A. L. Andrews, J. E. Annis and E. C. Ewing, was followed by a resolution, which was carried, to omit the No. 27 gauge when quoting prices on corrugated or roofing iron, and otherwise confining such quotations as much as possible to the even gauge. This is quite an important feature, and will commend itself to all manufacturers whether members of the association or not.

*[It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

A second committee, composed of J. G. Battelle, G. E. Needham, H. P. Lloyd, Joseph Biechle and R. F. Graham, was instructed to formulate and suggest additional plans for improving present low prices and to deal with the unsatisfactory condition of the iron roofing business. Adjournment of morning session was then taken, to meet again at 2 p.m.

Afternoon session was called to order at 3 p.m. A number of suggestions and plans for improving the condition of the business and establishing better prices were passed upon, but no definite action was taken, the meeting adjourning with the election of the following officers for the ensuing year, who will also act as an Executive Committee:

President, J. C. Biechle of the Berger Mfg. Company, Canton, Ohio.

Vice-president, Chas. H. Conner of Chas. H. Conner & Co., Louisville, Ky.

Secretary and treasurer, R. J. Hyndman of the Hyndman Iron Roofing Company, Cincinnati, Ohio.

At the close of the meeting an elaborate banquet was tendered to the visiting and local members of the association and press by the American Roofing Company, Globe Iron Roofing & Corrugating Company and the Hyndman Steel Roofing Company, Major H. P. Lloyd acting as toastmaster.

Coral as Building Material.

The church built of coral, says a recent issue of a Brooklyn paper, is one of the curiosities of the Isle of Mahe, one of the Seychelles Islands in the Indian Ocean. The Seychelles Islands, which are supposed by many to be the site of the Eden of the Old Testament, form an archipelago of 114 islands, and are situated about 1400 miles east of Aden and 1000 miles from Zanzibar. They rise steeply out of the sea, culminating in the Isle of Mahe, which is about 3000 feet above the level of the ocean, and is nearly the center of the group. All these islands are of coral growth. The houses are built of a species of massive coral hewn into square blocks, which glisten like white marble, and show themselves to the utmost advantage in the various tinted green of the thick trophical palms whose immense fern like leaves give pleasant and much needed shade. These palms grow as high as 100 feet and more, overtopping both the houses and the coral built church. They line the seashore and cover the mountains, forming in many places extensive forests.

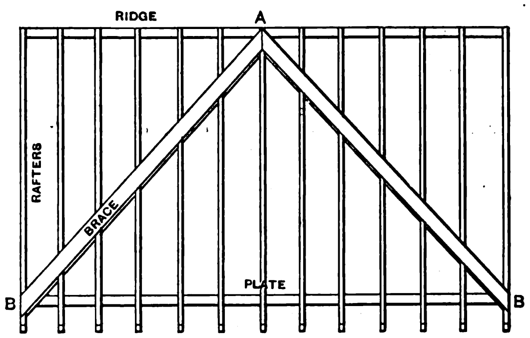
Brick Statistics.

A census of the brick under the sheds in the great brickmaking center of the Hudson River regions—namely, Haverstraw and Stony Point—shows some interesting figures. The census was taken by men who have performed this labor for many years, the object being to ascertain the condition of the brick industry at the beginning of 1895 as compared with former years, determining the surplus left over after the season's work had been accomplished and finding out how many old brick must go on the market before the new output in the spring come into play. It appears that 41 firms manufacture brick in the places named, the total number of arches of brick reaching 1672. The average for each arch is figured at 42,000 brick, making a total of 70,224 000 brick under all sheds in the two townships mentioned. A year ago the census was taken five days earlier than the one just referred to, and then it was found that there were 72,200,000 brick awaiting shipment, or about 2,000,000 more than this year. However, the difference in the time of taking the census, coupled with the demand and the river comparatively free from ice, leaves the surplus this year, it is claimed, at about the same figures as at the corresponding period the year before.

CORRESPONDENCE.

Self Supporting Roofs.

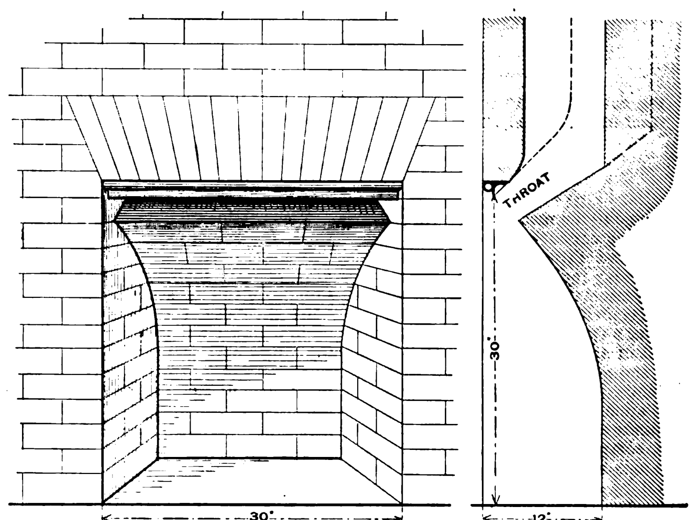
From H. H. R., *South Seaville, N. J.*—I find a great deal of discussion in the Correspondence Department of the paper concerning self supporting roofs. It happens very often that a building is to be finished partly and sometimes all the way to the peak of the roof with ceiling or lath and plaster. In such cases it makes a fellow scratch his head to know how to keep his roof from sagging. Now, I have a plan which "does the business," although it is not original with me. [I send a sketch of one side of the roof after the rafters are raised.] I first find the center of the ridge, as at A, and strike two lines to the corners, B B, 6 or 8 inches apart. I then cut off my rafters according to the thickness of brace I desire to use, generally 1 or 2 inches, thus bringing my brace flush with the rafter tops. I nail the brace thoroughly to each of the rafters. While this plan may be known to a great many there may be a few who have never seen it. I hope it may be of use to some one. Let us have more in the Correspondence Department about floor plans, roofs and other good subjects and less kicking about wire nails.



Method of Framing a Self Supporting Roof as Practiced by "H. H. R."

Proportions of Fire Places.

From B. D. E., *Topeka, Kan.*—Referring to the reply to "F. A. H.," in the March number, touching the building of fire places, permit me to submit the following: The suggestions given as to the proper size and shape of flues are in the main correct, but they are not sufficiently explicit. The two most important points in building a fire place are the flue and the "throat" or passage from the fire place to the flue. The flue should be smooth and straight and your rule that it should have $1/10$ to $1/8$ the area of the fire place is good. The throat should be smaller in area than the flue and should be brought well forward and pointed in front by a sharp "draft edge." The most frequent cause of failure in fire place building is an imperfect throat. The accompanying illustration represents an elevation and section of a fire place 30 inches wide and 30 inches high. Twelve inches is sufficient depth for burning wood, while 8 or 9 inches will suffice for coal. The back should be perpendicular for 12 inches and then brought forward on a curve leading to the "draft edge." The opening of the fire place should be horizontal at the top, the brick being supported by 1½-inch or 2-inch angle iron, set back from the front with an ornamental bead. The top of this angle iron should be drilled with holes and a wire hooked through, or a stiff piece of woven wire be doubled over the back edge and turned into the hollow to support a fall of mortar. The corner of the projecting brick back of the angle iron should be cut off and the whole made smooth, as shown in the sketch. The lower edge of this angle iron constitutes the sharp draft edge and the retreating angle of the back, and should be the point of least area from the fire place to the top of the flue. Being wider than the flue it should be gradually led into the proper shape, without any construction and with easy curves and smooth sides. A fire place 30 x 30 inches has 900 square inches. One-tenth of this is 90 square inches. A small, straight flue, 8 x 12 inches, will give a good draft, but if the flue is short or soft coal is to be burned, I would make it 9 x 13 inches. The throat will measure a little less than the width of the fire place, say about 26 inches, and should be 3¼ inches in its other dimensions. This method of constructing the throat concentrates the whole pull of the flue at the point where it is most needed, and offers no opportunity for smoke to eddy and roll out into the room. Let the correspondents try this plan and they will not be disappointed.



Plan, Elevation and Section of Fire Place Accompanying the Letter of "B. D. E."

Problem in Board Measure.

From O. L. W., *Dallas, Tex.*—I offer the following as a solution of "E. P.'s" problem presented in the November issue of the paper. Referring to the first of the conditions, the length of a board exceeds its width by 3 inches. We will therefore let $x =$ the width and $x + 3$ the length. The area will then be represented by $x^2 + 3x$. If then the width be reduced 2 inches and the length increased 3 inches, we have $(x - 2)(x + 6) = x^2 + 4x - 12$ for the area; but the areas are to be equal, therefore $x^2 + 4x - 12 = x^2 + 3x$. Now, by transposing -12 and subtracting $x^2 + 3x$ from both sides we have $x = 12$ for the width and $12 + 3 = 15$ for the length.

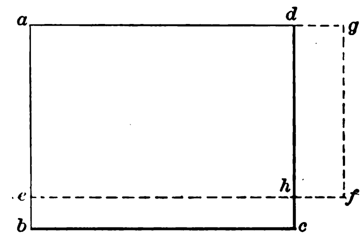


Diagram Submitted by "O. L. W."

The following method will give the same result: Referring to the sketch, let *a b c d* represent the board. Let *e b* equal the 2-inch reduction in width and *h f* the 3-inch increase in the length. Now, that the area shall remain the same *h f g d* must equal *e b c h* in area, but *f g* is 2 inches shorter than *c d* and *c b* is 3 inches shorter than *e h*. Consequently *h f g d* is 5 inches shorter than *e b c h*. Now, if we take away the 5 inches from *e b c h*, then it will equal *h f g d* in length, but only contains two-thirds the area, as it is only two-thirds as wide. This shows that we have taken away one-third, which was 5 inches of its length; therefore the entire length is 3 times 5, or 15 inches, and the width is 3 inches shorter, or 12 inches.

Problem in Handrailing.

From C. W., *Toronto, Canada.*—I inclose a diagram which I would like to have submitted to the readers of *Carpentry and Building.* I work to Riddell's system, and up to the present time I thought I understood it, but in the present case either the system or myself is at fault. The rail is to be 4½ x 2½ inches. I worked out a pine rail in order to be sure about it, as I thought the tangents would not bring me out right. It was as I expected, a regular botch. I then introduced a ramp at the top end, although the fault was not so much there as at the bottom end, but it would not do. It then occurred to me that probably some of the handrailing correspondents of the paper might help me out, so I submit it to them. I never met such a case before and probably never will again. The stairs are there, and there is no getting away from them—three winders in the quarter. If "A. L.," Mr. Secor, or in fact any good handrailer will come to the rescue a solution will be thankfully received by a number of readers and especially by your humble servant.

Note.—We have engraved he sketch of our correspondent, which is shown in Fig. 1, and, in accordance with his suggestion, submitted his inquiry to J. V. H. Secor, who kindly furnishes the following text and sketches: Too much cannot be said in condemnation of the practice of putting all the winders in a quarter. In all probability the stairs referred to by the correspondent have been built by a carpenter, as he states that he never met with a case of this kind before. It is very common to see four or five winders in a small cylinder, so that the balusters can stand only on every other step, and then the nosing on the next step above will have to be cut in to allow this. Stairs like the above are built by those who know nothing of handrailing, and more particularly in out of town places, and where the builder must go to the city in order to find some one to get out the rail. In this case the balusters are much closer together in the cylinder than on the straight treads, and to put on a rail which will look well under the various conditions that present themselves requires careful consideration. First, it is desirable to have the best easing in the rail which can be made over the cylinder from the chord D of Fig. 5 up to the point B of the elevation, Fig. 3. To accomplish this it is necessary to lift certain portions higher than we would under ordinary conditions. This gives longer balusters, as shown at the development of the rail through the center of the baluster, Fig. 7. In the elevation at A over the starting riser, the bottom of the rail is set up 3 inches, which gives a good easing. Then in order to cover the other quarter we make a bevel joint, or, as it is termed, a forced easing. This gives the best result and can be made from the same thickness of material as the other wreath. This is shown by the dotted lines 1, 2, 3, of Fig. 5. At E the bevel is shown which is to be applied at D in squaring the wreath. The extreme length of the face mold is indicated by 4 3 C. The letter C of Fig. 5 indicates the bevel by which to make the joint and applied to the top face of the plank. Referring to Fig. 4, the upper wreath X A is made the same length as 7 8 of the elevation, Fig. 3. The bevels for squaring are at A and B of Fig. 2, and are applied to the corresponding points for the wreath, *a b c d* of the elevation, Fig. 3, indicating the balusters with their lengths. As the bottom easing is shown, we obtain the lengths by measuring from the step to rail and adding this to the short balusters. At *d* the rail is ½ inch below the center of the baluster, which will make the baluster 2 feet 3½ inches long. The development of the full easing of the rail over the cylinder and through the center of the balusters, as shown in Fig. 7, answers a twofold purpose in this case. First, it illustrates the true lines, as the rail will show when finished. If this be developed before the elevation of the tangents is set up, we have at once the points to guide us and can ascertain the exact length of balusters, but only when great care is taken in squaring the wreath, for through carelessness this would be changed considerably. 1 2 3 4 of Fig.

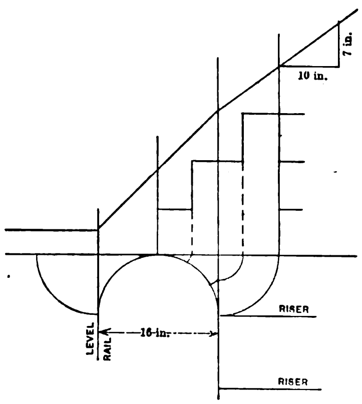


Fig. 1.—Sketch Submitted by "C. W." of Toronto.

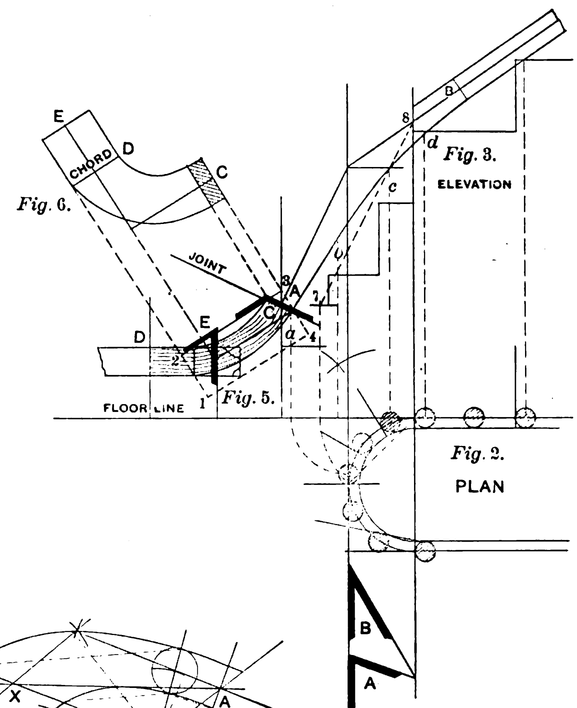


Fig. 2.—Plan of Stairs and Position of Balusters.
Fig. 3.—Elevation of Treads and Risers, Tangents, Easing of the Rail, &c.
Fig. 5.—Method Employed in Working a "Forced Easing."
Fig. 6.—Face Mold for the "Forced Easing."

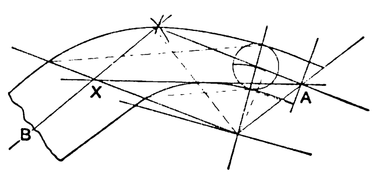


Fig. 4.—Face Mold for the Upper Wreath.

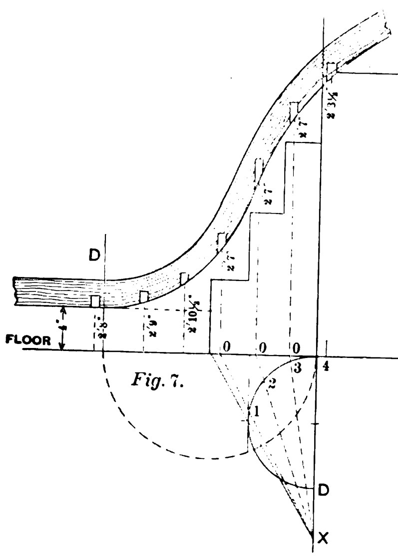


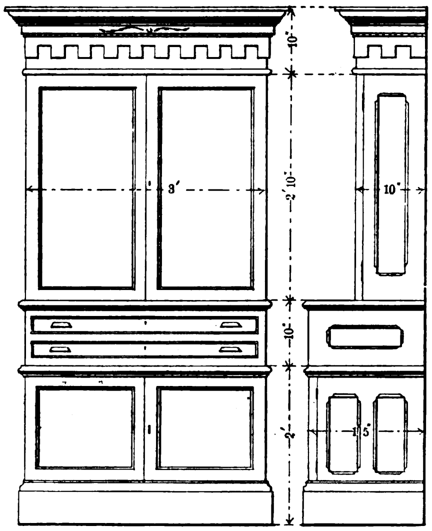
Fig. 7.—Development of the Rail through the Center of the Balusters; also Showing their Lengths.

Problem in Handrailing.

7 represents the center of the baluster. From X draw through these points to 0 0 0 and erect perpendiculars to the line of rail. Draw the line for the top of the step and form the easing. This method is resorted to only in cases of the kind described.

A Curiosity Cabinet.

From C. M. M., *Auburn, Maine.*—I submit herewith an original design for



Front and End Views of Curiosity Cabinet as Made by "C. M. M."

a cabinet which I think may prove of interest to the readers of *Carpentry and Building*. It is my first piece of work of this kind and therefore I lay it before my mechanical friends for criticism. The outside is of solid black walnut, while the back and shelves are white wood painted pure flat white inside. The walnut has an oil finish. The doors in both upper and lower parts are glazed. The two drawers in the center division are used for anything that may be desired to keep in the dark, such as collections of butterflies, millers, &c. The sketch which I inclose represents front and side elevations, upon which are indicated the principal dimensions The panels are sunk ¼ inch. I used ⅞-inch stock for the main part of the work and for the Grecian work at the top I cut out a $\frac{5}{16}$-inch piece and veneered it on. At the top of this is a ⅜-inch ball molding, then 1½-inch facia and a 8½-inch cornice molding. The sketch will give an idea of the general work so that further explanation is unnecessary.

Roof Plan of the $750 Cottage.

From N. Q. D., *New Iberia, La.*—I would be glad if J. S. Zimmerman would submit the roof plan of his $750 cottage, published in the September issue. I think the rooms are well arranged and also think that the cottage is suited to this Southern climate, as it has sufficient outside openings and plenty of veranda. I cannot, however, see how he can roof the building to conform with the elevation.

Brick and Mortar Hoist.

From W. H. L., *Johnstown, Pa.*—Will some one of the numerous readers of *Carpentry and Building* please send for publication a sketch of a brick and mortar hoist of sufficient capacity to keep eight bricklayers supplied with all the material they can use on a three-story building? The hoist should be one that can be conveniently moved from one building to another.

Problem in Stonecutting.

From D. F., *Philadelphia, Pa.*—I would like to ask through the Correspondence department of the paper a question which relates to the sketches inclosed. The check block 1 2 3 4 5 of Fig. 1 is to have a rock face on the concave and convex sides as well as on the front. The top is chiseled. Now, I want to know how I shall work the stone so that the rock face shall have no point or tooth chisel marks on it.

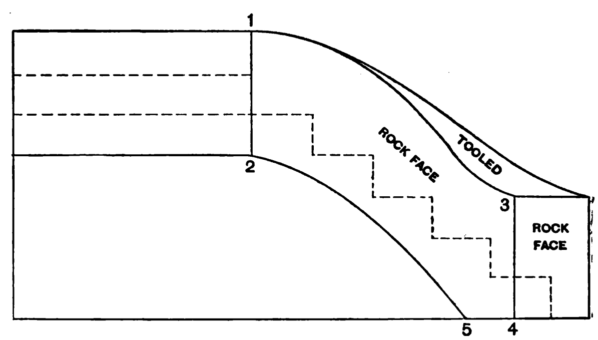


Fig. 1.—Elevation.

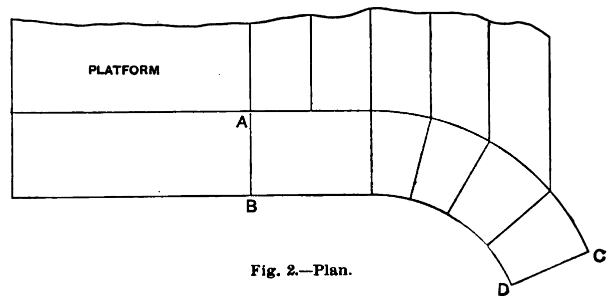


Fig. 2.—Plan.

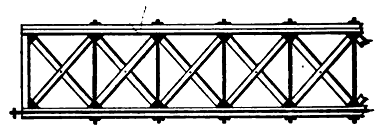
Problem in Stonecutting.—Sketches Submitted by "D. F."

Can the top be worked first? If it can, how shall I make a pattern to fit the top so I can draw lines to pitch the sides to their proper shape?

Note.—The inquiry of our correspondent is one which will interest those of our readers engaged in stone masonry work and will afford them something to consider during these winter evenings. We trust they will give it the attention which its merits seem to demand and fully discuss it in the columns of the Correspondence department.

Strength of Self Supporting Roof Truss.

From W. H. B., *Baxter, Iowa.*—I want to place a self supporting roof on a brick building 44 x 70 feet in size and have it sufficiently strong to carry a covering of felt, tar and gravel, the fall of the roof being ½ inch to the foot. Can I do so by arranging the beams as shown in the sketch? The upper beam is 2 x 6 and the lower one



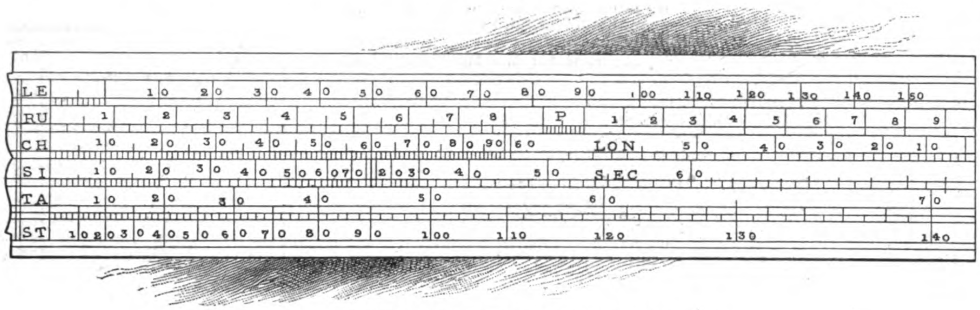
Strength of Self Supporting Roof Truss.

2 x 8. There are four of these beams, two being placed above and two below. At each end is a heavy plate through which a 1-inch rod passes the entire width of the building, running between the beams as shown in the sketch. I want to use ten of these beams for the roof.

A Curious Scale.

From Benem, *Washington, D. C.*—Inclosed find a rule that was presented to me by a stonecutter who purchased it 50 years ago. I would like to have some one unravel the meaning of the various lines, figures and characters that are to be found on both sides of it.

Note.—One side of the scale sent by our correspondent is represented in the engraving presented herewith, which clearly indicates the lines, figures and letters referred to. We are somewhat in doubt as to the signification of the letters "LE," but think it probable they refer to what is known upon the sector as a "Line of Lines." The scale is used for a variety of purposes, one of which is to find a fourth proportional of three given parts, values or distances. Another use is to bisect a straight line, while still another use is to divide a straight line into any number of equal parts, thereby enabling the construction of any desired scale.



View of One Face of the Scale Submitted by "Benem."

The letters "RU" are an abbreviation of "Rhumbs." A line of rhumbs is a scale of chords of the angles of deviation from the meridian denoted by the several points and quarter points of the compass, by which a navigator is enabled without computation to lay down or measure a ship's course upon the chart.

The next scale upon the rule bears at the left the letters "CH," which is an abbreviation for "Chords." The various distances represented on the scale are the chords of the number of degrees indicated by the figures. Midway of the rule are the letters "LON," referring to longitude. A line of longitudes shows the number of equatorial miles in a degree of longitude upon the parallels of latitude indicated by the degrees on the corresponding points of the line of chords. The scale is used in connection with that of chords at the left.

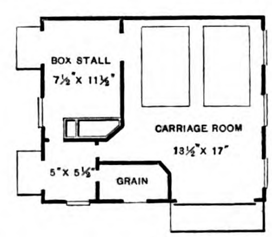
Next in order are the letters "SI" which relate to a scale of sines. "SEC" on the same line, but to the right, represents a scale of secants beginning where the line of sines finishes. "TA" is a scale of tangents and "ST" a scale of semi-tangents or half the angle indicated on the scale of tangents. The divisions on the last four scales are called the "functions of the degrees of an arc" and are used principally for the several projections or perspective representations of the circles of the sphere by means of which maps are constructed.

Turning the rule we have upon the opposite side at the top a scale of inches divided into tenths, below which is a scale of tenths of a foot. Below this is a scale of ½ inches, while at the bottom is one of ¼ inches, these being used in connection with drawings which are made respectively to ½ and ¼ inch to the foot. At the extreme right of the rule is a decimal scale dividing ½ inch into tenths and hundredths, while at the extreme left is another scale dividing ¼ inch into tenths and hundredths. The illustration which we present represents the rule full size. It will be noticed from the above that we have made no reference to the scale marked "P," but leave it for some of the readers to explain.

Design for Carriage House and Stable.

From GEORGE W. PAYNE & SON, *Carthage, Ill.*—In a recent issue we noticed the request of a correspondent asking for a design of a small barn, and while the drawings which we send may not exactly meet his requirements they may contain suggestions which will prove interesting. The perspective view shows the general appearance of the building, while the floor plan clearly indicates the arrangement of the interior. The balloon style of framing is employed, using 6 x 6 inch sills and 2 x 6 inch joists for first and second floors. The corner posts are 4 x 4 inches and the studding 2 x 4 inches, well braced, with 1 x 4 inch diagonals let into the sills and studs. The rafters are 2 x 4 inches. The walls are 13 feet to the plate, with the first story 8 feet in hight. The outside walls are covered with coved siding and shingles.

Perspective View.



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

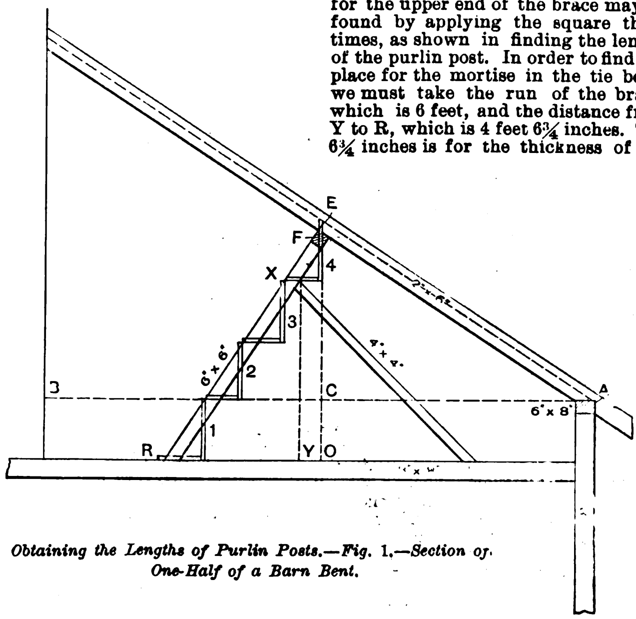
Design for Carriage House and Stable.—George W. Payne & Son, Architects, Carthage, Ill.

Arranging a Dancing Floor.

From G. P. B., *Wilmington, Del.*—I would like to ask the readers of *Carpentry and Building* a question. Can a very solid floor, 40 x 65 feet, made of two thicknesses and laid on yellow pine joists 3 x 14 inches, 20 feet long, spaced 16 inches on centers and resting on center wall 20 inches thick, be made sufficiently elastic and with enough give for dancing purposes? I have suggested putting 1 x 2 inch strips two feet apart on top of the present floor and then covering with ⅝-inch oak. But there is objection to this, because it makes a small break and consequently a stub-toe on entering the room from the hall. The bridging has been knocked from between the joists, but this does not help it any. If some of the readers of the paper can offer a plan by which this question can be solved, they will greatly oblige the writer.

Obtaining the Lengths of Purlin Posts.

From C. E. C., *Marshall, Wis.*—I send the inclosed sketches in answer to "J. E. R." of Thurman, Ohio, who asked in a recent issue how to obtain



Obtaining the Lengths of Purlin Posts.—Fig. 1.—Section of One-Half of a Barn Bent.

the length of purlin post when set at right angles with the rafter. Referring to the sketches, let Fig. 1 represent a one-half section of a barn bent, with a rise of 8 inches to the foot. Now, in order to find the length of the purlin post, let the point E represent the middle of the rafter, and let the dotted line E O be drawn square with A B; then A C will be one half of A B, or 9 feet; E C one-half the rise of the roof, which is 6 feet, and E O 8 feet. The purlin post being square with the rafter and E O being square with A B, we may assume that E R would be the rafter of another roof of the same pitch as this one, provided that E O was one-half its width and O R its rise. We know the length of E O, and the length E R would be found by taking 24 inches on the blade of the square and 16 inches on the tongue and applying it four times,

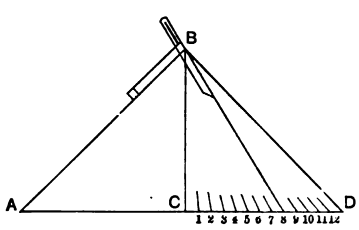


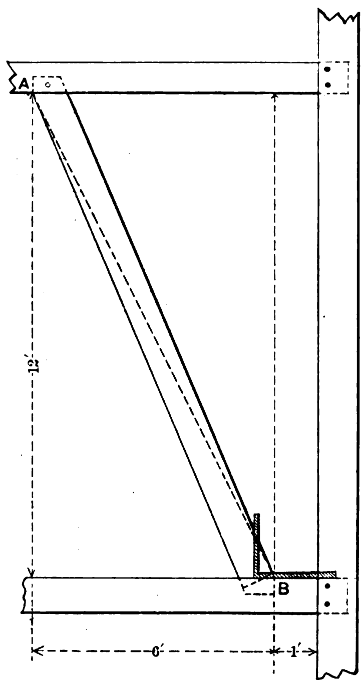
Fig 2.—Diagram Showing Method of Obtaining Bevel at X of Fig. 1.

as shown in Fig. 1 of the sketches. After finding the distance from E to R, deduct 9 inches from E to F—3½ inches for the rafter below the work line and 5½ inches for the purlin plate. This gives the true distance from the shoulder F to the long point at the shoulder R. It also gives the place for the purlin post mortise in the tie beam for A C, 9 feet, and O R, 5 feet 4 inches. We find by adding these together that the true distance from the outside of the building to the face side of the mortise at R is 14 feet 4 inches. The brace for the purlin post must next be framed, and also the mortise for it; one in the post and the other in the tie beam. The length of the brace and the lower end bevel of it will be the same as in a regular 6-foot run. The place in the purlin post for the mortise for the upper end of the brace may be found by applying the square three times, as shown in finding the length of the purlin post. In order to find the place for the mortise in the tie beam we must take the run of the brace, which is 6 feet, and the distance from Y to R, which is 4 feet 6¾ inches. The 6¾ inches is for the thickness of the purlin post on the horizontal line at X.

In Fig. 2 is shown the method of obtaining the bevel at the top of the brace at X of Fig. 1. Let the line A D of Fig. 2 represent the tie beam, which is 2 feet, and from C square up to B; draw A B and B D, which make two right angled triangles; then divide C D into 12 equal parts, and draw a line from B to any one of the numbers which corresponds with the pitch of the roof. In this case it would be the figure 8. Now apply the bevel square to the line A B as shown, and this will set the square to the bevel required for the top of the brace.

Laying Out a Brace With the Steel Square.

From A. J. B., *Lima, N. Y.*—In the August number of *Carpentry and Building* "H. V. S." of Butte, Mont., gives a method for laying out a brace between parallel timbers by means of the steel square. I think he has made a serious mistake and would like to give my way of doing the work. The problem, as I understand it, is to frame a brace between two parallel beams 12 feet apart with a 6-foot run from toe to toe. If "H. V. S." should frame the brace by his rule he would find when it came to putting the frame together that it was about 4 inches too long. His brace would have a run of about 6 feet 9 inches. The trouble with the correspondent is that he treats the brace as a line. This is all right when both toes come from the same side of the brace, but when they are on opposite sides, as in this case, the length must be found from toe to toe. The bevels for the shoulders of the brace should be obtained from a line connecting the toes instead of from the edge of the timber. If I were to lay out the brace I should take a straightedge and lay off on it with the square 12 spaces, the same as "H. V. S." I would then put the first point on the timber at A, as shown in the sketch which I send, and shove the other end of the straightedge across the timber until the last point was on the opposite side, at B. In the sketch inclosed A and B are the toes of the required brace. Line along the straightedge for a foot or so from A and from B. In order to find the bevel of the shoulder at B, place the 6-inch point of the square on B and the 12-inch

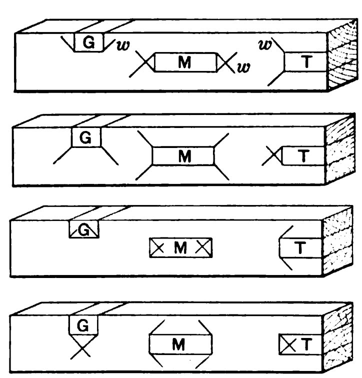


"A. J. B.'s" Method of Laying Out a Brace with the Aid of the Steel Square.

point on the line A B, as shown. The bevel at A is the same and is found in the same way.

Witness Marks in Timber Framing.

From TRAMP, *South Denver, Colo.*—The sketch which I inclose represents four pieces of square timber laid off ready for framing. The letter G represents a gain, M is a mortise and T is a tenon, the short diagonal marks *w* in the upper piece being the witness marks. The sketch shows four different methods of witness marking which I have seen employed by various persons, while numerous combinations of these four methods are often used. Now, what I want to know is, which of these methods is the best one? I hope the readers of *Carpentry and Building* will present their views on this subject, together with sketches showing their methods of marking.



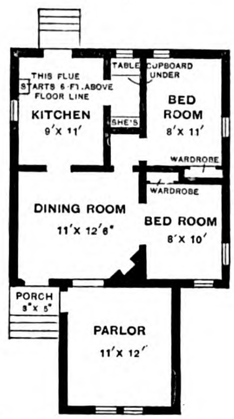
Witness Marks in Timber Framing.

Design of a $600 Cottage.

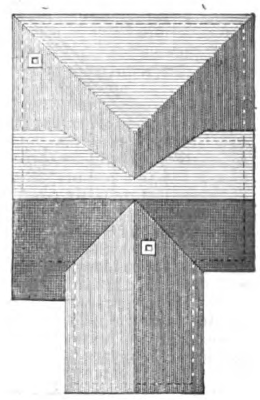
The cottage which we illustrate by means of the elevations, floor plans and details presented herewith, was erected not long ago from drawings made by Laidlaw Brothers, architects of Marion, Ind. The arrangement is such as to provide five rooms upon the main floor, two of the number being sleeping apartments. The central portion of the front of the house projects the depth of the parlor, back of which are the dining room and a sleeping room. The kitchen and a second sleeping room occupy the rear portion of the building. From the architect's specification we learn that all rough lumber is white pine, the girders being 6 x 6 inches; the sills, 2 x 6 inches; first floor joist 2, x 8 inches, spaced 16 inches on centers; attic joist, 2 x 6 inches, also spaced 16 inches on centers, and studding 2 x 4 inches, doubled at all openings and angles. The rafters are 2 x 4 inches, spaced 20 inches on centers. The exterior of the house is covered with well seasoned 6 inch white pine bevel siding. The roof is sheeted and covered with white pine 16 inch shingles laid 4½ inches to the weather. All outside finish is either white pine or poplar, with corner boards 4 inches wide. The exterior wood work is painted two coats in addition to the priming coat.

The inside finish is in basswood, well sandpapered. stained a dark cherry and completed with two coats of varnish. The floors throughout are white pine, well bridged. The plaster is three-coat work and is carried to the floor in all cases. The pantry is fitted up with four 12-inch shelves, table and cupboard underneath. The house is piped for gas and cost, complete, $600. It was erected for H. L. Bert, otherwise known as "Bert, the Tailor," at Marion, Ind.

Front Elevation.—Scale, ⅛ Inch to the Foot



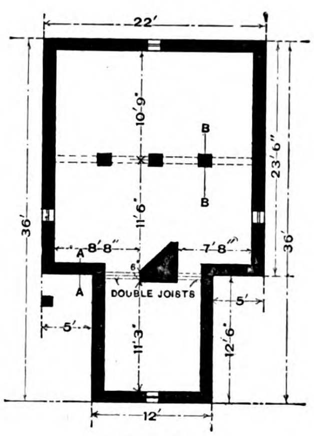
Main Floor.



Roof.

Scale, 1-16 Inch to the Foot.

Design of a Six Hundred Dollar Cottage.—Laidlaw Bros., Architects, Marion, Ind.



Foundation.

Scale, 1-16 Inch to the Foot.

Law in the Building Trades.

Effect of Destruction of Building as to Mechanics' Lien.

Under the statutes giving a contractor who performs labor or furnishes materials in the construction of a building "a lien thereupon and upon the interest of the owner of such building in and to the land on which the same is situated," and extending the right to sub-contractors, neither a contractor nor a sub-contractor has any lien for materials or labor when the building is destroyed before completion.—Goodman *vs.* Baerlocher, Supreme Court of Wisconsin, 60 N. W. Rep., 415.

When Mechanic's Lien Cannot be Enforced.

Where a building company contracted to build a cheese factory for the subscribers to the stock of a creamery company, who agreed to pay for the building when completed and to incorporate when the amount of the price had been subscribed, each stockholder to be liable only for the amount subscribed by him, on completion of the factory the building company cannot enforce a mechanic's lien on the joint property for non-payment of part of the contract price, but must look to the individual subscribers.—Davis & Rankin Building & Mfg. Company *vs.* Murray, Supreme Court of Michigan, 60 N. W. Rep., 437.

Time for Filing Mechanics' Liens.

Under the statute which limits the time for a sub contractor to sue to enforce his lien to three months "from the time of performance of the subcontract or doing the work or furnishing the materials," suit to enforce a lien for materials furnished from time to time under an entire contract may be begun within three months from the furnishing of the last of the materials, although the contract provides for payment on the first of each month for materials furnished during the preceding month. Carey-Lombard Lumber Company *vs.* Fullenwider, Supreme Court of Illinois, 37 N. W. Rep., 899.

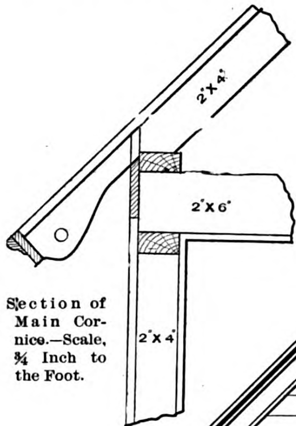
Effect as to Owner in Erroneous Description of Property.

One who claims the benefits of the Mechanics' Lien law must show a substantial compliance with each essential requirement thereof, one of which is that the sworn statement to be filed shall contain a description of the land upon which the labor was done or material was furnished, for the purpose contemplated by such law. A description of property in such statement, which is entirely inapplicable to the land actually benefited, cannot be made effective to any extent for the purpose of subjecting the land actually built upon to the operation of the lien claimed. This rule holds good as well in favor of one who was the owner of the land at the time the improvements were erected as in favor of a subsequent purchaser. Whether, under certain states of fact, the owner might not be estopped from urging the error in the statement as a defense to the line is a question.—Bell *vs.* Bosche, Supreme Court of Nebraska, 60 N. W. Rep., 92.

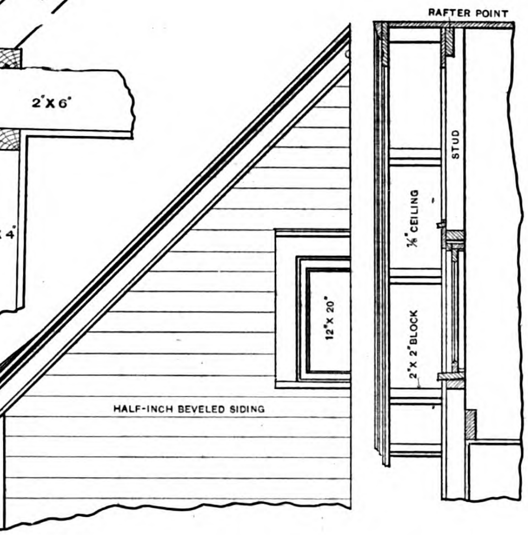
Priority of Mechanics' Liens Over Mortgage Debts.

Where an owner of land entered into a contract to sell it at a price named, and the purchaser agreed to proceed to erect a building upon it of specified character, and that when the building had progressed to a certain stage the vendor should make a deed of conveyance to the purchaser, and accept from him a mortgage for a sum considerably more than the price of the land conveyed, and advance to the purchaser at the same time a part of the excess over the price secured by the mortgage, and the balance when the building was finished, the contract was carried out and the deed delivered and the mortgage made, and the first payment of the advance upon the mortgage. In a contest between the mortgagee and the lienholders the lienholders were second to the amount of the purchase price, and had priority over the amount advanced in cash upon the mortgage.—Mutual Life Insurance Company *vs.* Walling, Court of Chancery of New Jersey, 26 At. Rep., 453.

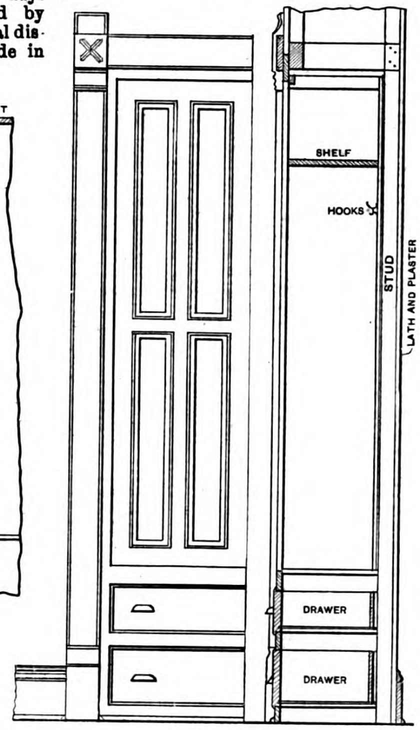
The New York State Board of Mediation and Arbitration have made public their annual report for the 12 months ended October 31, 1894. The Board received information of about 425 strikes and lockouts occurring in the State during the year, an increase of 25 per cent. over the number that took place in the preceding year. The majority of these strikes were not of long duration, and lasted only a few days at most, having been adjusted by mutual concessions. The principal disturbance was in the clothing trade in New York City and Brooklyn. "A large proportion of the strikes in 1894," the report says, "may be attributed to the effort of the workmen to have their wages restored to the rates existing prior to 1893, when many reductions were voluntarily submitted to by employees owing to the general depression in business. The percentage of unemployed has been materially reduced.



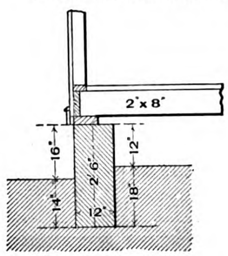
Section of Main Cornice.—Scale, ¾ Inch to the Foot.



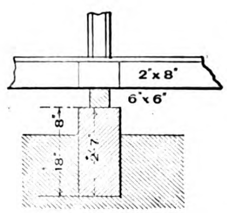
Partial Elevation and Sect on of Front Gable.—Scale, ⅜ Inch to the Foot.



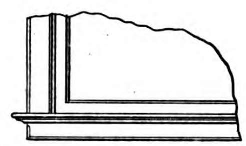
Half Elevation and Section of Wardrobe.—Scale, ½ Inch to the Foot.



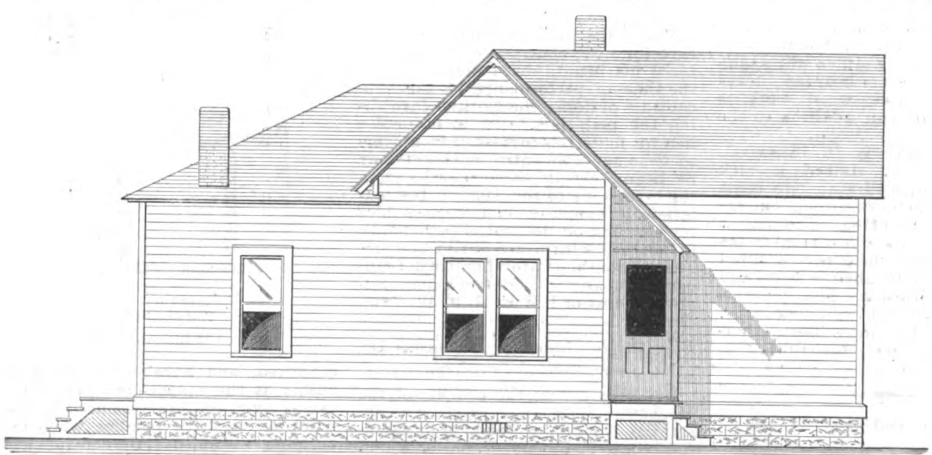
Section of Foundation on Line A A of the Plan.—Scale, ¼ Inch to the Foot.



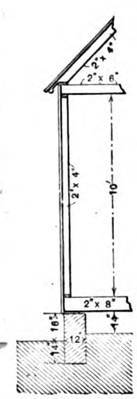
Section through Pier on Line B B of the an.—Scale, ¼ Inch to the Foot.



Detail of Window Stool.—Scale, ⅜ Inch to the Foot.



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



Section.

Elevation and Miscellaneous Details of a Six Hundred Dollar Cottage.

Cellar or No Cellar?

In conversation, many years ago, with the late Dr. Agnew of New York, says Edward Atkinson, in a late issue of the *American Architect and Building News*, he told me he thought that, for sanitary reasons, there should be no cellar under any dwelling house. If there were, he remarked, the floor above should be most carefully sealed against the passage of any cellar air into the house, while the entrance to the cellar should be wholly outside of the house. This was in the beginning of my practice in dealing with the construction of factories, and it became one of the motives, aside from safety and economy, in treating the subject of the basement floor.

I now venture to put a question which has become of considerable practical importance to architects: Ought there to be a cellar, in the ordinary sense in which that word is used, under the occupied parts of buildings of any kind, such as school houses in which children are taught, factories in which men and women work, lower stories or basements of houses where much of the household work is done? In other words, ought not the lower story of almost every building to be put on well drained ground above grade, both with a view to economy in construction and for sanitary reasons if for no other?

In factory practice all types of basement floors built of timber and plank placed a few feet above the ground. in an excavation or even at grade when not open to the air on every side, with the expectation of ventilation beneath, have failed. It may be alleged that it has proved to be impracticable to ventilate a mere air space under a basement floor of a large building over the ordinary gravel or hard pan of the soil, so as to prevent the decay of timber. In the best mill practice excavated basements or cellars, half to two-thirds under ground, with cemented floors of concrete, have been sufficiently well ventilated; but that type of construction makes an expensive underground story, of which, as a rule, but a small part can be put to effective use. It is apt to cost as much or even more by the square foot of floor than any other floor surface in the factory.

POSITION OF MACHINERY.

On the other hand, in many workshops and in some factories it is very desirable to be able to set machinery as nearly as possible upon the solid ground with timber and plank interposed between the ground and the machine, since, for many reasons, machinery may not be placed directly on concrete. This has been safely accomplished by making the concrete over a well drained floor space, with asphaltum or coal tar in place of cement. Timber and plank laid in cement will rot very speedily, and a cement concrete is a quick conductor of heat. As asphaltum or coal tar concrete properly laid is a non-conductor of heat, an antiseptic, and is impervious to moisture, upon such a surface timber and plank laid solid last as well as in any other part of a factory building.

Under these conditions the question arises: May not expensive basements or cellar stories be done away with, except so far as it is either cheaper or more convenient to make an excavation for absolute use and not merely for the purpose of interposing a partly underground story beneath the main floor of a building?

In dealing with the condensation of moisture on interior surfaces, absolute success has been attained in preventing such condensation even over the Fourdrinier or the cylinder machines in paper mills, from which the maximum quantity of humidity is discharged in the process of converting wet pulp into dry and finished paper. Composite roofs made of proper materials 6 to 7 inches thick have proved to be absolute non-conductors of heat, cold and moisture, and in their application to these machine rooms, with proper ventilation to remove the steam, the condensation of moisture on the under side has been wholly done away with.

Reverse this process: May we not put a composite floor underneath the lower story of a building, reversing the order of materials which are used in the roof, and in this way put an absolute non-conductor of heat and moisture between the first occupied room and the well drained soil below this composite floor? Why not? Many examples can be cited of complete success in this practice, which is now becoming common in our lines.

CONSTRUCTION OF CELLAR.

The following conversation occurred between myself and a very practical man not long since, in the discussion of a building in which he desired to put all his main work on a single floor. On my suggesting this method of construction, he said, "Oh, but I must have a cellar! It would not be fit to build such a building without a cellar."

"Very well," I replied, "then we will put a cellar under your main floor. You will desire to floor your cellar, will you not?"

"Certainly."

"What will you floor it with?"

"Cement or concrete."

"Would it not be better to use coal tar or asphaltum?" explaining the reason.

"Certainly," said he, "we will adopt that floor."

"Then," said I, "you had better have a light cellar, had you not? You can afford to put your main floor considerably above grade for your purpose."

"Oh, yes, light by all means!"

"Shall we put it half-way out of the ground?"

"Yes, as much as that."

"Good!" said I. Next I asked, "But where you propose to put this building will it not cost you a great deal more to excavate than it would to keep up well toward the surface?"

"Yes," he replied; "very hard place to dig."

"Then," said I, "suppose we put the cellar two-thirds above ground."

"Well," he replied, "why not?"

"Now, then," I said, "you have just back of your location a good gravel bank; wouldn't it be a good deal less costly to grade up a foot and drain well than it would be to dig a hole of any kind?"

"Why, certainly," said he.

"Then," said I, "why not put your cellar floor one foot above grade and drain it well?"

"Why," said he, "what has become of my cellar?"

My reply was, "You have put it in the best place possible, with the floor one foot above ground, and that cellar wholly above ground, being placed under your main floor, will cost you less than it would to dig a great hole in the ground in which you will generate foul air and accumulate rubbish."

"But," said he, "you have given me a two-story building with two floors, and that is double the floor space that I want."

"Yes," I replied, "I have given you a two-story building with two equally useful floors at less cost than you would have put into a one-story building with a deep and almost useless cellar under it. What are you going to do about it? Will you waste your money by digging a hole in the ground?"

"No," he said.

"Well, what will you do?"

"Why," said he—"why can't I leave out the upper story and bring the roof down so as to cover in the first story?"

"Well," I remarked, "why not? I think you have landed where I meant you should. If you can cut off the passage of heat, cold and moisture by properly constructing a composite floor directly upon well drained ground, why do you want to dig a hole underneath it, at heavy cost?"

"But," said he, "I meant to store my coal in the cellar."

"Well," I said, "you can dig a hole for your coal if you want to; put it down in the hole in order to go through the work of bringing it up again. Why not put it in a shed in the rear on the level of the floor where you use it?"

"But," said he, "I meant to have put my sanitary appliances down below."

"Then," said I, "you would probably have made your cellar a great deal more foul than it would be under ordinary conditions. Better put them outside, for every reason, whether you have a cellar or not."

My practical man thought he had found for himself an excellent method of getting the room he needed on one floor at about three-fifths or perhaps one-half of what he expected it would cost him on his own plan for one floor and cellar. Yet there are still many persons who think that they must have a cellar under the main floor.

To what extent can such persons be persuaded to build their cellars wholly above grade by at least 1 foot?

In other words, the question put to architects and, through them, to owners, may well be, If you have no use for a cellar, why put one under your building? A building costs a certain sum by the unit of the square foot of floor, counting every floor. If the use of only one floor is called for, why put a more expensive floor 10 feet below it by digging a hole in the ground?

If it be expedient to use two floors and to have all the light, air and ventilation one can get on both, why make one a basement partly below ground and partly above? Why not put them both above grade?

Of course these questions apply to open spaces where it is not necessary to go down deep into the bowels of the damp earth or high up into the air in order to get floor space. On a broad area, floor space on one floor can be provided at less cost than by excavating or going high into the air; on two floors at the lowest cost at which floor space can be provided in any way.

Then why provide either cellar or basement floors below grade, except in deference to a superstition derived from a period when the right way of constructing a floor directly upon the ground had not been devised?

A HANDSOME pair of solid bronze vault doors and other work for the George W. Childs mausoleum now in course of erection in Laurel Hill Cemetery, Philadelphia, are being turned out by Bureau Bros., bronze founders, Twenty-first street and Allegheny avenue, of the city named. The doors are each 7 feet high and 3 feet 3 inches in width, and will be surmounted by a molded cornice of elaborate workmanship. Each door will be ornamented with an oblong grille of exquisite design in scroll work. The firm have just completed a bronze statue of William Penn., one of three figures that are to surmount the new Betz Building, in Philadelphia.

Wind Pressure on High Buildings.

At the time the American Institute of Architects held their twenty-eighth annual convention one of the subjects discussed was the wind pressure on high buildings, concerning which W. L. B. Jenney of Chicago spoke as follows:

You know in all tall buildings the wind pressure is an exceedingly important factor. Suppose, for example, there were two columns or two girders, top and bottom of a story. The ordinary way was to put high rods across diagonally, from the top of one column to another, set up with turn buckles. You all know how that is; they will come just where you don't want them; in the center of a hall, in between two large offices, somewhere in the way. They can only be used around the elevators. And they will come in a thousand places. The other way, of putting in beams and knees at the angles as they do on steamboats and vessels of iron construction, is also open to objection. In discussing this once with the late Mr. Sherzer, an engineer of the Carnegie Company and of the Keystone Bridge Company, he said: "Why don't you make the attachments of your beams to your columns broader, as broad as you can, getting larger moment there?" The idea was so good that, having at that time the New York Life Insurance Company Building at Chicago in process of construction, I tried to put it in application.

I find that buildings 100 x 80 feet, 12 stories, that is 150 feet high, will resist, by the ordinary attachments of the interior columns, one quarter of the wind pressure. Now, we take the wind pressure—the wind pressure against one side of the building from the top down to the hights of the neighboring buildings that prevent the wind acting upon it, usually 100 feet—the ordinary buildings around being 50 feet high. The top 100 feet of a 150 feet high building is subjected to a wind pressure that we will assume to be 40 pounds a square foot. I found that the interior columns would carry one-quarter of that, or 10 pounds; that leaving 30 pounds a square foot, or three quarters of the wind pressure, to be provided for otherwise. I introduced instead of an I-beam two 15 inch girders on the outside. I am speaking now of the outside walls; the inside took care of one-quarter; three-quarters had got to be taken care of by the outside construction of the building. I put in two 15-inch girders, riveting them to the sides of the column, both ends; then added plate gussets. The corner would be there and the columns below; always provided that they could be covered by the masonry. In the upper stories your windows would come in here, so that this point here would be just under the corner of the window sill, therefore this gusset and the one riveted to the inside of the channel, the flanges of the channel being out and in, would be left flush except on the inside, so that the plate girders would be riveted the whole length through and the whole length well to the columns.

In that way, by calculation, we discovered that we could do away entirely with any other wind pressure. Now, that method seems to be advantageous in the ordinary tall office building. With regard to the upper stories, of course, you may assume each story to be thoroughly held by the stories below. We calculate the wind pressure as if this was a beam, held here, and the wind acting uniformly distributed over the length of the beam, treating the whole side of the building very much as the side of a bridge between two columns, the same as a panel of the building. The upper stories require no gussets. There is one other point that those who may, for the first time, have to build a very tall building, 200 feet high or so, may be interested in, that has come up recently, and that is this: the supply pipes by which it is necessary to pump the water to the top of the building and which are ordinarily in use are entirely inadequate. There must be special pipes for that purpose; pipes that have been tested to resist the pressure, and not do as was done in one building that I know of, quite recently, where it was learned that the first pipe burst; another pipe burst, and then the matter was calculated, so that finally pipes that were tested and found to resist the pressure required were put in.

Architects' Claims on Unfinished Work.

Judge Cullen of the Supreme Court, Kings County, N. Y., recently handed down a decision in a test case of interest to architects and builders. On March 28, 1892, J. Philip Rim, an architect, received from the Electric Power Company of Staten Island, N. Y., an order to prepare plans for a power house on the grounds of the company at New Brighton, S. I. The plans were accepted and the building begun. In April, 1893, a receiver was appointed for the company and the work stopped. Rim wanted his commission of 1½ per cent. not only for the plans prepared, but for the supervision of the unfinished part of the building as well, which was refused. Application was then made to the court for an order, or the declaration that the claim was a mechanic's lien on the land upon which the unfinished part of the building was to be erected.

Judge Cullen in his decision said that the plaintiff could not be allowed a lien upon the unconstructed part of the building, as the work of the architect and supervisor must be treated the same as that of the labor of any other workman. It was the part the architect takes during the construction that brings his services within the lien law. The case was the same as if the defendant, after accepting the plans, had refused to prosecute the work, and the only redress would be in an action for breach of contract, therefore the motion was denied.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

A DETAIL of the inside finish, drawn to a scale of 1½ inches to the foot and showing the face and sections of base, plinth block, casing and corner block, is presented in Fig 26. We have now completed the details of our house plan, but before concluding our lessons in drawing we wish to give a few examples for practice, to represent a class of work that has not been shown. Fig. 27 represents the shingling of a gable with round and octagon butt shingles, drawn to a scale of ½ inch to the foot. To execute such designs on a small scale is a very difficult task. The method of drawing may be described as follows: After making the outlines of the finish down to the space required for shingles, space and draw lightly the lines representing the courses. Then, for the round butts, draw lines to use as centers in describing the circular lines, as shown by dotted lines in the engraving. For the octagon butts draw lines representing the depth of the octagon cut, as shown by dotted lines, and finish as indicated, drawing the perpendicular lines last. After this has been done erase the superfluous pencil marks and trace the drawing permanently. A more expeditious and, perhaps, a better method to pursue with such work is to make patterns showing the profile of the bottom line of courses, as shown by Figs. 28 and 29. These patterns can be made of thin sheet brass, or even of cardboard, and will be found a great help in regard to speed as well as in keeping the work uniform. There are many small patterns of this kind that can be made to do good service in the way of helps and aids in drafting.

Fig. 30 shows an octagon plan of a bay window, and Fig. 31 the elevation, drawn to a scale of ¼ inch to the foot. Figs. 30 and 31 have been presented with a view of showing how to give a drawing the octagon appearance. This bay window is of the same general style as the square one previously shown, with but few exceptions. In this it will be seen that the window sill miters around the corners and the corner casings extend from frieze to sill and from sill to water table, instead of extending from frieze to water table, as shown in Fig. 20. It will be noticed that the side rail of the sash on the side windows does not show on the side next to the middle window. The reason for this is obvious when the plan is properly considered. Looking at an octagon bay window squarely from the front the casings of the frame hide this portion of the sash. In representing the brackets the draftsman has a regular picnic, and it is no small task to do the work properly. As will be seen by referring to the elevation, we have three views of the brackets. Directly in front we get a face view, while next to either side we get kind of a half-face and half side view. To the extreme right or left corner we would get a full side view of the bracket were it not for the fact that it is partially concealed by one of the side brackets. This drawing shows that there is a great study in architectural drawing and that much depends upon the judgment and skill of the draftsman. In fact, there are many things that come up in drafting that are very difficult to represent on paper. The draftsman has to form an idea of how the drawing should look to represent certain things; then study how to draw them, and, lastly and most essentially, practice the art.

We will now give a few instructions in regard to tracing drawings with ink. First, the draftsman wants a rule specially prepared for the work. Any common rule can be prepared for the purpose in a few minutes. Fig. 32 shows the shape of rule as used with the drawing pen, the same to be used with the beveled edge down. The idea of this is to prevent the rule touching the paper at the very edge of the ink line. When the rule and ink line touch the paper at exactly the same point, it is very difficult to move the rule without making blots. The rule slightly beveled and used in the manner above described is a sure preventive to blotting the work if anything like ordinary care is exercised.

In regard to the position of the pen it should be held with the flat side of one of the nibs to the rule, and very nearly in a perpendicular position. The ink commonly employed is Higgins' American drawing ink, prepared ready for use. This ink dries quickly, the lines can be made very close together, and the rule moved around over the paper almost as fast as desired. The draftsman seldom has to wait more than a few seconds for the ink to dry.

In regard to filling the pen, there is a quill with each bottle of ink designed for the purpose. Our advice is to pay no attention to the quill method of filling the pen. It is too slow and bothersome. Dip the pen right in the ink, and then with a piece of cloth lightly wipe off any ink that remains on the outside of the nibs of the pen, as it would come in contact with the rule and otherwise might cause trouble. Always try the pen on a piece of paper before starting a line to see if it is working properly. On account of the quick drying qualities of the ink it frequently dries on the pen, thus stopping the flow of ink. This is particularly bothersome, especially in making very fine lines, and the nibs of the pen have to be frequently wiped off and adjusted. Therefore we repeat, be sure the pen is working right every time before you start a line, and then know just where you want to stop the line when you start it. This is about all there is of inking and drawing. Remember to make all drawings lightly with the pencil first, then ink the same lines over. If any superfluous pencil marks remain they can be easily erased with a rubber, which will have no effect on the ink lines. To ink a drawing on architects' tracing paper, place the paper, which is transparent, over the pencil drawing, and the lines will show plain enough to be easily traced.

We have now passed through a full description of the manner and method of making architectural drawings. The subject is one of such wide range and the work that comes up from time to time so varied that perhaps no definite rules can be laid down that will meet the requirements in all cases. No two architects would be likely to pursue exactly the same course, yet they would arrive at the same results. To illustrate and describe all phases of the art would make a book seemingly without end. In these instructions in drawing we have given the draftsman the principles, method of starting and his course of procedure to the finish. By faithful practice and study of the art he will steadily improve, acquire the proper use of the tools and better judgment as to the methods of proceeding in difficult cases. These points must necessarily be left to the judgment of the draftsman as they come up from time to time. Experience and practice will prove of valuable service in the art, and gain for him a knowledge of drafting that can be acquired in no other way. Therefore let him bear in mind that success in the art depends largely upon a faithful adherence to the simple words of study and practice.

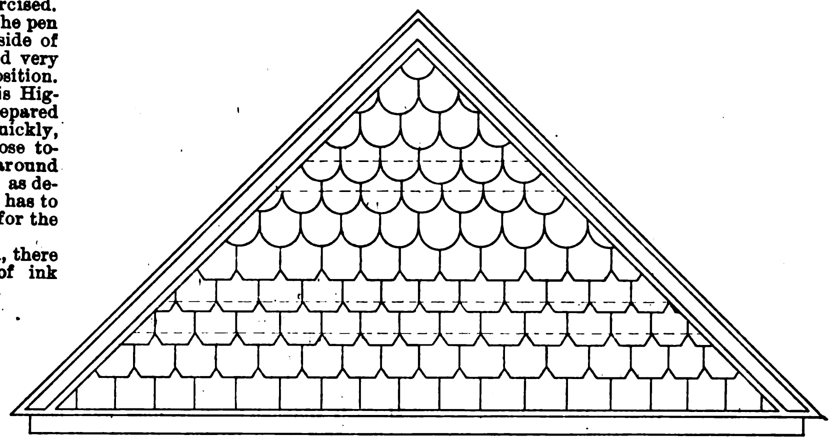


Fig. 27.—Method of Drawing Ornamental Shingles in Gables.—Scale, ¼ Inch to the Foot.

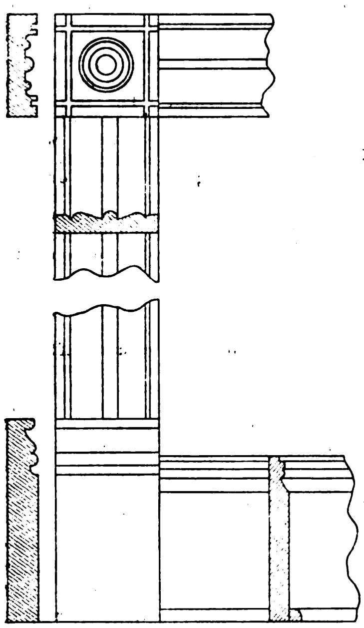
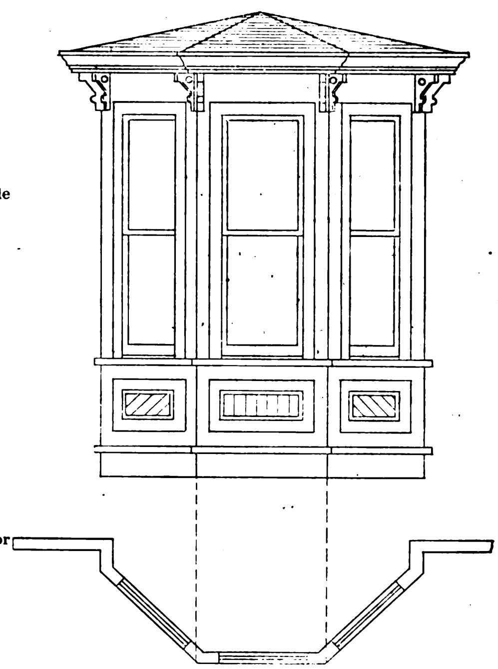


Fig. 26.—Detail of Inside Finish, Showing Faces and Sections of Base Board, Plinth Block, Casing and Corner Block.—Scale, 1½ Inches to the Foot.

Fig. 28.—Pattern for Shingle Work.

Fig. 29.—Another Shingle Pattern.

Fig. 32.—Shape of Rule for Use in Inking Drawings.



Figs. 30 and 31.—Plan and Elevation of Octagon Bay Window.—Scale, ¼ Inch to the Foot.

Architectural Drawing for Mechanics.—Exterior and Interior Details.

The Builders' Exchange

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To Local Secretaries.

The following circular letter, issued to architects and others by the secretary of the Mechanics and Traders' Exchange of New York City, offers a good example of action that would be beneficial to all exchanges:

"Your attention is respectfully called to the following extract from the rules of this exchange:

SECTION IV.

"The following named persons will be admitted to the rooms upon making themselves known to the superintendent, viz.;

"Practicing architects or their draftsmen.

"The superintendent of buildings or persons by him authorized.

"Former members of the exchange to whom the privilege is voted.

"Under the above you are privileged and are cordially invited to make use of the rooms of the exchange and their conveniences, including facilities for private consultations, for correspondence and the use of the telephones.

"The hours during which the rooms of the exchange are open are from 9 a.m. to 5 p.m., excepting Sundays and legal holidays. Saturdays, 9 a.m. to 2 p.m.

"Respectfully yours,

"ELLIOTT SMITH, Secretary."

The local secretaries are reminded that in the office of the association there is a supply of recommendations of the national body in printed form, available upon application for general use. These recommendations may be used either directly by the local exchanges or may become the basis of a ction upon which such modifications as may seem necessary may be founded. It seems desirable that the various secretaries should keep continually before their members every possible means for improving the transaction of the building business, and the methods recommended by the National Association are formulated for this distinct purpose. It is only by continual "hammering" that changes can be brought about, and the continual presentation of methods that are progressive in themselves and specially calculated to be of service to the builders cannot but result in benefit.

Methods adopted by the various exchanges, that have proved beneficial, have been prepared in such form as to become applicable to other exchanges, and these, together with the recommendations mentioned, form a large supply of valuable matter for the use of all concerned As the success of every exchange depends upon the ability of the individual members to recognize the value of concerted effort, it is a manifest necessity that advantage should be taken of every means possible for giving information to the individual, thereby increasing his value as a factor for good.

Sub-Contracting.

A movement is on foot among the sub-contractors in Chicago looking toward the improvement, from their point of view, of the conditions under which they transact their business. As yet no definite action has been taken; the preliminary work thus far being limited to an attempt to define just what form the desired improvement will take. The plea of the sub-contractors is that they are injured by becoming subordinate in their business to the principal contractor without sufficient benefit to either principal contractor or owner to warrant the continuance of what seems to be the unfair conditions. The sub contractors take the position, generally stated, that it is impossible for the owner to secure a better building by dealing solely with the principal contractor, making him responsible for all branches of the work, for the sub-contractor will work for the owner just as cheaply as for the principal contractor. The claim that work goes on with greater rapidity and less friction under the management of the principal contractor is offset by the statement that the management of the work primarily belongs in the hands of the architect, and that the full exercise of his functions will secure as great and satisfactory rapidity of construction as though the control of the work were delegated by him to the principal contractor and from him to the various subs.

The main cause for complaint by the sub-contractor is the custom of giving general contracts to men who lack sufficient capital to carry on extensive operations, and they (the sub-contractors) are dependent wholly upon the dealings of the owner with the principal contractor before they receive their money. If, on the other hand, the principal contractor is financially able to carry on the work it would be but right and proper that he have a just return for the use of his money, thus increasing the cost without adequate return to the owner; for the same work could be accomplished by direct contracts for all the parts without the necessity for this extra expenditure.

The sub-contractors complain that under the system of general contracting their work is made wholly tributary to the profit of the principal contractor; that his paramount object is to get the work done as cheaply as possible in order that the margin of profit within the amount of his bid for the entire work may be as large as possible. By this system, it is claimed that inferior sub-contracting is not only made possible, but fostered. The tendency, from the sub-contractor's point of view, is to increase the cost of work, which must, when all things are settled, come out of the owner; to lower the quality of work and to make contractors feel that it is hardly worth while to do a good job for the owner who does not consider it worth his while to recognize the sub contractor in any way. The movement is expected to be placed in such form that it will appeal to architects and to others interested in the building business as being a genuine effort to secure better work, not only without endangering the position of any of the parties to the building contract, but on the contrary to improve such relationships in all their various aspects.

J. C. Adams.

The Business Exchange of Indianapolis, Ind., has been honored by having one of its members chosen Speaker of the Indiana House of Representatives. Justus C. Adams, who has just been selected for this post of honor, has been one of the most active and progressive of the Indianapolis builders, and has ever been one of the foremost of the members of the exchange in all efforts for better business conditions and the general welfare of the community. Mr. Adams is an ex-officer of the exchange and has been closely identified with the best interests of the organization for many years. He has frequently represented his exchange in the conventions of the National Association, where he has been an important factor for progress. The address of the new Speaker on assuming the chair in the House of Representatives was sound and positive and promises a successful incumbency.

TYPES OF BELGIAN TIMBER ROOFS.

At the exposition held last year at Antwerp there were many things connected with building matters of interest to foreign as well as local architects, builders, contractors, &c. In the Belgian section there were displayed numerous models of timber roofs, some of which are illustrated herewith. In describing the exhibit the correspondent of a London architectural journal says that the various forms of construction "are designed for a country possessing and importing small timber only for building purposes. The avoidance of stout members is very noticeable, also the substitution for them of double members, with consequent great saving of labor in the joints. Whether this simplification leads to such sound work as does the necessarily careful framing of English trusses may be questionable, but there can be no doubt that the system might be much more largely adopted than it is where scantling are readily available and where it is desired to reduce the cost as much as possible, particularly in structures of a more or less temporary nature. Quite simple examples, adaptable to many purposes, are those suggested for the roofs of sheep pens and piggeries, shown in Figs. 1 and 2, though in neither case, possibly, can we unhesitatingly admire the way in which the purlins are not supported where they occur.

"The way in which the ridge piece rests upon the head of the king will also be noticed in every instance, rather with a feeling of wonder than with any desire to imitate. The want of support to the lower purlin is also the great fault with the stable roof, Fig. 3, but otherwise it is a suggestive piece of construction, the fire proof floor of loft being utilized for support. The double hammer is sensible, if none too scientific, and the supporting of the ridge piece is wise.

"Both these principles are extended in the large dormitory roof, Fig. 4. It is a pity that support to the lower purlins could not have been obtained in a vertical plane; but, even as it is, the bearing of the purlin is considerably decreased, and it is thereby rendered possible to either increase the distance apart from principal to principal, or to decrease the section of the purlin—and altogether it is a clever piece of construction.

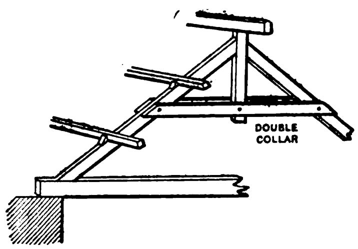

Fig. 1.—Roof for Sheep Pens and Open Sheds.

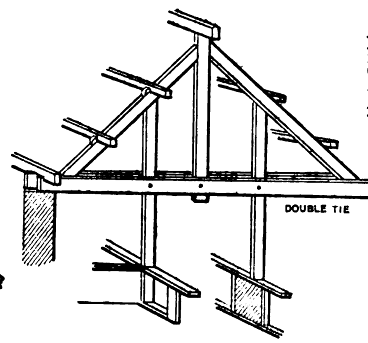

Fig. 2.—Roof Designed for Piggeries.

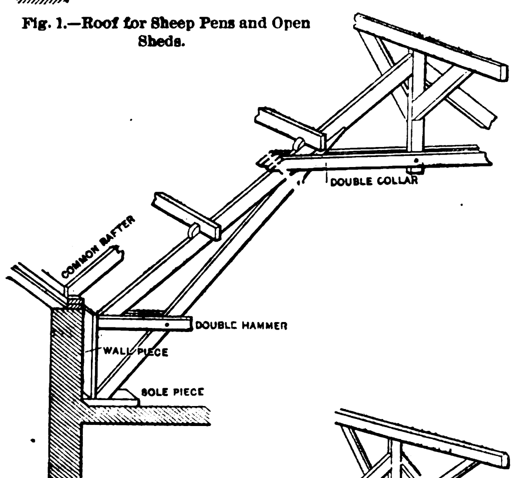

Fig. 3.—Stable Roof.

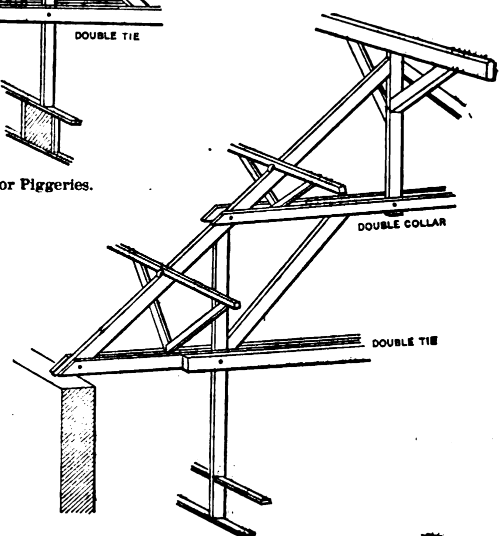

Fig. 5.—Roof for Cattle Shed.

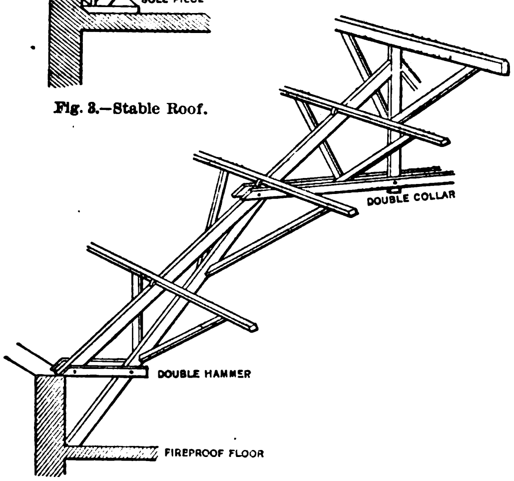

Fig. 4.—Roof for Large Dormitory.

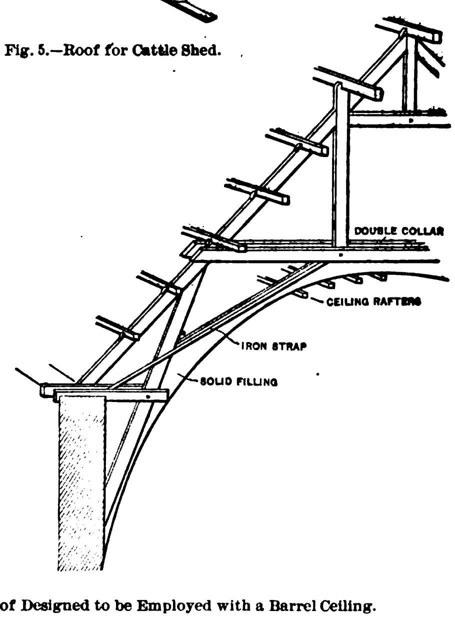

Fig. 6.—Roof Designed to be Employed with a Barrel Ceiling.

Types of Belgian Timber Roofs as Seen at the Antwerp Exposition.

"In the cattle-shed roof, Fig. 5, the supports to purlins have been kept in a vertical plane, and a vertical support to the end of collar is obtained from the ground; but what a terribly clumsy contrivance it is to lengthen the double tie, when timber is not procurable of the length required, in the way which is shown. It looks like amateur's work rather than a model fit for an exhibition, and, presumably, for the instruction of others.

"Want of support underneath purlins is again noticeable in the barrel roof, Fig. 6; but the introduction of the flat iron bar as a tie is of considerable advantage, and would scarcely be noticeable from below even were the roof unceiled. In such a case, however, the double hammers would scarcely be admissible.

"It was, unfortunately, impossible to obtain the scantlings of these roofs, the models from which they were taken being to a scale of $\frac{8}{10}$ full size—too small for timbers to have been very accurately cut to it.

Heating and Lighting of Windsor Castle.

A chatty account in a London paper of Windsor Castle, the chief palace and usual winter residence of Queen Victoria, contains the following in regard to the question of the heating and lighting of the castle:

For lighting the castle four methods are available, all of which are more or less in operation—viz., gas, oil, candles, and the electric light; while for warming and cooking, wood, coal and gas are used. During the residence of the court some hundreds of persons are in the castle besides the royal family and the visitors; consequently, the adequate provision of all these processes is of a somewhat gigantic nature, keeping many servants constantly employed.

For the general lighting and heating, gas and coal are adopted; but this is not so in the Queen's own rooms, nor in many other of the royal apartments. In the matter of fires for her own rooms the Queen strictly banishes coal. She has a confirmed preference for wood only. Special supplies of wood have to be obtained for this purpose from the thickly timbered hills a few miles up the river above Windsor, where a number of workmen are regularly employed on this task. The timber, when felled and roughly trimmed on the spot, is brought down to a wharf on the river side, where it is dressed and cut up into blocks of fixed sizes; it is then stacked to get seasoned, and as required supplies are brought down to the castle for consumption in the Queen's rooms.

Gas and oil are excluded from her Majesty's apartments. Here light is provided by means of wax candles, all of one special pattern, their daily removal being the duty of a special official. In some of the other apartments gas is utilized, and in other parts oil lamps are burned, gas supplying the quarters of the staff generally. Moreover, although the Queen bars all but candles for her own private use, she has permitted the introduction of an electric light plant. This is placed underneath the north terrace, and is in charge of a special engineer, under the general supervision of a prominent electrician. This plant has never been largely used, but the light has been led into and applied to the main corridors, to one or two of the royal apartments and to the library. A year or so ago the original plant was replaced by newer and more powerful machinery, which would probably suffice to light the whole of the castle if the Queen so willed; but this has not yet occurred, nor is she likely to sanction it. Electric bells and telephones abound throughout the castle, but electric light is allowed very limited play.

The coal required for Windsor Castle chiefly comes from certain collieries in North Wales, brought in train loads of perhaps 500 tons at a time. From the station it is carted to the Castle, in various parts of which are deep and spacious cellars into which it is tipped. Thence it is conveyed as required to the different rooms and offices, numbering some hundreds.

Lifts are almost unknown in the Castle, consequently the coal has to be hoisted from the cavernous cellars and carried hither and thither by coal porters. The replenishing of the fires is carried out upon a most careful and efficient plan, footmen and other higher servants receiving the coal from the porters and passing it on to the royal apartments at intervals throughout the day.

Each official connected with heating and lighting the castle has his allotted duties and recognized position, and thus the residence of the highest lady in the land is lighted and warmed in an efficient manner by many and various processes.

New Publications.

MONCKTON'S STAIR BUILDING. Fourth edition, revised and enlarged. By James H. Monckton. Size, 9¼ x 12 inches. Illustrated with 112 full page plates, accompanied by ample descriptive letter-press. Bound in stiff board covers. Published by John Wiley & Sons. Price $4, post-paid.

This work, by a well-known author on stair building, presents what is known as the one-plane method of handrailing, as applied to drawing face molds, unfolding the center line of wreaths, thereby obtaining the exact lengths of balusters and also unfolding side molds. The volume is arranged for the especial use of architects, stair builders, carpenters, iron workers, pattern makers, stone masons, ship joiners and technical schools. It has been revised and enlarged in the light of the author's practical experience, and changes have been made intended to "perfect, widen and maintain the usefulness and raise the scientific and practical character of the work." An interesting feature is 16 entirely new plates which have extended uses in the practice of building wood, iron and stone stairs. The first division of the volume relates to a history of stairs, in connection with which are seven engravings showing examples of ancient English work. The next section relates to definitions of terms used in connection with stairs and stair building, after which is a list of books published in England and America treating partially or wholly on the subjects named. Another division is devoted to suggestions, while other chapters relate to iron and stone stairs. Among other features likely to prove especially valuable are the portions dealing with circular stone work and the planning of stairs. The author treats his subjects in such a way as to prove of great interest and value to those engaged in the various branches of the trades addressed, and the volume will be found an important addition to the library of the building mechanic.

A SHORT time ago the workmen at the Mount Airy quarry in North Carolina split off a piece of stone in a straight line 210 feet long, 10 feet wide and 2 feet 8 inches thick. It contained about 5600 cubic feet and weighed about 460 tons."

CONTENTS.

RESIDENCE OF JOHN S. WHITEHOUSE, LEXINGTON AVENUE, PROVIDENCE, R. I.

FRED. E. FIELD, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING FEBRUARY, 1895.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

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DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR

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MARCH, 1895.

New York Architectural League.

The tenth annual exhibition of the Architectural League of New York opened under favorable auspices on February 15, in the American Fine Arts Building on West Fifty-seventh street. The various galleries are filled with examples of the work of leading architects and designers, and the exhibition is one which cannot fail to prove educational in a marked degree. There are nearly 400 architectural designs and over 800 examples of sculpture and decoration. The architectural student will find much of interest and value in the plans and perspectives arranged about the Vanderbilt Gallery, these including competitive designs for State buildings, schoolhouses, mausoleums and asylums, as well as a multitude for city and country dwellings. There are also to be found designs for glass, mosaic and mural ornamentation, furniture, decorative panels in plaster as well as color, panels in burnt wood, bronzes, ornamental iron work, examples of wood carving, &c. Many of the efforts are conspicuously clever, and the display should prove, before its close on March 9, one of the most popular which the league has held.

The Kitchen of the Future.

In the designing of buildings intended for living purposes one of the features which often fails to receive the attention its importance warrants is the kitchen. The idea seems to prevail in many quarters that this department of the household can be located almost anywhere without much regard to light, ventilation or convenience of access. It may be stated without fear of contradiction that in a majority of the flats and apartment buildings in the large cities of the country, and frequently in private houses as well, the kitchen occupies a damp basement or remote corner of the building with little or no provision for ventilating the room of the vapors arising from cooking, and often so dark that it is necessary to keep the gas lighted during the day as well as at night. Under such conditions it is not surprising that the lives of cooks are short compared with those engaged in other indoor occupations. The many and serious objections urged against this condition of things in the course of time caused efforts to be made to remedy the difficulties. Some of the results are seen in connection with a few of the more expensive apartment houses, hotels and clubs, where the kitchen is located at the top of the building. In this position there is an abundance of light and ventilation, while the odors and vapors arising from cooking operations can be readily carried away without annoying the occupants of the floors below. Ever since this plan was tried some little thought has been given to applying the feature to private houses. It is as yet in an experimental stage, but probably when electricity becomes more generally employed for domestic purposes the kitchen at the top of the house will be regarded as common practice.

Sanitary Aspects.

Apropos of the above it is interesting to note that the Society of Cooks in Paris lately secured the services of an eminent physician to investigate the causes of the alarming mortality in their profession. He declares that the kitchens of Paris are the foulest portions of the houses, and that their occupants are subject to a multitude of disorders; which would be immensely reduced if the kitchens received a proper supervision on sanitary lines. One of the remedies proposed consists in increasing the size of the kitchen and removing from its vicinity larders, sculleries, sleeping rooms and water closets. A writer discussing the principles of kitchen sanitation states that "they can be applied to any house by a little study of material at hand. Oil cloth or linoleum should cover a wood floor, zinc or oil cloth should be placed over shelves and tables, and every vestige of carpet or rug relegated to some other place from that in which the food is prepared. Better, of course, than all this is to have put in new floors and walls of tiles or marble in the kitchen or pantry. Expenditure here would be of greater value than in the parlor if both could not be afforded."

Some American Kitchens.

In marked contrast with the French kitchens, as well as some to be found in many German houses, are those of many of our modern American homes, where vaulted roofs, swell ends that take up the greater portion of the back yard, tiled or marble walls, inlaid floors, open plumbing and the latest features in ventilation make the word kitchen a poor term to apply to these places. In a beautiful mansion recently completed in this city the kitchen has a ceiling fully 15 feet in hight; the floor is inlaid with chips of marble, the walls are tiled and there is scarcely a strip of wood to be found outside of doors and frames of the china closets. Under a set of cupboards, which stand perhaps 8 feet from the floor and are 10 feet wide, the space is lined with marble and fitted with marble shelving. Every corner of the kitchen is light, the water pipes run outside the walls in stacks of six and eight lines, and the nickel plated stop cocks are readily accessible at all times. In the butler's pantry adjoining are marble shelves, tiled wainscoting, inlaid floors and tables covered with zinc for draining dishes and keeping food while serving the table.

A Pompeiian Bathroom.

A very interesting discovery recently made near the old site of Pompeii is described in the European journals. A large building was unearthed on the property of a Signor de Prosco, containing several rooms, among them three bathrooms, furnished with large sculptured marble basins, heating apparatus, lead plumbing work, with bronze faucets, and tiled floors and walls. The three rooms correspond in their arrangements with the usual hot, tepid and cold baths usually found in the old dwellings of the wealthy classes. This is, however, said to be the most complete, richest and best bathing installation so far found. It has been so well preserved on account of the roof not having caved in during the great eruption of Vesuvius which buried the city of Pompeii in the year 79. Most of the houses were entirely destroyed at that time, only a few vaulted structures resisting the immense pressure of the lava and ashes. This roof is nearly 45 feet in length.

The Strike Abandoned.

During the past month action has been taken by workingmen of St. Louis, Mo., which, if carried into effect, will set a worthy example to organized labor in every city in the country. The central labor organization has abolished the office of walking delegate, has taken a decided stand against strikes and come out in favor of arbitration as the only means for adjusting the differences between employers and workmen. For some time past the Builders' Exchange of St. Louis has been advocating the adoption by the separate trade associations of the city and the trade unions of the form of arbitration recommended by the National Association of Builders. This, together with the fact that the employers are said to be willing to meet the employees half way, practically prevents the possibility of lockouts. The establishment of joint boards of arbitration in which both sides have equal representation, supported by the certainty that each side is determined to avoid an open break, will do more to bring about amicable relations between the two than would be possible by any other means. The position taken by the workmen is most commendable; and so manifest a desire to establish harmonious relations between themselves and their employers cannot fail to command respect and consideration. The elimination of strikes from the disastrous possibilities of executing a contract is so very desirable as good business policy that the employers cannot fail to see the wisdom of meeting the workmen half way in so equitable an arrangement. It must be taken for granted that the success of this laudable endeavor on the part of the w rkmen depends in a measure upon the employers, for should the latter fail to profit by this step in advance and attempt to take advantage of the pledge of the workmen not to strike, the latter would be in a measure justified in again taking up the destructive weapon they have thus voluntarily laid down.

Philadelphia's New Hotel Metropole.

A building which, when completed, will be the largest and finest hotel structure in the Quaker City, is about being erected at the corner of Broad and Locust streets, Philadelphia, Pa., from plans prepared by architect A. S. Wade. The new building will occupy the site of the Empire Theater and will include the present Hotel Metropole on Broad street below Locust. The new portion of the hotel will be 99 feet on Broad street, 130 feet cn Locust street and will be ten stories in hight. The exterior will be of Union stone, terra cotta and red brick, with the main entrance on Broad street. This entrance will consist of two arched doorways, 38 feet wide, opening into a lobby 40 x 100 feet and 30 feet in hight. The main floor will be occupied with the lobby, offices and four *cafés* in Dutch Renaissance, Turkish, Venetian, Gothic and Empire styles. On the second floor will be the parlors, reception and banquet rooms. Above this, to the ninth story, will be sleeping rooms, private parlors and baths, making more than 600 rooms in the entire structure. The tenth floor will be devoted to dining room and kitchen. Five electric elevators will be employed and the basement will contain a very complete mechanical plant. The hotel will be constructed for Robert Goelet of New York City and the work of tearing down the Empire Theater will be commenced about the middle of March.

A LATE ISSUE of an exchange contains an account of the way a two-story house was moved from the eastern side of Muscongus to Damariscotta Mills, Maine, by way of the pond. The house was put on two heavy shoes and twenty powerful oxen hitched thereto. The building was hauled to a lofty hill overlooking the lake, the oxen detached and the building given a slide down the hill, a distance of about a quarter of a mile. It went down the declivity with considerable rapidity and out on to the ice of the lake, making the trip in safety. The oxen were then again attached and the rest of the journey triumphantly made down the lake. It is stated that it was moved from eight to ten miles in one day.

Measuring Masonry.

There are two widely different methods of measuring and estimating the value of masonry, says the *Canadian Architect*, to which we will find it necessary to attend. By the first of these methods the value of the rough material in cubic feet is added to each successive kind of labor exercised upon it in superficial feet, in order to ascertain the final value of each piece of stone employed. In ashlaring the price of plain work is allowed to face, bed and joints of each stone, with horizontal bed and one vertical face only for bond stones, unless they are through stones, when two vertical faces may be allowed. If labor is not charged on any face of a stone, half sawing is to be allowed for each lower face. Columns are measured by taking first two plain sides of the cube, added to the girth of the column as circular planes, and two plain faces to each horizontal joint. The material in solid steps is measured by taking the extreme length, including the tailing in the wall, by the width and whole hight. Winders in the same, the width being the mean between the extreme end widths. Labor on steps, if solid, includes plain, sunk or molded work on the face of the tread, riser and ends only if laid on brick work. To this half the bed is to be added if the step is laid on stone. For cornices, strings and blocking courses set on brick work add the molded, sunk or planes in faces and top to the plain work in joints and allow no beds; but if set on stone half a plain bed to be allowed besides, also half plain to the back if worked. For landings plain work is to be allowed on top, edges and joints. If the underside be worked, to be charged half plain superficial. Curbs are taken as plain, sunk or molded to the three faces, but no bed. For hoisting stone above 10 feet from the ground level an additional 2d. per cubic foot for 10 feet in extra hight is to be understood, unless otherwise specified. The second method of estimating masonry recognizes only the exact net cubic quantity of stone used, and affixes a definite and total price to this, varying it only to meet cases, where vast differences of labor are palpably required, and allowing no extra or additional charges whatever under any circumstances. Thus we may have rubble or ashlar, as the case may be, in walls, including all plinths, grooves, arch stones, reveals to openings, string courses, copings, returns, &c., at so much per cubic foot net, deducting all openings and backings, if of brickwork, as they may appear in the drawings or in the specifications; in fact, tantamount to a lump sum for the whole piece of work. While it must be admitted that this wholesale method of measuring facilitates the progress wonderfully, it is equally undeniable that it is as uncertain in results as careless in process; and, indeed, the exact and just measurer, even if driven to adopt this method ostensibly, will take the trouble to work out an average block or two of each kind of work upon the other and more correct system, and reduce the cost thus found to a set of prices per cubic foot in the required estimate.

Why We Ventilate.

A paper, from which we quote below, read by Louis Wilde before the Society of Minnesota Florists, discusses pure air and ventilation as necessities in a manner that presents the arguments from a new and impressive standpoint.

In experimenting with our roses under glass, I think that we go at it entirely too one sided. We pay too much attention to what our plants must have to eat and drink, so to speak, and too little or none at all to what they must breathe. In other words, we care too little about the air our roses have to live and grow in. As long as it does not appear foul to our sense of smell, and is not considered bad from our personal point of view, we are apt to regard it as all right for the roses, forgetting that what is agreeable to us may not be to them, and *vice versa*.

I have been through quite a number of rose houses, and what I have seen and the opinions I have heard expressed regarding ventilation are astonishing. One meets so called rose growers who have not the faintest idea why rose houses should be ventilated, neither do they know or suspect what influence the air exerts on the growth of the plants. Many consider ventilation an easy means of regulating the temperature of the houses rather than anything else, and, with them, opening the ventilators in cold weather means a needless waste of coal. There are growers who keep their houses shut tightly for two or three months at a time during cold weather.

In my opinion there are two good strong reasons why we should ventilate:

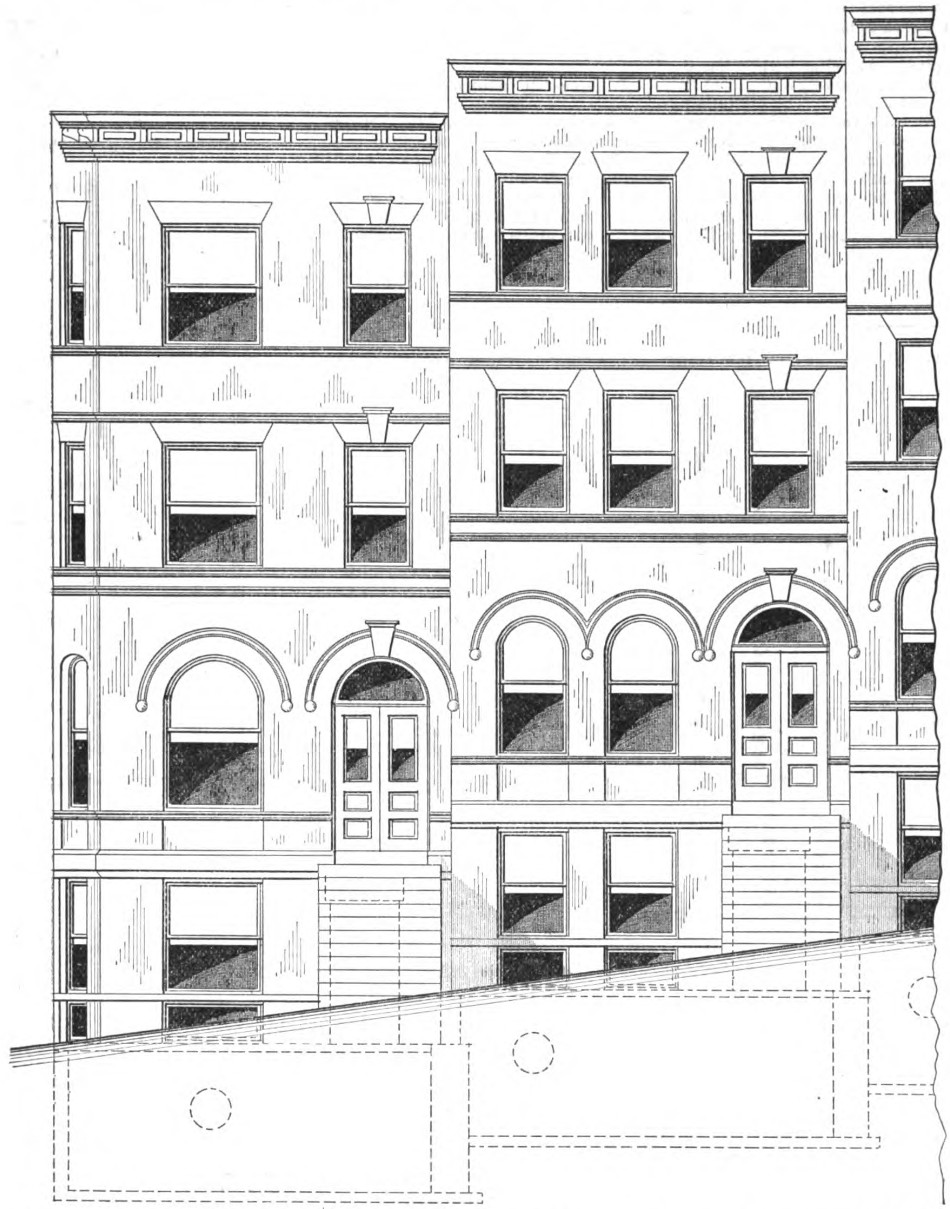
1. To change the exhausted air of the houses for the purer one without, full of the elements necessary for plant life.
2. To regulate the moisture contained in the air in our houses.

We all know that one of the most important substances which build up the tissues of the plant is taken directly from the air through the pores of the leaves and under the influence of light. I am referring to carbon. The air contains relatively only a very limited quantity of this element and important plant food. In such a comparatively small space as our houses this will soon be used up. When carbon is not present in the air of our houses in sufficient quantity the plants will not grow vigorously. Its total absence means death to them. This, however, will rarely, if ever, occur, as no house can be built air tight, and on that account an exchange of air, however insufficient, will always take place. On the other hand, a small amount of carbon is also supplied by all decaying vegetable matter in the houses, such as sods and stable manures, so that even if a house be never ventilated the plants will not die at once, but as the supply of carbon is insufficient they will grow straggling and sickly. As plants are taking up carbon during daylight, we should have ventilation during that time, if at all possible.

We must further ventilate, as before stated, in order to regulate the atmospheric moisture of our houses. Moisture of the air influences indirectly the growing process of the plants in so far as its presence in smaller or larger quantity regulates the evaporation going on on the surface of the leaves, which evaporation in its turn gives rise to the flowing of the sap, thereby causing nutrition of the plants.

DESIGNS FOR TWO-FAMILY HOUSES.

THE subject of our supplemental plate this month is a row of houses recently completed in West 146th street, this city, each being arranged to accommodate two families. The houses were designed and built by Architect John P. Leo of 287 Fourth avenue, New York City, in order to meet the than one elevation being to show the variation in the design of the exterior. In the floor plans we show the general arrangement of the rooms for the two families, the idea being that the owner will occupy the main floor and basement while the tenant occupies the two upper floors. We give the floor plans of the sleeping rooms on the top floor. On the second floor there are kitchen, dining room and parlor, out of which opens a small room which may be used as a library or chamber, as desired. The top floor is devoted to four sleeping rooms and a bathroom. The houses are each 20 feet front and 43 feet deep.



Front Elevations of the Two Houses shown at the Extreme Left on the Supplemental Plate.—Scale, ⅛ Inch to the Foot.

Designs for Two-Family Houses.—John P. Leo, Architect, New York City.

demand for dwellings of moderate price where the owner could rent a portion of the building and still retain for himself what would be practically a private residence, while the tenant would carry the expense of interest and taxes. The front elevations which we give are those of the two houses shown at the extreme left in the row illustrated on the supplemental plate, our object in giving more of only one house, as all possess the same arrangement. It will be noticed that in the basement provision is made for dining room, kitchen and bathroom, all being equipped with the latest improvements. On the main floor are parlor and two sleeping rooms, which complete the accommodations for the owner of the building, unless he should arrange with the tenant for one or more They are constructed of the best Hudson River brick with brown stone fronts. The roofs are of tin, the cornices and leaders of galvanized iron and the railings and window guards of wrought iron. In connection with the treatment of the fronts of the houses is found an interesting feature of construction. In order to obtain such a deep reveal as would be shown had 8-inch ashlar been used, the window frames are trimmed with a plate of wood ⅝ x 4 inches, which just laps the edge of the brown stone ashlar. In order to add to the attractiveness of the fronts the sash are glazed entirely with plate glass and the windows finished with shades and awnings.

For the purpose of insuring stiffness throughout, the timber employed is 8 x 12 spruce for the main floor joists and 8 x 10 for the roof tier. The studding is of 2¼ x 4-inch hemlock. The yellow pine girder in the cellar rests on rolled pipe columns. The cellar bottom has 8 inches of concrete and a finishing coat of pure Portland cement. The plastering is three-coat work and the cellar ceiling is skimmed. The flooring is of North Carolina pine, comb grained, and in the main stories is finished with three coats of varnish. The parlors and dining rooms are finished in birch, the rest of the finish being whitewood stained to correspond, and all rubbed to an egg shell finish. A special feature of the doors which gives a richness of effect is that the panels are all horizontal and are fielded. The front doors are of the combination type with upper panels glazed with plate. The fanlights are glazed with Chance's figured rolled pattern. The plumbing of these houses is a feature to which special attention has been given, and all the work has been executed as carefully as possible. Wherever circumstances permit the pipes are left exposed, making them easy of access.

The houses are heated by portable furnaces located in the cellars. In order to insure perfect warmth and prevent cold drafts, all the window frames were plugged with oakum before the hanging stiles were put in place. A further means of heating is found in the parlors, which have open fire places fitted with gas logs. The houses are tastefully decorated throughout, and are of attractive exterior.

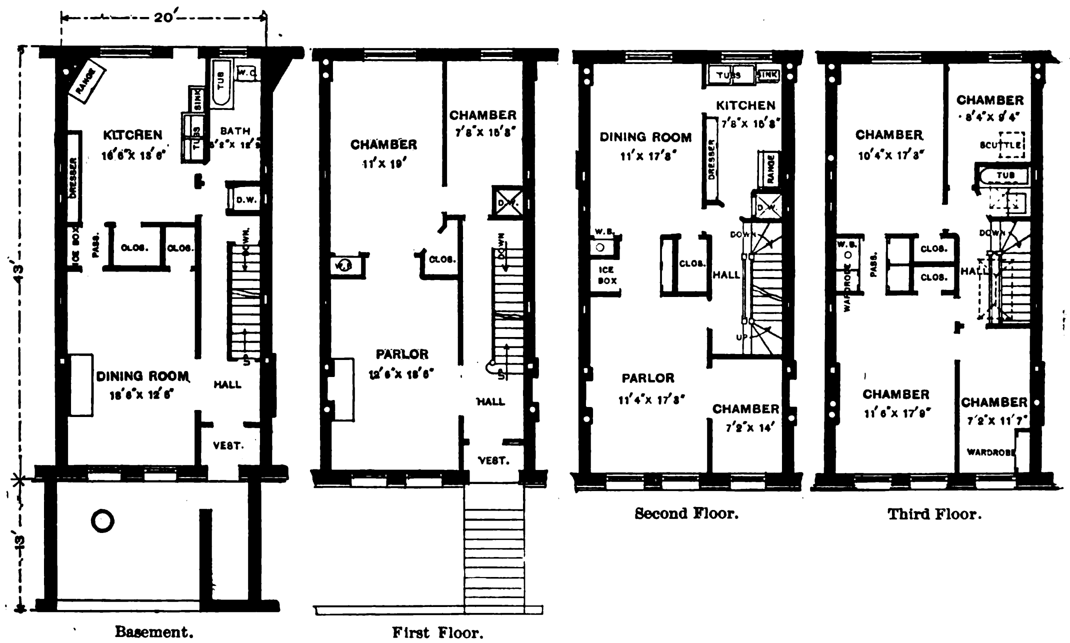
THE ninth annual report of the New York State Factory Inspector, submitted to the Legislature on Monday, recommends, among other things, that eight hours be made the limit of a day's work for women and for children under 16 years of age in factories and mercantile establishments. Legislation is urged regulating the erection of fire escapes on hotels and also for the means of egress and sanitary arrangements in halls, theaters, &c. The report also recommends that inspectors of steam boilers and examiners of stationary engines be appointed with suitable powers.

Turnstile Storm Doors.

A novel set of doors has recently been provided at the street entrance of the Postal Telegraph Company's tall building on Broadway, New York City, facing the City Hall Park. The object of these doors is to keep out the cold and wind which, at that particular locality, seems to come from all directions at once. The constant streams of people coming and going kept the ordinary doors constantly on the swing, and the cold winds swept into the building in a way which was anything but pleasant to those occupying the lower floor. The new doors are the design of a St. Paul man, and are built upon the plan of the old fashioned turnstile. In this case, instead of arms, there are four doors fastened at right angles to one another about a central pivot, and these turn within a partial inclosure of other doors. This octagonal structure, as it may be termed, is placed just within the doorway of the building, and in order to make the doors air tight as they revolve within the outer wings of the structure, broad flaps of rubber are fastened to their edges. They are not fixed directly to the doors, but to hinged pieces, and are held in place by light springs, so that there is very little resistance to the movements of the doors. When it is desired to admit air, as in warm weather for example, two of the doors can be turned back against the other two, leaving open two straight passages, one on either side of the central pivot. The arrangement has one other clever device intended to prevent the doors from offering any obstruction to the ready escape of a crowd in case of fire or other panic. The wing doors are held in place by spring hinges, and the central pivot sets in a socket on a caster center. This is held in place by a spring pintle at the top. In case the people pressed against the doors, the spring pintle would come off, and the whole set of doors be carried out in front of the surging mass of humanity, rolling along on its caster bearing and leaving the passageway clear.

Drying Damp Walls.

A method of drying damp walls is published in a late issue of the *English Mechanic* and may prove interesting to many of our readers. The article describes what is known as Sylvester's process, which consists in using two solutions for covering the surface of the walls, one composed of castile soap and water and the other of alum and water. The proportions are ¾ pound of soap to 1 gallon of water, and ½ pound of alum to 4 gallons of water, both substances to be quite dissolved in water before being used. The walls should be quite clean and dry, and the temperature of the air not above 50° F. when the compositions are applied. The first, or soap wash, should be laid on when boiling hot, with a flat brush, taking care not to form a froth on the brick work. This wash should remain 24 hours, so as to become dry and hard before the second, or alum, wash is applied, which should be done in the same manner as the first. The temperature of this wash when applied may be from 60° to 70° F., and this also should remain 24 hours before a second coat of soap wash is put on. These coats are to be applied alternately until the walls are made impervious to water. The alum and soap thus combined form an insoluble compound, filling the pores of the masonry and entirely preventing the water from entering the wall.



Designs for Two-Family Houses.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

THE USE OF THE SLIDE RULE.

BY WILLIAM COX.

TWO things are necessary to insure the easy and successful use of the slide rule: A predetermination to begin at the beginning, and a continued determination to persevere and practice with it constantly, not merely now and then when you have an hour or two to spare, but daily, and frequently every day, until the point of thorough mastery of its principles and comparative perfection in using it are reached. The method adopted by the writer, some 20 years ago, was always to carry his slide rule in his pocket, and in those many odd moments, indoors or out of doors, when one is unable to settle down to regular work, and which would otherwise be lost, to get it out and study it, reason it out, and try to make himself thoroughly acquainted with the principles upon which its construction depends, thus getting to the bottom of the why and wherefore of every operation performed with it.

The slide rule is like a book, which you cannot read until you know first the letters of the alphabet, then the various combinations of letters forming words, and lastly the method of putting words together in logical sequence so as to form intelligent sentences. The letters of the slide rule are the various perpendicular lines dividing each of the four scales (two on the rule and two on the slide, called A, B, C and D, beginning at the top of the rule) into a number of continuously diminishing parts. The first thing to do is, therefore, to thoroughly master these. To simplify this study take the slide quite out of the rule and consider the bottom row of divisions on the rule alone. It will be noticed in the first place that there are ten primary perpendicular lines, numbered in large figures 1, 2, 3....1, which divide the bottom scale of the rule into ten parts, each succeeding one of which is smaller than the preceding ones. Taking in the second place any one of these primary parts, we see that it is subdivided by secondary lines into ten other parts, those of the first primary part only being marked with a small 1, 2, 3....9. Further examination will show that these secondary parts are again subdivided, but not all alike, as space does not admit of ten tertiary subdivisions throughout the entire length of the rule. Between large 1 and 2 there are ten parts to each secondary division, between 2 and 4 there are five parts, and between 4 and the right hand 1 there are only two parts. All these lines, however, form a complete scale of ten parts, each one subdivided into tenths, and each of these tenths again nominally subdivided into hundredths. Although in fact these parts and sub-parts are not equal to each other, yet in value, by reason of the peculiar logarithmic feature of the scale, they are so equal. They may, therefore, be looked upon as a decimal scale of parts, tenths and hundredths. So much for the letters of the slide rule alphabet.

VALUE OF THE LINES.

A letter by itself possesses no value, but only as it is combined with others so as to form a word. So with the slide rule, any one of these lines of the scale, even although numbered 1, 2, 3, &c., has of itself no value, seeing that these numbers as they stand on the rule are arbitrary, being mere figures placed there for convenience, and not numbers possessing unchangeable values. When a problem is to be solved a value must be assigned to some one of these numbered or unnumbered divisions, after which a corresponding value becomes by right the property of every other division. Thus, if I wish to multiply 234 by 6, I assign (mentally) a value of 200 to the primary division marked 2, upon which the other primary divisions possess the value of 100, 300, 400....1000. It then follows that the secondary divisions between 2 and 3 have values 10, 20, 30, &c., while the tertiary subdivisions, of which there are only five, have values 2, 4, 6, &c. Thus the position of 234 is the second primary line, plus the third secondary line, plus the second tertiary line, always proceeding from left to right. Similarly with any other value assigned to any one given division. The following table shows the relative values of the different divisional lines, with different values assigned to the first primary line, or left index, as it is called:

Primary...	1.0	10.0	100.0	1000	0.1
Secondary.	0.1	1.0	10.0	100	0.01
Tertiary...	0.01	0.1	1.0	10	0.001
Estimated.	0.001	0.01	0.1	1	0.0001

The last line in this table is marked "Estimated," as it is essential to the successful use of the slide rule that the operator should be able to estimate the position of the imaginary lines subdividing the tertiary parts into ten other parts, so that the position of such a number as 1357 may be pretty accurately determined. Success in this can only be obtained by constant practice, and the student would do well to take a series of numbers of four figures and try and allot them their exact places in the scale. This can be done by placing the runner where it is estimated such divisional lines would come if space made further subdivision of the tertiary parts possible. In taking such examples it is the best to mentally call out the numbers in the order of the figures composing them—thus, one, three, five, seven—proceeding step by step from the primary division to the secondary, then to the tertiary, and finally to the figure whose position is to be estimated. This method will be found a very great help, seeing that in the case of the number 1357 its position in the scale is exactly the same as if the number were 1.357 or any other number composed of the same figures.

DIVISIONS OF SCALE.

Having now learnt to spell words—that is, to know the position in the scale of any number—let us put the slide back into the rule, and that exactly in such position that all divisions of the slide correspond to or coincide exactly with the divisions of the rule. It will then be seen that the two top scales, A and B, are divided exactly alike, as are also the two bottom scales, C and D. Now draw the slide out toward the right until the left index of the slide is exactly over or coincides with the second primary line of the rule, marked 2, and we find the following figured lines coinciding:

Slide............	1	2	3	4	5.
Rule............	2	4	6	8	1.

Now draw the slide out a little further until the left index of the slide is over three of the rule. Then we have:

Slide..................	1	2	3.
Rule......	3	6	9.

In the first of these cases it is seen that every figure on the rule is twice as great as its corresponding figure on the slide, while in the second case it is three times as great. This is then evidently multiplication, our first complete sentence.

But we may look at the matter from another point of view. Examination of the above cases will show that all coinciding lines of the slide and rule form similar ratios, giving in the first case the ratios 1 : 2 = 2 : 4 = 3 · 6 = 4 : 8, &c., and in the second case 1 : 3 = 2 : 6 = 3 : 9, &c.

These are only the primary divisions, but the same features exist with the secondary and tertiary divisions as well as with any estimated ones: thus, giving different values to the left indices 10 : 20 = 15 : 30 = 234 : 468, &c., and 10 : 30 = 15 : 45 = 234 : 702, &c. This peculiarity is the natural consequence of the logarithmic division of the scales, and from it we deduce the following general principle applicable to all slide rule calculations:

Place the slide as we will, all the coinciding divisions of the slide and the rule form equal ratios.

As multiplication and division are but names for proportion worked out forward and backward, when one of the terms is unity, these arithmetical rules are worked out by setting the slide to the ratio indicated by the terms of the problem. Thus, in multiplication we have:

Unity : One factor = Other factor : Product; and in division:

Divisor : Dividend = Unity : Quotient; while proportion stands:

1st Term : 2d Term = 3d Term : 4th Term. These are worked out on the slide rule thus:

Proportion:

C	Set 1st Term	Under 3d Term
D	To 2d Term	Find 4th Term.

Multiplication:

C	Set Unity	Under other factor
D	To one factor	Find product.

Division:

C	Set divisor	Under Unity
D	To dividend	Find quotient.

NOTE.—Unity is always represented by either the left or the right index.

The similarity of these three diagrammatical demonstrations is clear, thus showing that proportion is the basis of the other two.

EXAMPLES.—What is the weight per square foot of a wrought iron plate $\frac{7}{32}$ inch thick?

A plate 1 foot square and 1 inch or $\frac{32}{32}$ inch thick weighs 40 pounds, so that we have 32 : 40 as the ratio of thickness to weight. Take then 32 on scale C of the slide and bring it into coincidence with 40 on scale D of the rule; now, look along toward the right until immediately under the division marked 7 on the slide will be found 875 on the rule. (Say 8-7-5, not 875.) The weight is, therefore, 8¾ pounds. This is shown diagrammatically for any thickness, as follows:

C	Set 32	Under thickness in thirty-seconds inch
D	To 40	Find pounds per square foot.

If the metal is lead, use 59.1 instead of 40.

If copper, use 45.8 instead of 40.

If zinc, use 37.5 instead of 40.

How many square feet are there in a board 15 feet long and 14 inches broad?

C	Set 12 inches	Under 15 feet
D	To 14 inches.	Find 17.5 square feet.

How many square feet are there in 16 boards of the above measure?

C	Set Unity	Under 16 boards
D	To 17.5 square feet.	Find 280 square feet

The runner allows of these two examples being condensed into one, also diminishing the chances of errors in reading results, thus:

C	Set 12 in.	Set R to 15 ft.	Bring 1 to R.	Under 16 boards
D	To 14 in.			Find 280 sq. ft.

NOTE.—R stands for runner.

If the length of the board is also given in inches, then instead of setting 12 inches on C to the breadth on D set 144 square inches to the breadth. Thus, taking the same example:

C	Set 144	Under 180 inches
D	To 14 in.	Find 17.5 sq. feet.

Find the cubic feet in a beam 15 feet long, 14 inches deep and 8 inches broad.

C	Set 144	R to 15 feet.	Bring 1 to R.	Under 8 inches
D	To 14 inches.			Find 11.6 cub. feet.

In this example the right index has to be brought to the runner.

These examples will suffice, I trust, to give a clear idea of the general method of working out problems on scales C and D. They must, however, be thought out, and the why and wherefore of every operation mastered, proceeding step by step as the ground is cleared, when it will be found that each succeeding step is a self-evident consequence of what precedes.

The space at my disposal does not permit of my saying anything about the scales A and B except that they are each of them double scales and the lines on them are the squares of the corresponding lines on C and D, so that we see

A and B,	1	4	9	16	25	36	&c.
C and D,	1	2	3	4	5	6	&c.

This paper is not intended to give complete instructions as to the methods of using the slide rule, but rather to be supplementary to the various manuals on the subject, making, it is hoped, some points clearer which often perplex the beginner. In conclusion, let me say, the slide rule is worth knowing and understanding, therefore, as with any other subject, both time and patience must be spent in acquiring the desired knowledge. Everything about it is thoroughly logical, and if the study of this valuable instrument is taken up in the order here indicated, all the several parts will be found to fit accurately, and when combined make a most perfect and beautiful whole.

BREACH OF BUILDING CONTRACT BY CONTRACTOR.

THE following recent decision by the Supreme Court of California, in which many cases are cited, cannot fail to interest readers of the paper:

It appears from the evidence in the case of Perry *vs.* Quackenbush (38 Pacific Reporter, 740) that the contractor had not furnished the quantity or quality of materials called for by his contract, and had not constructed the building in a good and workmanlike manner; that the foundation was not as large as contracted for, and instead of good hard brick he had used old, second hand brick, of poor quality. The piers were only one-fourth part as large as called for, and of inferior, old brick, and only half as many of them. There was no first class lumber in the frame work, and some of it was old, refuse lumber from other buildings. The paint used was inferior to that called for in the agreement. And in divers other respects the contract had not been performed. The building had never been accepted or received by the owner in full or part satisfaction of the contract, but he had taken possession of it under protest, and with notice to the contractor that he was dissatisfied with it and would not accept it, and had offered to deliver up the building if the contractor would cancel the note and mortgage which had been given for it. The difference in value between the building and what should have been constructed, the lower court found to be $350, while the note was for $3000.

The Supreme Court of California, on the above statement of facts, said: The owner has the right to have built the structure he contracted for, and not another. Even his caprices, if expressed in the contract, must be complied with, even though they would not have added to the value of the structure, or may have lessened its value. It is only when this plan has been embodied substantially in the work that the court can have occasion to estimate the deficiencies. The authorities are very clear on this point. There are a variety of cases to which the so-called modern equitable rule has been applied. One is where the contractor fails to complete the structure. In such case, it is said, if the contractor has done or furnished anything of which the owner avails himself, such owner may be made to pay the value of it, after deducting all damages resulting from the failure of the contractor. In such case it has been sometimes said that it does not matter why the contractor failed to perform. Another case is where there is a defect which can be remedied. Here the contractor can recover the contract price, less damages caused by failure, including costs of supplying the deficiencies. Another case is where the contractor has endeavored, in good faith, to perform his contract, and has substantially performed it, but there are some unimportant defects, arising through accident or inadvertence. Here, the defects not being such as defeat or materially change the design embodied in the contract, the contractor may recover, less damages occasioned by the failure. In such case there must be a substantial performance of every material covenant of the contract, and the failure must not have resulted from design or bad faith; and whether these facts exist is a matter to be determined by the jury, or the Court sitting as a jury. Substantial performance must be found. To justify a recovery upon the contract, as substantially performed, the omissions or deviations must be the result of mistake or inadvertence and not intentional, much less fraudulent; and they must be slight or susceptible of remedy, so that an allowance out of the contract price will give the other party substantially what he contracted for. They must not be substantial and running through the whole work, so as to be remediless and defeat the object of having the work done in a particular manner. So far as I have investigated there is no conflict in the cases. Since the rule as to what shall constitute performance has become so definite, it is an important consideration, in determining whether there has been a substantial performance, that the deviations are so slight that they might have been made by one who was honestly endeavoring to comply with his contract. Good faith, however, on the part of the contractor is not enough. The owner has a right to a structure in all essential particulars such as he has contracted for; and to authorize a court or jury to find that there has been a substantial performance it must be found that he has such a structure. The Court cannot say that anything is immaterial which the parties have made material by their contract. One has the right to determine for himself what he deems a good foundation, or what materials he desires to be used; and if he contracts for them, neither the contractor nor the Court has the right to compel him to accept something else, which may be shown by the witnesses to be just as good or even better. No precise rule can or ought to be laid down upon this subject; but whenever such a case arises courts and juries should see to it that the design of the owner shall not be defeated in any important respect.

In accordance with the above rules, upon the facts shown, the Court held that the owner was entitled to have the entire note and mortgage canceled.

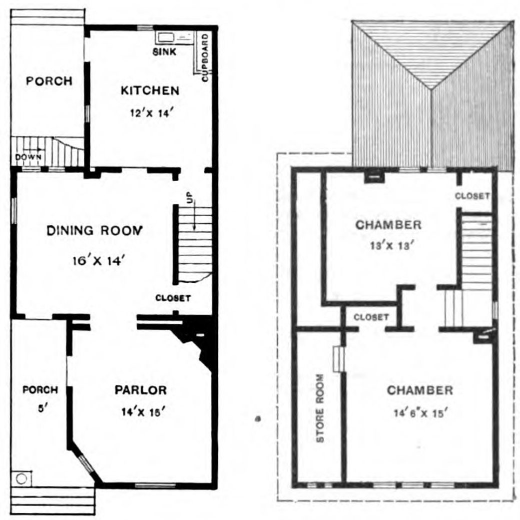
Gothic Doors and Windows.

In Gothic doorways the side splays and the arch or arch moldings above may be enlarged or increased to almost any extent, and that without producing heaviness or looking like exaggerated decoration. In many instances the width of the splays or dressings around the opening is equal to the width of the opening itself, and in some the former even exceeds the latter. And this breadth of splay, it should be observed, constitutes a marked distinction between doors and windows in the Gothic style, for though the apertures of both kinds strongly resemble each other in general shape and design, the latter do not admit, under any circumstances, of anything like a similar enlargement of their external dressings. Never is a small window attempted to be made a principal and ornamental feature by means of a deep splay filled in with decorations, says an English writer. Never is a large one placed within a wide and deeply recessed splay bearing the same proportion to the aperture as the respective parts of a doorway generally do to each other. Nor is such difference of treatment—so fortunate in itself, inasmuch as it conduces to æsthetic variety—a merely arbitrary one, but is dictated by sound architectural propriety; for a Gothic window is not a mere gap in the wall, standing in need of external dressings to render it an ornamental feature. On the contrary, it furnishes its own decoration, and the larger the window the more numerous the mullions and the more complex the tracery; consequently, all the more rich the design of the window. Another difference between Gothic doorways and windows is that in the former the doors themselves are sometimes square headed, the apertures being carried up only to the spring of the arch, in which case the tympanum, or space between the opening and the arch, is usually filled in with sculpture. A third difference between doors and windows—at least to doors in the perpendicular style—is that for the doors the general design is formed into a square headed composition and surrounded in its upper part by a series of external weather moldings termed a label, and although labels are a very general, not to say universal, accompaniment to windows in the Tudor or perpendicular domestic style, they are almost unknown for large windows with a head formed by a single arch.

Five-Room Frame Cottage.

The five-room, one story and a half frame cottage illustrated herewith was erected summer before last from plans prepared by R. C. Ferguson, architect, of Ninth and Olive streets, St. Louis, Mo. The cottage is adapted for a city lot and occupies a site having a frontage of 25 feet. One side of the house is built to the line, thus leaving room for a path to the rear porch. There is a cellar under the kitchen 12 x 14 feet in size and 6 feet 6 inches high. The first floor is divided into three apartments, consisting of parlor, dining room and kitchen, with the main stairs rising from the central room. Between the parlor and the dining room is a single sliding door, by which the two rooms can be thrown into one if desired. The parlor has a fire place with antique oak mantel. The kitchen is provided with sink and cupboard and is plastered 3 feet high with Acme cement. On the second floor are two sleeping rooms of good size, provided with ample closets, while opening from the front chamber is a storeroom. The latter is well under the eaves, but is lighted by means of two small windows directly over the front porch. The architect states that the house can be built for about $1000.

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



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

Five-Room Frame Cottage.—R. C. Ferguson, Architect, St. Louis, Mo.

WHAT is termed a "ventilating window" is now being adopted in some of the barracks and other public buildings in France. It consists in employing two panes of glass for one, with a space between them, and their length so curtailed, one on the lower side, the other on the upper, that the air comes from the outside, passes between the panes, and enters the room. Such a window is, of course, only required in one part of a room, preferably near the ceiling.

Government Buildings at Fort Crook.

The following interesting description of the new buildings erected for the Government at Fort Crook, about 10 miles from Omaha, Neb., is submitted by the secretary of the builders' exchange in that city:

Accommodations for four companies are already complete, although this post will in all probility not be occupied until accommodations for a full regiment can be had. Contractor M. P. Keefe of Omaha has had supervision of the work done. Bids will probably be invited in the spring for the construction of one barrack wing to the mess hall, eight sets bachelor quarters, and one hospital steward's quarters.

The work done at Fort Crook is considered by the Secretary of War to be the best upon any Government reservation in the country. Two miles of macadam road 20 feet wide, with vitrified brick gutters and sub drains, outline a fine parade and lead in and out the fort gates. The post is provided with a complete sewer system and water works, the supply being obtained from six tubular wells sunk to an average depth of 85 feet. These wells are connected by one main leading to two immense pumps, and direct to a reservoir having a capacity of 600,000 gallons on the highest point of ground and distributed by gravity to the garrison.

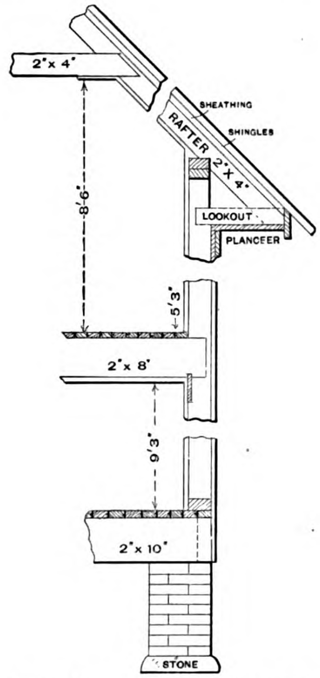
The buildings now complete are six double sets of line officers' quarters, three double sets non-commissioned staff officers' quarters, quartermaster's stables, commissary and quartermaster's store house, guard house, hospital, mess hall and barracks for four companies, shops, pump house and coal house. Every structure is of pressed brick, and the stone work from grade line to water table is in range work. The buildings are two stories high, with slate roof. A system of direct and indirect heating is used in all buildings, with the exception of the hospital, which is heated by hot water and equipped with two boilers. Twenty-eight thousand dollars have been spent in heating alone, and $51,000 in underground work, water pipes, sewer system, &c. All the interior wood work is white pine, excepting on the front floors of officers' quarters, where oak is used. Every building has a cemented cellar under its entire length and breadth. All are supplied with the best of modern plumbing.

Officers' quarters face the east; they are models of architecture, combining marked simplicity and adaptability to family use. Each house has a spacious porch and 11 large airy rooms, with baths, closets and laundry provided with stationary tubs, servants' bathrooms and butler's pantry.

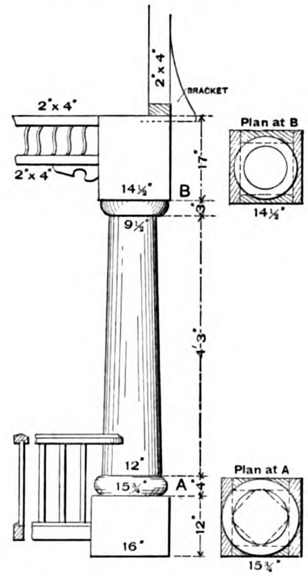
The building containing the large mess hall, capable of seating 600 men, is directly opposite officers' line and will be used for barrack and administrative officers. One barrack wing is now in place, and when the second is added the building will be 800 feet long. The mess hall is 109 x 95 feet and occupies what will be the center of the building. In the rear are the bread and dish pantrys and a long hall leading into one of the largest and most complete kitchens in the country. In the center of the room is a steel range, and two vegetable steamers, subdivided into 12 compartments. They are placed upon a cement floor and over them is a ventilating skylight. There are roasters, steamers, and meat kettles of 60 gallons capacity, and nickel plated tea, coffee and hot water urns, and all have sheet iron hoods for carrying off fumes. A bakery with a capacity for making 800 loaves of bread occupies a large room in the well equipped basement. Six tubular boilers, now in place, will furnish heat and power for this immense building. The smoke will be carried into a smokestack 86 feet high. Major Chas. F. Humphrey, chief quartermaster Department of the Platte, is in charge of the construction of the post. The amount already expended is $498,000, $66,616 of which was for purchase of site. The original limit of cost for the construction was fixed by law at $500,000, but this was increased by special act of Congress last winter to $700,000, and will reach far greater figures before the completion of such a post as the Government proposes to erect.

Protecting Wooden Buildings.

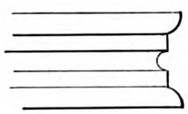
A writer in one of the English architectural papers gives what he terms "a very simple method of rendering a wood factory building of greater resistance to fire." It consists in filling the spaces between the studding with "a grout made of sand, lime and a large proportion of sawdust, mixed with water to flow slowly. It becomes quite hard; is a poor conductor of heat, and will not ignite, although it is charred by exposure to an intense fire. This applies to a building already constructed, where it would be a difficult task to remove the sheathing or lath and plaster already on the inside walls. Where the studding is already exposed on the inner side, the space is frequently filled with brick, masonry or large tiles made for such purposes."



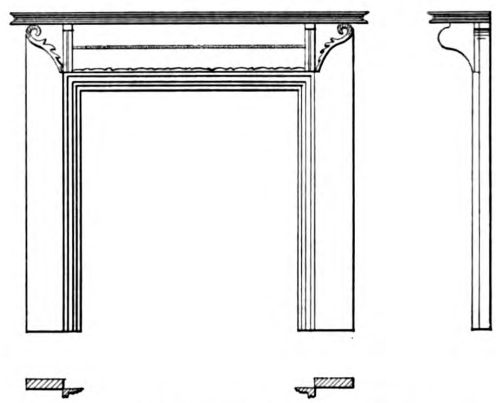
Section through Exterior Wall, showing Hight of Stories and Details of Main Cornice.—Scale, ⅜ Inch to the Foot.



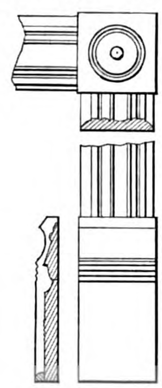
Details of Columns and Balusters.—Scale, ⅜ Inch to the Foot.



Detail of Mantel Molding.—Scale, 6 Inches to the Foot.



Details of Mantel Showing Plan, Front and End Elevations.—Scale, ½ Inch to the Foot.



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

Main Cornice.—Scale, ⅜ Inch to the Foot.

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

Elevation and Miscellaneous Details of Five-Room Frame Cottage.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

IN the illustrations which are here given Fig. 46 makes, when carefully cut, a very pretty panel decoration. In some respects this is the most difficult design to cut that has yet been given, and unless correctly treated it fails to give the satisfaction it should. Let none, however, be discouraged if he does not arrive at the correct results the first time trying. He has only to persevere and success will surely crown his efforts. It will be noticed that I have given fuller details of this design than for the preceding ones ; still there are many small but important items which it is almost impossible to describe in an article of this kind. After the design has been correctly outlined, cut the stems, using a small veiner for the purpose, and leave all swellings and enlargements until more of the work is completed. In this way the work will be kept under better command. After the stems are outlined, commence cutting wherever may be desired, but follow the details as closely as possible. In Fig. 47 are shown sections of the stems of the design indicated in the previous figure.

It will be seen that some portions of the design lie flat, while others have the appearance of being tilted over. In drawing we can shade with the pencil to give the proper effects, but that is out of the question in work of this character. In carving we have to deal with the light and must cut the material so as to give the nearest possible approach to shading, bearing in mind the sort of work under consideration. Were this design cut in relief most of the operations would be reversed, but as we are simply "chasing" we must make the holes in the wood so as to give the design as natural an appearance as possible under the circumstances.

By referring to the details of the flower G, shown in Figs. 54 and 55, it will be seen that the cutting is very irregular as regards depth. By cutting in this way it throws some portions more into the shade—makes a deeper shade—and gives it the appearance of being tilted. Now the flower on the opposite side lays nearly flat, consequently it must be cut more even in depth. The depth itself, however, is immaterial, so that it is at all points about equal. I think that, with the extended details given, the reader will be able to arrive at a satisfactory conclusion respecting the balance of the design illustrated in Fig. 46 of the engravings.

In Figs. 48 and 49 are shown an enlarged view, with sections of the leaves E; in Figs. 50 and 51 of the flower bud F; in Figs. 52 and 53 of the leaf I; in Figs. 54 and 55 of the flower and leaves G, and in Figs. 56 and 57 of the leaves H.

No doubt there are some among the readers who are adepts at that Yankee accomplishment known as whittling. In Fig. 58 is presented a design intended to be cut with a knife ; a straight bladed knife will answer, that is, straight upon the cutting edge, but a knife with a slight hook upon it is better. A gardener's pruning knife is just the thing. It will, however, require to be perfectly sharp, and in using it do not be afraid to cut deep. It will be seen from the cross sections shown in

Fig. 46.—Design for Panel Decoration.

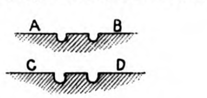


Fig. 47.—Sections of Stems taken on the Lines Indicated.

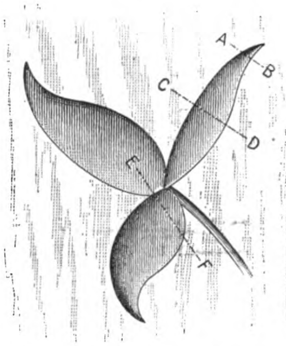


Fig. 48.—Enlarged View of Leaves E.

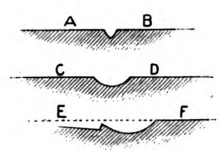


Fig. 49.—Sections of Previous Figure.

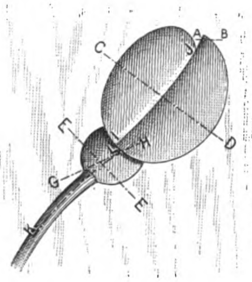


Fig. 50.—Enlarged View of Flower Bud F shown in Fig. 46.

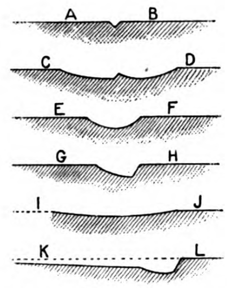


Fig. 5'.—Sections of Flower Bud F.

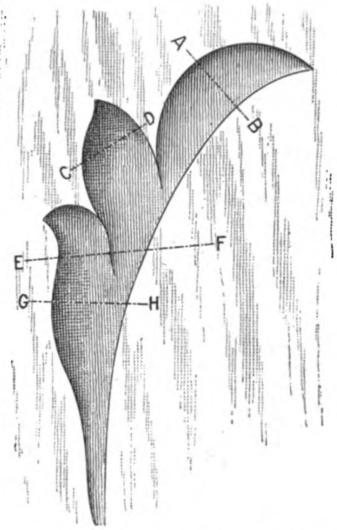


Fig. 52.—Enlarged View of Leaf I shown in Fig. 46.

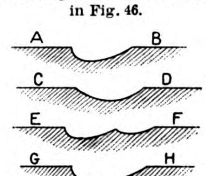


Fig. 53.—Sections of Previous Figure taken on the Lines indicated.

Hints on Wood Carving.—By Chas. J. Woodsend.

Fig. 59 that the depth is considerable when compared with the width. The design, however, can be readily executed with a sharp knife, a strong wrist and a little care, resulting in a very creditable piece of work *

(*To be Continued*)

Apartment Houses at Pompeii.

Our architects should not forget that the modern system of hotels and apartment houses on a vast scale is mere child's play compared with the practice of the ancients in the same direction, says an English contemporary. Recent excavations at Pompeii have unearthed some enormous buildings, of such beauty and solidity in architecture, such perfect drainage, and such provisions for health and comfort, as to fill all who have seen them with astonishment. These newly discovered buildings contain 30 or 40 immensely spacious apartments on the first floor, and as many on the second. The rooms looked out on a rotunda nearly 40 feet long; courts supported by columns surround the bedrooms, which opened upon large, ornamental gardens with fountains. Provision for light and air was made upon the most extensive scale. On the second floor were found evidences that there were suites of rooms built upon the flat plan of to-day. In fact, the revelations made by the exhumers at Pompeii show that place to have been one of the most wonderful watering places for splendor, comfort, health and enjoyment, and gave every evidence that floor renting, like many other modern improvements, is not a new thing under the sun. We have in preparation a short series of articles on Roman house building, in which some of the systems and materials used will be illustrated.

Rusticated Masonry.

It is an error to suppose that rusticated work is incompatible with elegance and elaborate finish, says a writer in an English exchange. It is true that it admits of great rudeness and severity of character, but it also admits of the most studied and elaborate finish. So far, too, from requiring less care and accuracy than usual, the arrangement of the courses and rustics so as to combine them in perfect symmetry with arches, windows, &c., is a work of more thought and labor than would suffice for designing half a dozen Grecian porticoes. Much of the beauty of rusticated fronts depends upon the form and proportions of the arches or openings, and of the arrangement, &c., of the rustics which form the voussoirs either to arched or straight headed windows. Occasionally molded archivolts are substituted for radiating voussoirs, but the effect is not good, because they cut the horizontal joints of the courses very disagreeably, which, it may be observed, is likewise the case where the voussoirs form an extrados either concentric with the arch or making a more elevated curve, as in most of the Florentine examples. It is far better to make the voussoirs elbowed, so as to unite with the horizontal courses, whereby the whole looks firmly bonded together. Sometimes imposts to arches are omitted altogether, or if there be such member it is usually a mere plat-band, although occasionally it is molded. In arches the keystone may either be similar or distinguished from the other voussoirs, which last may be done in a variety of ways, although the most usual one is to cut it into the form of a console, or else enrich it with a mask sculptured upon it. "Bossages" is a term more particularly applied to rusticated cinctures on the shafts of columns, which may be either square or cylindrical, but should not greatly exceed the diameter of the shaft itself, more especially in the former case. Columns of this kind ought invariably to be engaged, and the wall behind them of course rusticated also. In such case the cinctures serve as ligatures to bind and incorporate them with the rest, whereas insulated columns with blocks upon their shafts are equally unmeaning and uncouth. The same remark applies to rustic blocks stuck at intervals upon the architraves of doors and windows.

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

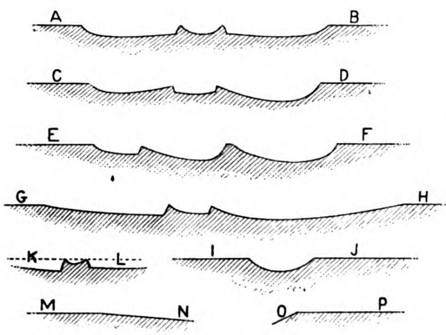


Fig. 55.—Sections of Fig. 56 on the Lines Indicated.

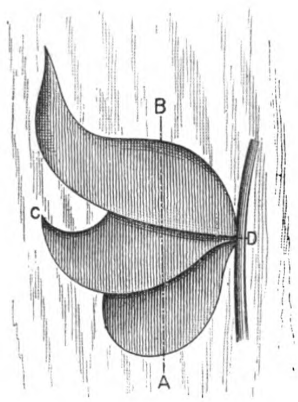


Fig. 56.—Enlarged Views of Leaves H of Fig 46.

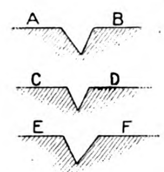


Fig. 59.—Sections of Fig. 58 taken at the Points Indicated.

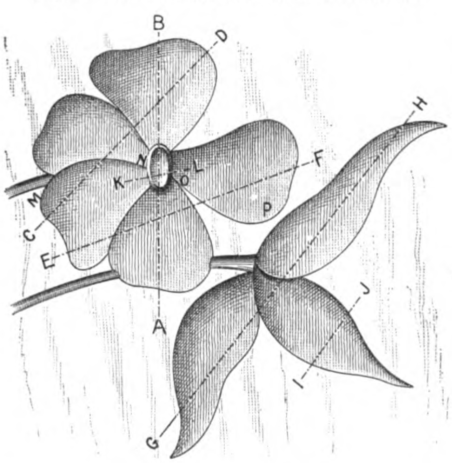


Fig. 54.—Enlarged Views of Flowers and Leaves G of Fig. 46.

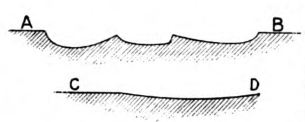


Fig. 57.—Sections of Previous Figure.

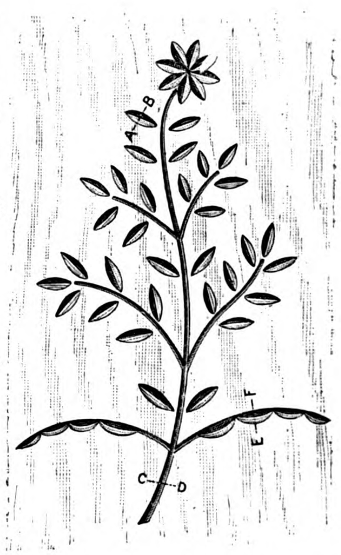


Fig. 58.—Design for Cutting with a Knife.

Hints on Wood Carving.—By Chas. J. Woodsend.

CORRESPONDENCE.

Witness Marks in Timber Framing.

From TRAMP, *South Denver, Col.*—I have just received the February issue of *Carpentry and Building* containing the article which I contributed under the title of "Witness Marks in Timber Framing." I notice a mistake has been made in the engraving of the sketch which I sent. The end of the timber having the tenon in it does not show the lines across the top and down the side indicating where the timber is to be sawed. I mention this matter so that the readers will better understand the idea I intended to convey.

From D. H. J., *Danielsonville, Conn.*—In answer to "Tramp" of South Denver, Col., I will repeat what was said to me when I framed my first timber over thirty years ago: "Always witness on a tenon and off a mortise." On a tenon as "Tramp" shows in his fourth sketch, and off a mortise as in his fifth sketch.

"C. W.'s" Problem in Handrailing.

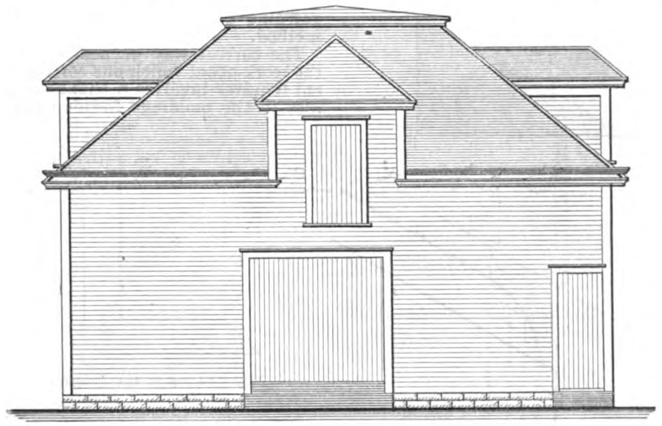
From JERE, *Davenport, Iowa.*—I would like to know what is the fault, if any, with the Riddell system that "C. W." of Toronto cannot make a good rail? I wish some of the Riddellites or Mr. Secor would explain through the paper.

Design for Carriage House and Stable.

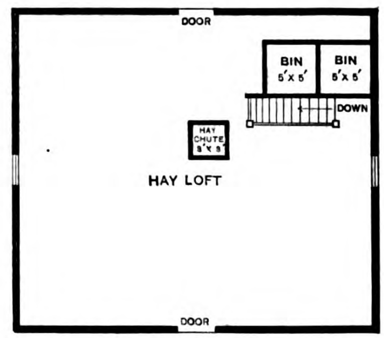
From JACK PLANE, *Kansas City, Mo.*—In reply to "O. G. C.," Elmdale, Kan., I send the drawings of a barn which may prove of interest to him. From the brief description in *Carpentry and Building* it is difficult to determine just what kind of a barn is wanted, as different requirements would call for variations in the planning.

It is evident that "O. G. C." wants something more than what is usually found in an ordinary barn plan or he would not call on the generous correspondents of *Carpentry and Building* to come to his assistance. As the inquiry emanates from a small country town I am of the opinion, therefore, that the barn is wanted for general purposes, and offer the sketches here shown.

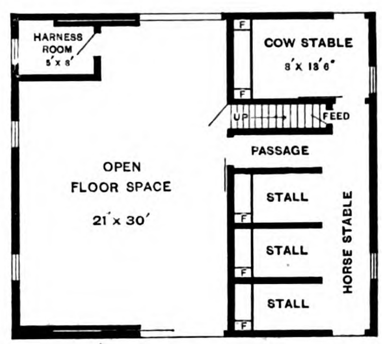
Referring to the plan it will be seen that there are stalls for three horses, the spaces marked F being the feed boxes in the mangers. The cow stable gives room for two cows, and is separated from the horse stable by a tight partition with sliding door, as shown. The passage between the stairs and horse stable is also closed with a sliding door. The partition between driveway and horses is only 3 feet high. If it is desired to have a solid partition in front of the stalls it will be necessary to provide suitable doors in front for light, ventilation and feeding purposes. The large open floor space with the direct driveway through the barn and the wide passage from floor to stable enables the hostler to harness and unharness without going out of the protecting shelter which the barn affords. This will be found especially desirable during stormy and cold weather. The driveway doors are hung to slide inside, this being the best for the protection of the track from snow and ice in the winter season, although outside sliding doors can be substituted if desired.



Front Elevation.—Scale, 3-32 Inch to the Foot.

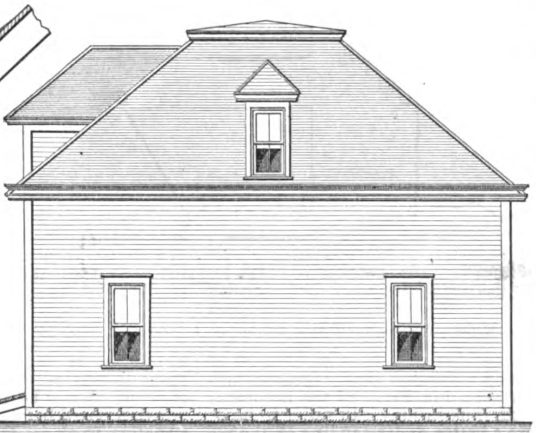


Second Floor.

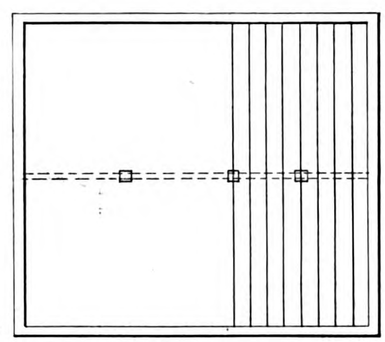


Main Floor.

Detail of Main Cornice.—Scale, ⅜ Inch to the Foot.



Side (Right) Elevation.—Scale, 3-32 Inch to the Foot.



Foundation and Framing Plan.
Scale, 1-16 Inch to the Foot.

Design for Carriage House and Stable.—Engravings Made from Drawings Submitted by "Jack Plane."

The first story is 9 feet in the clear, with a tight floor overhead which is used principally as a hay loft. This is provided with a hay chute 3 x 3 feet, as shown on the second floor plan. The second floor has two hopper bottom bins to serve as receptacles for grain. These bins have outlets under the stairs near the partition door to cow stable, as shown, making it convenient and of easy access to both stables.

On account of the hight of posts being only 14 feet there is not room under the eaves for a suitable outside doorway for taking in hay or articles of storage that might sometimes be required. To obviate this difficulty a dormer doorway has been planned which should be provided with double doors. The same can swing out or in, as desired. If swung outside they should be made to clear the ends of the eave cornice. The elevations show only one dormer doorway; the other door under the eaves is merely for ventilation when required in hot weather.

As some light would necessarily be required on the second floor, and as windows under the eaves would be rather low, two dormer windows have been provided, one at each end, as shown. These dormers relieve the plainness of the roof while adding to the general appearance of the design, and as the correspondent desires a hip roof the dormers have been given a roof of this kind. The pitch of roof given is 10 inches rise to the foot run, that being considered the most suitable for the size and style of the building.

As the roof of the building is of considerable size, requiring a long span of rafter, it is necessary that the rafters be 2 x 6 inches in size to make a substantial, self-supporting roof. The covering of the outside is cove siding as shown in detail of cornice, gutter, &c.

The estimated cost of construction is as follows: Foundation, $20; lumber, $325; carpenter work, $130; hardware and tin work, $45; and painting, $30, which gives a total of $550.

Method of Cutting a Raking Miter.

From P. Q. R., *Brooklyn, N. Y.*—I have a question I would like to have answered through the columns of *Carpentry and Building*. It is this: What is the method to be employed in running a molding around a bracket standing plumb and the roof pitched to any degree? In the sketch which I send A A represents the planceer, B the bracket and C the molding. What I particularly desire to know is how to obtain the miter cut.

Answer.—The sketch inclosed by our correspondent has been engraved and is presented in Fig. 1 of the accompanying illustrations. In order to facilitate a better understanding of the relations existing between the various pieces of molding involved in the problem, we present in Fig. 2 a plan view of the bracket, in which similar letters refer to the same members designated in Fig. 1. It may not be out of place at this point to state that there are two ways in which the problem of our correspondent can be solved, but there is only one way in which it ought to be done. If the planceer were horizontal the miter cuts at the ends of the different pieces of molding forming the bracket head, as well as at the ends of the pieces of the bed molding between the brackets, would be made at the angle of 45° necessary to form plain square miters. As the proper method of constructing these parts necessitates more or less time and trouble, some carpenters, either through ignorance of proper methods or to avoid trouble, cut the ordinary square miters just as though the planceer were level, simply making the length of the piece on the front equal to the slant or raking width across the face of the bracket instead of the horizontal distance or width. This method, when the planceer is brought to its raking position, gives the appearance indicated in the sketch inclosed by our correspondent, namely, that of leaning toward the eaves, or of having too much projection at the lower and not enough at the upper side. Too often the workman tries to compromise between a right and a wrong method by inclining the return or side moldings in or out, as the case may be, which if carried too far prevents them from properly membering with the adjacent parts. This the workman remedies by a little trimming here and there and occasionally by a little putty or a wedge to fill a yawning gap resulting from such a method.

The correct way of accomplishing the work about which our correspondent inquires involves a change of profiles in the moldings forming the returns E and E′ of Figs. 1 and 2, all of which should be developed on the drawing board before any of the constructive work is commenced. This calls for a knowledge of mathematics and drafting—a too much neglected department of carpentry—and it is needless to say that every mechanic with a desire to excel should familiarize himself with the principles involved in this and similar operations. In the first place we shall show how these profiles are obtained upon paper, and then how the same results may be obtained by cutting the wood during the work of putting up the brackets.

In the sectional elevation, Fig. 3, E F represents the pitch of the roof and the inclined planceer of the cornice, while A B and C D represent the vertical sides of the bracket, meeting the planceer at A and C. The letters E K H G and F L I J designate portions of the normal bed molding lying between the brackets, the profile of which

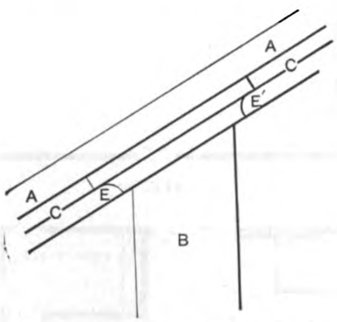


Fig. 1.—Sketch Submitted by "P. Q. R."

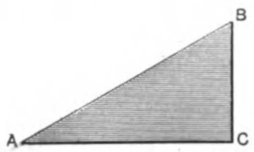


Fig. 4.—View of Pitch Block.

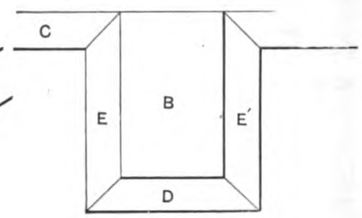


Fig. 2.—Plan of the Bracket.

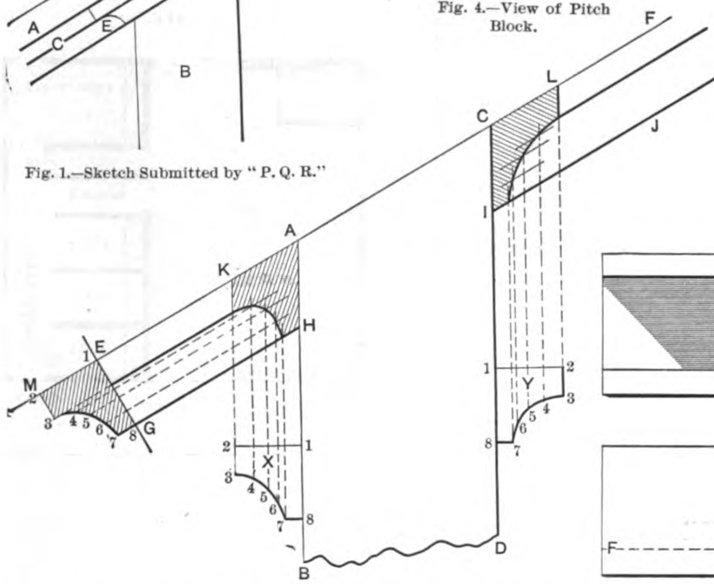


Fig. 3.—Sectional Elevation Showing the Correct Method of Obtaining the Profiles of the Molding forming the Sides of the Bracket Head.

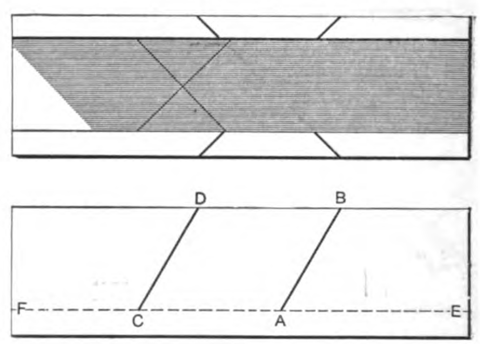


Fig. 5.—Plan and Elevation of Special Miter Box.

Method of Cutting a Raking Miter.—Illustrations Accompanying Answer to "P. Q. R."

is shown at E M G. The conditions necessary to the construction of the new moldings for the returns or sides of the bracket are that each point of their profiles shall have the same projection from a given vertical line (the side of the bracket) as the corresponding point of the normal profile, and that it shall at the same time be on a line drawn from corresponding points of the normal profile parallel with the rake. To accomplish this in the case of the molding on the lower side of the bracket, it is only necessary to place a duplicate of the normal profile M E G in proper position against the side of the bracket, but below the new one about to be constructed, as shown at X. All the points of both profiles are numbered to correspond as shown.

As the curved portion of the profile demands careful consideration, it should be divided into a convenient number of spaces, and the points numbered in rotation with the other points. Now, from the points in the normal profile M E G, lines may first be drawn parallel with the rake and continued indefinitely toward the sides of the bracket, after which lines may be drawn vertically from the points in the profile X and continued until they intersect with lines of corresponding number drawn from the profile M E G. A line traced through the points of intersection as shown at K H A will be the required profile for the molding at the lower side of the bracket.

The method of obtaining the profile of the molding at the upper side of the bracket is exactly the same, and is clearly indicated in the engraving, but the result differs owing to the fact that the face of this molding is turned toward the peak of the roof instead of toward the eaves. Templates of these profiles can be cut out of thin metal or cardboard, to be used in working out the new moldings. The miter cuts at the ends of these new pieces of molding can be made in the ordinary miter box, care being taken to keep the backs of the moldings A H and C I in a vertical position against the side of the box while sawing.

While the pieces of molding with the raked profile require only the usual miter cuts, it must be remembered that the pieces of molding of the normal profile filling the space between the brackets and crossing their faces require a special cut which can most easily be accomplished by means of a pitch block, shown in Fig. 4, upon which the slant of the side A B is the same as the pitch of the cornice. This block may first be placed upon the bottom of a miter box of the usual construction and the piece of molding to be cut then placed upon its slanting side A B, the back of it being kept vertically against the side of the box while being sawed. If it is desired to construct a special miter box, it can be done as shown in Fig. 5, the cuts on the side of the box giving the same angle with the level bottom which the sides of the bracket shown in Fig. 3 make with the planceer. Thus the angles F C D and E A B of Fig. 5 are the same as the angles indicated by the same letters in Fig. 3.

If during the construction of the work and without the aid of the T-square and the drawing board, it is desired to obtain the profiles of the pieces E and E' of Figs. 1 and 2, forming the sides of the bracket head, it may be done in the following manner: First place the bracket in its correct position under the planceer, and then fasten it. Next cut from the molding of normal profile a piece of sufficient length to make the front of the bracket head, sawing the miters in the special miter box, or by means of the pitch block as described above. When this has been done fasten the piece in position upon the face of the bracket as shown in Figs. 6 and 8. Now take a piece of material of a thickness equal to the projection of the molding and of sufficient hight to allow for cutting, and bevel the upper edge of it to the pitch of the roof, as shown in Fig. 7. This will then form a blank from which may be cut a piece of molding of the necessary profile to form either the upper or the lower return of the bracket head. If it is to be used in forming the upper return the side A D will be considered as the back or the part fitting against the side of the bracket, while the upper side A B will fit against the planceer; while if it is used for the return on the lower side B C becomes the back.

Suppose it is desired to cut the upper return first. We place the blank in the ordinary miter box with A D against the side of the box and make the necessary cut for an outside miter, as shown by the dotted lines in Fig. 7. Cut the other end off square and make its total length something less than the projection of the bracket. This blank may now be placed in position with its side A D against the bracket, the bevel A B fitting against the planceer, and brought forward till its mitered end fits against the mitered end of the face molding, which, it will be remembered, was previously fastened in place. This is represented at A in Fig. 8 of the illustrations. Now with a pencil mark around the end or miter cut of the face molding from a to b, thus transferring its outline or profile to the mitered surface of the blank. After removing the blank it is simply necessary to cut away those portions outside the pencil line, taking care to always cut parallel to one of the upper edges, as B E of Fig. 7. When this has been perfectly done the end of the blank which was previously sawed off square will then show a correct profile of the required molding and will, if the work is properly executed, be the same as that shown at C L I of Fig. 3, from which a template may be cut for use in getting out the necessary amount of molding. The operation of obtaining the lower return is the same as that just described, B C of Fig. 7 now being considered as the back of the blank instead of A D, as in the case of the upper section. Its position ready for marking is shown at B of Fig. 8 of the illustrations.

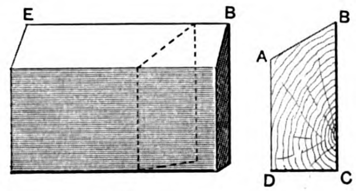


Fig. 7.—Side and End Views of Blank from which to Cut the Molds.

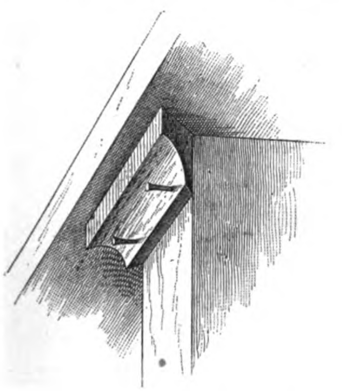


Fig 6.—View of Bracket, Showing Face Mold Tacked in Position.

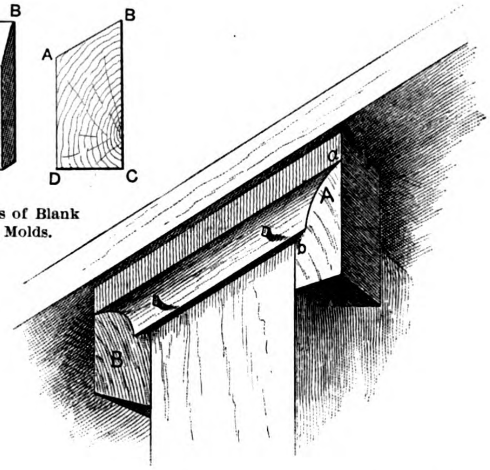


Fig. 8.—View of the Bracket and Face Mold, with the Blanks from which to Cut the Returns in Position for Marking.

Method of Cutting a Raking Miter.—Illustrations Accompanying Answer to "P. Q. R."

Rule for Kerfing.

From G. N. Y., *Woodbine, Iowa.*—I have been much interested in the discussion appearing in the paper, and would like to bring up another subject, mention of which I have looked for in vain. I would like a rule for ascertaining the distance apart to cut kerfs, so that they will close tight when the timber is bent. I would like to know a rule that would hold good on any size circle or thickness of board.

Fire Proof Floors in Concrete.

From INQUISITOR, *Nanaimo, B. C.*—Should one of the readers of *Carpentry and Building* who has had some practical experience in the construction of fire proof floors in concrete happen to see this letter, I feel sure that he will not only be conferring a favor on the writer by answering the questions propounded, but that his experience in the matter will prove interesting to a large number of subscribers. The questions which it would interest me to have answered are:

1. In order to obtain the most economical floor, say for the corridor of a public building, what has been found the best distance apart to set the iron or steel joist?

2. With economy in view, what is the best form of joist, and what should be the thickness of good Portland cement concrete between joist placed at a given distance apart?

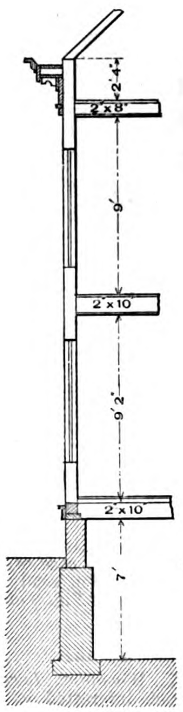
3. Give a handy rule for estimating the dimensions of cast iron joist for a given span?

Designs for Church Truss.

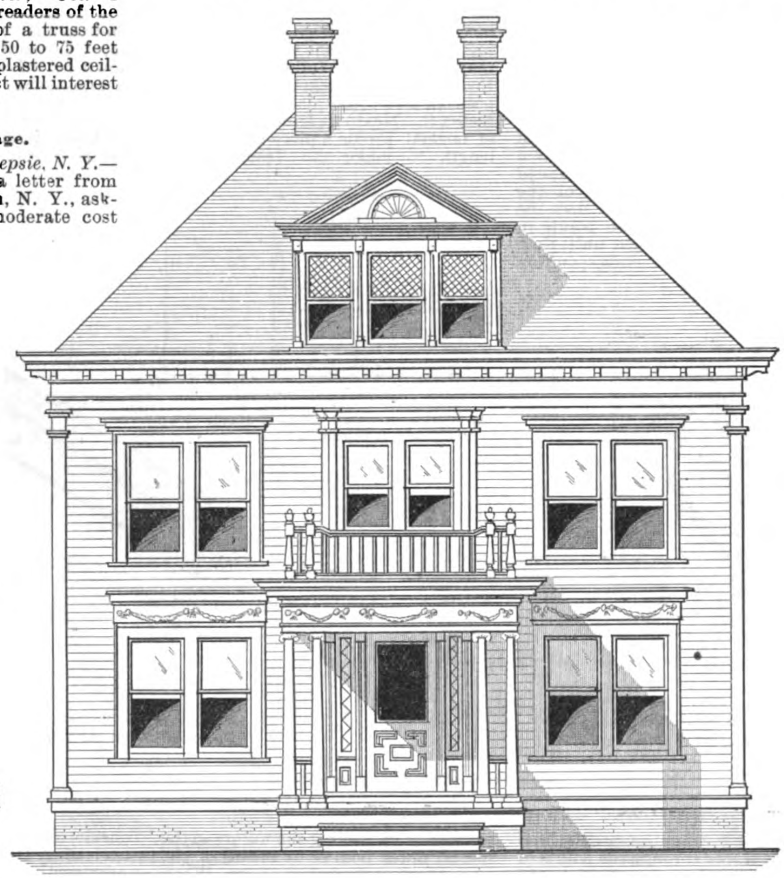
From J. McD., *Denver, Col.*—I would like some of the readers of the paper to present designs of a truss for a church, say a span of 50 to 75 feet and one-half pitch, with plastered ceiling. I believe this subject will interest others as well as myself.

Colonial Cottage.

From D. B. C. *Poughkeepsie, N. Y.*—I notice in a late issue a letter from "W. I. H." of Brooklyn, N. Y., asking for drawings of a moderate cost six-room cottage in the colonial style of architecture. In answer thereto I submit the accompanying elevations and floor plans, which I trust will prove interesting to him, as well as to other readers of the journal. The drawings are so clear as to render extended reference to them unnecessary.



Section.



Front Elevation.—Scale, 1/8 Inch to the Foot.

Design for a Colonial Cottage, Submitted by "D. B. C." of Poughkeepsie, N. Y.

Plans for a Crematory.

From CHIP AND PENCIL, *Washington, D. C.*—Friends of the pencil and makers of chips, make me as wise as yourselves. I want to see published in the paper plans of a crematory, and would therefore ask you to brush away the cobwebs, get out your drawing boards and materials and help yourselves by aiding others. This is something about which for years, if ever, there has not been any discussion of which I am aware.

Wire vs. Cut Nails.

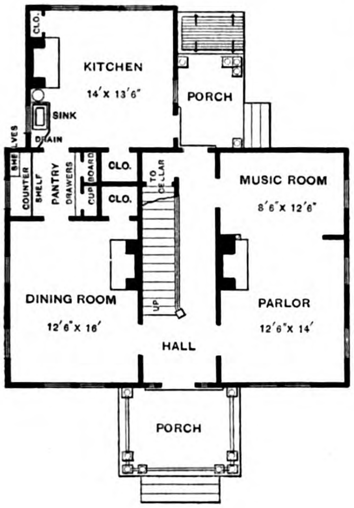
From W. V. McC., *Tucson, Ariz.*—For some months past there has been a discussion in progress in the columns of *Carpentry and Building* between various correspondents regarding the relative merits, durability, &c., of cut and wire nails. I have read what has been published with interest, and will now take a hand in the controversy by giving my experience. I find it advisable to use both kinds of nails. The cut nail gives the greater satisfaction for shingling and flooring, and the wire nail for framing and trimming.

From J. O. McC., *Hagerstown, Md.*—Will you kindly allow me a little space in your paper. I have been reading the arguments in the case of wire *versus* cut nails, but have as yet said nothing. Of all the articles presented in the paper I have not noticed one which has taken friction into account. While I am not prepared to say which of the two kinds of nails will last the longer, I do say the cut nail will, or does, hold better than the wire, for the reason that friction is greater between rough surfaces than between smooth. A cut nail is very rough compared with the wire nail, and if it were not for friction the nail would not hold at all. If any of the readers will take the trouble to put the matter to a test, let him select a piece of timber of any kind, either hard or soft, and two nails of equal size in length. Drive each nail into the wood the same depth and sustain from them weights sufficient to draw them out. Compare the weights required to draw out each nail and the question is solved. I think I am safe in saying that the cut nail will sustain one-third more in pounds than the wire nail. I am also of the opinion that the cut nail will outlast the wire nail, but on this point I am not prepared to argue the question.

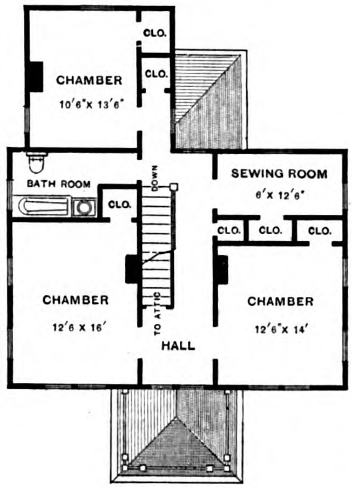
From A. H. R., *Lostant, Ill.*—I have noticed of late several articles in *Carpentry and Building* in regard to the difference in the lasting qualities of wire and cut nails. My experience is that there is very little difference in this respect between the cut steel nail and the wire nail where exposed to the weather, the life of each being about seven or eight years. The life of the iron cut nail, however, is from 30 to 35 years. I would like very much to have the practical readers of the paper express an opinion on this point, for I think the sooner we are able to return to the iron cut nail the greater satisfaction we, as builders, will be able to render to our clients.

Tool Chest Construction.

From F. A. B., *North Bolton, N. Y.*—I have been a reader of *Carpentry and Building* for some time, perusing it with much interest, especially the Correspondence department. I do not mean by this that my interest is concen-

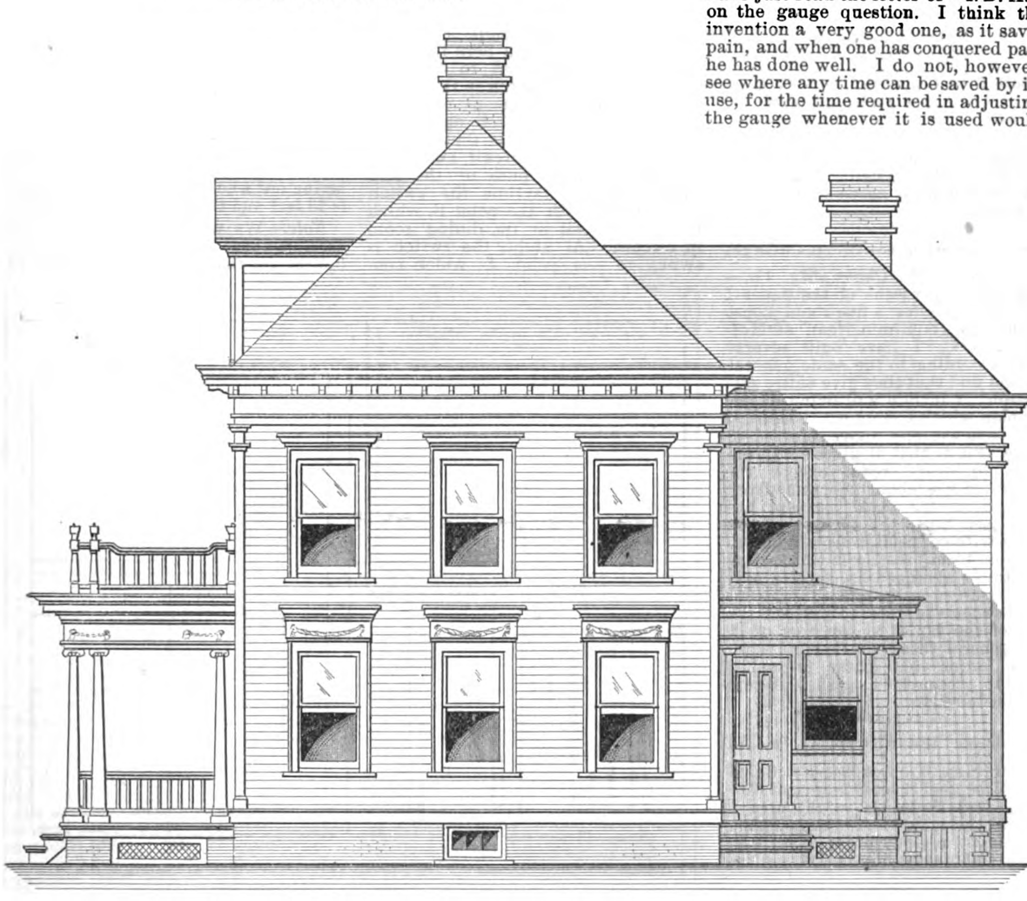


First Floor.



Second Floor.

Scale, 1-16 Inch to the Foot.



Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.

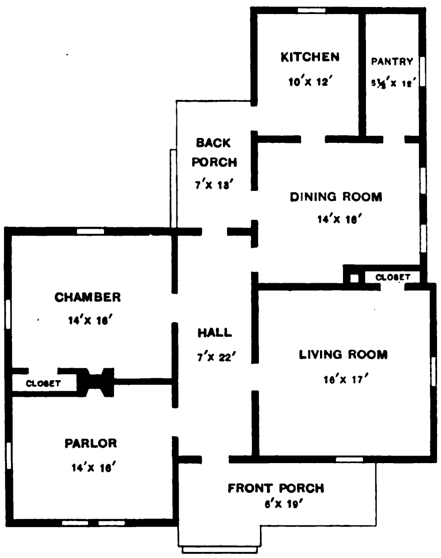
Design for a Colonial Cottage, Submitted by "D. B. C." of Poughkeepsie, N. Y.

trated in this department, for the whole paper is so valuable that a person has to be especially endowed with more knowledge than I possess to know where to concentrate his interest; but I gather a great deal from this department. I have never as yet contributed anything, as I do not feel competent to give any important information, but as I am contemplating building a new tool chest I beg the opportunity of asking some of my brother chips for plans for constructing the inside of the chest so that it will be convenient and so that the sharp edge of one tool will not come in contact with another tool. I find this is a great trouble with chests. I have a very good one now, but it is too large, and my object is to have one smaller with such an arrangement that one tool will not become dulled against another. I have seen plans in *Carpentry and Building*, but none are entirely satisfactory to me. I am sure some additional designs will prove useful to others as well as to myself.

Note.—Some of the designs of tool chests which have been presented in the columns of the paper during the past few years have been referred to by numerous correspondents with a great deal of satisfaction, and it is possible that by carefully studying some of the designs to which we refer "F. A. B." may be able to obtain suggestions which will aid him in the construction of his new chest. It is hardly probable that he will be able to obtain exactly what he requires in the way of a design without stating his wants more specifically. We think it would promote an interesting discussion if he would send for publication drawings of the tool chest which he has, together with a description of it, with the idea that the readers suggest such modifications as will meet the requirements of the case.

Carpenters' Gauge.

From S. H. G., *Keyser, W. Va.*—I have just read the letter of "I. D. A.," on the gauge question. I think the invention a very good one, as it saves pain, and when one has conquered pain he has done well. I do not, however, see where any time can be saved by its use, for the time required in adjusting the gauge whenever it is used would be equal to the time taken in extracting splinters from the finger if it should touch the wood while sliding the rule. We West Virginia carpenters have learned to keep our fingers out of the fire, also not to slide them over splintery boards. We just set our thumb nail at the desired point on the edge of the rule and allow the point of the nail to slide smoothly along the board or timber, while the pencil is held by the other hand. This method is accurate, rapid and easy, and no damage is done to the thumb nail. I think "I. D. A." will readily agree with me on this point.



Floor Plan Contributed by "W. K. H."—Scale, 1-16 Inch to the Foot.

Floor Plan of a Southern Cottage.

From W. K. H., *Chase City, Va.*—In the September issue of the paper I notice the plan for a five-room house drawn by J. S Zimmerman of Morganton, N. C. I have built several houses according to the same general plan and find that they give entire satisfaction. I inclose a drawing of the floor plan which I employ. I think it better than the one above referred to for the reason that it gives a hall entrance to every room except the kitchen. I use about the same front elevation as "J. S. Z." except the tower covering the front porch. Houses with connection from front to rear seem to suit better in this section than those arranged in such a way that it is necessary to pass through one or more rooms in order to get from the front of the house to the rear of it. As a general thing the demand is for rooms larger than those ordinarily given in connection with different published designs.

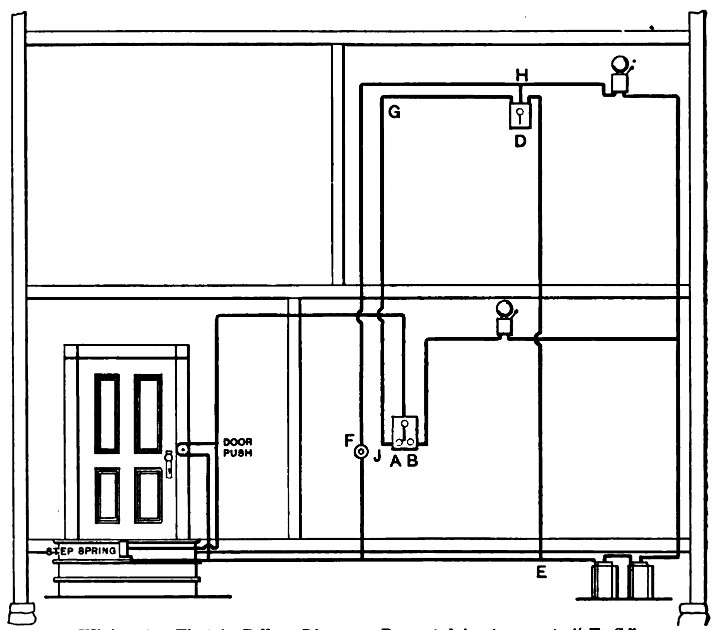
Tempering Wood Cutting Tools.

From F. H. K., *Los Angeles, Cal.*—I would be glad if some reader of *Carpentry and Building* would present for publication in the Correspondence department a description of an easy process of tempering wood cutting tools.

Wiring for Electric Bells.

From F. S., *Ashbourne, Pa.*—I am a carpenter by trade and read *Carpentry and Building* with a great deal of interest. I am doing a little electrical bell work for myself at home and would like to know if some of the readers will help me in the matter. I have a push button at the front door and an alarm on the front steps. There is also a push button in the dining room arranged to ring a bell upstairs, and there is a bell in the dining room. Now, what I want is to so arrange the wires that when the alarm on the front steps is sprung it will ring the upstairs bell at night and the downstairs or dining room bell in the day time. I also want the push button at the front door to work the same way and the button in the dining room to ring the upstairs bell only. This I know must all be done with a switch, but what I do not know is how to run the wires so as to bring about the desired results. I am very much interested in electrical work and have tried several ways to solve this problem, but have not yet succeeded.

Note.—The arrangement suggested by our correspondent can be made to operate successfully by placing the fixtures where desired and connecting them by wires run as shown in the diagram here presented. It will be noticed that the wire is run from the battery to the front door, where it is branched to permit either the door push or the step spring to complete the circuit. From here the wire is conducted to a "two-point" switch in the dining room by means of which either the bell upstairs or the bell in the dining room can be thrown in circuit, and operated by the door push or the step spring. In the daytime the switch is in contact with the point B, which throws the bell in the dining room in circuit. At night the switch is swung to the point A, which connects with the upstairs bell. Presuming that our correspondent intends the step spring to operate the upstairs bell as a burglar alarm, we suggest that as the contact at the step spring will be only momentary, a constant ringing attachment be placed near the upper bell, as shown at D in the diagram. This is operated by the short impulse through the wire from the step spring, and when this occurs it makes a short circuit through the wire D E, which rings the bell continuously until some one is awakened and stops it. The bell in the bedroom can also be rung at all times by the push button placed in the dining room, as it connects with the bell by means of a separate circuit. It has nothing to do with the constant ringing attachment, and the bell will ring only when the button is pressed. If the constant ring is not desired, it can be omitted by leaving out the wires J G H and D E, in which case the point A of the switch is connected directly with the bell wire at F. This will give an arrangement which will cause the bells to ring only so long as the buttons are pressed.



Wiring for Electric Bells.—Diagram Presented in Answer to "F. S."

Floor Plans for an Insane Asylum.

From J. C. M., *Richland Center, Wis.*—I would like to ask some of the numerous readers of the paper, especially those that are near such institutions, if they will send for publication a sketch of the floor plans of an insane asylum. I do not care for the elevation. I am somewhat interested in an institution of the kind named, and my object is to ascertain the different arrangements for the care of inmates, the sanitary conditions, heating and ventilating, &c. I think it would prove interesting to have published one or two such plans, as it is an excellent subject for discussion.

Laying Out a Collar Beam with a Steel Square.

From J. J. D., *Cornwall, Cal.*—Will some one please tell me the proper figures on the steel square to use in laying out a collar beam when the span is 18 feet and the roof one-third pitch.

Note.—We would suggest that our correspondent make use of the same figures on the square that he would employ for obtaining the level cut at the foot of the common rafter. In a roof of the form named the run of rafter is 9 feet and the rise 6 feet, indicating that 9 and 6 are the figures to be used. Taking 9 on the blade of the square and 6 on the tongue, the blade will give the proper cut for the collar beam.

WHAT BUILDERS ARE DOING.

THE business outlook for the builders of Boston continues to improve, and all signs point to a prosperous year in 1895. The amount of new work already outlined exceeds the amount visible at this season since 1892. The relations between employer and workman promise, at present, to be amicable, and there is little indication that the promise will not be fulfilled.

A most desirable departure from the usual methods of considering the labor question occurred under the auspices of the Master Builders' Association on February 13.

At a special meeting called for the purpose on the evening mentioned the relations of employer and workman and the principles of arbitration and conciliation were discussed by "Harry" Lloyd for the United Brotherhood of Carpenters and Joiners and William H. Sayward for the Master Builders' Association. P. J. McGuire was to have spoken on behalf of the carpenters, but was unable to be present on account of sickness. The subjects were broadly treated by Mr. Lloyd and the position of the trade unionist well defined from his own standpoint. Mr. Sayward's position has been repeatedly shown in these columns in the recommendations of the National Association of Builders. The principal point of interest about this meeting was the fact that it was arranged by the employers and held in their rooms. A number of members of the carpenters' union were present and after the discussion a collation was served, the remainder of the evening being spent in singing songs and in pleasant social intercourse. The whole affair was most pleasing in the spirit maintained throughout and in its significance of the future relations of employers and workmen in the city.

On January 29 the Master Builders' Association held its annual "smoker," and a most delightful time it proved to be. The attendance was limited to the members and their personal guests, the number present being about 250. The rooms were very tastefully decorated with flowers and greens, and an excellent orchestra helped to enliven the evening. After an elaborate lunch had been disposed of, several new features of entertainment were introduced and received with enthusiasm. It was the universal opinion that the affair was one of the most enjoyable ever given by the association.

At the American House on January 23 the fourth annual convention of the Society of Master House Painters and Decorators of Massachusetts took place. Papers were read on the following subjects: "Is Dignity a Necessity in Carrying on the Painters' Supply Business?" by Ottomar Walburg; "How Can a Man do a Job for $100 that is Considered Worth $150 by Another Man?" by George H. Brown of the Lawrence Association; "The Future of the Master Painter," by A. K. Adams of the Lynn Association; "Does the Painting Business Pay as Well as Other Trades in the Building Line?" by W. A. Houston of the Lawrence Association, and "Are Master Painters Responsible for Property of Their Customers Left in Their Possession?" by William F. Gilbert of the Cambridge Association. The following named officers were elected for the ensuing year: President, William J. Edwards of Cambridge; vice-president, G. H. Brown of Lawrence; treasurer, F. J. Thayer of Cambridge; secretary, William E. Wall of Somerville; executive board, Samuel Alexander, chairman, George Agnew, J. Mounsey, John B. Forbes, W. A. Houston. Delegates to attend the convention held in Louisville, Ky., February 5, 6 and 7 were chosen as follows: William J. Edwards, William E. Wall; alternates, George H. Brown, C. F. W. Hanson.

Buffalo, N. Y.

The election of officers for 1895 of the Builders' Association Exchange of Buffalo was held January 15, with the following result: President, Henry Schaefer; vice-president, John A. Wolsley; treasurer, George W. Carter.

Trustees: Jacob Reimann, J. H. Tilden, John Lannen, H. C. Parsons, Wells Dygert, Jacob L. Mensch, William H. Schmidt, L. Ginther, William P. Straub, Henry L. Jones.

Secretary, J. C. Almendinger.

Arbitration Committee: F. T. Coppins, George E. Frank, George W. Maltby.

Delegate to the National Convention, at Large: William D. Collingwood.

Delegates: John Feist, Joseph J. Churchyard, M. McNamara.

President Schaefer is at the head of the firm of Henry Schaefer's Sons, mason contractors.

The new officers were installed on January 28, at the annual meeting. Secretary J. C. Almendinger read a report showing that receipts for the year were $4999.45; disbursements, $3933.35; cash on hand and invested, $7262.99. The report of the retiring president, George Duscherer, was full of interesting facts. Messrs. Lyth and Hager escorted the new president, Henry Schaefer, to the chair. After a few remarks by Mr. Schaefer, ex-president H. C. Harrower presented Mr. Duscherer with two handsome rocking chairs.

After the business of the meeting was concluded, the members adjourned to another room in their spacious building and discussed the merits of a well served dinner.

Among other things which the annual report of the secretary set forth were the facts that in addition to its own use, the rooms of the exchange are the headquarters of eight organizations of builders, representing as many trades. The exchange has taken an active part in a large number of public projects; the number of plans submitted by architects to the exchange is steadily increasing; five members of the exchange have received liquidated damages for failure to receive contracts for which they submitted the lowest bid; the use of the Uniform Contract is constantly extending; and sundry other matters demonstrating the practical nature of the administration of the affairs of the organization.

The amount of building done in Buffalo in 1894, as indicated by the permits issued alone, no account being taken of other work, was valued at $5,302,933, a decrease of $629,000 as compared with 1893, and $1,105,000 as compared with 1892. The present prospects for the coming year are considered very good.

Chicago, Ill.

At the annual meeting of the Carpenters and Builders' Association of Chicago the following officers were elected: President, W. F. Behel; vice-president, Francisco Blair; secretary, John F. Neagle; treasurer, Cesaire Gareau; directors for two years, J. W. Andrews, Alex. M. Ross and John Ramcke.

At the annual meeting of the Builders and Traders' Exchange these officers were elected: President, George H. Fox; first vice-president, F. S. Wright; second vice-president, R. S. Haldeman; treasurer, W. H. Alsip; directors, A. J. Weckler, J. G. McCarthy, Henry Appel, E. B. Meyers and James Bloomfield.

At the first meeting of the new board Frank Conrick was reappointed secretary, and the several other employees retained. President Fox announced the committees for the coming year as follows:

Membership Committee: James Bloomfield, chairman; E. B. Myers, Alex. Gordon, A. J. Weckler, James A. Hogan.

Arbitration Committee: A. J. Weckler, chairman; Henry Appel, John Mountain, William Grace, James Bloomfield.

Committee on Rooms: J. G. McCarthy, chairman; George Tapper, James A. Hogan, A. J. Weckler, William Grace.

Committee on Finance: William Grace, chairman; John Mountain, J. G. McCarthy, George Tapper, Alex. Gordon.

Committee on Legislation: George Tapper, chairman; E. B. Myers, James Bloomfield, J. G. McCarthy, Henry Appel.

Library Committee: James Sinclair, chairman; August Zander, D. G. Phimister.

Committee on Complaints: F. V. Gindele, chairman; William Henry, George C. Furst.

The prospects for building in 1895 seem to be growing brighter, though the total amount in sight at this time is far below the average of past years. Everything is quiet just now as regards affairs between employers and workmen.

Cincinnati, Ohio.

At the monthly meeting of the Builders' Exchange of Cincinnati, on February 6, a large number were present and business of importance was transacted.

A communication from the Committee on Ship Canal, whose report has already been made public, was received, and the resolutions were concurred in by the exchange.

The Board of Trade of New York City also sent a set of resolutions indorsed by it, opposing the passage of the Bailey bankruptcy law, and advocating the passage of the Torrey bill. These resolutions contained a clause requesting Congress to take no further action in regard to the tariff question at present. The exchange also concurred in these resolutions. The following Committee on Nominations was appointed for the purpose of selecting the regular ticket: Messrs. L. B. Hancock, J. F. Tuttle, F. B. Lucky, J. C. Carter and J. M. Blair. The independents are yet to be heard from This election, which will be held on March 4, promises to be close and exciting.

A joint meeting of the officers of the various carpenters' unions of Hamilton County will be held in the near future for the purpose of inaugurating a movement looking to a conference with the contractors and builders before the opening of the building season, at which to come to definite and unmistakable terms as to wages and other questions that might arise and cause an interruption of business after work has been commenced. The experience of last summer has taught the carpenters a lesson, and they are more than anxious to pass through the coming season without any controversy with the employers. It is proposed to have a meeting of committees from the organization and the contractors and builders, in which all matters shall be arranged as to wages and other matters, the same to be a binding contract on the part of every individual on both sides, to be effective during the entire season. This proposition has met with hearty approval, both by the members of the various unions and the employers, and, if carried out, will doubtless prove a very satisfactory departure.

Building operations have been very limited during the past two months and there seems to be little prospect of an immediate increase. A correspondent writes us that there are about two-thirds of the carpenters of the city idle and that wages range from $1.50 to $2.25 per day of nine hours.

Milwaukee, Wis.

The Milwaukee Builders and Traders Exchange held an adjourned meeting January 21 and elected eleven directors for the coming year. The vote resulted in the re-election of the following ten: T. R. Bentley, Phillip Gross, John Langenberger, Paul Riesen, C. G. Forster, J. G. Wagner, Louis Bierbach, J. J. Quinn, L. J. Mueller and C. F. Kindt. John C. Rugee is the other director chosen. The officers of the board will be elected by the newly chosen directors at the next meeting. A social lunch, given by the Builders and Traders' Exchange, was an exceedingly pleasant affair; the attendance was good and all present thoroughly enjoyed themselves.

Indications point to a recovery of business to proportions more nearly nominal than those which have existed during the past two or three years.

New York City, N. Y.

As we go to press with this issue a strike is in progress which seems likely to involve before it is settled many departments of the building trades. The trouble grows out of the dissatisfaction with the terms of their employers of the men whose business it is to put in place the electrical wires in buildings under construction. The demands are for an eight-hour day; that apprentices of the third and second classes shall be restricted to the work of carrying tools and supplies for practical electricians; that apprentices of the first class shall only work as assistants to journeymen, and that double wages shall be paid for work done between the hours of 5 p.m. and 8 a.m. A number of meetings and conferences have been held, but all attempts at a compromise seem to have thus far failed, and the matter resolves itself into a fight between the Electrical Contractors' Association, the employers in the building trades, and the Board of Walking Delegates. On February 20 the latter ordered sympathetic strikes on some of the big buildings in process of erection in the city, involving several hundred men, and at the hour of writing it is expected that the workmen on some of the other large structures will be called out before this issue reaches our readers. The trades involved include plasterers, steam fitters, hod hoisting engineers, plumbers and gas fitters, elevator constructors, carpenters, tile layers and helpers, marble workers, mosaic and encaustic tile layers, and in some cases the bricklayers. The Electrical Contractors' Association held a meeting on the 20th, and resolved to notify the Brotherhood of Electrical Workers that on and after Monday, February 25, the members of the association would begin to fill the places of the workers now out who failed to report for duty on their respective jobs. The contractors give no estimate as to the probable extent of the strike, but all seem to feel that the struggle may prove a serious one.

At the annual election of officers of the Mechanics and Traders' Exchange, which was held January 29, the following officers were elected to serve during 1895: President, Isaac A. Hopper; vice president, John Byrns; treasurer, Edmond A. Vaughan; secretary, Elliott Smith.

Trustees, John J. Tucker, Thomas Dimond, John J. Donovan, John J. Roberts, John L. Hamilton, Isaac E. Hoagland, Thomas M. Mulry.

Examiners (Department of Buildings), Warren A. Conover, Edwin Dobbs.

Inspectors of Election, Ronald Taylor, Frank N. Howland, Michael Larkin.

The officers of the Building Trades Club for 1895, as elected at the annual meeting February 11, are: President, Charles A. Cowen; first vice-president, Henry A. Maurer; second vice president, Henry M. Tostevin; secretary and treasurer, Stephen M. Wright.

Managers for three years: Warren A Conover, John J. Roberts, John L Hamilton, Charles L. Eidlitz, Dunham Wheeler.

Managers for one year: Ronald Taylor, George J. Wills.

At a meeting of the Employers and Builders' League the old officers to serve for the ensuing year were re-elected as follows: John P Leo, president; Francis J. Schnugg and Richard G. Platt, vice-presidents; Arthur Gorsch, secretary, and C. A. Du Bois, treasurer.

An idea of the tendency of building operations this spring in the city may be gained from the fact that during the third week of February plans were filed with the Department of Building for no less than 66 apartment houses of various kinds and for 19 tenement houses.

Philadelphia, Pa.

The one hundred and fifth annual meeting of the Master Bricklayers' Association of Philadelphia was held at the Builders' Exchange, when the following officers were elected:

President, Joseph B. Hancock; vice-presidents, Michael Magee, John Atkinson; treasurer, John W. Miller; secretary, Wm. J. Gillingham.

Measuring Committee, John H. Fullerton, Michael Magee, John N. Gill, Wm. J. Gillingham, Wash. J. Gear, Jr.

After the meeting about 100 members of this ancient and honorable society sat down to their annual dinner in the *café* of the Builders' Exchange, having with them about 50 invited guests from kindred trades and societies. Joseph B. Hancock, who has been president of the society for many years, presided, and acted as toastmaster, bringing out the several good points of his fellow members. The Entertainment Committee, Charles P. Hart, chairman, and Daniel O. Boorse and Harry C. Roydhouse, left nothing undone to add to the pleasure of the company.

At the eighth annual meeting of the Master Builders' Exchange which was held recently the annual reports were read and seven directors were elected.

From the statistics presented in the reports, the interest of the members has not decreased, the average daily attendance having been 63. The exhibition department has suffered by reason of business men curtailing their expenses, although the public interest in it is still unabated.

The Mechanical Trades School department enjoyed a prosperous year. The classes were well patronized, especially in the plumbing class, although the stonecutting and blacksmithing classes had not their full quota of pupils. In order to increase the efficiency of the schools, a bill has been prepared and presented to the Legislature asking for an appropriation in support of the schools. The exchange has an endowment fund on hand amounting to $6245, which has been invested in bonds and notes of the exchange for the benefit of the Mechanical Trades Schools.

The members were urged to increase the membership of the exchange, which at the present time is 250. A resolution was passed making John S. Stevens an honorary member.

The seven directors elected were: William B. Irvine, John R. Wiggins, Cyrus Borgner, F. A. Ballinger, John E. Evanson, Francis Schumann and John Kisterbock.

At a later meeting, held in February, the directors elected Charles Gillingham, president; Wm. B. Irvine, John Kesterbock and Chas. G. Wetter, vice-presidents: Wm. Harkness, secretary, and Charles H. Reeves, treasurer.

The Journeymen Bricklayers' Protective Association, at their last meeting, considered several important questions. The first was the wage scale; the present price is 45 cents per hour, and it was decided to let this continue. In regard to working hours, it was decided that from the first Monday in April to the first Monday in November nine hours should constitute a working day, with a half holiday on Saturday. A code of rules was also adopted regulating the quality of work done by members. This was referred to the conference committee. The object of the rules is to have work done by members finished in a workmanlike manner, and conform to the city building laws. A special committee was appointed to confer with the architects and Building Inspectors in regard to the rules regulating work.

Providence, R. I.

The eleventh annual report of the Inspector of Buildings shows that operations during 1894 fell off to a considerable extent as compared with 1893 both in volume and cost. The total value of building operations in 1894 was $2,876,880, while in 1893 the total value was $4,149,450. One of the features of the year was the gradual displacement of old wooden buildings bordering on business streets The building law, as changed a short time ago, is said to have proven satisfactory, and it is said that a provision requiring every one erecting a building to notify the inspector before the constructive parts are covered by lath, sheeting, &c , that it is ready for examination, would prove beneficial.

Rochester, N. Y.

The Builders' Exchange of Rochester has elected the following officers for 1895: President, J. J. L. Friederich; first vice-president, H. H. Edgerton; second vice-president, Frank F. Miles; secretary, J. H. Grant; treasurer, W. Carron.

The exchange is reported as being in good condition and the prospect for the coming year fair. The relations between employers and workmen are unbroken by dissension and promise well for next season.

St. Louis, Mo.

The election of officers of the Builders' Exchange of St. Louis occurred in January, but too late for the result to be announced in the February issue of *Carpentry and Building*. The following officers were chosen for 1895:

Thomas J. Ward, president; James S. Dowling, first vice-president; Augustus Pullis, second vice-president; Thomas H. Rich, treasurer; Richard Walsh, secretary. Board of Directors: Anthony Ittner, Wm. J. Baker, Stephen O'Connor, Michael Laine, P. J Moynihan, James Kearney, Jeremiah Sheehan, Joseph L Guedry, H. W. Ballman, Adam Bauer, Thos. J. Kelly, Richard Miller.

The day on which the election occurred was one of special entertainment for the members, a banquet being served at noon and a programme of special amusement features having been arranged. Every one had a thoroughly jolly time.

The total value of building done in St. Louis in 1894, as reported by the Commissioner of Buildings, was $11,844,700, a decrease from 1893, due largely to depressed prices of material and labor, as the same volume of work at the prices which prevailed in 1893 would have made the cost about $13,000,000. The present outlook is very good.

The Building Trades Council has abolished the walking delegate, has taken the power from any one man to call a strike, and has substituted a Board of Arbitration in his place.

January 9 a committee was appointed to formulate a new constitution and submit it to the Building Trades Council for adoption. The document says that strikes are failures and boycotts un-American, and the use of both is discountenanced in subserving the aims of union labor.

All differences between employer and employee will hereafter be settled by arbitration in St. Louis.

Delegates representing all trades unions were present.

This action has received the hearty commendation of the local press and seems to promise most excellent results for the future. The council is composed of 32 unions, representing all branches of the building trades.

The Legislative Committee of the Builders' Exchange at its last meeting discussed the lien law giving dealers of building material a lien on the building. A sub-committee consisting of Thomas Mockler, Daniel Evans, Jeremiah Sheehan and John Ratchford was appointed to procure an amendment abolishing the lien.

A bill is in the hands of the Committee on Legislation of the City Council proposing to license building.

The ordinance provides that no person shall engage in, carry on or exercise or conduct the business of building contractor within the city of St. Louis, without first procuring a license therefor, as hereinafter provided. The bill goes on to define the meaning of building contractor and provides that there shall be levied on each building contractor a license of $100, to run from the first Tuesday in April of each year, and no license for a fractional part of a year shall be issued, and such licenses shall not be transferrable. The bill includes every sub contractor and omits only day laborers. Persons violating the provisions of the measure shall be deemed guilty of a misdemeanor, and upon conviction to be fined not less than $25 or more than $500 for each offense, and every day on which such business is carried on or exercised without a license shall be considered a separate offense.

The bill is meeting with vigorous opposition from the smaller contractors throughout the city.

Wilmington, Del.

The members of the Builders' Exchange, Wilmington, have elected the following officers to serve for the ensuing year: President, Lewis T. Grubb; first vice president, Calvin I. Swayne; second vice-president, Frank C. Simpson; third vice-president, Lewis W. Brosius; secretary, William H. Foulk, and treasurer, Henry Evans.

The following are the directors for 1895: W. Gallaher, A. S. Reed, Henry Evans, G. W. McCaulley, C. I. Swayne, L. W. Brosius, A. L. Johnson, W. H. Foulk, P. Chandler, Richard Kelly, J. K. Baylis, J. R. D. Seeds, H. A. Miller, F. A. Mitchell, G. H. McCall, F. C. Simpson, J. D. Winslow, W. S. Allmon, I. M. Lenderman, L. T. Grubb, George W. Phillips.

Worcester, Mass.

On February 14 the Builders' Exchange of Worcester held its annual banquet. The rooms of the exchange were artistically decorated, and the banquet tables were most invitingly arranged. The entire membership, with few exceptions, was present, and the guests of the evening included a number of the most prominent men of the city. Several members of other New England exchanges were present and participated in the enjoyment. The toasts were ably responded to, and the whole evening was one of unadulterated pleasure. The exchange is reported as being in good condition, and the members are looking forward to an improvement in business during the coming year. The recent death of Charles D. Morse, an ex-president of the exchange, has bereft the exchange of one of its best beloved and most valuable members. Suitable resolutions have been prepared expressing the keenest sorrow at the loss and paying just tribute to the worth and respect in which Mr. Morse was held.

Notes.

At the annual meeting of the Builders' Exchange of Bridgeport, Conn., these officers were elected: President, Zalmon Goodsell; first vice-president, C. L. Chamberlain; second vice president, C. H. Botsford; secretary, Charles Bottomley; treasurer, Lucius H. Mills; trustees, Patrick Coughlin, H. M. Purdy, George E. Scofield and D. C. Mills. The exchange is reported as being in good condition, with a membership of about 200.

A new exchange has been organized at Danville, Ill., under the name of the Build-

(*Continued on page 78*).

METHODS OF HANDRAILING.*

BY J V. H. SECOR.

COMBINATION OF TWO SYSTEMS.

THE illustrations here given are from two recent methods in use. Fig. 46 is a plan with winders around a portion of a cylinder, making the tangents in plan accute. A newel is located at the chord line H. The tangent H C is a level tangent, the elevation of the pitch being from C to A. On the chord line O D G are set up the number of risers contained in the cylinder, with the treads and risers outside of the cylinder to regulate the inclination of the straight rail, as at 6 7 8. points in the limits of the mold are B C G X, in which B C is the level tangent for the mold and C G the pitch tangent. The levels are found from the point, the curved line being drawn with radius equal to K K, Fig. 46. The dotted lines are drawn at right angles from tangents and touching the curve. The bevel B′ is to be applied at B on the newel end and A for the upper end.

All the bevels are formed in the same way for this article The width for the rail is shown at X X, Fig. 46. This this case there are three risers between the platforms, the rail being drawn without ramps. One mold is required for the two pieces to cover the cylinder. The elevation is lettered to correspond to the ground plan, A B C being for the first quarter and C D E the second or upper quarter. The dotted lines marked "length" show how it is applied to Fig. 51 in drawing the mold.

(*To be continued.*)

TO TAKE DOWN a mill chimney, or "stack," 105 feet high, is no light undertaking. This is how it was done recently at Salford, England, to make room for a dock railway: First of all a course of bricks was taken out at the foot of the chimney, each brick as it was knocked out being replaced by a wood block. When the bricks had been withdrawn in such number that the chimney was almost entirely resting on its new support the space below was filled with the materials for a fire. A light was applied and in a quarter of an hour the supports were burned through, and the chimney leaned forward and fell in a mass. In the line of its fall was the gable wall of an old corn mill, which was brought down at the same time.

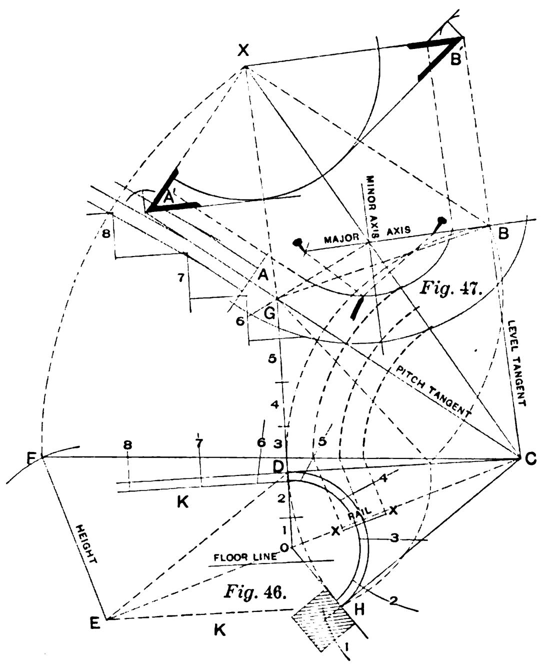


Fig. 46.—Plan, Starting with an Acute Angle as at H C D; the Rail X X and the Bevels A′ B′.

Fig. 47.—The Mold Completed—the First Method.

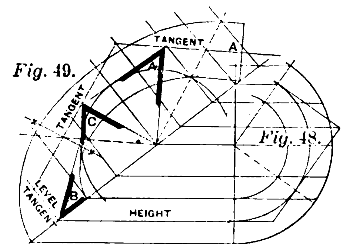


Fig. 48.—Plan Same as that shown in Fig. 46.
Fig. 49.—Mold Completed—the Second Method.

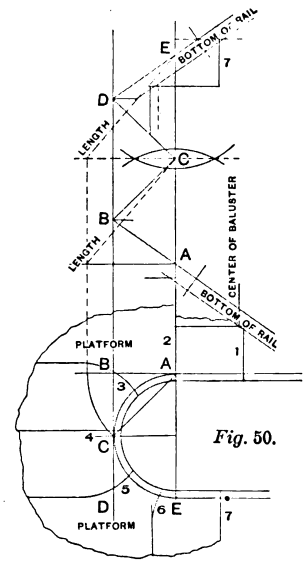


Fig. 50.—Plan showing Platform in Each Quarter with Three Risers between.

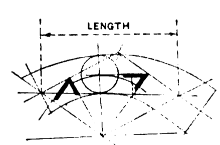


Fig. 51.—Mold Completed for Plan shown in Previous Figure.

Methods of Handrailing.—Combination of Two Systems.

From D to the floor line is a distance equal to two risers, which at 8 inches each makes 1 foot 4 inches. This added to 2 feet 2 inches, which is the hight of the short baluster between step and the rail, gives 3 feet 6 inches as the hight from the floor to the under side of the rail for the newel. H C D E is the parallelogram of the tangents. At right angles to C E is the hight, E F being equal to D G of the elevation. This makes C F the extreme length through the center of the mold. This, shown in the elevation, Fig. 47, at C X, is described from C as center and C F as the radius. The extreme is then marked on the line C F, and from C as center draw the dotted lines, cutting the center of the mold on the line C X.

Fig. 48 is a duplicate of the plan shown in Fig. 46, and the mold, Fig. 49, is drawn by ordinates from the hight E F, Fig. 46. Three bevels are shown on the face of the mold and a center point is indicated, as at X X, with the bevel C.

A mold may be cut through at any point if desired to accommodate material on hand, and the bevels found by this system.

Fig. 50 shows a plan of stairs known as quarter platform and cylinder. In

*Continued from page 21, January issue.

National Association of Manufacturers.

In accordance with the invitation extended by the committee of leading manufacturers of Cincinnati and Hamilton county, reference to which was made in these columns a short time since, something like 500 delegates from the leading industrial cities of the country assembled in Cincinnati on January 22, for the purpose of forming a national association of manufacturers. The initiative in this movement was taken by some of the prominent citizens of Cincinnati, among the number being Thomas P. Egan, president of the J. A. Fay & Egan Company, well-known makers of wood working machinery. The convention met in the theater of the Odd Fellows' Temple, Cincinnati, and was called to order by W. B. Melish, chairman of the Committee on Entertainment, who announced Thomas P. Egan chairman and E. P. Wilson secretary of the temporary organization. Mr. Egan addressed the meeting outlining briefly the aims which those had in view who were instrumental in calling the convention. He then introduced Governor McKinley of Ohio, who made an address, which was enthusiastically received and in which he referred to the position of Cincinnati as a commercial and industrial city. After a brief address by Mayor Caldwell of Cincinnati, committees were appointed on Permanent Organization and Order of Business, Credentials and Resolutions.

The afternoon session was opened with a preliminary report by the Committee on Resolutions, which authorized the chairman of the convention to appoint a committee of 15 to prepare a constitution and by-laws and to report to the convention Thursday morning. The Chair thereupon announced the composition of the Committee on Constitution and By Laws, after which the Committee on Permanent Organization reported, recommending as permanent chairman Thomas P. Egan and as permanent secretary E. P. Wilson. After the report had been accepted Charles H. Clark, secretary of the Manufacturers' Club of Philadelphia, addressed the convention.

WEDNESDAY'S SESSION.

The first work of the convention was the adoption after an unimportant debate of the following resolutions, prepared by the Committee on Resolutions, as the broad platform defining the aims of the association.

Resolved, That the National Association of Manufacturers adopts the following general statement of principles as the basis of its organization :

To the largest possible extent our home market should be retained and supplied by our own producers, and our foreign trade relations should be extended in every direction and manner not inconsistent therewith.

The principle of reciprocity should be embodied in national legislation, in accordance with the requirements of equity, so that reciprocal trade relations between the United States and foreign countries may be developed and extended as far as practicable.

Believing that ships sailing under the flag of the United States should carry our entire maritime commerce, and in view of the injury thereto by subsidized foreign shipping, we declare in favor of a judicious system of subsidies in order to the complete restoration and extension of our merchant marine.

The Nicaragua Canal being essential to the commerce of the United States, and of national importance, we favor its construction and operation under the control of the Federal Government.

Our natural and artificial waterways should be improved and extended by the Federal Government to the full needs of commerce, connecting the Great Lakes with the rivers of the Mississippi Valley and the Atlantic seaboard.

A large number of additional resolutions were submitted to the convention and were referred to the Committee on Resolutions.

M. E. Ingalls, president of the "Big Four" Railroad, then made an address which was listened to with marked attention. Following him Warner Miller made an address on the Nicaragua Canal.

THURSDAY MORNING.

The principal work of the morning session on Thursday was the adoption of

THE CONSTITUTION.

Article 1. Membership: Said association shall consist of all National, State and local associations, clubs, societies and other organizations of manufacturers in the United States, and associate members as shall from time to time be admitted thereto by a vote of three-fourths of the Executive Committee of said association.

Article 2. Officers: The officers of said association shall be a president, and one vice-president from each State and Territory in the United States, a treasurer and a secretary, each of whom shall be elected annually as hereinafter provided.

Article 3. Said association shall meet in convention annually. The delegates to said convention shall consist of five delegates from each State and Territory, and an additional delegate from each State and Territory for every $50,000,000 of manufactured product of each State and Territory, as appears in the last Federal census. Said delegates, apportioned as aforesaid, shall be selected by the vice-president of each State from nominations made to him by the organizations in his State, members of this association. And his certificate shall be the credential for each delegate from his State.

Each national association of a specific industry, member hereof, representing not less than 60 per cent. of the product of such specific industry, as shown by last Federal census, shall be entitled to one delegate, to be selected by such association. Each convention shall designate the time and the place of the next convention.

Said convention, at its annual session, shall elect all the officers of the said association and transact such other business as it may determine in furtherance of the objects of the association.

Article 4. Executive Committee: The Executive Committee of said association shall have its headquarters at Cincinnati, in the State of Ohio. It shall consist of the president, treasurer and the secretary, and the vice-presidents from the 12 States producing the largest output of manufactured goods, according to the last Federal census.

Said Executive Committee shall arrange for holding the conventions, and shall, by the secretary, preserve all the records of the association, and shall exercise all powers necessary to promote the purposes of the association. It shall also fill all vacancies in the offices of the association.

Article 5. Dues: Each association, society, club organization and associate member, on becoming a member of this association shall contribute $50, and a like sum annually so long as it shall continue a member thereof; but the amount of such dues may be changed at any annual convention by a majority vote thereof.

Article 6. Amendments: This constitution may be amended at any annual convention by a majority vote of said convention.

The constitution was the subject of a lively debate, the method of appointing the delegates by the vice-president of each State from nominations made to him by local associations being sharply objected to as open to the danger of perpetuation in office. Doubt was also expressed concerning the narrow lines drawn in regard to the character of local associations.

AFTERNOON SESSION.

In the afternoon the Committee on Nominations presented the following:

NEW OFFICERS.

President: Thomas Dolan, Philadelphia, Pa.

Treasurer: Robert Laidlaw, Cincinnati, Ohio.

Secretary: E. P. Wilson, Cincinnati, Ohio.

Vice-Presidents: Hon. Warner Miller, Herkimer, N. Y.; William D. Shallenberger, Pittsburgh, Pa.; John B. Kirk, Chicago, Ill.; Thomas P. Egan, Cincinnati, Ohio; L. D. Kingsland, St. Louis, Mo.; Fred. W. Silvey, Milwaukee, Wis.; P. E. Studebaker, South Bend, Ind.; Arnold B. Sandford, Fall River, Mass.; R. G. Soloman, New Jersey; John B. Howarth, Detroit, Mich.; Pliney Jewell, Hartford, Conn.; W. R. Vanderclute, San Diego, Cal.; C. A. Pillsbury, Minneapolis, Minn.; Thomas Deford, Baltimore, Md.; Charles Fletcher, Providence, R. I.; Theodore Ahrens, Louisville, Ky.; Charles W. Armour, Kansas City, Kas.; J. H. MacMullen, Biddeford, Maine.; Levy C. Barton, Omaha, Neb.; Dabney Crenshaw, Richmond, Va.; C. D. Mitchell, Chattanooga, Tenn.; H. C. Tossey, Sherman, Texas; I. F. Hanson, Warren, Ga.; Ex-Gov. H. C. Warmoth, New Orleans; H. F. De Bardeleben, Birmingham, Ala.; W. Robertson, Denver, Col.; W. H. H. Green, Seattle, Wash.; John Wilkes, Charlotte, N. C.; Thos. Somerville, Washington, D. C.; Colonel Fairbanks, St. Johnsbury, Vt.; John R. Linden, Rock Hill, S. C.; John A. Lewis, Meridian, Miss.; W. B. Scott, Wheeling, W. Va.; Geo. Sellers, Wilmington, Del.; Fred'k Lewis, Bartow, Fla.

There were no nominations for Montana, North Dakota, Wyoming, New Mexico, Idaho, Nevada, Arizona, Indian Territory, Oklahoma, Alaska, Iowa, New Hampshire, Oregon, Arkansas, South Dakota and Utah, and these vacancies will be filled by the Executive Committee.

In the evening the delegates gathered at the Scottish Rite Cathedral, where supper was served. Ex-Governor Foraker of Ohio delivered an address on Reciprocity.

A REMARKABLE discovery was made in digging about the foundations of Durham Cathedral of the remains of walls which, upon further investigation, show that the original building had a triple apsidal east end termination, says an exchange. This is not uncommon on the Continent, but it is unique in England. All the existing books on Durham, from the very earliest, assume that the cathedral originally had an ambulatory, like others in that country, but that is shown now to be a mistake.

EVOLUTION OF AN OLD BUILDING.

THE adaptability of sheet metal for architectural purposes has been demonstrated during the past 15 years by the extent of its adoption. Numbers of new buildings in all parts of the country have exteriors composed entirely of sheet metal. Old and dilapidated structures of wood or brick, too, may be modernized and improved by the use of sheet metal applied in the form of plates, and in this direction a practically unlimited field is open to the metal worker. The manufacture of sheet metal plates in iron steel and copper for architectural purposes has already become an important industry, and manufacturers have brought their productions to such a state of perfection that material of all kinds is now so closely imitated in metal as to make actual examination necessary to discover the substitution. The endurance of the plates has been severely tested, and has proved to be such as to warrant their use in any and all climates, and they have been adopted in many cases in preference to stone or brick as successfully withstanding climatic and atmospheric influences.

To give an idea of their usefulness in the renovation of old buildings, we present a series of illustrations showing the different stages in the evolution of an old building to one embodying modern ideas of architecture. Fig. 1 is a view of an old three-story brick building recently purchased by Gara, McGinley & Co., Philadelphia, and known as 23 South Seventeenth street, in that city. The firm mentioned have been identified with the growth of the architectural branch of the sheet metal industry for many years, and they conceived the idea of transforming the old building into one of modern appearance in order to practically demonstrate their abilities in this direction. Fig. 2 shows the windows removed and the side doors bricked up. The window openings are not enlarged, and beyond the bricking up of the doors no change in the appearance of the building is noticeable. In Fig. 3 it will be seen that the third story was obtained by squaring the peak of the house. The work was rough, no pointing or finishing being required, and the bricks were taken from an old wall at the rear of the house. Fig. 4 shows the method of putting on the metal plates. The

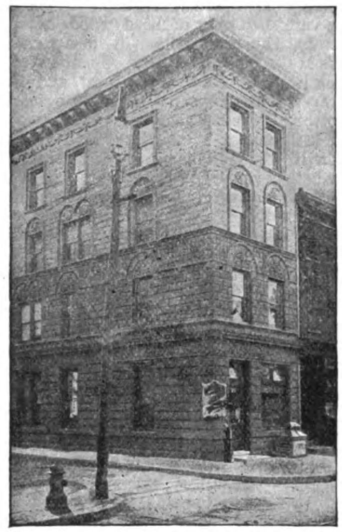


Fig. 5.—The Finished Building.

bricks are first plugged, that is, wooden plugs are driven into the mortar for use as supports or nailing surfaces for the wooden strips to which the plates are attached. The window arches are formed on the wide strips seen above the old windows. The upper story has been treated with a coating of red lead preparatory to painting. Fig. 5 shows the finished building. The walls of the two upper stories are covered with rock faced siding plates; those of the second story from the top to the lower part of the arches with tiling plates, and the remainder with pick faced plates. The upper story is painted to represent Indiana limestone, and the lower stories represent red sandstone.

Fig. 1.—View of the Old Building.

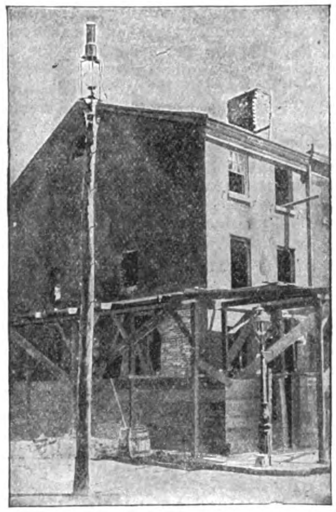


Fig. 2.—View Showing the Windows Removed and the Doors Bricked up.

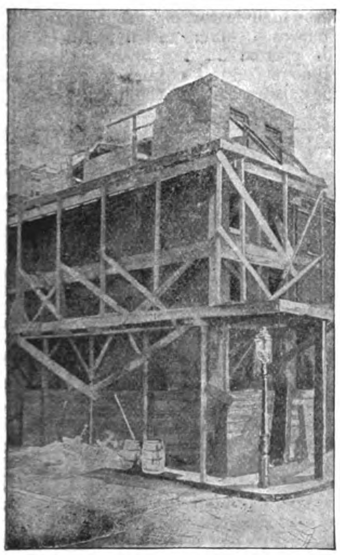


Fig. 3.—Completing the Third Story.

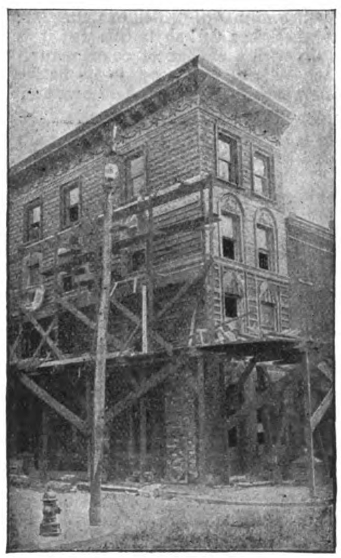


Fig. 4.—Putting on the Metal Plates.

Evolution of an Old Building.—Illustrations Showing Different Stages of the Work.

Cleveland Architectural Club.

The subject of the December Competition of the Cleveland Architectural Club was "An Entrance to a Residence in Masonry." Messrs. Coburn and Barnum, architects, were judges and rendered a decision as follows: W. D. Benes was the first choice, G. B. Bohm the second, J. W. Russell the third, F. Baird the fourth and H. S. Nelson the fifth. At the first meeting in January Herbert B. Briggs, secretary of the club, read a paper upon colonial architecture, and at the second meeting competitive drawings for "A Transfer Station for a

Public Square" were presented. Architect C. F. Schweinfurth was the judge of the drawings and awarded first place to B. S. Hubbell, second place to W. B. Benes, third place to C. S. Schneider and H. Ganzenmuller, fourth to W. M. Hall, A. E. Skeel, H. B. Briggs, H. S. Nelson and G. B. Bohm, and fifth to L. R. Rice. The subject for the February competition was a city *café*.

Staining Wood.

This is a subject few writers in the magazines have touched upon, says James Marks in one of the issues of *Painting and Decorating*. It is not so well understood as priming or painting. It requires a knowledge of wood, its nature and the beauty that a stain is to bring out, or at least not mar nor destroy. All woods have a transparent look, or what may be termed reflection; they change as light strikes them. Look at a varnished door of hard wood in one light, the cross stile will look darker than the upright stiles. Change your position or change the light, and the reverse will appear. Examine a panel of bird's eye maple, or any curled wood, it will change as the light is reflected on it. This is the beauty of real wood, whether varnished or stained, and is a beauty that no grainer has ever been able to imitate.

To stain wood and keep this reflecting power or change of appearance is or should be the object. It has been done, it can be done, but it very seldom is done. The conditions are against its being done on the ordinary work that is met within our every day experience. The first thing necessary is the wood itself; it must be clear and free from sap, soft places and knots. Mill dressed lumber should be finished off with a sharp smoothing plane. No sandpaper should be used on the work. All ends of mortices should be carefully sized before staining so as not to appear dark by the extra quantity of stain they absorb. No lime or plaster should touch the wood work, or a dark stain will be the result.

Let us varnish a piece of wood work of this description, say white pine, with three coats of light hard oil finish, or, better, a good No. 1 coach varnish, and all the beauty of the wood is to be seen. Nothing is marred, nothing hid. Next let us stain and varnish, and the chances are that the fine, satin-like reflection is gone. There is something in the stain that mars the fine transparent reflection which is the beauty of all natural wood finish. The grain may be left, and even brought out more prominently by an inferior stain; but this is not or should not be the object sought for, for if the reflection which changes is destroyed with a filler or a stain, then it should not be used.

STAIN VS. TINT.

The average painter concludes that a coat of thin color that produces the desired tint is a stain, and will, and does in a number of instances, meet the requirements of a stain best, but this is not a proper stain. No coating of any pigment, no matter how finely prepared, or how applied, in oil or distemper, can be applied to wood as a stain without destroying the real beauty of the wood, the reflection.

It is the natural tendency of all woods to darken under varnish or polish; how this is cannot be readily accounted for, except it be the action of light on the wood shining through the varnish or polish, either of which excludes air; but when they darken in this way it is always with a change of color natural to the color of the wood in its native or new state. This can be observed in old oak furniture or mahogany, both of which grow old with a beautiful transparent richness, the color which should be imitated if possible.

Let me give an illustration: I have a strip of ash or light oak, the grain of which is as near to walnut as possible. This strip is to be stained the color of the walnut, and the reflection is not to be destroyed. The stain that will accomplish this is a proper stain and none other.

Staining has taken the place of graining, and while, on account of cheapness, it may be a substitute, so far as the average job is concerned, that is produced with a coat of stain and filler combined, or color stained, it has neither the beauty nor appearance of an average job of graining, and will not until wood work is properly prepared and staining is properly done; then be assured it may compete with graining, but it will certainly cost more money. There must be a new idea formed, and a more correct one, of what is needed, and the makers of stains and fillers must be required to produce a stain that will do the work in a proper manner, under skillful workmen, and not advance claims for their goods that cannot be accomplished.

A NOVEL housing scheme has been adopted by the Town Council of Manchester, Eng., to clear a space of about five acres in the center of the city, in an overcrowded and unhealthy area, and to erect blocks of workmen's dwellings. Large areas will be left for playgrounds, and the roofs of the buildings will be left flat, which is for playgrounds and other purposes. Trees and flower beds will be planted in the open spaces. Several novel features will be introduced into the construction of the dwellings.

BUILDING IN THE NORTHWEST.

IN the course of a lecture on "Architecture, or the Art and Science of Building," lately delivered in Winnipeg, Manitoba, by Architect George Browne of that city, he referred to methods in vogue in the Northwest, and among other things said:

When I came to Manitoba in the spring of 1879, there were no buildings of any importance, and the wigwam of the Indian and the log house of the pioneer were seen on every side, while the frame buildings were not numerous off Main street, and when I returned to the city in December, 1881, to reside, architecture was still in a primitive state. Architects and builders seemed to have little or no knowledge of the proper methods to pursue in order to erect buildings suitable for their purpose, the climate and the place. Since then, however, considerable knowledge has been gained, and progress made, both as to the proper methods of construction and design. . . . . . .
At one time it was considered necessary for the safety of the building to build the foundations on piles, or two or three thicknesses of 2 inch plank laid crossways or diagonally and spiked together, but both have been found unnecessary and expensive, and only on rare occasions are resorted to, concrete and broad footing stones having been found quite sufficient to carry our heaviest buildings on the blue clay, provided the latter is properly drained. Footings of broad stones without concrete are sufficient enough to carry an ordinary building. Stone foundations should be coated well on the outside below the ground line with hot tar and pitch or Portland cement to keep the damp out of the wall and cellar, and where expense is not an object the foundation wall should be lined on the inside with 4 inch brick with 2 inch air space.

I am frequently asked which I consider to be the warmest, a house of solid brick, a frame house or a brick veneer house. I believe that the three kinds are equally warm if properly built and attention is paid to details, which seem but trifles to the average workman, but which play a very important part in adding to the comfort of the inmates. One is to build in properly the door and window frames so that when the wood of which they are constructed shrinks they will be air tight. Another one is, in the case of a veneer house, to fill in the space between the boarding and brick work solid with mortar, and in all houses to have two air spaces in the exterior walls, formed by putting on the inside of the walls 1 x 2 inch strapping, lathing and plastering one coat, commonly called back plastering, which should go, in every case, from the ground floor joints up the walls and rafters and between the joints, practically making an air tight jacket of plaster for the building.

If the house is to be heated with hot air the cellar should not be less than 7 feet 6 inches in the clear, to allow the pipes to have a good incline. The furnace should be placed so that the pipes will be of equal length and as short as possible. Long pipes interfere with the proper working of the apparatus and are of little or no benefit to the rooms to which they lead. Return pipes are necessary to draw off the cold air from the rooms and create a vacuum for the hot air to fill.

People complain of the shrinkage that takes place in the wood work of their houses, and attribute its cause to its not having been properly seasoned before being fixed in position, and while in some cases this may be the correct reason, in others it is owing to the wood absorbing the moisture from the plaster, for the wood finish is, as a rule, rushed on before the latter is dry, and by that time the chilly weather has set in, the furnaces started, and a hot blast thrown on the wood work and severely testing it. The unusual dryness of our climate is also responsible to a certain extent. I have known wood works, after having been in for two years in the East, to fall to pieces after being here only a short time. Owing to this defect, which we cannot easily overcome, I never paint my interior work more than two coats the first year, leaving the third coat to be applied the following year, after the work has been rubbed down and the cracks and open points puttied up.

The architecture of our city is now in a transition state; the wood, brick veneer and galvanized iron age is passing away, and is being succeeded by the stone, brick and copper age, our capitalists recognizing that it is poor economy not to build for the future as well as the present.

SYSTEMS OF ZINC ROOFING.

At a late meeting of the Northern Architectural Association, held at Newcastle-on-Tyne, a paper on Zinc and Zinc Roofing was read by the secretary, Arthur B. Plummer, and published in full in the *Building News* of London. From that portion of the author's remarks relating to zinc roofs we condense the following, and reproduce the sketches as shown:

Referring to some of the different systems of zinc roofing recommended by the Vieille Montagne Company and others, I would state that the roll cap system is laid on boarding, and on this boarding, at intervals of about 2 feet 10 inches or 2 feet 11 inches, center to center, wood fillets or rolls are fixed while the roofing is being laid. These run from ridge to eaves. Roughly speaking, the sheets of zinc are laid between these rolls, with their edges turned up against the rolls and the edges and roll are then covered with a capping of zinc. If the roof has a fall of 1 foot in 8 feet, or upward, then only a welt or fold joint at the junction of the sheets is required (Fig. 1). In the case of flatter roofs, if possible a fall of 3 inches in 10 feet should be obtained; in such flat roofs, however, the drips should occur at about every 7 feet 6 inches. The drips should be 2½ inches deep and not less than 2 inches, to allow the rolls to pass under the projecting upper sheet. If laid with the drawn roll the drip will require to be 3½ inches deep. In the roll cap system, the section through a roll is somewhat of a wedge section, with the point of the wedge cut off (Fig. 2). The clips that pass under the wood rollers are about 2 inches wide and placed about 3 feet apart along the roll. The cap is secured by forked connections; these are pointed pieces of zinc, 2 inches or 3 inches long, by about 1 inch wide, one end of which is soldered to the inner surface of the cap on each side, the point being free as the cap slides into the roll. The points of these forks slip in under the hooked portion of the clip. The stopped end of the roll cap on the upper level of the drip is bent over with the edge of the sheet (Fig. 3). In gutters where the incline is very slight and soldered joints are therefore necessary, an extra allowance of play should be provided for expansion and contraction by placing a sort of roll system across the gutter at its highest points (Figs. 4 and 5). For gutters 1½ x 2 inch drips should be allowed, except where it is necessary to put a roll in the center, and in this case they must not be less than 2 inches.

FLASHINGS.

Wall flashings should go into the wall 1½ inches; they are very similar to lead and for strength to stiffen the edge, and for appearance, should be finished with a bead (Fig. 6), and pointed in cement. The edge of the sheet should be turned up about 6 inches against the wall. The upper edges of the sheets nearest the eaves are strengthened where they project over the gutter by being doubled back so as to form a bead, and also by a strip of strong zinc nailed along the edge of the boarding over which the bead is turned (Fig. 7). The ridge cap can be covered by a zinc roll cap turned over it; this cap is strengthened on the lower edges by being bent round so as to form beads, and it is fixed with clips in the usual way (Fig. 8). The incline of zinc roofs constructed as before mentioned should be from, say, 20° to 30°, whereas for slate or tiles it is from 32° to 45°; consequently this system of roofing requires lighter framing and less brick work in the hight of chimneys, gables, &c., and there is also less surface to cover, owing to the lower pitch of roof. Zinc roofs also have zinc gutters and flashings, and the extra cost of such lead work in ordinary roofs is thus saved. In case of greater or less pitch than 20° to 36°, it is better, the Vieille Montagne Company say, to adopt the patent roll cap system. This is similar to the ordinary roll cap construction, excepting that there are differences in the shape of the wood roll, the roll cap and the clips. When zinc roofing is required to be laid not upon boarding, it is strengthened by corrugations. Ordinary corrugated zinc has the flutes about 3⅛ inches wide, and rests upon spars about 2 feet 6 inches apart. Zinc roofing thus constructed has the advantages of both strength and durability owing to the corrugation. I may perhaps also mention that the corrugation itself in great measure overcomes the difficulty of expansion and contraction—at any rate, this is the case across the sheets in corrugation. It can be easily laid upon a light frame work of wood or iron; it is unnecessary to have boarding. The minimum incline of these roofs should be about 22°; the lap in the width of the sheets should be from 3½ to 4 inches. The sheets should not be riveted together; they can be sufficiently fixed with clips—that is to say, three slips of zinc are soldered to the underside of each sheet, and these hook on to similar hooks fixed to the wood framing, or they can hook on to iron purlins. The corrugations are of three sizes—2⅝, 3 and 3 1/16 inches, center to center. Patent corrugated zinc, with flat spaces between the corrugations, is another form of corrugation often preferred (Fig. 9).

DOUBLE RIBBED ROOFING.

Double ribbed zinc roofing may be laid on boarding or on laths or battens (Fig. 10). The double ribs give extra rigidity to the sheets. The top of the sheets are nailed to the wood work under the overlap of the sheets above them, and the upper sheets are fixed with a forked connection on the inner

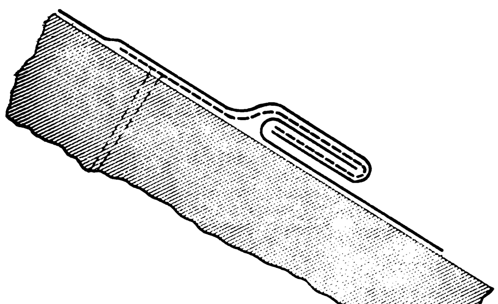


Fig. 1.—"Fold" Joint at Junction of Sheets.

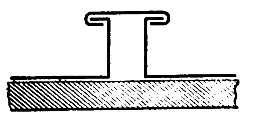


Fig. 4.—Expansion Joint in Gutter.

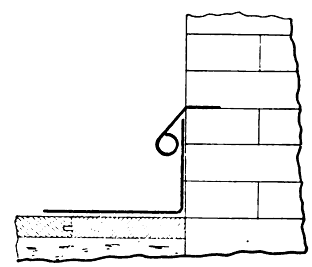


Fig. 6.—Flashing Against Wall.

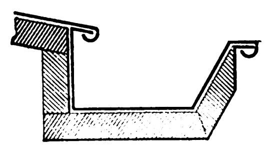


Fig. 5.—Section through Gutter.

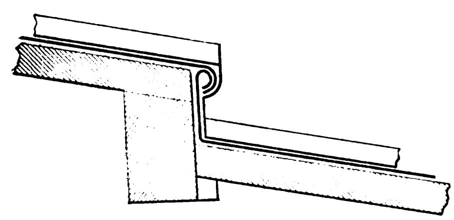


Fig. 3.—Stopped End of Roll Cap.

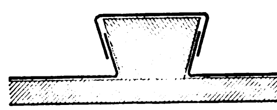


Fig. 2.—The Roll Cap.

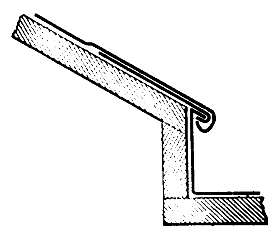


Fig. 7.—Finish at Gutter.

Systems of Zinc Roofing.—Illustrations Accompanying Mr. Plummer's Paper.

face of the ribs. The length of the lap varies, according to the incline of the roof, from 2½ to 6 inches; the smaller the inclination, of course the longer is the lap, to avoid capillary attraction. Corrugated zinc may be laid like corrugated iron, with the flutes horizontal, so that the sheets will span wider spaces between principals without any intervening rafters or purlins. In such a case, however, the flutes must be of a peculiar angular stepped form (Fig. 11). In Italian corrugated zinc roofing the corrugations are 1 foot 3 inches center to center (Fig. 12). A great advantage is that it may be laid without boarding upon rafters spaced and shaped to fit into the corrugations, or it may be laid on boarding. The sheets are secured to the rafters by patent holding-down clips. The lap of the upper sheets over those below them should be about 5 inches. The rafters rest upon purlins, which in large roofs (owing to the lightness of the system) may be 10 feet apart. The depth of the rafters or rolls should be about 3 inches when resting upon purlins 7 feet apart; but when laid upon boarding, 2 inches deep is enough. The wood rafter can be any depth and width; but 3 x 1½ inches (Fig. 13) is large enough if the rafters are wider. Then the upper part to a depth of 1½ inches must be worked to receive the corrugations of the metal (Fig. 14). The ridge roll is covered with zinc nearly in the same manner as with lead, except that the zinc is not worked so much into the angles under the roll, and it is secured on the underside by forks. Valley gutters are also formed in somewhat the same manner as with lead. For roofs laid with wood rolls, the wooden trough is lined with sheet zinc, the sides of which are turned up, and the upper edges bent inward under the bead formed by the lower edge of the sheet at the eaves. When Italian corrugated zinc is used, the sides of the zinc lining to the gutters are turned up, and the edges bent over the thickness of the wood sides of the trough; the minimum fall of such gutters should be 1 in 40.

WEIGHT OF ROOFING.

The following is the approximate weight when laid, including corrugations and laps, for 100 superficial feet: Square roll cap, 14 gauge, 144 pounds; Italian corrugation, 150 pounds; square roll cap, 16 gauge, 192 pounds; Italian corrugation, 198 pounds.

In the zinc tile system the tiles are generally fixed on boarding with clips or hooks, and are well adapted for high pitched roofs; they can be fixed with ease even by unskilled men. Each tile is hung from a hook fixed upon battens or boarding, and passing through a hole near the top of the tile. I may mention that paint does not readily adhere to sheet zinc unless it is first washed with one or other of the necessary solutions, or a thin coat of liquid size will make any oil color adhere to zinc should this be required for any purpose.

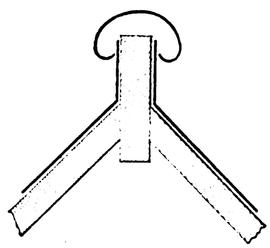


Fig. 8.—Ridge Cap.

Fig. 9.—Patent Corrugated Zinc.

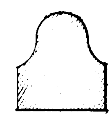


Fig. 14.—Section of Wide Rafter.

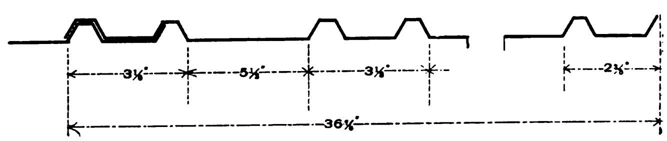


Fig 10.—Double Ribbed Zinc Roofing.

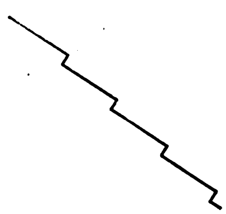


Fig. 11.—Angular Form of Roofing.

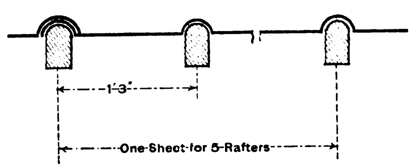


Fig. 12.—Zinc Roofing Laid on Rafters.

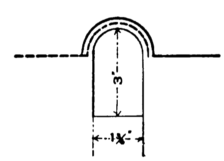


Fig. 13.—Narrow Rafter.

Systems of Zinc Roofing.—Illustrations Accompanying Mr. Plummer's Paper.

A Novel Theater.

The new theater which is in process of construction at Buenos Ayres, South America, bids fair, on completion, to be the largest in the world, besides embodying other unique features. Its mammoth capacity will afford sitting accommodation for 5000 persons. The structure is further so planned, says *Invention*, as to enable carriages to deposit their occupants on the level of the grand tier of boxes, as well as the ground floor, while elevators will be provided for the benefit of all seat holders in the upper part of the house. The most novel feature, however, of the new theater is the arrangement by which, in a brief space, the pit and stalls can be converted into a circus or racing track; so that on the same day, or even on the same night, tragedy may give place to a bull fight, or opera to a bicycle or foot race. Further means are provided by which the ground floor of the house can be turned into a mimic lake for the benefit of swimming or other aquatic performances.

A New Stone Saw.

A newly devised stone saw that has been put in operation in West Philadelphia is demonstrating extraordinary cutting powers as compared with former processes, says a recent issue of the *Philadelphia Ledger*. It is the invenvention of James Peckover, an expert stone mason and carver. By tests made with the saw, using a chilled iron shot abrader, and cutting through the hardest of all brown stone, known as the Hummellstown, using a block of stone 10 feet by 6 inches long and 2 feet 2 inches in thickness, the following results were attained:

The first cut through was made in one and three-quarter hours, the second, with increased feed, in one hour, and the third cut, with the full limit of speed, in three-quarters of an hour, which is equal to cutting 33 inches per hour. Four inches per hour has been considered good work in the ordinary mills of the country with other saws.

Upon Nova Scotia granite the saw has cut through 6 inches per hour. The manager of the New Brunswick Company of Calais, Maine, who witnessed the new invention's operation, stated that his company had never been able to compass over 8 inches cut of Nova Scotia stone in ten hours.

Thin slabs are also cut leaving no ridges on the face of the pieces after cutting, although the saw passed through various veins of flint.

In the improved saw is used a lineal or horizontal motion, while in other saws the pendulum motion has been depended on. Further, the improved has a thinner blade with thicker teeth, which allows the abrading material to fall down between the teeth to the bottom of the kerf.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President, Noble H. Creager of Baltimore.

First vice-president, C. A. Rupp of Buffalo.

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

LIST OF DIRECTORS.

E. L. Bartlett	Baltimore.
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Luther H. Merrick	Syracuse.
A. S. Reed	Wilmington.
Chas. A. Vaughn	Worcester.

Form of Proposal.

The form of proposal under which building contractors tender for work receives much less consideration than such an important part of the business of making a contract warrants. Any form of proposal which states the amount of the estimate, irrespective of its wording, is considered to be sufficient. For example: The majority of contractors are in the habit of submitting estimates about as follows: "I propose to furnish all labor and materials for such and such work on such and such a building for such and such an amount," signing their names to it. While in intent a proposal submitted under this form is a proposal only, by its nature it becomes a contract in itself, if accepted by the owner. As will be observed, under the operation of such a form of proposal as this the contractor has executed a contract without having committed the owner in any way; in other words the contractor has agreed to do certain work for a certain price and the owner has agreed to nothing. Estimates should be tendered in such a way that under any and all circumstances they shall continue to be estimates and nothing more. While undoubtedly improper estimates are rarely taken advantage of by either architects or owners there is no reason why the building business as much as any other should not be conducted correctly in all its parts.

The Builders and Traders' Exchange of Milwaukee about a year ago prepared and adopted a form of proposal covering just this contingency, and builders generally would be wise in adopting something of a similar character.

The form mentioned was presented in these columns at the time of its adoption, and is available to any who may desire a copy at the office of the National Secretary.

The Uniform Contract.

The practice by architects of preparing a form of building contracts according to their own individual ideas without in any way consulting the contractor results in many unequal conditions to which the contractor is expected to subscribe. In the office of the National Secretary there are a large number of printed forms of building contracts prepared by architects in various cities of the country in which the most unfair requirements are exacted of the builder and in which there is no evidence of any collaboration between the two in preparing the document. A building contract is quite as much the affair of the contractor as it is of the architect, and the contractor should be equally interested with the architect in the preparation of a just and equitable form under which building operations shall be prosecuted. Inasmuch as these contracts almost invariably relieve the architect from all responsibility, denying his position as agent of the owner, it is absolutely imperative that the contractor should insist upon such conditions as will give him full protection as one of the parties to the agreement. The benefit of a universal form familiar to both architects and builders is self evident, and the Uniform Contract prepared and advocated for use by the American Institute of Architects and the National Association of Builders presents conditions which are conceived to be fair and equitable in such an agreement by the highest authorities in the country of the two parties interested. One of the results of the keenness of competition in the building business is the acceptance of unfair requirements for fear that if these unfair requirements are not accepted by one builder they will be by another; therefore the contractor who is asked to sign an inequitable form of contract is reluctant to present objections for fear the architect will say to him: "Well, if you don't want to sign this contract there are plenty of others who will." As a result of this condition of affairs this abuse of the rights of the contractor is allowed to continue, practically without protest. Contractors who insist upon the use of the Uniform Contract may be certain that if the architect declines its use he is not content to have the business conducted by fair and honorable means. The fact that he has a private form of contract under which business has been conducted from his office for a greater or less period without serious damage to the contractor has no weight as a reason for declining to accept a contract universally advocated and adopted as being the most equitable and satisfactory form of agreement for this character of work in existence in the United States.

Blank Form of Estimate.

The blank form of estimate given below has been prepared and will be submitted to the Master Builders' Association of Boston at its next regular meeting. The need of some form which shall fulfill the requirements of a proposal for work, and yet not exceed the functions of a proposal, has long been needed, and the subjoined form has been prepared with this object in view.

The only form heretofore prepared for general use is that of the Builders and Traders' Exchange of Milwaukee, which was published in this department at the time of its adoption about a year ago. It is thought that the form herewith will meet the requirements of Boston builders and will prevent the possibility of ambiguous proposals being made and establish uniformity as well as prevent the possibility of such errors as were pointed out in this department last month.

The form mentioned is as follows:

THE MASTER BUILDERS' ASSOCIATION

Of the City of Boston.

BLANK FORM OF ESTIMATE.

BOSTON,........ ......

....

....

....estimate for the

....

for building to be erected for

... ...

on.......... .... street,

....

is ($......) ....

This estimate refers to and includes such work in the line above referred to as is mentioned in specifications for said building (pages numbered ....), prepared by......................, architects; and such work only, and comprehends that the method of construction or application of the said specified work is to be in accordance with certain illustrative drawings prepared by said architects, and submitted in conjunction with the said specifications, to wit: sheets numbered.......... ....

Signed,

....

John McGlensey.

John McGlensey, who recently died at the home of his son-in-law, John A. Jarvis, in New York City, was born at Lancaster, Pa., in 1819. When sixteen years old he apprenticed himself to one of the prominent employing plasterers of Philadelphia, and after years of hard work he became one of the most prominent employing plasterers in New York and other large cities. The work upon some of the handsomest and costliest buildings to-day stands as a monument of his handicraft. He was ever ready to assist those in distress, and always looked upon the bright side of everything.

He was a prominent member of the Society of Mechanics and Tradesmen, the Mechanics and Traders' Exchange and Building Trades Club. For several years he was president of the Employing Plasterers' Association, and was a regular attendant at the conventions of the National Association of Builders.

(*Continued from page* 70)

ers and Traders' Exchange. The object, as already stated, is for mutual betterment, socially and otherwise, of the members. The officers are: President, J. G. Holden; vice-president, F. Walton; secretary, Mat. Wiseman; treasurer, C. H. Gillespie. The directors are: F. W. Penwell, T. Prendergast, A. Bolton, M. Duffy, Will LeWarn, G. Bredehoft, W. E. Shedd, P. Yeager, E. A. Leonard, A. H. Brandon, L. W. Straw, L. W. Wilkinson, L. M. Moore, G. Yeomans and H. Hall. A charter will be secured soon and a hall secured for a permanent meeting place of the organization.

The Springfield, Ohio, Master Builders' Exchange has elected the following officers for 1895: President, Lee Goode; first vice-president, O. N. Bartholomew; second vice-president, Thomas F. Quinn; third vice-president, J. A. Humphreys; secretary, C. A. Schuster; treasurer, H. G. Wraight.

It is stated by the Chicago *Inter-Ocean* that the building contractors of Anderson, Ind., will organize a union for their protection and to keep foreign contractors out of the city. They will make an effort to extend it over the entire gas belt, including the cities of Kokomo, Marion, Muncie, Elwood and Alexandria, and make a united effort to repulse the invasion of outsiders, who have in the past year taken most of the good gas belt jobs. They will resort to the boycott rule and will take in material supply companies and the trades, making a formidable organization. Anderson will organize this week.

A council of all the building trades was recently organized at Dubuque, Iowa. It was decided to notify building contractors that the building trades are now organized into a council authorized to represent the several trades in negotiations with the contractors. The unions represented in the council are the carpenters, bricklayers, stone cutters, stone masons, lathers, tinners, plasterers, painters and plumbers. Heretofore each union has treated with the contractors directly; now the council will negotiate for all. It is not the intention to ask for any increase of wages or reduction of hours this year. Last year the bricklayers worked eight hours and other trades nine.

Columbus, Ohio, carpenters have decided that after May 1 they will work but eight hours a day, in order to give more work to members of the craft. They will ask for only eight hours' pay.

The Builders' Exchange of Grand Rapids, Mich., held its annual meeting February 7 and re-elected the old officers to serve for the ensuing year. The officers are: President, C. P. Campbell; vice-president, A. A. Stearns; secretary, J. H. Hoskin; treasurer, Warren C. Weatherly; directors, G. W. Miller, chairman; W. C. Hopson, James Curtis, W. T. McGurrin and W. Rosema. The treasurer's report was read and other business of a routine nature transacted.

The Builders and Traders' Exchange of Jackson, Mich., recently elected the following Board of Directors: A. Graver, H. J. Adams, C. J. Riley, James Barrett and E. M. Jackson. The board elected the following officers: President, A. Graver; vice-president, H. J. Adams; secretary, C. J. Riley; treasurer, James Barrett.

W. A. Kelly, the new president of the Kansas City, Mo., Builders and Traders' Exchange, has appointed to the Committee on Admissions: J. Welch, J. H. Swearingen, Joseph Castle, A. F. Rodly, P. Guinan, J. A. Ritzler, James Gray, H. B. Farley and A. Sutermeister; and on the Committee on Rooms: W. A. Wilson, W. B. Hill and J. T. Seddon.

The annual meeting of the Builders' Exchange of Toronto, Ont., was held January 21. After the ordinary business was transacted the officers for 1895 were elected as follows: President, George Oakley; first vice president, John Aldridge; second vice-president, William Park; treasurer, D. Williams. The following were also elected to serve upon the board: Messrs. William Pears, James Thomson, William Booth, James Crang and H. Martin. Messrs. Clay and Holmes were elected auditors.

The new Master Builders' Association of Marlborough, Mass., has elected the following officers: President, J. E. Warren; vice-president, Thomas P. Horley; secretary, C. H. Andrews; treasurer, H. P. Richardson.

Church with Sheet Metal Front.

A good illustration of the increasing use of copper and galvanized iron work in building construction is found in connection with the St. Augustine Church, Bridgeport, Conn., the front of which will be covered with rock faced siding and the cornice made of galvanized iron. The roof will be of 18 ounce copper, laid between wooden cleats standing 3 inches high and 2 inches thick. The copper courses will be scant in width to fill the space between the cleats in order to allow for expansion. The edges of the courses will extend about ½ inch above the top of the cleat, and will be turned down away from the cleat. A sheet copper cleat will be nailed to the wooden cleat and extend beyond the edges on two courses of the other copper. These copper cleats will be placed about 8 inches apart, fastened with copper nails and the ends of the cleats will be turned down over the copper courses. A copper cap will cover the wooden courses lengthwise, and will be wide enough to have an edge turned over the edge turned on the courses, forming a seam which will be turned down tight against the wood work. By putting the copper on by this method no trouble is anticipated from expansion and contraction, which are apt to make trouble in copper roofing when proper provision is not made for them. Two copper crosses will be placed at the ridge of the roof, and with the pedestals will stand 16 feet high. These crosses are very handsome pieces of sheet metal work.

Statistics of the Building Trades.

Pennsylvania has at last begun in earnest the work enjoined upon its Bureau of Statistics, which was created by the act of 1874. Governor Hastings has appointed Capt. J. M. Clark of New Castle, a former newspaper manager, the secretary of this bureau, and Mr. Clark has entered upon the work with a will. He is visiting the towns of the State, advertising first in the local papers that he wishes to meet the mechanics of the town at the stated place, which has been procured beforehand. His object is to secure reliable statistics relating to the building trades, and he asks for the carpenters, stone cutters, masons, plasterers, painters and other mechanics to come to the meeting. He distributes blanks which ask the mechanic's opinion as to apprenticeship laws, and what he thinks of the industrial school, and a space is left for the mechanic's answers. The effect of machinery upon the hours of work and also upon wages is another of the questions asked, and the nationality of the workmen in the different industries of the State will be learned also; how many of them ever served as apprentices and for how long. The aim of the bureau is to secure information which will be of much interest and possibly of much value, both to the cause of learning and of labor. This is the first active effort made to make the State's Bureau of Statistics of any use or interest to the laboring men themselves.

An international exposition of industries and fine arts, authorized by the Federal Government of Mexico by decree dated January 9 of the present year, will be inaugurated in the City of Mexico on April 2, 1896, and will remain open for a period of at least six months. This, we understand, will be Mexico's first exposition and will include all kinds of industrial, scientific, commercial and artistic productions. The site of the grounds will be in the neighborhood of the new quarter of the city and will cover an area of over 600 acres.

CONTENTS.

ROW OF "TWO-FAMILY" HOUSES IN WEST 146TH STREET, NEW YORK CITY.

JOHN P. LEO, ARCHITECT

SUPPLEMENT CARPENTRY AND BUILDING, MARCH, 1895.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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The Local Building Outlook.

If one may judge from the plans filed the past two months with the Department of Buildings of the City of New York, the outlook for the building industry during the rest of the year promises a gratifying degree of activity. There seems to be no doubt that large amounts of capital are being drawn into the real estate market for investment in new buildings, a noticeable feature of the situation being the multitude of old fashioned structures which are in process of demolition, or soon will be torn down in order to make room for more substantial edifices. It is intimated that within the compass of a year there will be more buildings torn down in New York City than ever before in a corresponding period. Upon the sites of the old structures will be put up modern buildings for office and business purposes, there being now under way plans for a score or more, which will be erected in that section of the city lying below Fourteenth street. These in the aggregate will involve the expenditure of an immense amount of money, it being stated that the structure which is to go up on the site of what is now the Metropolitan Hotel will alone cost something like $3,000,000. There is also a decided tendency in the direction of new flat houses, and although it would seem that the city was pretty well supplied with this style of habitation, plans for no less than 133 were recently filed in the short space of two weeks. An examination of the statistics of the Building Department shows the remarkable improvement which has occurred both in the number and value of the buildings planned the first ten weeks of this year as compared with the same period a year ago. Up to the close of the first week in March there were filed plans for 707 buildings, estimated to cost $17,665,359, as compared with 368 buildings, valued at $6,812 235, for the corresponding period in 1894. In this connection it is interesting to note that for the single week ending March 1 of this year plans were filed for no less than 159 structures, estimated to cost $4,903,915—a record not often surpassed.

Rights of the Lowest Bidder.

In considering the rights of the lowest bidder it is generally accepted that the man who submits the lowest bid is entitled to the contract irrespective of any conditions in the specifications. This is an error, for no bidder can rightfully claim a contract if he has permitted the owner to reserve the right to "reject any or all bids." If the contractor submits a bid under conditions which make its acceptance a matter of the pleasure of the owner, then, even though the lowest, he can have no claim upon the owner and suffers no damage. In estimating under specifications which include the customary clause, "the owner reserves the right to reject any or all bids," the contractor waives all his right to claim the work or damage should the owner see fit to reject his bid, even though it should be the lowest. The right of the lowest bidder to a contract becomes a right only when the specifications state that the work will be given to the lowest bidder, and in such a provision only is the contractor assured that the lowest estimate will secure the work. The protection which the contractor must claim is that "the right to reject," etc , clause be omitted from the specifications, and an agreement that the work shall be awarded to the lowest bidder substituted in its place.

Another Trades School.

Some of the leading builders of New Bedford, Mass., are moving in the matter of establishing trade training in the public schools of that city. It is stated that failing to have instruction in the trades included in the regular school course, the builders contemplate the founding of a trades school supported by private enterprise. This subject is worthy the most careful consideration by both employers an workmen, and each should be equally interested in the careful and thorough instruction of apprentices. The old system of apprenticeship under which the boy was taken into the master's family and carefully taught the principles of a trade is practically a thing of the past, and some system must be adopted to fill the space left by its departure. The apprentice in the building trades to-day is simply an errand boy, who in the course of his day's work is expected to pick up sufficient knowledge to some time enable him to become a journeyman. That such lack of system as this is bad is most evident and is in itself a demand for something better. In the present state of affairs both employers and workmen have cause for complaint; the former objecting to the restriction by the unions of the number of apprentices, and the latter objecting to the substitution for journeymen of apprentices at less wages. There are other causes of complaint on both sides, but these are sufficient to show the need of a concerted effort by both to bring about a better condition of affairs. The form of training which obtains in the trades schools of New York City and Philadelphia is regarded as offering the best solution of the question thus far established, and the New Bedford builders add another city to the steadily increasing number in which the vital need of some settlement of the apprenticeship question is recognized.

Manual Training at Bridgeport, Conn.

In connection with the above it is interesting to note that the Master Carpenters' Association of Bridgeport, Conn., recently appointed a committee to inspect and report upon the educational work and especially the manual training carried on at the Young Men's Christian Association in that place. In their report the committee highly commend the work done, and state that it is divided into five departments, namely: Industrial and Fine Arts, Science, Business, Language and Music. In the first named are two classes in mechanical drawing, one in machine designing, one in freehand drawing and one in elementary carpentry. In examining the work in carpentry the committee report that the association makes no claim to graduate carpenters, but to improve men in the trade and to give practical help to others who may desire. The method of instruction involves the use of 18 benches with as many sets of tools and a blackboard and plates for the purpose of illustration. The course of study pursued includes the use and care of saws, planes, chisels and laying out tools, followed by joint work and construction in framing and paneling. Attention is also given to filing and setting saws and sharpening tools. Upon receipt of the report of the committee, the Carpenters' Association adopted a series of resolutions in which they heartily indorsed the work and commended it to the support of the public and to such as might wish to avail themselves of its privileges. They also pledged to the Young Men's Christian Association their cordial co-operation and aid, particularly in this department of their work.

The Eight-Hour Law.

The Supreme Court of Illinois has decided unanimously that the eight-hour law for women which was enacted in 1893 by the Legislature of that State is unconstitutional. The act expressly prohibits women from working in any manufacturing establishment more than eight hours in any one day. The court holds that a woman has the right to contract to work as many hours in a day or a week as she may deem proper. The mere fact of sex does not justify the law making power to restrict the right of any person to dispose of her labor as she sees fit. But the decision goes further than this and lays down the broad principle that an act which abridges the freedom of contract between workman and employer in a lawful occupation is unconstitutional. In far-reaching results this decision is regarded as exceedingly important. It is stated to be the first decision in the United States against eight-hour laws, and thus presents a new obstacle in the path of the movement for shorter hours. Labor is held to be property and the laborer is declared to have the same right to sell his labor and to contract with reference thereto as has any other property owner. The declaration that a legislature is powerless under the State constitution (which conforms on this point to that of the United States) to interfere with the freedom of contract, strikes at all enactments which have been made for the purpose of shortening the hours of labor. Much progress has been made in the creation of a strong public sentiment in favor of shorter hours of labor, and the movement seems destined to continue to grow in strength. But the short cut through an act of legislature has been clearly shown by this decision not to be feasible.

Anti-Freezing Mortar.

A recent item in a technical journal translated from an Austrian publication gives the result of a series of experiments on the subject above indicated and states that Portland cement mortar mixed with 7 per cent. solution of salt water and laid with dry brick or stone gives satisfactory results, lime mortars, or mortars containing lime, being of no value. Another authority in the building line advises as the result of experience that the stone or brick used, together with the mortar, should be heated, the object being to retard the freezing sufficient to permit the cement to set. A furnace such as is used in making asphalt mixtures for floors or paving is suggested as suitable for the purpose.

Residence with an Iron Roof.

An interesting feature of the magnificent residence now nearing completion for John J. Astor of New York City is the iron roof which covers the building, involving as it does the use of about 700 tons of metal. The structure was designed by the well-known architect, R. M. Hunt, and covers an area of 155 x 125 feet. The arrangement of main walls is that of three sides of a hollow square four and five stories high, built of marble and brick masonry with iron and steel framework and girders, arched floors, flat and domed and vaulted ceilings on metal elements. It is covered with mansard roofs of 41 foot and 36-foot spans over the west and south street fronts respectively, a half mansard roof of 36 foot span over the north lateral part, and gable or deck roofs between and adjacent to these, 57 by 41 feet over the picture gallery, 40 by 35 feet over the stable which adjoins at the rear and several smaller surfaces. All are of fire proof construction with stiff riveted steel and wrought iron trusses, girders, deep rolled beams and framing, and slate, tile and copper covering. This covering has been carefully designed by a specialist to conform to the complicated intersections and irregularities of the finished structure, and also to afford required proportions and sections for the computed weights, loads and wind strains, as well as adaptability to modern shop practice, strength of connections, simplicity of detail and convenience of erection. The hips, valleys and rafters intersecting at all angles formed numerous complicated and intricate connections, each requiring distinct treatment. The main interior walls are of brick anchored firmly by iron bars to the outside walls at their points of juncture. These walls are furred with fire-proof brick, of which also the lighter interior partition walls are constructed. The first four floors rest on the brick walls, while the fifth is in the roof. The floors are of steel beams 12 to 20 inches deep and filled in between with flat burnt clay arches 8 and 12 inches deep.

The main roof is at an approximately uniform hight and is U shaped in plan, the base being in front, 114 x 41 feet, and the lateral parts each 125 x 56 feet, having at the corners of the front towers at the northwest and southwest extremities, each one 41 x 33 feet at the base, 33 feet high and 21 x 13 feet at the top. These roofs, says the *Engineering Record*, inclose one 50 x 41 feet over the main hall, and have a mansard front both on the streets and overlooking the lower roofs of the inner square. The outer fronts are 25 feet high, and the trusses are designed to avoid producing any horizontal thrust on outside walls or columns. To this end the feet of the rafters are tied to the ends of the floor beams, which are intended to distribute any horizontal strains over the whole structure. The inside rafters extend to the 12-inch court wall, but are supported from iron columns so as not to load it, but to transmit the roof weight to the floor girders. The nearly horizontal top rafters have T-bar purlins 19 inches apart, which support terra cotta blocks upon which the copper sheathing is laid. The steep pitched sides are slated on horizontal angle bars riveted to the rafters 6½ inches apart. The main roof has a level ceiling throughout, formed of 2 inch blocks, resting in tees suspended from the tie-rods of the trusses. The stable roof is a single mansard similar to the north side of the main roof. The "suspended" ceiling is formed of 2 inch tees, spaced 18½ inches, attached to 3-inch angles every 5 feet, and which are suspended by bars from the rafters. The ridges between the flat and the steep roofs are covered with a copper cornice supported by angles bracketed to the rafters. The upper edge of the cornice is turned over and attached to the sheet copper roof sheathing so as to be continuous with it. At the sides it runs down over a couple of slates and is turned under and fastened back to the angle purlins.

The slates have a hole pierced through each side near the top, through which nails are clinched around the purlins or copper wire ties are fastened. Each slate is set in cement above the exposed surface, and provision is made to drain off the moisture that collects between them through an iron pipe fastened to the hip rafters by bent clips and light castings and supporting the hip moldings, the outside edges of which are also tied to the angle purlins. The rafters all rest at the bottom on a continuous cast iron sill, at the outer edge of which a vertical webbed rolled channel is fastened to support the galvanized iron gutter frame, which is lined with copper, the copper passing up under the slate and fastened to the angle purlins. The dormer windows of the fourth story have stone fronts on the walls and terra cotta blocks in the iron side frames, which are covered with slate or copper and have copper roofs. The large Fifth avenue dormers have elliptical side windows 3 feet 9 inches by 2 feet 8 inches in each wall. Many of the fifth-story dormers are semicircular in plan, and all of them are set entirely in the roof and are built with iron frames of angles and tees, into which fits an ornamental copper front that runs under the slates and covers the top and sometimes the sides.

Early Schools for Drawing.

One hundred and thirteen years ago a simple carpenter in Zurich opened a drawing school on Sunday afternoons, to aid his apprentices and fellow-carpenters in properly learning their trades. He traveled to Paris and London in search of information. This was among the first efforts at technical education anywhere. Art schools—for the learned only—had existed, in a small way, for 25 years previously in Geneva and Basle. The practice now so common in Switzerland of having an industrial department attached to certain of the common schools dates from the time of Napoleon's interference in Swiss affairs. Industrial and technical education is now so common in Switzerland as to receive almost the same attention as the common schools. In a few cantons the attendence at some of these schools (the Fortbildungs Schule, drawing school, &c.) is compulsory. They are held oftenest in the evening, but a proposal is made to change the school laws so as to permit absence from the public schools for boys who propose to attend the drawing schools. The evils of having drawing schools in the evenings, instead of during the day, are obvious to every one, but the evening drawing schools are not among the most important of the industrial and technical schools aided by the Swiss Government.

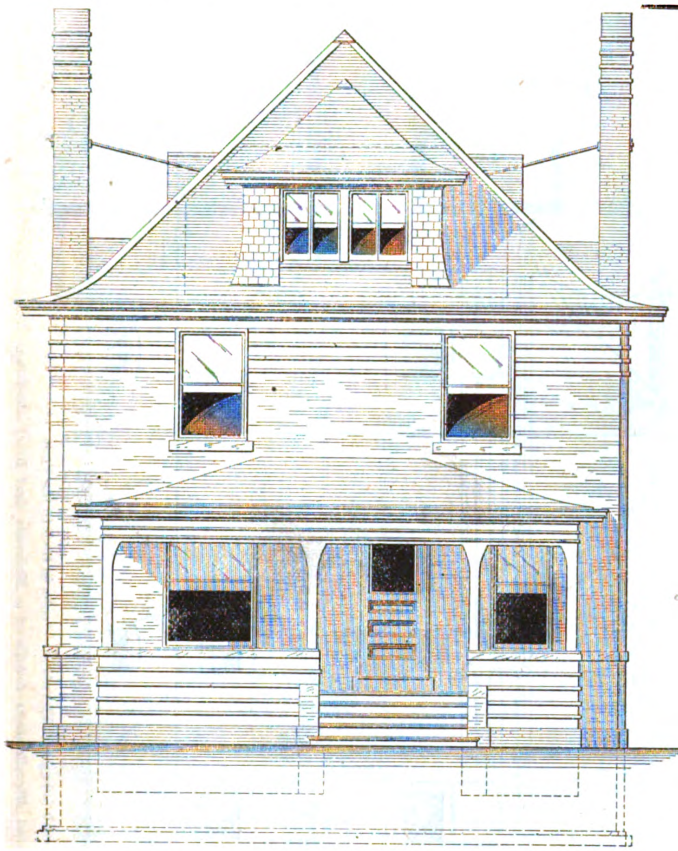
Buff Brick in New York.

Builders and dealers in building material believe that the buff brick is to be a permanent and increasing conspicuous feature of New York architecture, says a writer in a late issue of one of the local papers. The North Jersey fire clays, from which the buff brick is made, are seemingly inexhaustible, and the material can be brought to New York very cheaply. Some of the clays that lie near those used for these bricks are too valuable for ordinary building purposes and are sent all over the country to be worked up for other uses. The crude clay is worth in some instances $100 a ton. If the buff brick can be reduced in price its use will be greatly extended, because houses and office buildings of that material rent more easily than equally well situated buildings of other materials. Luckily for house owners, the mere cost of front brick, whether red or buff, is not an important item in the construction of a considerable building, so that even a slight reduction in the price of buff brick would probably greatly extend the use of that material.

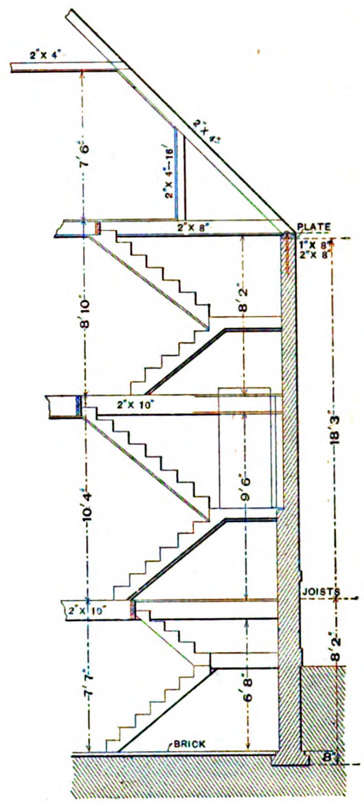
A MODERATE COST BRICK DWELLING.

WE have pleasure in laying before our readers this month the elevations, floor plans and constructive details of a moderate cost brick residence erected last summer in University Park, Col., for Mrs. A. J. Trott. The supplemental plate gives a good idea of the general appearance of the completed structure, the picture being a direct reproduction from a photograph taken for the purpose. The house is 28 x 38 feet in size measured on the brick work, and has a cellar 6 feet 8 inches in the clear under the entire area. The 13-inch foundation walls are of brick with foundation footings 22 inches wide made of the same material, the walls being plastered on the outside below grade. The first-story walls are 13 inches thick and the walls of the second story 9 inches thick. The outside walls, including porches and chimneys, are faced with Boulder pressed brick laid in white mortar with joints $\frac{3}{16}$ inch thick. In laying the face brick the mortar was spread on the brick in the hand (buttered, as it is called) and the brick set in place. The front and rear porches have brick foundation walls, while the front porch has a railing of brick work coped with cut stone. This was done to avoid the use of wood about the porches, as the architects state that water used in irrigating the lawns soon causes the wood work to decay. The first and second story joist are 2 x 10 inches, the third or attic floor joist 2 x 8 inches, the rafters 2 x 4 inches and hips 2 x 6 inches placed 16 inches on centers. The attic side walls and collar beams are well braced. The studding is 2 x 4 inches, doubled at all openings and angles, and bolted to the brick walls with two bolts. The main roof and that of the front porch are covered with Oregon cedar shingles laid $4\frac{1}{2}$ inches to the weather, while all hips are double shingled with shingles 4 inches wide. The rear porch roof is flat and is covered with a canvas deck, as it is used as a balcony for the room over the kitchen. The floors are of Texas hard pine, those of the reception hall, dining room, kitchen, pantry and front bedroom over the parlor being quarter sawed. The dining room and bedroom floors as well as the steps and stair platforms are filled and finished with "elastica." The first and second story are finished in natural Mexican white pine treated with shellac and varnish. The paneling at the main stairs and the railings are in black ash, while the second floor stair railings leading to the third story are of poplar stained to imitate cherry.

An inspection of the plans presented herewith shows that on the main floor there are reception hall, parlor, dining room and kitchen. The vestibule is separated from the reception hall by *portieres* and has a cased opening the same hight as the sliding doors. An alcove is also separated from the reception hall by a similar cased opening. The reception hall is separated from the parlor and the parlor from the dining room by sliding doors. In the parlor is a sycamore mantel with bevel plate glass mirror and Chicago grate. The hearth and facings are of embossed tile of morning glory pattern. The fire place has an ash dump leading to the ash pit in the cellar. Between the dining room and the pantry is a cased opening in lieu of a china closet provided with three drawers below the counter shelf, which is placed 2 feet 8 inches above the floor. Above the counter shelf is a cupboard with double doors on the dining room and pantry sides, giving communication between the two rooms for the passage of dishes, &c. In the rear hall is a wash bowl with hot and cold water, and there is also a large coat closet opening at the right. From this room stairs lead to the cellar or to the outside of the house. A platform is placed on the stairs one step above the grade of the lot and a recess placed below the rear stairs on this platform for a refrigerator or ice box. The kitchen is wainscoted and behind the sink it extends up for a distance of 5 feet 6 inches, being capped with a 6-inch shelf. The kitchen pantry has cupboard, shelving and flour bin, and at the entrance door is a dumb waiter

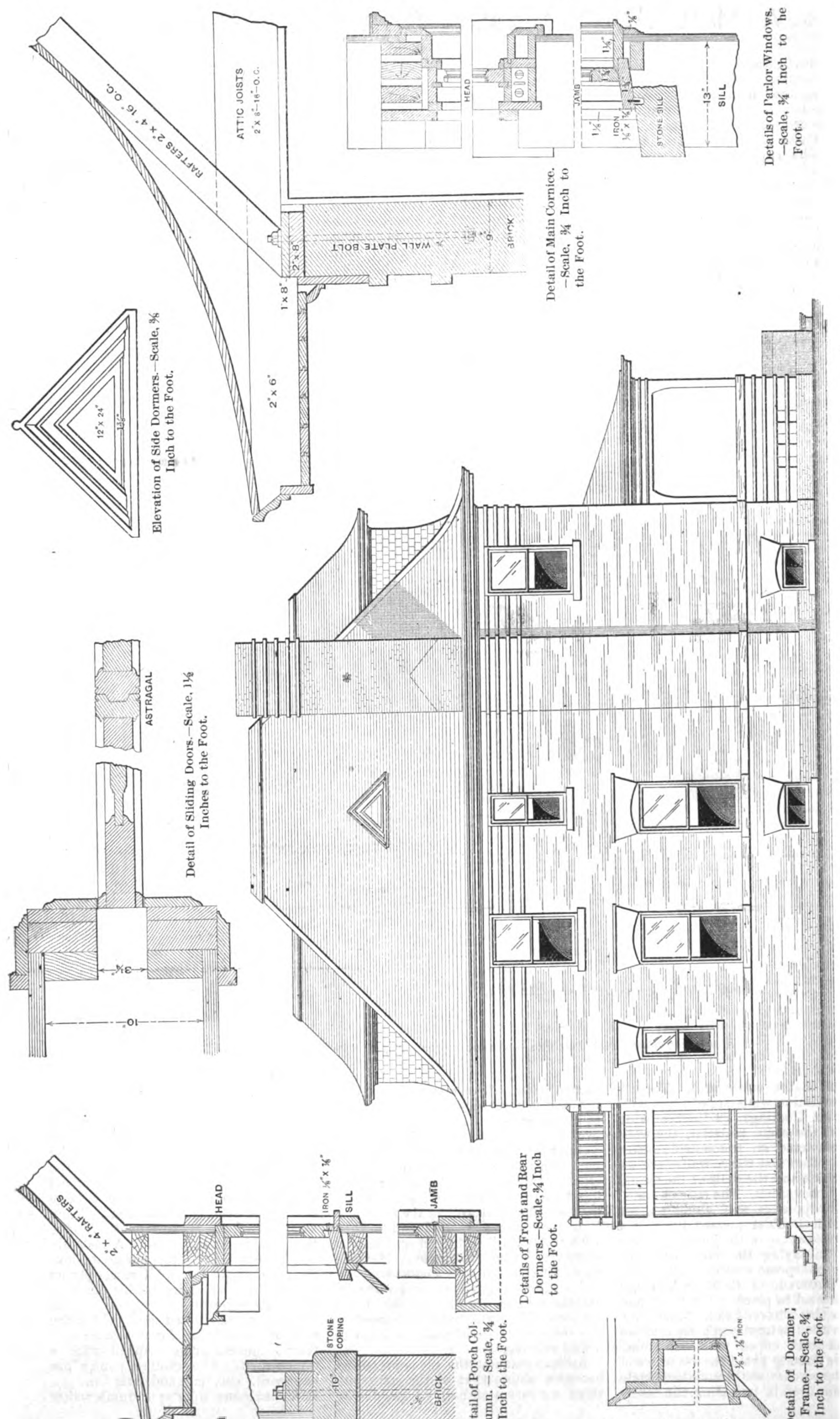


Front Elevation.—Scale, ⅛ Inch to the Foot.



Section.—Scale, ⅛ Inch to the Foot.

A Moderate Cost Brick Dwelling.—Grodavent Brothers, Architects, Denver, Colorado.



Elevation of Side Dormers.—Scale, ¾ Inch to the Foot.

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

Details of Parlor Windows.—Scale, ¾ Inch to the Foot.

Detail of Sliding Doors.—Scale, 1½ Inches to the Foot.

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

Elevation and Miscellaneous Details of a Moderate Cost Brick Dwelling.

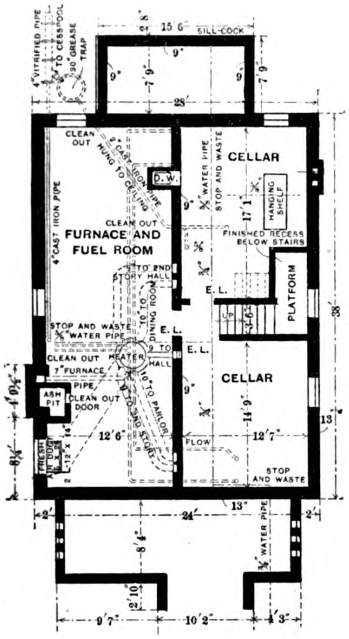
Details of Front and Rear Dormers.—Scale, ¾ Inch to the Foot.

Detail of Porch Column.—Scale, ¾ Inch to the Foot.

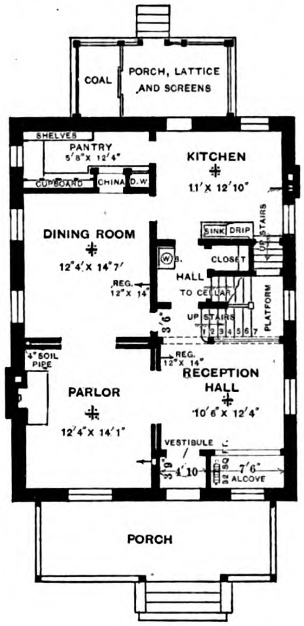
Detail of Dormer Frame.—Scale, ¾ Inch to the Foot.

used for lowering things into an inclosure in the cellar, where it is cool. The rear porch is incased with wire coal, which is delivered through a small opening at the rear.

It will be noticed that the front stairs second-story landing, from which communication is had with the different apartments on the second floor. The

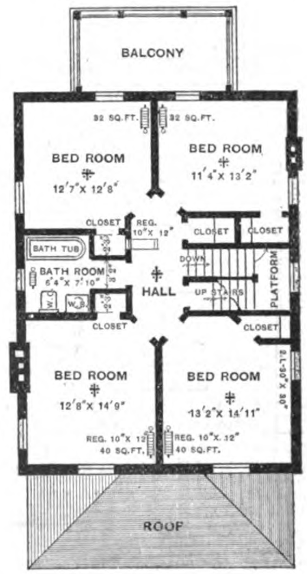


Foundation.

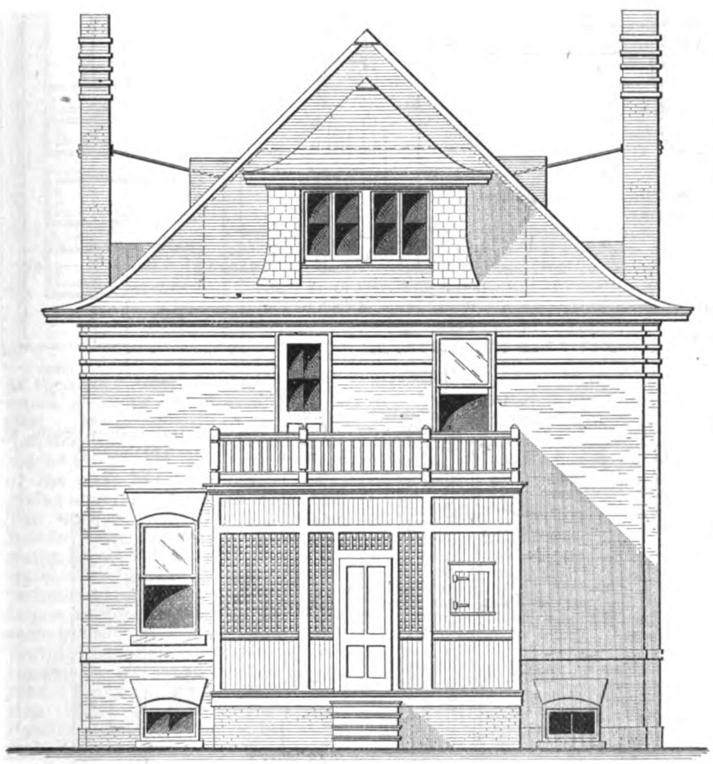


First Floor.

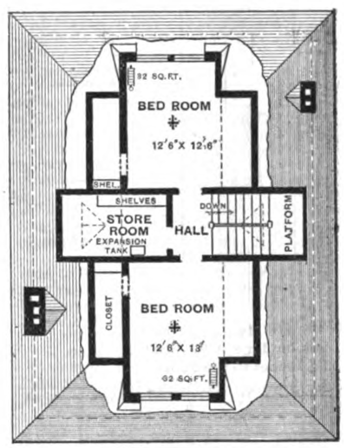
Scale, 1-16 Inch to the Foot.



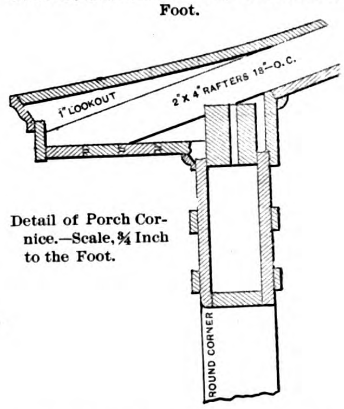
Second Floor.



West or Rear Elevation.—Scale, 1/8 Inch to the Foot.



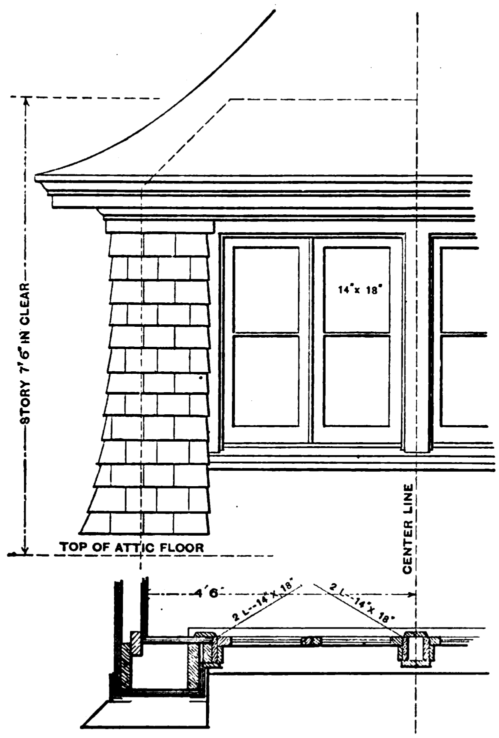
Attic and Roof Plans.—Scale, 1-16 Inch to the Foot.



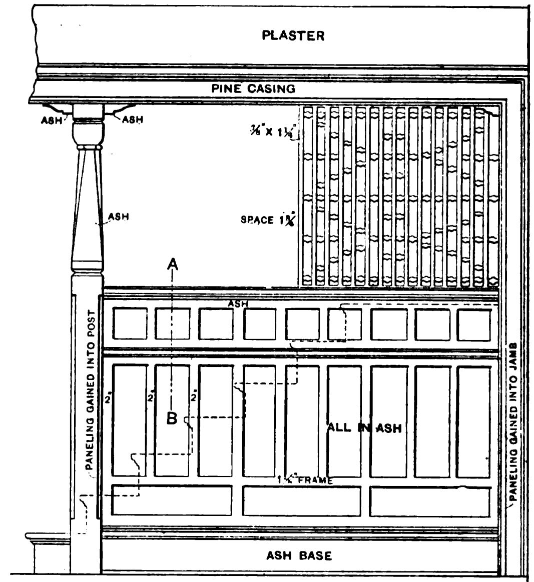
Detail of Porch Cornice.—Scale, 3/4 Inch to the Foot.

Elevation and Floor Plans of a Moderate Cost Brick Dwelling.

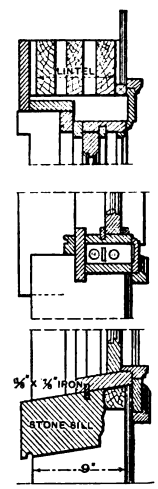
netting placed between the lattice and has screen and panel doors at the outside entrance. A portion of the porch is divided off for the storage of kitchen from the reception hall and the rear stairs from the kitchen meet about one-third up on a common platform, and thence continue as a single flight to the sleeping rooms, it will be seen, have ample unbroken wall space and are provided with commodious closets. The bathroom is fitted with an oval



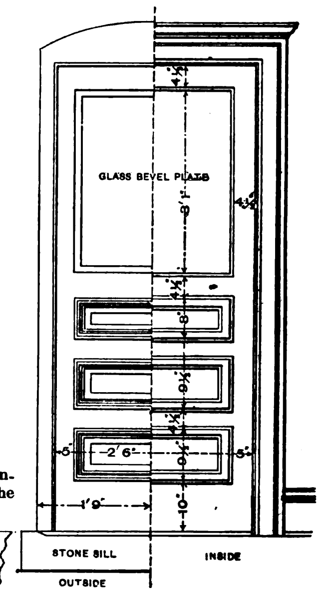
Half Elevation and Plan of Front and Rear Dormers.—Scale, ⅜ Inch to the Foot.



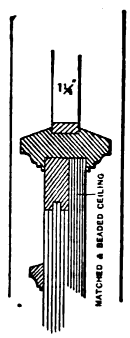
Elevation of Main Stairs as Viewed from the Reception Hall.—Scale, ⅜ Inch to the Foot.



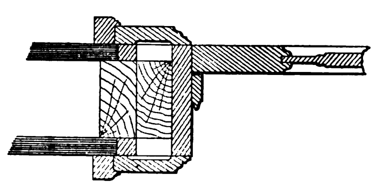
Detail of Second Story Windows.—Scale, ¾ Inch to the Foot.



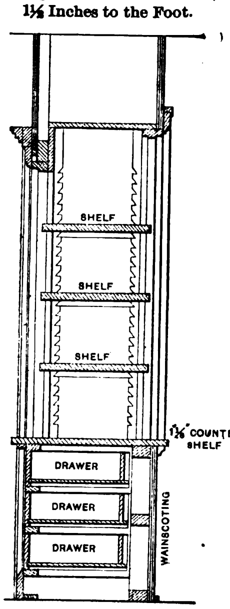
Front Entrance Door.—Scale, ⅜ Inch to the Foot.



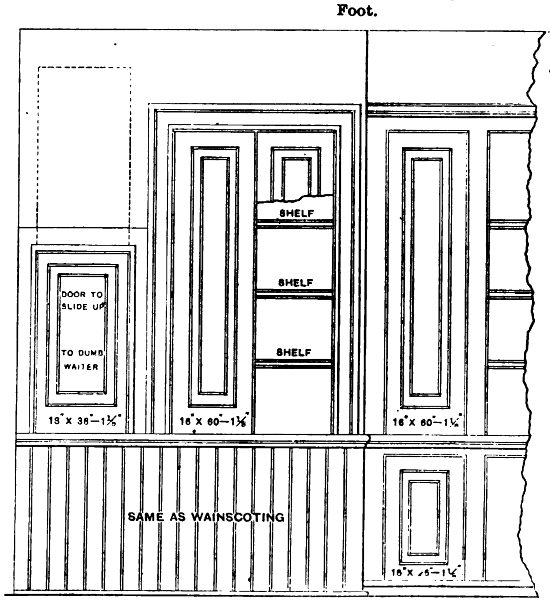
Section of Main Stair Railing on Line A B.—Scale, 1½ Inches to the Foot.



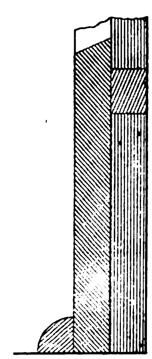
Detail of Single Inside Doors.—Scale, 1½ Inches to the Foot.



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



Elevation of China Closet as Viewed from the Pantry.—Scale, ⅜ Inch to the Foot.

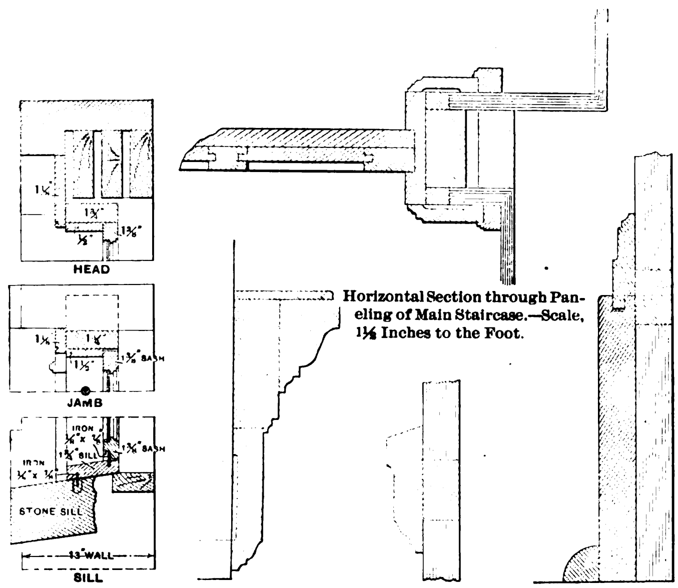


Detail of Common Base.—Scale, 3 Inches to the Foot.

Miscellaneous Details of a Moderate Cost Brick Dwelling.

washbowl with combination waste and overflow, a washout closet, a cast iron enameled bath topped with oak rim and nickel plated fixtures. The room is wainscoted to a sufficient hight to receive the flush tank and pipes for the water closet. Two rooms are finished in the attic, each having a closet, and there is also a storeroom. The sash in the large dormers at the ends are hung at the sides to swing inward the same as French windows, so as to give full openings for ventilation.

The architects of this house are Grodavent Brothers of Denver, Col., who state that the cost was inside of $3500, including architects' fee. The structure is heated by a hot air and hot water combination system. The hot air is delivered into the reception hall, parlor and dining room on the first floor and in the hall and two front bedrooms on the second floor. The front sleeping rooms are both heated from a single riser. Bronze registers are used in the first story and japanned registers in the second story. The hot water portion of the plant has Perfection radiators giving a total surface of 264 square feet. The work is done by a No. 2 Magee Boston heater, provided with two water logs and one disk for heating water. The supply is taken from the bathroom through a pipe leading to an iron expansion tank set in the storeroom in the third story. The tank is provided with ball and cock to regulate the supply, and has an overflow pipe to take off any extra water from expansion. The house is wired for electric lighting and has an electric bell at the front door entrance.



Horizontal Section through Paneling of Main Staircase.—Scale, 1½ Inches to the Foot.

Details of Cellar Windows.—Scale, ¾ Inch to the Foot.

Detail of Head Casing.—Scale, 3 Inches to the Foot.

Cap for Wainscotting. — Scale, 3 Inches to the Foot.

Detail of Base in Parlor, Dining Room and Reception Hall.—Scale, 3 Inches to the Foot.

Miscellaneous Details of a Moderate Cost Brick Dwelling.

WORK has been commenced on the foundation of the new plate bending shop at the Brooklyn Navy Yard. The building, for which Congress appropriated $70,000, will be 200 feet long by 85 feet in width and will be constructed of steel.

Sub-Letting in Building Contracts.

Architects and intending builders have recently been in receipt of a protest from the Metal Cornice Manufacturers' Association against letting the different parts of a building to one general contractor. The communication bears date at Chicago and reads as follows :

Believing that the practice of letting the entire work upon a building to one general contractor, the different parts of the work to be in turn sublet by him, instead of letting those different parts direct to the contractors who are actually engaged in the different trades, is detrimental to the general interests of the owners, architects and building contractors, and believing that the practice is increasing, because of the efforts of those engaged in general contracting, while on the other hand, up to the present time, no set of men have taken the trouble to systematically oppose it, we shall herein attempt to present the arguments against it. We will consider how the matter affects the owner, the architect and the contractors for the different trades.

1. *As to the Owner.*—We have never heard it claimed that an owner could get a better or cheaper building from a general contractor than he could by dealing directly with the different contractors, and we do not see why he should. Any one will work at least as cheap for the owner, who has the money, as for a contractor, who often has no capital of his own, and depends upon getting the money from the owner with which to pay his sub-contractors ; the result frequently being disastrous to the sub-contractor, if, through having taken the work too low, or if, through mismanagement, he does not get enough to pay the expenses of his business and his sub-contractors' bills. If, on the other hand, the contractor does have capital invested, so that one can safely do work at as low rates for him as for the owner, then some one must pay a profit on this capital, and that some one must be the owner, who may pay it directly in paying a higher price for his work, or indirectly by getting poorer or cheaper work than he had contracted for. It is good business policy to get rid of the middleman wherever possible, and the general contractor is surely one. It is certainly harder for the owner and more expensive for him to make changes on a building let to a general contractor than where the work is done directly by those engaged in the different trades, as on all changes the general contractor expects and demands his profit. To the owner again : Another and very material reason why work should be let in separate contracts, instead of in one general contract, is that the chances and the rewards to the general contractor of combination or pooling are so much greater that it is much more likely to be done. There are not many general contractors, so that it is comparatively easy for them to get together and arrange things, and the jobs taken as a whole are so large that it is worth while for them to try to make a combination, even if they cannot often succeed.

2. *As to the Architects.*—While we have never heard it claimed that by letting the work of a building to a general contractor the owner would get a better building, or that he would get one for less money, it is frequently asserted that work done in that way is less trouble to the architect and to the owner, and that it can be done in less time if it is let to one contractor rather than to several. When the first of the World's Fair buildings were figured, bids were taken for the entire building and for the several parts. The separate bids were in all cases the lowest, and the work was let and done that way. We have always supposed that those buildings were put up with unusual rapidity, which would seem to prove that to get work done rapidly it is not necessary to let the entire building to one contractor. That letting the work upon a building in separate contracts for the different branches is cheaper than letting it all in one, and that it need not result in slow work, is evidenced by the experience of the Board of Education of this city, who always divide their work, though they occasionally take figures the other way, but always find them higher than the separate bids. We could never see how a general contractor could get his sub-contracts done any more quickly than an owner or an architect could. We could never see what magic there is in a contract made by a sub-contractor with a general contractor that makes it easier for the general contractor to crowd him than it would be for the architect or owner to do it. If it is admitted that an owner is likely to get either a cheaper or a better building, or both, when he divides his contracts as much as possible, is he getting proper treatment at the hands of his paid professional adviser, his architect, when that architect counsels him to let his work to a general contractor, that advice being given, it would appear, for the purpose of saving trouble to the architect? Does the architect's plea that he himself is not paid sufficiently to enable him to give his client the advice that his best interests demand tend to raise the architect's profession in the eyes of his client and the general public? If his present rate of compensation is such that the architect cannot look after the details that he is expected to do where the work on a building is divided, are there not several plans that an architect should adopt rather than advise the owner to let the work in one contract? If the architect is so situated that he or his office force can attend to it, why not let him demand higher compensation from the owner? If that will not do, if the owner will not pay 2, 3 or 5 per cent. more to his architect for looking after these details, why cannot the architect have some contractor or superintendent or clerk of the works take charge of that part of the work on a percentage of from 5 to 10 per cent. ? We understand that it has been done. Or, a cheaper method would often be to have the owner hire some one on a salary to look after this part of the work.

The advantage of these two latter methods over letting the whole in one contract is that all the contracts will finally be let by some one who will have more interest in getting good contractors, in having the work well done than does a general contractor, whose sole interest, or at least his paramount interest, is to get the job done cheaply, and that is the backbone of this protest ; that the general contractor has so little regard as to how the work is done ; that general contracting breeds and from its nature must breed a class of scamp sub-contractors, to the loss of those who want to do good work. It is because we think that the architects take pride in their work and in their buildings and wish to have their buildings well built that this appeal is made to them, that this phase of the matter is presented to them. In the past, general contracting has not prevailed in Chicago as it has in the East, and we think that the present tendency comes from Eastern influences, both of architects and general contractors. We understand that general contracting has been in vogue in the East from colonial days, from before the days of architects, as it were; that in early days there was no architect. The contractor builder was everything; all in all. What power, influence and importance the architect has there now is largely in spite of the builder. In New York a good many years ago an architect was hardly known. Most of the houses now are built by builders, and architects have little to do with them. The same state of affairs did and does exist at Philadelphia and other Eastern cities so that the man who builds his own house in those cities is considered to have done something to distinguish him from ordinary people who buy theirs ready made from the speculating builder. The builder has never been so important here. The architect has always been more important, and why the architects should wish or even be willing to give up so much of their business and responsibility we cannot understand It is suicidal for them to shirk or to let any one do for them any large part of what they have heretofore done as part of their duty and for which they are paid. It is a very sure thing that whatever trouble the architect saves he must before long allow for either directly in what the owner pays him for his services or indirectly in the importance of his profession in the building world. At present an easy way for the architect or for the owner to ascertain which is the cheaper way to get work done is to take bids both ways—that is, from the general contractor for the entire job and also from the different trades in detail. We are perfectly satisfied to abide by the result of such tests. The general contractors will also probably be satisfied, as at present they are not as strongly entrenched in their position as they might be, otherwise they might take the position that was taken in Philadelphia some few years ago, where the Master Builders' Exchange announced that "members should decline to give estimates in the aggregate for work when the owner or his agent are receiving estimates in detail for the same." At Louisville also the Builders' Exchange adopted rules to the same effect.

When bids are taken both ways, it should, however, be understood that bids given to an architect for the different parts of the building are solely to enable him to let the work in separate contracts; and that to disclose those bids, without the consent of the makers of them, to a general contractor to enable him to take the entire work, is as flagrant a breach of fair dealing as it would be to disclose them to any other competitor. We protest because it increases the cost of doing our business, as we sometimes have to figure five times as often as we should to get the same amount of work direct from the owners or architects. We protest because it tends to poor work, as very few general contractors are nearly so particular as to the quality of work done as they should be, and will let work to the cheapest man, often when they know the chances are against his doing a good job. The temptation to do this is strong. Their interest in the job is solely to make what they can out of it; they will not give a dollar preference for a first class job, where an owner would give ten; all they require is something that can be made to pass. We also protest because so many of the general contractors do not pay their subcontractors as promptly as they should; many of them do not pay nearly as promptly as they get their own money, and some of them refuse to settle with or pay their sub-contractors until long after they have received their own money. The tendency, from our point of view, is certainly to increase the cost of doing business, which must, when things are settled, come out of the owner; to lower the quality of the work, and to make the sub-contractors feel, even the best of them, that it is hardly worth while to do a good job for an owner who thinks it is not worth his while to make a direct contract with him, or to recognize him in any way. The practice certainly tends to lower the standard of work and to lessen the pride of the subcontractor in his work.

Heating and Ventilating Schoolhouses.

Under the head of medical and sanitary notes a recent issue of the New York *Tribune* contained the following on heating and ventilating schoolhouses: The plan of ventilating schoolhouses in Massachusetts possesses, it is asserted, possibilities of insuring first-class results, even when, from certain unavoidable obstacles, only one inlet is provided, being located about eight feet above the floor, and as nearly as practicable in the center of the warm or inner side of the room. Of equal importance with the inlets is the size of the outlets, or foul air ducts, as well as their location, and it is found that, for a 50-foot schoolroom, the outlet duct should have an area of not less than five square feet net; this is to be placed at the bottom of the inner side of the room or in the floor at the inner side, in case the air is to be taken from the first story down to the bottom of the foul air shaft in the basement. The rule is that in a room with two cold or exposed sides the outlet should be as near the inner or warm angle of the room as possible, and, in a room with three exposed sides, the outlet should be as near the inner or warm side as practicable, this applying equally well whether the warm air is brought in through either one or two inlets. It is desirable that the outflow of air from the room through the outlet should be a little in excess of the amount brought in at the warm air inlet, the difference being made up by air drawn into the room through cracks, &c.

Cotton States Exposition.

In the competition for the Woman's Building at the Cotton States and International Exposition to be held at Atlanta, Ga., next September, there were 13 designs submitted, the one selected being that of Miss Elsie Mercur of Pittsburgh, Pa. This lady has been a resident of Pittsburgh for four years and has been engaged in practical architectural work in the office of Thomas Boyd of the city named. She assisted in the preparation of the plans for the new City Poor Buildings at Marshalsea and superintended their erection. The design of the Woman's Building at the Cotton Exposition has been designated as classic colonial, and the structure will cover an area of 124 x 184 feet. It will be built of Georgia pine, with the interior finished in yellow pine. The base of the exterior for about 10 feet in hight will be of 2 inch planking, while the remaining portions will be shingles, stained a light gray color. The structure will contain exhibition rooms, nursery, cooking school, art rooms, offices, &c. The Carnegie Steel Company of Pittsburgh donated the iron to be used in the construction of the building, while Bissell & Co. of the same city have agreed to furnish various designs of their Peerless and Columbian grates for the numerous fire places in the structure.

The design for the Administration Building, which has just been accepted by the Executive Committee, will be one of the most beautiful of the exposition structures. The building will serve as a grand entrance to the grounds and as offices for the Exposition Company. The building is a composite of old baronial castles The principal entrance is reached under a portcullis guarded, as in the days of the old barons, by the iron teeth of a huge iron spiked gateway, lowered from the wall above. The main tower is in imitation of the Rheinstein, that famous old stronghold on the banks of the Rhine. The entrance archway, frowning down with its deeply imbedded windows and loopholes, is entered by a circular doorway hewn from rough stone thrown together—a model of the old doorway of the famous Bloody Tower, a part of the Tower of London. The whole effect of the building will be that of an old baronial castle, and it will serve as a beautiful and picturesque introduction to the kaleidescope effect of the great exposition lying beyond its entrance.

SHORING AND NEEDLING.

BY OWEN B. MAGINNIS.

IN town and city work, as well as very often in the country, the builder finds it necessary to "shore" or "needle" up the walls of an old or a new building, and he is, therefore, interested in knowing how such work is done and the best methods in vogue in this particular line. The information which follows has been gathered by the author during a period of several years and the methods described represent current practice for such work.

With regard to the word "shore," we find by reference to Webster's Dictionary that the noun in its technical sense means "a prop or timber placed as a temporary brace or support on the side of a building." The verb is "to support by a post or buttress; to prop." We will, therefore, proceed to describe the best methods of shoring, or temporarily propping up, walls. Different walls require different methods of shoring, according to the position and condition of the wall or walls and the manner in which they must be sustained. This must be the first consideration before commencing the actual work of placing the shores. This fact being determined, it follows that the builder must with the architect make a very careful examination of the work to be sustained in order to ascertain its condition and the amount of shoring required, so that the sizes and quantities of timbers may be obtained. In joint consultation they will also arrange for the placing of the timbers. All this can only be done by a close scrutiny of the wall and its requirements.

When a wall is so much out of plumb that it is liable to topple over it should be shored or tied in such a way as to prevent its falling. As we are dealing entirely with shoring, we will consider that it is necessary to do this from the outside of the wall. When a wall is as much as ¼ inch in every foot of its hight out of plumb it is in a dangerous condition and should be condemned as such, for the reason that as it is gradually moving outward, it will eventually fracture at some point and collapse. To prevent this shores should be inserted.

In the first example we will suppose a piece of wall to be perfectly sound, or a composite whole, with bonds adhering, which by reason of the slipping of the foundation or otherwise is gradually settling out of plumb and leaning over. It will then be necessary to support the wall about three-quarters of its hight from the top, as illustrated in Fig. 1. The best method of doing this is to apply the shore at right angles to the face of the wall. This not being practicable, on account of the absence of a solid body opposite on which to rest the end of the shore or resisting piece,

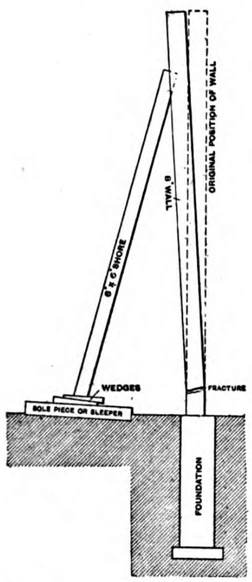


Fig. 1.—An Example of the Use of a Raking Shore.

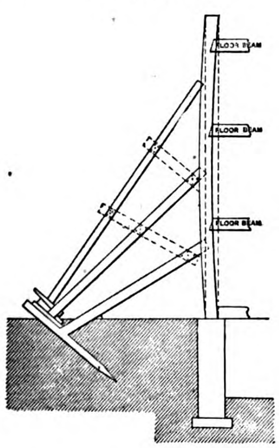


Fig. 2.—Method of Employing a Series of Raking Shores.

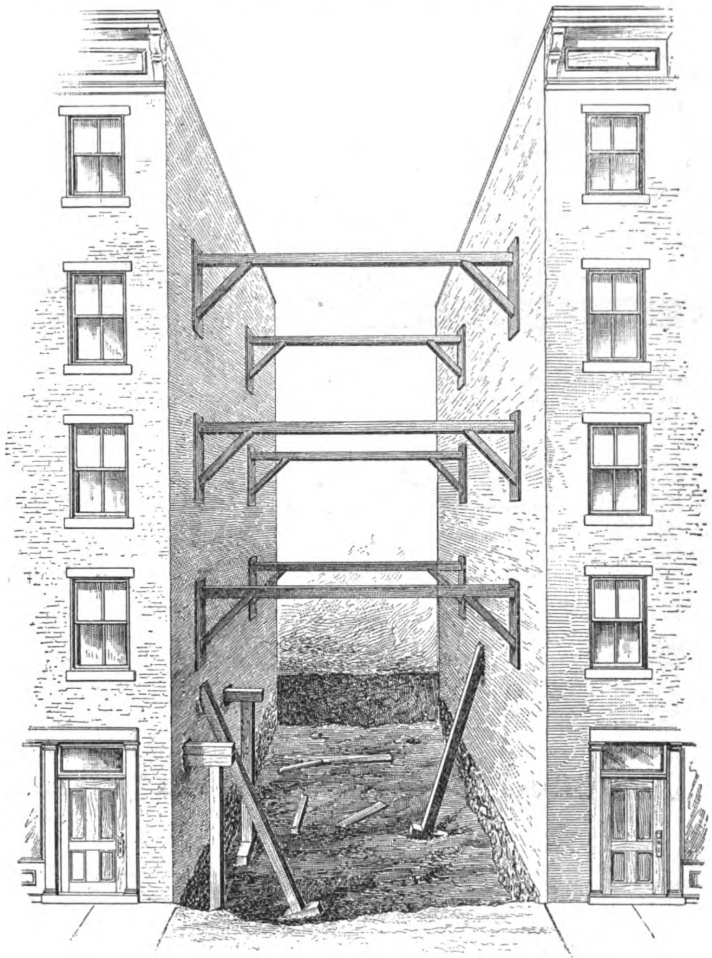


Fig. 3.—A Good Example of the Use of Fly Shoring and Needling.

Shoring and Needling.—Illustrations Showing Various Applications of Needles and Shores.

it becomes necessary to employ a raking shore or extemporized buttress, which consists of a good sound spruce or yellow pine timber. In order to prevent slipping the upper end is inserted in a hole or notch made for its reception by removing one or two bricks. The bottom end of the shore is placed on two reversed wedges which rest on a good block of timber imbedded in the solid ground. By driving on the wedges the end of the shore is forced tightly against the wall, thus securing it firmly in position and preventing the wall from overturning.

Raking shores of this description should be of sufficient thickness that they will not bend, and if the wall be very high, two or more shores must be applied in order to secure it safely.

In Fig. 2 are shown several shores applied in this manner. The wall being broken in two places it is necessary to use several shores. Holes are cut in the face of the brick work to receive the top ends of the timbers, while the bottom ends are wedged from a slanting piece driven deeply into the ground, as shown in the engraving. The wedges are driven up tight with the sledge, thus retaining the wall in place. Two or more shores may be tied together by pieces spiked or bolted on in the manner indicated by the dotted lines in Fig. 2. The following table gives safe dimensions for raking shore timbers of spruce or yellow pine:

		Inches.
For walls	15 to 20 feet in hight,	4 x 4 to 6 x 6
"	20 to 30 " "	4 x 8 to 6 x 8
"	30 to 40 " "	6 x 8 to 8 x 10
"	40 to 50 " "	8 x 8 to 10 x 10
"	50 to 75 " "	10 x 12 to 12 x 12

Beyond this hight combinations of shores must be used.

Fly shores are those which are placed between two walls to prevent them falling toward each other, or to prevent one wall from falling by shoring it from the wall opposite. Fig. 3 represents a good example of fly shoring, recently used in connection with a rebuilding job on Broadway, in New York City. It consisted of six fly shores inserted from the floors of the old building as it was being demolished. The whole width was 50 feet between walls, and the shores wedged the timbers tightly down between the walls, each shore abutting against a stout 4 x 8 piece. They were driven to a solid bearing with the sledge, thus guarding against all danger of the walls bulging outward. The timbers were 6 x 10 inches, and were prevented from sagging by diagonal braces framed in and placed under them and spiked. The left hand wall was also needled in order to rebuild its foundation. The right wall had one raking shore, as indicated in engraving.

Before commencing to shore up a solid front wall for the insertion of a breastsummer beam with its supporting columns, the whole front must be carefully looked over to see how it is built and how the parts are to be supported. Figs. 4 and 5 represent the front of the Hotel Hamilton, at corner of 125th street and Eighth avenue, New York City. A consideration of this wall, as shown, revealed the fact that the piers would have to be separately supported; likewise the floor beams which rested on the wall to be removed. To do this a sole piece, or bottom timber, was placed inside on the floor, running parallel to the wall about 2 feet from it. A similar piece was set on the sidewalk outside about 8 feet from the wall. Directly under the center of each pier, 12 inches above the top line where the breastsummer would rest, a hole was cut through by means of a hammer and cold chisel. This was done in such a way as to leave the top side of each hole with a smooth brick face. The hole was about 12 inches square. In it a stout 8 x 8 timber or needle was inserted and shores This was placed in the angle of the wall, resting on a block and wedges set on the sidewalk. The shore was inserted for the purpose of preventing the corner from springing out while the breastsummers were being inserted and the pier rebuilt underneath them.

The appliances necessary to do the work consisted of the timbers to form the shores and needles, wedges and screw jacks. The timbers may be of spruce or yellow pine, but the wedges are best that it cannot possibly fall or kick over sideways. The lifting jack is, however, extremely useful for purposes where that shown in Fig. 7 would be unsuited. Both these appliances are easily obtained and run in sizes as follows :

Regular Sizes.

	Inches.			
Hight when screwed down	10	12	14	16
Total rise of screw	4½	6½	8½	11½
Diameter of screw	1½	1½	1½	1½

Heavy.

Hight when screwed down	10	12	14	16
Total rise of screw	7	8	9	11
Diameter of screw	1⅝	1⅝	1⅝	1⅝

Extra Heavy.

Hight when screwed down	12	14	16	....
Total rise of screw	8	9	10½	....
Diameter of screw	1¾	1¾	1¾	....

When it is desired to remove an inside wall so as to obtain an enlarged

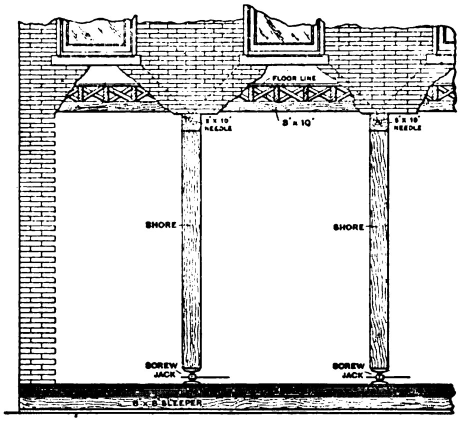


Fig. 4.—Front Elevation of Building, Showing Application of Shoring for the Purpose of Inserting a Steel Breastsummer.

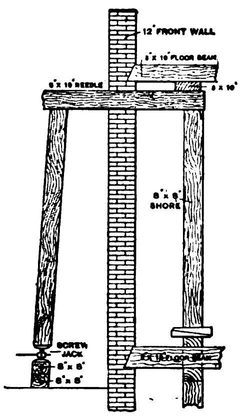


Fig. 5.—Section through Front Wall.

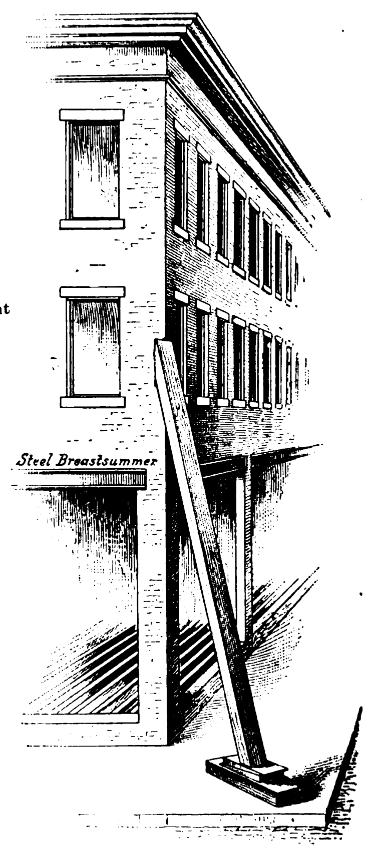


Fig. 6.—Showing Application of a Corner Shore.

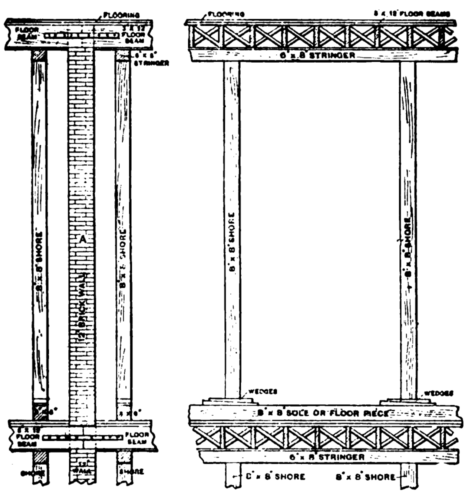


Fig. 8.—Sectional and Front Views Showing Method of Supporting an Inside Wall for the Purpose of Inserting Girders and Columns Underneath.

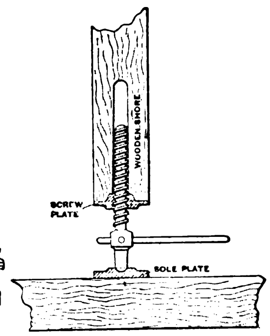


Fig. 7.—Section of a Shore Screw Jack.

Shoring and Needling.—Illustrations Showing Various Applications of Needles and Shores.

placed under it resting on screws or jacks. These being turned up with an iron lever, raised the shores until they pressed solidly against the needles and entirely resisted or carried the weight of the wall piers above. A 8 x 10 foot spruce timber was placed under the floor beams, resting solidly on the needle, and supported them in an immovable manner.

In Fig. 6 is illustrated an excellent job of shoring which was done at the corner of 125th street and Fifth avenue, where two private houses were remodeled into stores by doing away with the stoops and basements. Here the same system was followed, with the addition of the raking corner shore. made of oak. In Fig 7 is illustrated a screw jack employed for this kind of shoring. As will be seen, it consists of an iron shoe or sole plate, which rests directly on the timber placed on the sidewalk, and a revolving screw, which has its bottom end turning in a conical step in the shoe, and revolves in an upper plate on which the bottom end of the shore rests, the shore being bored out to admit the screw and allow the shore to slide up and down. The screw is turned by means of an iron bar or lever, as shown. This screw jack or jack screw, as it is sometimes termed, is the best and safest for placing under shores, being preferable to what is commonly known as a lifting jack for the reason floor, the floor timbers resting on it will require to be upheld by shoring. In Fig. 8 builders will recognize a job of this kind, where it is desired to remove a 12 inch brick wall, A, and substitute a steel girder supported by cast iron columns. Shores 8 x 8 inches in size are used, resting on 8 x 8 inch longitudinal timbers and driven tightly against the plate with oak wedges. If the walls are continuous from one floor to that above the upper part of the wall will require needling as well as shoring.

In raising roofs or floors the lifting jack screw is employed, and blocks laid crosswise on top of each other are placed under the jacks before commencing operations.

WHAT BUILDERS ARE DOING.

GENERAL indications existing in the principal cities of the country seem to point to the fact that there is considerable building to be done—enough to establish a fair comparison with previous years—but that owners are wavering as to the advisability of beginning operations until the general tendency of business is more clearly defined. There appears to be a reluctance to make new investments in buildings until the certainty of immediate return is assured. Different conditions prevail in different localities, and one city in a given territory may have a brighter outlook than others in the same general locality. Nearly all the large cities promise to be fairly busy during the season with perhaps the exception of Chicago and Cincinnati. From Philadelphia come reports that present indications point to a less-than average year, although the more hopeful ones depend upon the later season for developments. The territory west of the Mississippi River is still struggling with the dullness of the past two or three years, with little prospect of radical improvement before the end of the season. Taken as a whole there are very few labor troubles at present agitating the building trades. The strike of the electrical workers and those in sympathy with them in New York City is about the only important trade disturbance that has occurred during the past month.

Boston, Mass.

The indications of a good season in Boston, which were mentioned earlier in the year, seem to promise fulfillment. The present outlook is good, the amount of work in sight being fairly satisfactory, and the situation of affairs between employers and workmen amicable. The Master Builders' Association is making some improvements in its building, and is steadily increasing its membership. At a recent emergency meeting $250 was subscribed by the association to aid the sufferers in Newfoundland, and a private subscription paper circulated which resulted in the giving of as much more by the individual members.

Baltimore, Md.

The promise of the building season in Baltimore is that about as much work as usual will be done. At the last quarterly meeting of the Builders' Exchange a dinner was served in behalf of a number of members, including President Noble H. Creager, who had just returned from an extended trip through the South. President Creager, who is also the president of the National Association of Builders, was the recipient of many attentions during the trip. The following committee was appointed to arrange for the meeting of the National Association of Builders: P. M. Womble, Jr., S. B. Sexton, J. J. Walsh, John Trainor and John B. Sisson. The association will hold its annual session in that city on the third Tuesday of October next.

Buffalo, N. Y.

The builders of Buffalo are looking forward to an active season both in the city and the immediate vicinity. The Builders' Exchange has decided to establish an exhibit room in their building "where the ingenuity of the architect and skill of the mechanic can be properly exhibited for the inspection of architects, builders, those intending to build and the public at large." The large room on the ground floor now occupied by the Buffalo Ice Company has been set apart for the purpose. The exchange is sending out circulars to manufacturers and others interested in builders' materials throughout the country, and a number of answers have been received reserving room for exhibits.

The general arrangement of exhibits is after the following classification: 1, Stone, except artificial; 2, bricks, cement, terra cotta, artificial stone; 3, lumber, interior and exterior wood work; 4, wrought and cast iron—plain or ornamental; 5, sheet metal work, do.; 6, roofing slate, tile, slag, &c.; 7, sanitary appliances, plumbing, steam fitting, radial steam heating; 8, heaters, ranges, grates; 9, plastering, metal lathing, substitutes for plaster; 10, ornamental tiles, mantels, fire places, interior decorations; 11, hardware and artistic metal work; 12, stained and ornamental glass; 13, paints, coloring and varnishes; 14, gas fitting, electrical lighting, bells, tubes; 15, steam boilers, engines, electric motors, pumps, windmills, hoisting machinery, vertical shafting; 16, miscellaneous.

Cincinnati, Ohio.

The annual election of the Builders' Exchange was held March 4. As soon as the polls closed the members marched in a body to the spacious dining hall of the Hotel Emery, where a banquet was enjoyed. The retiring president, G. F. Nieber, was unable to be present. E. E. Locke, the president-elect, made a short address to his fellow builders, taking for his subject, "What Can the Builders' Exchange Accomplish?"

At the conclusion of the banquet the members returned to the exchange, where the result of the election was announced. It was a close contest. The full vote cast was 118. But two tickets were in the field, the Regular and Independent. The latter elected nearly all its men by a narrow margin. The following are the gentlemen elected: E. E. Locke, president; Dennis Flaherty, vice-president; Chas. H. Schuman, second vice-president; Wm. J. Tanner, treasurer; Chas. B. Stevenson, secretary. Directors, two years: F. Lawson Moores, Wm. J. Pugh, John Dorman, John Grace, Ed. B. Meiners. Committee on Arbitration: Wm. Schuberth, Jr.; Wm. Weiman, Jacob Freund, J. F. McManaman, Samuel Tappin.

The business prospect is good, though not up to standard of former years. What threatened to be a disturbance among the masons because certain contractors were cutting the union wage scale seems to have blown over. The men are working eight hours at 40 cents. There is no trouble in any other branches of the trade.

Chicago, Ill.

Building interests are reported as being unusually quiet for Chicago at this season of the year, and unless more work is put into the market the season will not be as busy as has been hoped. There is very little trouble between employers and workmen at the present time, though there is some disturbance in the relations between labor organizations which makes itself felt unpleasantly.

The committees appointed by the Carpenters' District Council and United Carpenters' Council to make an agreement whereby the carpenters of the city will work in harmony, met and considered propositions made by each other. The great stumbling block in the way of a settlement is said to have been the manner in which working cards shall be issued, but it is believed that this can be satisfactorily arranged, as all parties are anxious for a settlement of the disagreeable controversy.

The Knights of Labor and Amalgamated Society of Carpenters desire the reorganization of the United Carpenters' Council on the old plan, but the brotherhood is opposed to this because of the cost, as that organization, on account of its large membership, would have to pay 90 per cent. of the expenses of the council.

Representatives of leading manufacturing firms and trade unions directly interested in the convict labor question met recently to prepare evidence to be submitted to the sub-committee of the State Legislature on penal institutions. Mr. Grady, vice-president of the Trade and Labor Assembly, presided, and Walter M. Groves acted as secretary.

The bill presented to the Legislature by the Anti-Convict Labor League was indorsed. It provides that no convict is to be employed in the future at any trade that comes in competition with free labor except in the manufacture of articles that are to be used in State institutions.

Milwaukee, Wis.

At the annual meeting of the stock company who own the building occupied by the Builders' and Traders' Exchange of Milwaukee and who are composed of members of that organization, the following officers were elected for the ensuing year: President, Thomas R. Bentley; vice-president, C. F. Kindt; secretary, C. G. Forster; treasurer, Philip Gross.

The bricklayers of the city have presented a petition to the Board of Education asking that in future the board make separate contracts for brick work that enter in buildings to be hereafter erected. The bricklayers claim that money will thus be saved by the board and the work will be done better, for the reason that the general contractors before they make their bids to the board receive sub-bids, and then when they get the contracts they ask for new and lower bids, looking only to the quantity of work and not the quality and pocketing the profits.

New York City, N. Y.

The strike in the building trades which was in progress at the time the last issue went to press dragged along without important development until the middle of March, when an understanding was reached with regard to work on certain buildings in charge of John Downey. This involved a resumption of operations on the American Tract Society Building, the Astor Mansion and the Wolf Building. At about this stage of affairs a conference was arranged between the New York Council of Conciliation and Mediation and a committee from the Board of Walking Delegates, the object being to devise means for bringing the trouble to an end. The conference first met at the residence of Bishop Potter, where matters were discussed at considerable length. The next day, March 20, at a meeting of committees of the Electrical Contractors' Association, the Board of Walking Delegates and the Mason Builders' Association, held in the office of Charles T. Mills, the existing differences were adjusted and the following agreement was reached:

NEW YORK, March 20, 1895.

Resolved, That it is the sense of this committee that the following proposition be submitted to the Electrical Contractors' Association and to the Executive Committee of the Board of Delegates as a basis for an amicable adjustment of the present difficulty.

That all electrical workers at present employed be subjected to an examination as to competency, in accordance with the rule hitherto prevailing in the trade.

That the Electrical Workers' Union declares its readiness to accept into their union all persons who have satisfactorily passed such examination, irrespective of their action in the present strike, but the men employed at present by the Electrical Contractors' Association shall, if they wish, join the union without interference from their employers or penalties imposed by the union.

That the Electrical Contractors' Association agrees to grant the eight-hour day on May 1, 1895.

That all other matters at issue be subject to mutual agreement between the Electrical Contractors' Association and the Electrical Union represented by their employees

Electrical Contractors' Association: James R. Strong, chairman; E. S. Keifer, John T. Hunt, P. H. Klein, Jr., J. C. Hatzel, James F. Hughes and Charles L. Eidlitz.

Board of Walking Delegates: William J. O'Brien, chairman; R. J. Anslow, Jr., Matthew F. Murray, Thomas Tyrell and G. O. Guilliard.

Mason Builders' Association: Otto M. Eidlitz, chairman; Charles T. Wills and S. J. Robinson.

Late in the evening of March 20 a call was sent to the 38 walking delegates whose trades were involved to meet on the forenoon of the next day to ratify the agreement above given. All the trades involved were represented and the agreement was ratified by a vote of 35 to 3. The strike was then formally declared off and the unions were notified. By this agreement the eight-hour day begins May 1 instead of May 15, the date the employers were willing to concede at the outset. It is understood that an agreement similar to the above was signed for the plasterers, hod hoisters and others. It is stated that no non-union men at work at the time the strike was declared at an end will be discharged, which means that several hundred electrical workers employed upon jobs before the strike commenced will be without places. The principal buildings involved in the sympathetic strikes were as follows:

St. Luke's Hospital, Morningside Park, near 110th street; Casualty & Fidelity Company's Building, Cedar and Church streets; American Tract Society's Building, Nassau and Spruce streets; Prescott Building, Nassau and John streets; Wolf Building, Liberty and William streets; Albermarle Hotel, Twenty-fourth street and Broadway; Coffee Exchange Building, Hanover square; American Surety Company's Building, Broadway and Pine street; the Yerkes Mansion, Sixty-eighth street and Fifth avenue; John Jacob Astor's new residence, Sixty-third street and Fifth avenue; the Savoy Hotel, Fifty-ninth street and Fifth avenue, and the New Clearing House, Broadway and Cedar street.

This, we understand, is the first settlement of a strike brought about through the instrumentality of the New York Council of Conciliation and Mediation, both employers and employees admitting that the board did much toward smoothing away the existing difficulties.

The outlook for building operations is encouraging, and judging from the plans lately filed with the Department of Buildings there is likely to be a gratifying degree of activity for the season of 1895. Many important office buildings are contemplated, in the lower section of the city especially, while in the upper portion there will be erected a multitude of flat houses. A noticeable feature of the situation is the large number of structures erected 15 and 20 years ago, which are being torn down to make room for more modern and pretentious edifices intended for office and business purposes.

The Employers and Builders' League held a meeting on Wednesday evening, March 6, when it was decided to lease the house 24 East 124th street for use as a permanent home. Provision was also made for raising the necessary funds to fit up and furnish the building to meet every requirement.

The Mason Builders' Association and the Laborers' Union Protective Society have signed the agreement for 1895-1896, to go into effect on May 1. The eight-hour day will continue in force, and the wages will be 30 cents an hour. All time after 6 p.m. is to be paid at the rate of 45 cents an hour. The laborers wanted to be paid weekly instead of fortnightly, but yielded that point. By the terms of the agreement the representative of the men has the right to enter any building to find out the standing of the laborers employed there.

Some time ago the American Institute of Architects, assisted by the Architectural League of New York, caused to be introduced in the Legislature a bill called the "Architects' License law." The object of the bill is to require every person desirous of becoming an architect to pass a certain examination. A committee from the Architectural League, consisting of George B. Post, Richard M. Hunt, Charles I. Berg, George Martin Huss and Warren R. Briggs, has sent a letter to the presidents of the different building trades in the city asking them to co-operate with architects in getting the bill through the Legislature.

The Iron League, an association composed of the largest architectural iron manufacturers in New York, Brooklyn and Jersey City, has decided, unsolicited, to concede the eight-hour work day to the housesmiths, beginning on May 1, when all laborers known as outside men employed by members of the League at work on buildings in the cities named will commence work at 8 a.m. and work eight hours a day. The same wages will be paid for eight hours as are now paid for nine hours.

The Iron League, of which J. M. Cornell of the firm of J. B. & J. M. Cornell is president, was formed during the eight-hour strike of the union housesmiths four years ago, which strike ended in defeat for the men. The strike had the effect for the time of breaking up the union, which has been partly reorganized since When the housesmiths were defeated the leaders candidly admitted the fact, and advised the men to seek reinstatement the best way they could. The employers considered this action manly and straightforward, and nearly all of the strikers were reinstated.

Oakland, Cal.

The Builders' Exchange is talking of erecting a building of its own. The project has not taken definite shape, but there is a strong sentiment in favor of it. There are represented in the exchange 130 firms, 36 having been admitted last year. The exchange is growing rapidly, and is one of the representative organizations of Oakland. It numbers in its membership all the lumber and hardware houses and planing mills, besides all the principal building contractors in the city. The following officers and directors have been elected: President, William Winnie; first vice-president, W. P. Wetmore; second vice-president, A. R. Denke; secretary, A. E. Jones; treasurer, E. H. Lake; board of directors, J. K. Orelup, C. E. Nichols, Charles Sterm, J. A. Smilie, J. G. White, E. C. Bridgman.

Omaha, Neb.

At the last regular meeting of the Builders' and Traders' Exchange of Omaha a light lunch, with coffee and cigars, was served. The attendance was unusually large and much business of importance was transacted.

Building is very dull and collections very slow, although there seems to be some promise of improvement in the near future.

Bids have been recently opened for a new opera house, and work on the State fair buildings is just beginning.

The exchange is reported as being in good condition in spite of the depression in business, and with greater building activity it is expected that the membership will be increased. Committees have recently been appointed to go to Lincoln and endeavor to secure such legislation as is favored by the exchange. Charles Beindorff, Louis Mendelssohn, J. F. Tilly, Gustave Andreen and John A. Wakefield were named as the Charter Amendment Committee. They will endeavor to defeat the amendment placing the office of building inspector under the control of the Board of Public Works. The committee on the canal proposition consists of Messrs. Wakefield, Beindorff, Mendelssohn, R. N. Withnell and C. A. Lobeck. They will use their influence to secure the passage of the bill that gives county governments the necessary authority to issue bonds for purposes of canal construction.

Philadelphia, Pa.

The Bricklayers' Company of Philadelphia, composed of master bricklayers, recently met at the Builders' Exchange to consider the expediency of adopting or rejecting the scale of wages adopted some time ago by the Journeymen Bricklayers' Protective Association, composed of employees. The scale which the latter organization adopted for the ensuing year, and which it was hoped by them would be accepted by the master bricklayers, was 45 cents per hour, nine hours to constitute a day's work. This was practically the same scale as prevailed during the two preceding years, although at the time it was adopted a number of the members of the Journeymen's Association advocated an increase to 50 cents. After discussing the question for more than an hour, the master bricklayers could not agree to accept the journeymen's scale, the majority being of the opinion that the bricklayers' wages, on account of the condition of the times, should be reduced to 40 cents, and a resolution was passed referring the question to the conference committee as constituted under the rules.

This committee is composed of five members from the two respective organizations of masters and employees, together with an umpire, who is mutually agreed upon. As both bodies are opposed to strikes, the decision of the conference committee is final. It is contended by the journeymen that the prospects are unusually bright for a busy season, and in view of that fact the old scale at least should be maintained, if an increase were not to be granted. Members of the Bricklayers' Company, however, declare that at present there is not enough work for one-tenth of the 3000 bricklayers in the city.

The retiring president of the Master Builders' Exchange, Franklin M. Harris, was honored by his associates of the board of directors recently, who presented him with a handsome and valuable gold watch. Charles J. Gillingham made the presentation speech and recounted Mr. Harris' services, which, he said, were unexampled as president of the exchange. Mr. Harris, while greatly surprised, managed to answer in a happy and grateful speech.

Pittsburgh, Pa.

The regular meeting of the Builders' Exchange was held March 6, with W. R. Stoughton in the chair and R. M. Morse as secretary.

The building committee, which was appointed at a previous meeting to secure property for a new building, asked that the committee be increased, as quorums would then be easier to secure. The chairman of the committee stated that it was the intention to subdivide the committee and make the whole board an advisory one.

An amendment to the constitution providing for the enrollment as honorary members those of the exchange who retired from active business was considered. This idea was objected to unless the members had permanently retired from active business, and the matter was referred to the Committee on By-laws, with Mr. Hamilton and Mr. Barnes as counselors. A communication from the Pennsylvania Lumbermen's Protective Association asking for some action on an act providing for the regulation of mechanics' liens in building contracts was tabled, and a communication for data of mechanics' liens in building contracts for a Greater Pittsburgh pamphlet was similarly treated. The latter, however, was later referred to the Board of Directors. The exchange was reported to be in excellent financial condition.

St. Louis, Mo.

The prospects for building in St. Louis are very good. The regular monthly meeting of the Board of Directors of the Builders' Exchange was held March 4, and after the routine business President Thomas J. Ward made a report for the delegation who visited Jefferson City a short time ago in the interest of the amendment to the lien law. A resolution was adopted prohibiting any form of petition to be circulated in the future on the floor of the exchange. The board denies the statement made that the bill now pending before the Municipal Assembly licensing contractors is the Builders' Exchange's bill. On the contrary, when the question of indorsing the bill came before a general meeting it was voted down. A resolution was adopted by the board allowing the free use of the hall to the various boss mechanics' associations connected with the exchange for their meetings. It was also decided to fit up a small room in the lobby of the exchange for the accommodation of non members who may have business to transact with regular members.

Worcester, Mass.

At the regular meeting of the Builders' Exchange of Worcester, Mass., on March 6 several interesting talks upon building devices were given. A non-inflammable building paper was shown and its virtues demonstrated, and a new construction of light shafts for high buildings described. The exchange is in good financial condition and its membership is steadily increasing.

Notes.

The builders of Norwich, Conn., are agitating the question of forming a builders' exchange.

The exchange of Fitchburg, Mass., which was organized about a year ago, is in good condition, having increased its membership in spite of the hard times. The present officers are W. C. Carter, president; H. E. Jennison, vice-president; J. S. Starr, secretary and treasurer. But little work has yet been begun, although the builders are looking to an improvement in business.

The Builders' Exchange of Toledo, Ohio, held its annual meeting March 4 in the rooms in the Blade Building, and elected H. E. Brown president, W. J. Albrecht first vice-president and Albert Neukom second vice-president. The new directors elected are: John McCaffrey, Frank Gorman, John Stolberg, R. G. Bacon, M. Donovan and Ed J. Weis The directors who hold over are: John W. Lee, M. M. Davis, Joseph Pheils, Richard Kind, J. L. Creswell and John C. Romeis.

The Master Builders' and Traders' Exchange of Appleton, Wis., recently incorporated under the State laws, is composed of about 25 of the leading representatives of the building trades, with officers as follows: William Wilson, president; W. S. Patterson, vice president; S. B. Belding, secretary; August Knueppel, treasurer. The Board of Directors consists of H. Schneider, J Sherry, A. H. Weickert, W. Duvall, T. E. Johnston.

The Builders' Exchange of New Bedford, Mass., has petitioned the Board of Education to incorporate trade training into the public schools. A most earnest appeal in behalf of the great benefits to be derived from such a course was made and the operation of trade schools in other cities cited to show the practical results which have followed their establishment.

The Mechanics and Traders' Exchange of Brooklyn, N. Y., has elected the following named officers for the ensuing year: President, B. C. Miller; vice-president, Ellis H. Baillie; treasurer, Isaac P. Southerland; Board of Managers, W. C. Bush, George Ray, Jacob May, John W. Moran, J. W. Johnson, F. Kelly, Jr., George W. Anderson; inspectors of election, Charles H. Ridgeway, Albert Morton, W. L. Glidden.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

IN presenting the articles which are to follow, and which will discuss the subject of wood carving proper, I shall select subjects at random, using the whole or a portion of a design as may best suit the object in view. The tools required will be considerably more varied than those which were mentioned at the commencement of this series. Whenever a tool is required for a piece of work which has not been previously mentioned it will be described, with the exception, however, of rifflers and files of such sizes and shapes as may be necessary. In place of them a very good substitute can be made by taking pieces of cherry or other close grained wood, cutting them to the various sizes and shapes required as the work proceeds, and then dipping them in thin glue and sprinkling with ground flint or emery, laying them on one side until perfectly dry. Nos. 1, ½ and 0 in either flint or emery will be about what is required, and may be obtained from any large hardware or mill supply store. Before proceeding further I desire to impress upon the minds of the readers this difference between chasing and carving: In chasing one stroke of the tool should finish that part where the stroke was made, while carving, on the other hand, is gradual, and the proper shape is secured only after taking off a succession of small chips or shavings, as the case may be, and finishing with scraper and sand-paper.

In executing the design accompanying this article a mallet of the shape shown in Fig. 60 will be required. This can be made from some close grained hard wood; not too large, but still of sufficient size for the work in hand. There will also be required a router or "old woman's tooth" as it is called by some. This is shown in Figs. 61 and 62, the former indicating a top view and the latter a side view of the tool. This should be made so that plow bits or even chisels can be used with it if necessary. Scrapers of different sizes and shapes will, with the tools already described in previous issues of the paper, be sufficient for the present.

Carving is known under three special designations—namely, low relief (*basso relievo*), demi relief (*demi relievo*), and high relief (*alto relievo*), all having reference to the projection or prominence of the figure above or beyond the ground or plane upon which it is cut. Low relief is raised but slightly, demi relief projects about half, while high relief is formed from nature, as when the figure stands completely out from the ground or plane, being attached to it in a few places only. The first figure presented to the consideration of the reader is a portion of a Grecian ornament and is cut in demi-relief. At this point it may be well to state that in every case the design and the sections belonging to it are to the same scale, so that by multiplying or enlarging the design and its details the same number of times the proportions will still be correct. The first thing to be done in executing a design such as that presented in Fig. 63 is to decide upon the size to which it is to be cut. The next step is to obtain the block upon which the design is to be cut, making sure that the block is a trifle longer and wider than the design and of sufficient thickness to allow a substantial backing. Some may have a desire to cut the figure by means of a band or other saw and then glue it upon the backing. I would, however, prefer that the directions here given be followed, as by so doing the mechanic will obtain a far greater amount of skill in several things

Fig. 60.—View of Mallet.

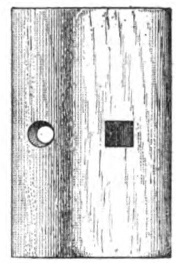


Fig. 61.—Top View of Router.

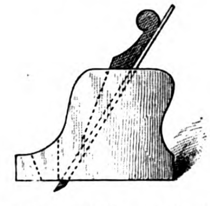


Fig. 62.—End View of Router.

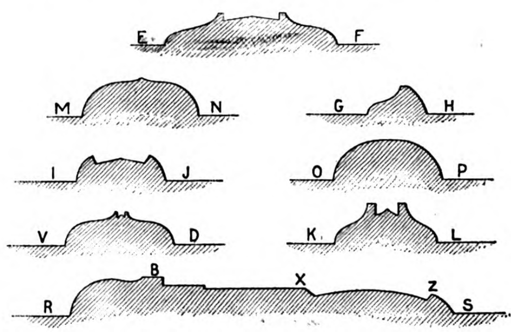


Fig 64.—Sections of Previous Figure Taken on the Various Lines Indicated.

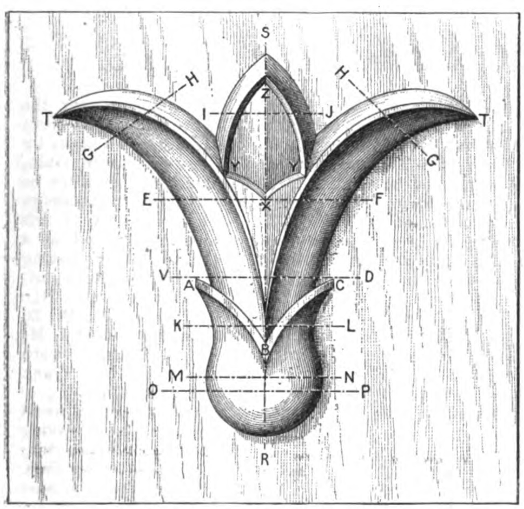


Fig 63.—Grecian Ornament in Demi-Relief.

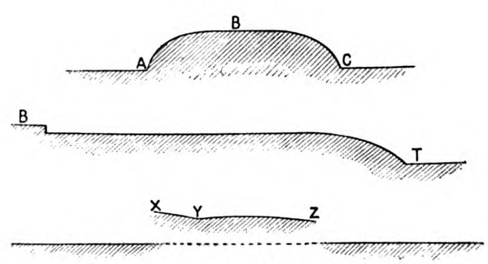


Fig. 65.—Extended Sectional Views on the Lines Indicated, the Lowest Section Showing the Relative Position of the Surface of the Relief and the Base Line of the Block.

Hints on Wood Carving.—By Chas. J. Woodsend.

* Copyrighted, 1894, by David Williams.

which could be mentioned, and he will be prepared to do good work when the situation perhaps would be such that a saw could not be employed. It will also render what is to follow far easier to those desirous of acquiring a knowledge of carving. Another reason is that a hand worked backing to carving presents a far more beautiful effect than one worked by tools before and the carving planted on afterward. A hand made surface will always be slightly undulating and will always present a play of light and shade which, in some situations, proves very effective. Having decided upon the size of the figure and secured the block, which, by the way, should be free from knots and shakes, draw upon it the design, or, if preferred, draw the design upon thin paper and paste upon the block, using a paste made either from flour or starch; do not employ glue, as the tools will dull too quickly.

After the design is upon the block run a gauge line around the outer edges at the depth to which it is decided to cut. Now secure the block fast upon a high bench, after which proceed to cut down along the outlines of the figure. Then make another downward cut a little way, the distance being immaterial, so as to form a groove all around the figure. Take the router and gradually work the groove very nearly to the depth of the gauge mark upon the outer edges. The gauge mark and the groove should vary less than $\frac{1}{64}$ inch—just sufficient to allow for clearing up. In cutting down this groove be very careful and not run the gouges or other tools beyond the depth to which it is intended to cut. Upon the side next to the design it must be cut down perfectly square so that the outer line of the design, when so cut down, and the bottom of the groove shall form a perfect right angle. If it is otherwise the design will be crippled and it may not be detected until the figure is nearly completed. After the groove is worked down nicely take off all the stuff between the groove and the outer edges of the block. Shave down carefully until the gauge mark is nearly reached; then scrape and shave down to the finishing line.

In carving great care requires to be exercised in having the tools that are used in cutting the two sides of any angle meet exactly in that angle. Neither one must pass the other, no matter how slight. If they do the result will be an unsightly mark that will pop up at a time least desired.

Having removed all the surplus material from the outer edges of the design, cut down and work the interior portions marked X Y, Y, Z in Fig. 63 to their relative depths and shapes. The next step is to shave down those portions marked B T, according to the extended view given in the details, Fig. 65. Now work the parts of the figure, beginning at the left, that are toward the letters T, G, E, V, D, F, G. T. Cut the concave portions first. Now cut along the line T B, starting in near T and cutting toward B; then return and finish to T. The mechanic should bear in mind what was told him under the head of chasing, and that is that the tool, well ground, should be held so that it will cut the surface first and prevent tearing out. After the parts indicated have been worked to their proper shapes, as indicated in the sections presented in Figs. 64 and 65, round up that portion marked A, B, C and below it. Then cut the concave parts, working up to the shapes shown. Now work the convex parts that are toward the letters T, H, I, S, J, H, T of Fig. 63. After this has been done finish the small bevel in Y, Y, Z Now, if the mechanic has been careful and made each cross section, as shown in Figs. 64 and 65, and has made each one merge into the others on either side, leaving no abrupt places and every part worked as smooth as gouges and chisels can make it, he is ready to sandpaper and finish the work. For this I would suggest No. 0 sandpaper with which to finish, rubbing out all marks made by tools and other sandpaper, and then give it a coat of varnish made of resin (common yellow) and alcohol, made very thin, and, after thoroughly drying, rub down with a piece of worn fine sandpaper. The varnish raises the grain, which requires to be cut down, and it also keeps the atmosphere from affecting the work.*

(To be continued.)

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—Editor.]

CONVENTION OF BRICK MANUFACTURERS.

The National Brick Manufacturers' Association held its ninth annual convention in the banquet hall of the Hollenden Hotel, Cleveland, Ohio, during the second week in February. Delegates from all over the country were present, and at the opening of the meeting were addressed by Mayor Blee, who, in a few well chosen remarks, extended to them on behalf of the citizens of Cleveland the unrestricted freedom of the Forest City. President W. H. Alsip of Chicago then delivered an address in which he suggested various matters for the consideration of future conventions. The election of officers which followed resulted in the choice of F. H. Eggers of Cleveland, Ohio, for president; Thomas Flood of Philadelphia, Pa., for vice-president; W. D. Gates of Chicago, Ill., for second vice-president; D. H. Haeger of Dundee, Ill., for third vice-president; Theodore A. Randell of Indianapolis, Ind., for secretary and John W. Sibley of Coaldale, Ala., for treasurer.

The first number on the programme was then taken up, it being a general discussion, led by W. D. Gates of Chicago, of the subject "Looking Backward." Among those taking part were Messrs. Crafts, McGraw, Haeger, Snell, Burton, Blair, Ittner, Purrington, McAvoy, Alsip, Styles and Orton. At the conclusion of the discussion the convention adjourned until Wednesday.

In the evening was held what the members facetiously termed a "pow wow." The banquet was a very pleasant affair, about 300 delegates and guests being present. Many entertaining speeches were made, interspersed with music.

On Wednesday morning the members assembled and listened to the reading of a paper by Daniel W. Mead, entitled "Paving Brick from the Standpoint of the Engineer and Manufacturer." The paper dealt with the subject in a very able manner, and at its conclusion was discussed by Messrs. Behan and Purrington. Following this paper was one entitled "The Progress and Development of the Brick Industry," by B. W. Blair of Cincinnati, Ohio, and one on the "Testing of Clay Paving Materials," by Edward Orton, Jr., which called out considerable discussion on the part of a number of the delegates. At this point the president announced the Committee on Resolutions and the convention adjourned until the afternoon.

The members were called together at 2.30 Wednesday afternoon and listened to a paper by John F. Seddon, entitled "Drying Brick." This paper was discussed in a very interesting manner by J. W. Carson of La Prairie, Ontario, as well as by several others. The secretary read a paper on "The Soft Mud Process—Its Advantages and Disadvantages," by John Greusel of Detroit, Mich., this being followed by a discussion in which Messrs. Snell, Crafts, Ittner, Styles, Purrington, Haeger, Pain and Nickel took part. There was also presented at this session a paper on "Burning Brick," by L. U. Nickel of Fulton, Mo., and another on "Organization as a Cure for Demoralizing Competition," by John O. Shares of New Haven, Conn. At this point a number of questions relating to the brick making industry were brought up and informally discussed by several of the members.

On Thursday morning the first business was the presentation of an essay by J. A. Buckstaff of Lincoln, Neb., entitled "My Experience in the Manufacture and Laying of Paving Brick." Mr. Buckstaff not being present the paper was read by the secretary. Next in order was the reading of a paper by Capt. W. S. Williams of Canton, Ohio, entitled "Can Shale Paving Brick be Toughened by an Annealing Process in Burning?" After the reading of this paper the president announced as a committee to prepare a plan for testing brick, Daniel W. Mead of Rockport, Ill; D V. Purrington of Chicago, Ill.; Willard Behan of Streator, Ill.; W. D. Richardson of Cleveland, Ohio; J. M. Jones of Haydenville, Ohio; Edward Orton of Columbus, Ohio, and Frank B. McAvoy of Philadelphia, Pa.

A general discussion then followed on "The Elements of a Good Paving Brick," in which D. V. Purrington, Prof. Orton and Anthony Ittner took leading parts. The morning session concluded with a further consideration of some of the questions forming what is called the "Question Box." In the afternoon the discussion of interesting topics was continued, that first receiving attention being the question, "How Many Members Use Grog, and in What Proportion, for Molding Sand, Faced Soft or Mud Brick, and What Are Its Special Advantages?" After this question had been considered at some length, Robert W. Lyle of Woodbridge, N. J., addressed the members on the subject of "Danger Signals," after which the Committee on Resolutions presented its report. At this point invitations were extended to the association to hold the tenth annual convention at various cities, among the number being Atlanta, Ga., Philadelphia, Pa., and Nashville, Tenn. A vote of thanks was extended to the various cities for their invitations, the secretary read a number of letters from absent members, and then the convention adjourned subject to the call of the Executive Committee.

CORRESPONDENCE.

Design For Colonial Cottage.

From D. B. C., *Poughkeepsie, N. Y.*—In looking over the plans of the colonial cottage presented in the last issue, I find that there has been omitted a doorway leading from the kitchen into the passage under the stairs. I speak of this so that "Constant Reader," who asked originally for a design of this kind,

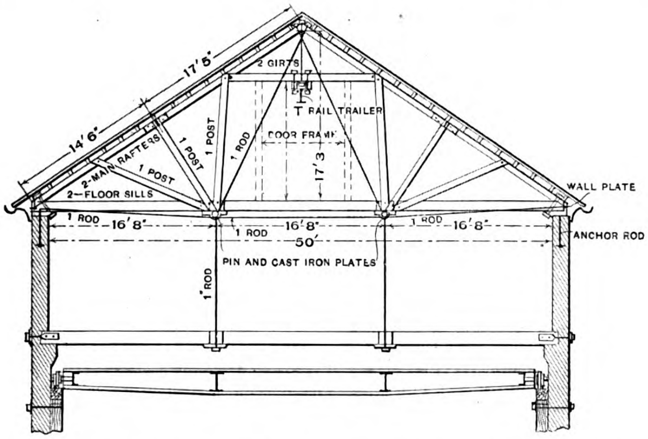


Fig. 1.—Sectional Elevation Showing Form of Truss favored by "S. W. D."

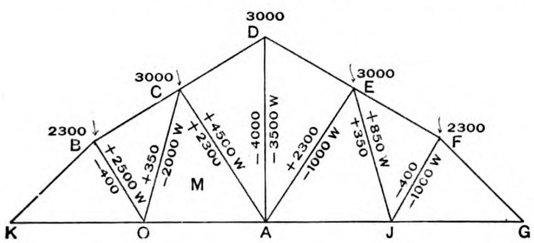


Fig. 2.—Skeleton of Truss Submitted by "E. P. B."

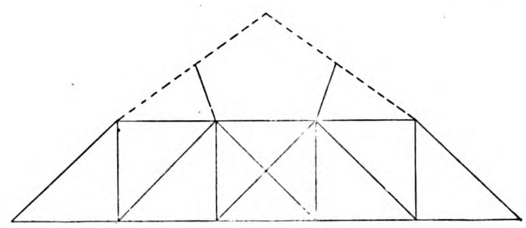


Fig. 3.—Form of Truss Recommended by "E. P. B."

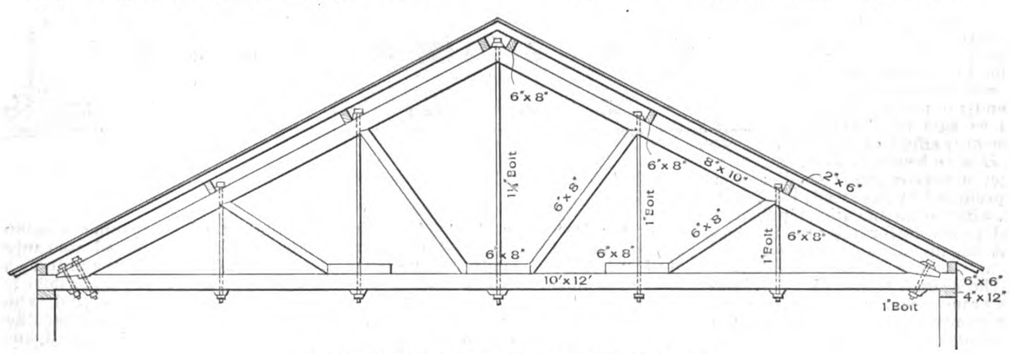


Fig. 4.—Style of Roof Truss Suggested by "F. W."

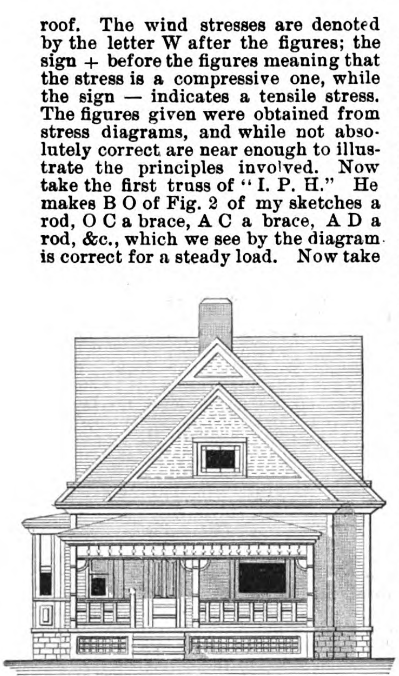
Criticisms of Self Supporting Roof.—Illustrations made from Sketches Contributed by Various Correspondents.

will not think it was an omission in the planning.

Criticisms of Self Supporting Roof.

From S. W. D., *Ashland, Pa.*—The January issue of *Carpentry and Building* has just been received and I have been particularly interested in the article on "Self Supporting Roof." As "I. P. H." expresses a desire to have some of the readers give their opinions as to which is the better of the two forms of truss shown in connection with his communication, I will, with the editor's permission, offer a criticism. My judgment is that the second form which he shows is much the better, but both are objectionable from the fact that they spoil, for storage purposes, the attic in which they are located. This space, in my estimation, is too valuable for shop use to be lost. I herewith send a sketch, Fig. 1, which represents the style of truss adopted by me and which has so many advantages over either of the styles presented by "I. P. H." that I believe many of the readers will be interested in it. To simply support the roof the trust need cost no more than the others, but as in machine shops, for example, all space is valuable, the attic is utilized for the storage of patterns, while a traveler is so located as to help handle them through the gangway. Next, we can support the floor below, thereby allowing a full width traveling crane to pass under it, and from experience this is perfectly practical. I know of a shop having a span of 60 feet, the largest timbers of the truss being 4 x 10 inches, and the truss carries 150 pounds per square foot on the suspended floor and 50 pounds per square foot on the attic floor, besides a slate roof, without showing any sag or spreading. In addition it is subjected to the jars and vibrations of heavy tools and the handling of large castings. I would call attention to the fact that in the illustration of the form of truss described there is no indication of the sizes of timbers and rods, but these may be of dimensions to suit circumstances. If we can locate our posts and rods in a truss so as to be of service and at the same time not be in the way I believe it much better to do so. I therefore present the method shown in the sketch with the hope that it may be of benefit to some of the readers interested in building construction.

From E. P. B., *Brockton, Mass.*—In the January issue "I. P. H." gives two forms of truss concerning which he desires the opinions of readers. In the diagrams which I forward, Figs. 2 and 3, the different members are indicated by the letters of the alphabet. It is possible to load this form of roof so that it will be in equilibrium without any interior bracing, supposing that the parts represented by C and E needed no support; for as a pressure on that portion of the roof between C and E has a tendency to raise the joints B and F, while a pressure on these joints has a tendency to raise the joint at D, all we have to do is to make one tendency balance the other. Fig. 2 represents a skeleton of the first truss submitted by "I. P. H." The figures each side of the braces represent the stresses in pounds produced by a steady load of 25 pounds on the roof surface supported by the truss, the trusses being 12 feet between centers and the stresses resulting from an extreme wind pressure on the left side of the roof. The wind stresses are denoted by the letter W after the figures; the sign + before the figures meaning that the stress is a compressive one, while the sign — indicates a tensile stress. The figures given were obtained from stress diagrams, and while not absolutely correct are near enough to illustrate the principles involved. Now take the first truss of "I. P. H." He makes B O of Fig. 2 of my sketches a rod, O C a brace, A C a brace, A D a rod, &c., which we see by the diagram is correct for a steady load. Now take



Elevations for Six-Room Cottage.—Fig. 1. —Front Elevation.—Scale, 1-16 Inch to the Foot.

the load under extreme wind pressure. O B will have to be a brace, as the wind gives a compressive stress of 2500 pounds, which will give an ultimate compression of 2100 pounds after taking out the counter stress of 400 pounds caused by the steady load, while F J, the counterpart or mate of B O, has an increase of tensile strain of 1000 pounds, making 1400 pounds in all. It is, therefore, more necessary than ever that it should be a tie, and as wind on the right would make the strains in B O and F J change places, it is necessary that they be made capable of resisting both extension and compression. A good way to do this would be to make them wooden braces and have their ends well strapped to the rafters and tie plate. The same could be said of C O and E J. The only effect of the wind on A E is to lessen its load, as we get a reverse stress smaller than that produced by the steady load. This truss, with the modifications indicated, would be ample for the roof in question if the members were of sufficient size.

In the second truss "I. P. H." has B O a brace when it should be a rod under steady pressure, while the rod supporting its foot should be a brace. It is still worse off under wind pressure, while the rod that he drops from B to O would buckle up the tie plate in its efforts to hold down the joint B. I should consider this truss much inferior to the first, as no modification would make it as strong with the same amount of work and material. Trusses with the rafters in a broken line are tricky affairs and should never be built without a thorough analysis for wind pressure as well as steady load, for it is impossible to tell from mere inspection whether certain members are struts or ties. My idea of supporting the roof in question would be a Howe truss, with posts to support the purlins carrying the middle of the upper rafters, as indicated in Fig. 3 of the sketches.

From F. W., *Findlay, Ohio.*—Replying to "I. P. H.," Omaha, Neb., I send a sketch, Fig. 4, of a truss roof for a span of 60 feet, although it can be increased in length of span with the same number of pieces up to 100 feet by simply increasing the size of the different timbers and rods. Now, we all know, or at least ought to know, that the principal strength of a truss depends upon the main rafter straining endways or pushing against the timber, and that the main chord has to stand this strain or pull endways on the timber. Now, in the sketch of "I. P. H." I cannot find any place where the strain is pulling endways on the main chord. All the strain is on the bolt at the foot of the rafter, which, I think, will not carry very much strain. I do not see where he is going to carry his purlin plates. It looks to me as if he would have to place a truss every 2 feet; but, of course, I may be wrong. I submit a sketch, Fig. 4, of my way of forming a truss, and hope to hear from others on the subject. The framing of the foot shown at the right in the sketch is that usually employed for a small span, while the framing of the foot at the left in the sketch is for a large span.

Elevations for Six-Room Cottage.

From Hawkeye, *Marshalltown, Iowa.*—The six-room cottage floor plan furnished by "J. W. R." of Vandalia, Ill., and published in the July issue of *Carpentry and Building*, is very good. In order to keep up the interest, I herewith send front and side elevations to the floor plans submitted by me and published in the issue of the paper for December, 1893 I am in hopes some one will try and better it. Will "J. W. R." kindly send elevations to his plan, as the cottage is the coming building in this section?

Fig. 2 —Side (Left) Elevation.—Scale, 1-16 Inch to the Foot.

Cleaning Plastered Walls.

From S. P. G., *San Antonio, Texas.*—Can any of the readers of the paper tell me how to clean a hard finish plastered wall, marked with pencil, greasy hands and smoke? I have tried kalsomine according to the most approved formulas, but it rubs off like whitewash.

Measuring the Top Square on Balusters.

From T. B., *Beverly, Mass.*—I wish some of the readers of the paper would tell me through the columns of the Correspondence department the correct way to measure the top square on balusters. I find there is a decided difference of opinion in the trade, some contending that the center line of balusters on the plumb should be the same length from the rail, while others claim that the short side of the baluster should be an equal length from the rail. Some architects scribe a line, say 4 inches equally distant from the under side of the rail, and make the center line of the baluster touch it. I have followed this latter plan for many years, but would like to know the prevailing method.

Speed of Band and Gig Saws.

From C. S. B., *Monticello, Minn.*—I have been getting up a band saw and a gig saw and would like to ask those who are familiar with them how fast they should run. My band saw wheels are 28 inches in diameter. I also have a small drying room which I can heat up to 160°. I want to know how long it will take for green oak lumber to dry in it.

Designs for Dining Room Closets.

From C. O. G., *East Hampton, N. Y.*—Will some reader of the paper kindly send for publication designs for corner closets for a dining room about 14 x 18 feet in size and 8½ feet high?

Sharpening a Cabinet Scraper.

From J. C. W., *Pine Hill, Pa.*—I have been a reader of *Carpentry and Building* since 1889 and have both presented inquiries for publication and contributed answers to those of other correspondents. Since I have been a reader of the paper, however, I have failed to see any description of the method of sharpening a cabinet scraper. Will some one please explain for my benefit, as I must admit I cannot sharpen it as it should be done? I have seen tools of this kind which would cut a fine shaving almost like a plane. I use a piece of saw. I know it is only a small tool, but I should like to know the proper way to sharpen it.

Value of the Slide Rule.

From J. M. B., *Monroeton, Pa.*—I must beg to differ with "W. W." when he says in reply to "J. H. B." that the slide rule is not a practical tool. I have used one of these instruments for the last ten years, and find it thoroughly practical and very useful. I would say to "J. H. B." that there are two kinds of rules; one called the mechanic's and the other the engineer's slide rule. They are both constructed on the same principle, but are marked differently, and if a learner happens to get a mechanic's rule with a book explaining the engineer's rule, it might puzzle him to understand its operation. I would say to "J. H. B.," do not be discouraged; I do not know of any other study that will so repay the time and trouble spent as in acquiring a knowledge of the slide rule, especially for mechanics. I have found Robert Riddell's "Lessons in Carpentry by the Slide Rule" and Arnold Jillson's "Utility of the Slide Rule" great helps in learning the use of this rule. I would add that for general use I prefer the engineer's rule. I would like to ask of the readers which in their opinion is the latest and most practical slide rule now on the market.

Designs for Drawing Tables.

From F. K. T., *Knoxville, Tenn.*—In reply to "R. B. W.," New Orleans, La., who asked in the December issue of the paper for designs of a drawing table, I send blue prints which may be of interest. The frame of the table was constructed to hold a 36 x 60 inch perspective board and to be used with the board as a table when working with smaller boards. A general view of the table is shown in Fig. 1 of the sketches, while Fig. 2 represents a front elevation and Fig. 3 an end elevation. From an inspection of the latter it will be seen that the top may be adjusted to stand at any desired angle. The principal part of the frame is 2 x 3 inch poplar, stained and finished to represent black walnut. A smaller board as a top and lighter material for the frame could be used if preferred.

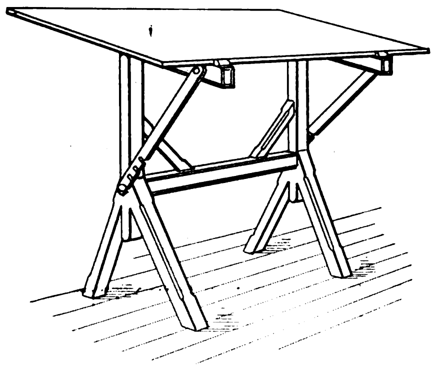


Fig. 1.—General View of Table Suggested by "F. K. T."

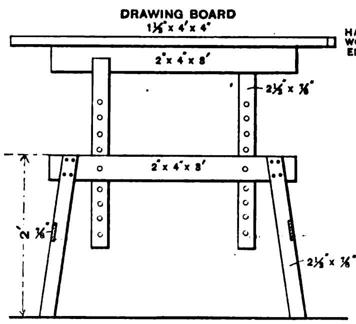


Fig. 4.—Drawing Table of "F. B. H."

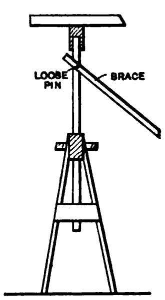


Fig. 5.—End View.

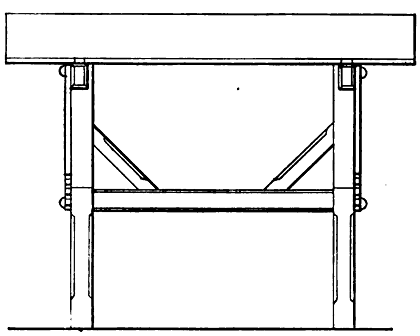


Fig. 2.—Front Elevation.

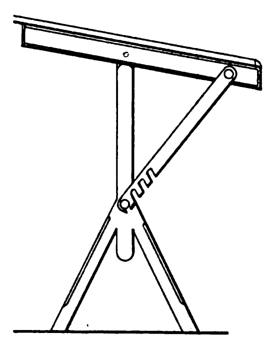


Fig. 3.—End Elevation.

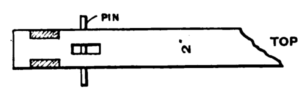


Fig. 6.—Detail of Wooden Horse Supporting Table Shown in Fig. 4.

Designs for Drawing Tables Submitted by Various Correspondents.

From F. B. H., *Franklin, Ind.*—In the December issue of *Carpentry and Building* I notice that "R. B. W." of New Orleans, La., wishes designs for a drawing table. I send inclosed some sketches which may meet his requirements. A front view is shown in Fig. 4 and an end view in Fig. 5, while in Fig. 6 is represented a detail of the wooden horse supporting the drawing board. The table may be made of any kind of soft lumber, the one I made being of pine and poplar and of the dimensions given in Fig. 4. The arrangement is of such a nature that the board can be raised or lowered at will and I find it very convenient indeed. The cost of my board was $3, which, in view of its convenience, cannot be considered expensive.

Sugar in Mortar.

From H. L. A., *Wilmington. Vt.*—In the issue of *Carpentry and Building* for April, 1891, I saw an article relating to sugar in mortar. I noticed that a Mr. Crampton of Cranleigh, Guildford, had been experimenting with sugar in mortar for the purpose of hardening it. I should like to know if it is practical to do this in connection with plaster intended for inside work. Our sand here is so firm that the plaster is brittle. If any of the readers of the paper have information on this point, I shall be glad to see their views published.

Seasoning Hard Wood.

From F. H. K., *Los Angeles, Cal.*—Will some one tell me of a quick process of seasoning green hard wood?

Wood Turning.

From J. C. W., *Pine Hill, Pa.*—Will not some one of the many readers of the paper take up the subject of wood turning and show by means of illustrations the method of handling the tools? I would also like to see illustrated the different parts that are turned out for furniture, for I notice that all of the furniture now made has more or less turned work. I have seen no comments from other readers of the paper about the articles on carving which are now running through the columns. I will say that they are good and very easily understood. I should like to see wood turning dealt with on this same general plan.

Easy Methods of Estimating.

From J. R. T., *Buffalo, N. Y.*—I would like to ask through the columns of the paper if some one of the many readers will give a simple way of estimating labor in timber by the M; shingling, flooring, siding, wainscoting and ceiling by the square; base, cornices complete with frieze, water table, corner boards, skirting, &c., by the foot, and window and door frames complete in building, also dormers, per piece. The wages on an average are to be $2 25 per day of nine hours. I think a discussion of this in the columns of the paper will benefit all of us, for the reason that many of the books published on estimating do not come anywhere near the mark, owing to the variation in the rates of wages in different localities.

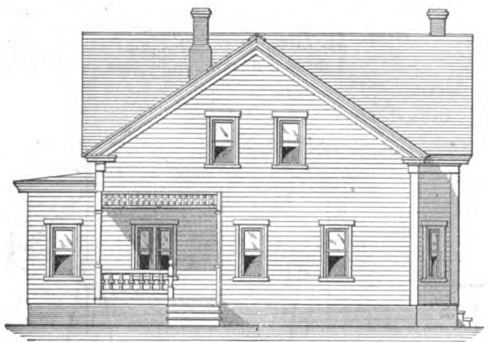
Arrangement of a Planing Mill.

From J. M. B.—Referring to the inquiry of the correspondent from Charleston, S C., which appeared in the January issue of the paper, permit me to say that one very important feature is to so arrange, construct and protect the building that the lowest possible rate of insurance premium may be had. Insurance is a regular and constant tax upon any industry, and for many reasons is especially high upon planing mills. One should consult the insurance authorities of the State in which the mill is to be erected. Some of the main points to which reference may be briefly made include the following: The building must be wholly of mill construction—that is, girders 10 x 14 inches and 8 or 10 feet between centers supported on wooden posts. The floors should be of 3-inch plank, grooved and splined, laid flat with a 1¼-inch floor above and without openings for belting, elevator or stairway. The roof should be of similar construction. I should arrange for convenience and economy in the placing of the machines, so the work may progress with the least movement of material; also that the factory may be enlarged and its capacity increased without serious changes in the present buildings or in the placing of tools. The machine portion should not be used for storage, and when work stops the area occupied by tools should be swept clean. Storage room should be provided so as to be convenient of access, yet sufficiently detached to secure the lowest rates of insurance. In several manufactories rebuilt to replace those burned, store houses have been separated by brick walls with 2-inch tinned doors, which, in my estimation, are the cheapest and best fire doors that can be constructed.

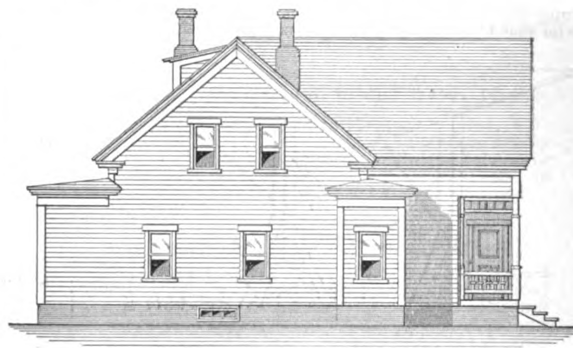
The question of heating a wood working establishment is of interest in this connection. The modern practice is to group the steam pipes in a single coil, preferably in a detached brick building erected for the purpose, or in an iron inclosure, the heat being distributed by a blower through iron pipes to kilns and also for warming the work rooms. The shavings bin should be of brick and have a brick chimney or vent, so that the shavings may be destroyed at any time without injury to the surroundings. The waste cans should be of metal with raised bottoms and self closing covers, and should be emptied daily at the boilers. At this point it may be interesting to describe a satisfactory method for cleansing mill floors from oil. To do this scatter dry soda ash over the floors Saturday night and on Monday they may be scraped and swept clean. If wooden roofs are employed over the boiler and engine rooms, they should be something over 5 feet above the boilers and the rooms provided with facilities for ample ventilation. With regard to fire appliances, two systems are required. If there is a good public system there should be a duplex steam pump of the variety known as "Underwriters" with water from another source. Automatic sprinklers constitute the second important auxiliary and require to be put in according to rules deduced from experience. A good anti-freezing compound for filling water buckets is made of 1 pound of bicarbonate of soda, 30 pounds of common salt and 50 gallons of water.

A Woman's House.

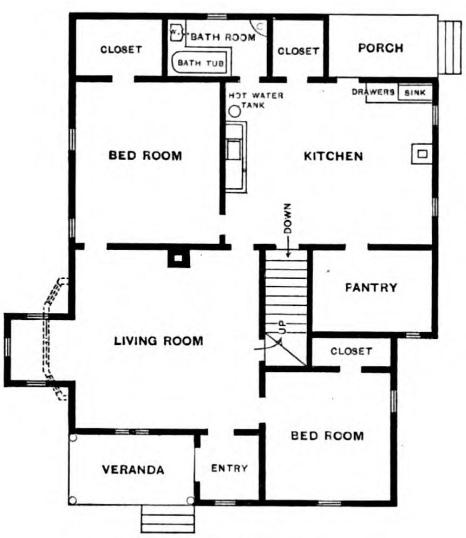
From S. S. K., *Concord, N. H.*—By this mail I send a few drawings very clearly indicating my idea of the elevations for the floor plan submitted by "B. F.," Fairfield, Neb., in the October number of *Carpentry and Building*. I also send floor plans embodying a few changes that might be made and which would render the arrangement more convenient than that shown in the original plan.



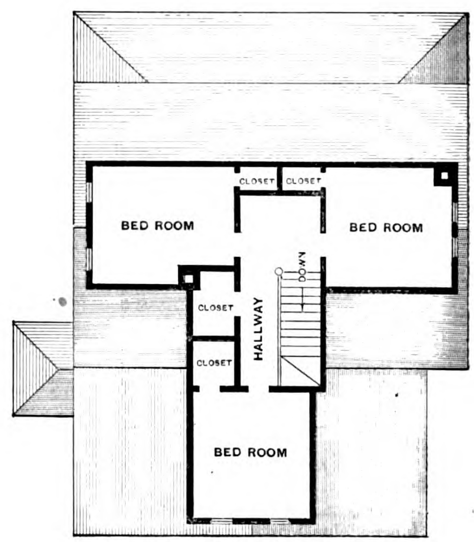
Front Elevation.



Side (Left) Elevation.



First Floor.



Second Floor.

A Woman's House.—Elevations and Floor Plans.—Scale, 1-16 *Inch to the Foot.*

Name of Chimney Partitions.

From A. A., *Brooklyn, N. Y.*—**What is the proper name of the partition between the flues of chimneys? If it is "with" I cannot find it in Webster.**

Answer.—**Perhaps the reason our correspondent did not find the word in Webster was because of the spelling he gave it. In the international edition of Webster's dictionary he will find that "withe" is in architecture a partition between flues in a chimney. We have also consulted an old architectural dictionary in which this passage occurs, under Chimneys: "When there are two or more chimneys in the same wall, the divisions between them or the solid parts of the brick, stone or metal are called withs."**

An Eyebrow Window.

From J. H. Monckton, *New York City.*—Some time ago a correspondent writing from Chicago desired to ascertain the method of striking out an eyebrow window and obtaining the lengths of the ribs. The eyebrow window comes to take the place of the old-fashioned dormer window, and its quaint eyebrow form with graceful curves flowing into the plane of the roof above and at each side, render it an attractive and artistic addition to our cottage roofs. I admire it and herewith contribute my study of its anatomy for the consideration of the practical readers of the paper. For the purpose of describing the curves and constructive details of the front framework of an eyebrow window it is necessary to proceed as follows: Referring to Fig. 1 of the sketches, we will begin by drawing the line A B, representing the top of the main roof boarding. At right angles to A B draw a center line, D E. Measure each way from the center C a distance of 4 feet 11½ inches, as figured, from C to B, making C E 21½ inches. Now on D as center describe the arc F E G. At right angles to A C B draw the lines A H and B I, each equal to 4 feet 9 inches. Connect I D and H D. Now with I and H as centers describe the arcs G B and F A; also describe the remaining curves from the centers I, H and D as indicated in the sketch. Space the ribs from the center C as at K M O Q and numbered 2, 3, 4, 5. The sash for the opening shown in this frame may be made fixed or movable and divided for glass as may be desired.

In Fig. 2 of the sketches is presented a central vertical section of the eyebrow window through its front, and showing the required curved roof and ribs to a point up the inclined main roof where the two join together. The pitch of the rafter in this case is made at an angle of 45°. The vertical hight of the window frame as taken from C E of Fig. 1 is shown by the letters C E of the figure under consideration. To find the position and hights of ribs 2, 3, 4 and 5, make C R, C P, C N and C L each equal to Q R, O P, M N and K L of Fig. 1. Along the upper edge of the rafter from T to V set off 6 feet 7½ inches. From S, the top of the roof board, draw a line, S U, at right angles to the edge of the rafter. Upon this line with a radius of 11 feet 1½ inches describe the curve of the roof S E. The thickness of the boarding as shaded will be the next and only other curve to be described from the last mentioned center, touching the top edge of the rafter at V and the top of the window frame at J. As the radius for describing the very flat curves for the ribs is considerable and awkward to manage, all of them from first to last may be produced with a little care and judgment by bending a flexible strip of even thickness from point to point as measured. All the upper edges of the ribs numbered 2, 3, 4 and 5 and lettered to correspond at the front face of the window frame J L N P R must be curved as indicated from the points lettered at the face of the window to the top of the rafter at V. All the ribs cutting against the inner face of the window frame and the center rib, as well as the two on the right and left of it, have to be made to a depth, as at L X and N W of Fig. 1. It will be seen from Fig. 1 that the top edge of each of the ribs, except the center one, requires to be beveled in line with the curved edge of the window frame. It is also evident from the direction of the curves R5, P4, &c., Fig. 2, that the top edge of the window frame itself must be beveled, being square only on its top curved edge at A and B. On a roof of much less pitch than this it might prove desirable to lessen the hight of the window or greatly extend the distance T V, Fig. 2. Perhaps both points might be thought necessary on a roof of very slight pitch.

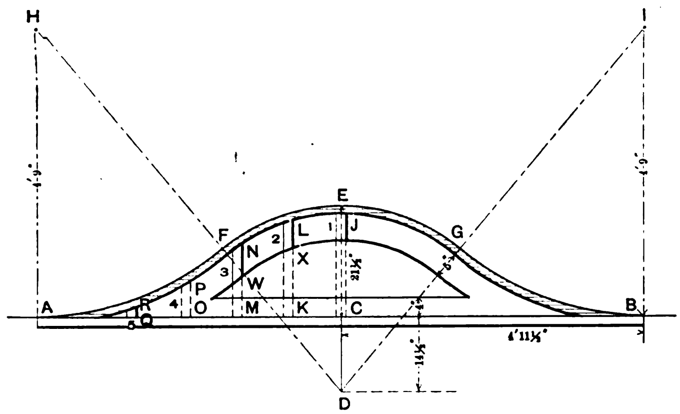


Fig. 1.—Front Elevation of Eyebrow Window.

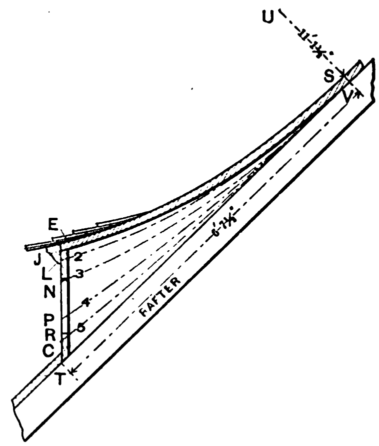


Fig. 2.—Vertical Cross Section through Window, showing Curved Roof and Ribs.

An Eyebrow Window.—Illustrations Accompanying Letter of Mr. Monckton.

Are Gravel Roofs Durable?

From G. D. B., *Greenville, S. C.*—**There are in course of construction in this section several cotton mills, most of them having been designed by Northern architects, who specified that they should be covered with five ply tar and gravel roofing. We know little about the durability of gravel roofing and are seeking information as to its durability and comparative cost. We would just as soon put on a tar and gravel roof for a customer as a tin roof if we knew how it would last, but from the nature of the material we can form no opinion as to its durability compared with a tin roof for the same price. We can put on a gravel roof for $5 per square five ply, but can put on a better one of tin and make more money at $4 per square. We have put tin roofs on cotton mills 20 years ago and they appear perfectly good to day. The chief objection to tin is the intense heat of the upper stories in summer. The writer has traveled some and has always observed the roofs used in the various cities. In Richmond, Baltimore, Philadelphia and New York I was struck with the great number of tin roofs. Cincinnati has quite a variety of roofs, mostly metal and slate. In Chicago hardly anything else is seen but gravel roofing. In the Gulf cities, Mobile, New Orleans, Galveston, and more particularly New Orleans, it was the exception to see a tin roof, nearly all of the roofs being of slate. This I suppose was to secure the water for drinking purposes. On the wharves there were quite a number of shell roofs, the shells being used instead of gravel on a tar roof.**

Note.—**We would call the attention of our correspondent to articles on gravel roofing which appeared in *Carpentry and Building* for November and December last. These do not give any information on either the cost or durability, but we hope our readers will give the result of their experience on both, as the information would be of value to a great many readers.**

Concrete Foundations.

From J. F. M., *Pocabello, Idaho.*—In the December number of *Carpentry and Building* it is stated in a note relating to concrete foundations that a barrel of Portland cement will lay a bed of concrete 6 x 6 x 2 feet, or 72 cubic feet, in the proportion of 1 in 9, as follows: 1 of cement, 3 of sand and 5 of broken stone. I cannot believe it possible, as my experience last summer while putting in concrete foundations for bridge work was that 1 barrel of English Portland cement will just lay 22 cubic feet of concrete in the proportion of 1 in 10, as follows: 1 of cement, 3 of sand and 6 of broken stone. The sand was water washed and sharp, and the stone was hard sandstone, broken to about 2½-inch cubes. I took a memorandum at the time for future use, but lost it, yet I am persuaded 22 cubic feet is all it laid. Some one who has kept a careful count of the quantity a barrel of cement will make will confer a favor by giving his data for publication. My system of making and laying concrete as conducted by the engineering department of the railroad was as follows: lay a platform 12 or 16 feet square; take 3 measures of sand, 6 of broken stone and 1 of cement; pile it upon the platform in the order mentioned, finishing by having the measure (barrel) of cement on top of all. Let the men turn it over, then back again, always shoveling from the bottom. Again turn it, this time wetting it with water; once more turn it and sprinkle again with water, when it ought to be right for putting in place. Get it into place lively, making a layer of 6 or 8 inches thick. Ram hard while soft. Repeat the dose until the desired thickness of concrete is obtained. See that the edges of the concrete are confined by planking or dirt, as the place requires. Concrete ought to be thick enough to sustain the weight required without breaking, otherwise it is waste labor and material. It is the general opinion of civil engineers, as obtained by experience, that English Portland cement will stand a higher proportion of sand and stone and does better in water than most other cements, but even English Portland is occasionally adulterated with ashes, &c., and is sometimes "dead." If the cement is not good it is better not to use it. Some Portland cements set much slower than others, but are equally as strong when they do set. The slow setting cements allow larger masses of concrete to be mixed at a time. English Portland cement on being made into concrete requires lively work to get the best results, and large masses of it cannot be mixed with good results. Let us hear from others on this question. It is of great importance to know the best system, as no two authorities agree on it. The estimate of cost in one location is of no benefit to those calculating the same class of work in other places.

Note.—The experience of our correspondent in the matter of concrete for foundation purposes is very interesting, and we trust other practical readers who have had to do with this material will adopt his suggestion and discuss the question of which is the best system to be employed in order to obtain the most satisfactory results. Now with regard to the area of concrete which can be laid, when making use of the proportions mentioned in the December issue of the paper, it is generally considered that the cubical contents of the mass of chip stone very closely approximates the amount of concrete resulting from the mixture for the reason that the cement and sand do not much if any more than fill the voids between the pieces of stone. Mr. Kidder writes us that the statement touching this point in his "Architects and Builders' Pocket Book," from which we quoted in the December issue, is an error and that his experience teaches that the best concrete is obtained when the sand and cement just fill the voids between the stones. Upon this basis one cask of cement employed in the proportion of 1 part in 9 would lay from 22 to 24 cubic feet of concrete.

Dovetail Puzzle.

From H. H. H., *Riverside, Mich.*—In one of the issues of *Carpentry and Building* for last year is given a dovetail puzzle, which at first sight looks a little mysterious, although it is really very simple. I send rough sketches of another puzzle which is more difficult to make, the dovetail being the same as the one illustrated, but in addition to the dovetail there is a mortise and tenon. Referring to the illustrations, Fig. 1 represents a general view of what may be called the dovetail cross, Fig. 2 shows a top view of the cross piece, while Fig. 3 is a bottom view of the part shown in Fig. 2. In Fig. 4 is represented a cross section through the dovetail showing how it is constructed. Another form of dovetail which looks still more difficult is that represented in Figs. 5 and 6. Two square pieces of different kinds of wood are dovetailed together, end to end, as shown, with the dovetails appearing the same on all four sides. Fig. 6 gives an idea of the manner in which the dovetails are cut.

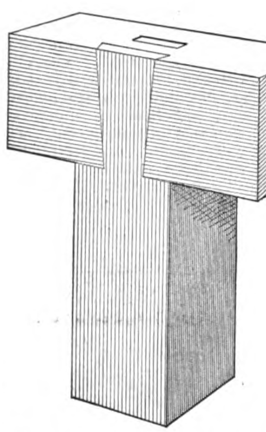


Fig. 1—General View of Dovetail Cross.

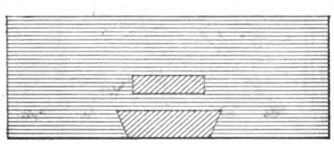


Fig. 2.—Top View of Cross.

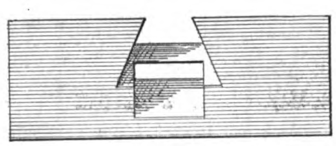


Fig. 3.—Bottom View of Piece Shown in Fig. 2.

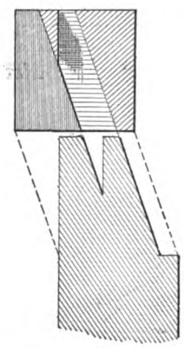


Fig. 4.—Cross Section through Dovetail.

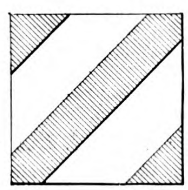


Fig. 6.—Section Showing Way in which the Double Dovetail is Cut.

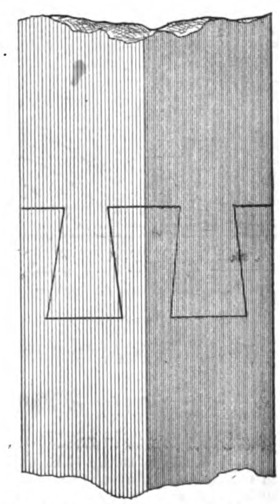


Fig. 5.—General View of Double Dovetail.

Dovetail Puzzle.—Sketches Illustrating Letter of "H. H. H."

Sweating of a Chimney.

From F. W. H., *Lafayette, Ind.*—Will some of the readers please describe a remedy for a chimney that sweats so badly that the condensation runs down the wall and looks like tar on the ceiling of the room? On the outside the chimney is wet and fairly steams. The chimney is in a two-story brick house, having a furnace which is connected to it by means of a smoke pipe and uses natural gas as a fuel. The chimney is in the north wall of the building. I have cut a hole in the wall of the chimney near the top of the second story with no beneficial results.

Note.—As the dimensions of the chimney are not given it is difficult to state what causes the trouble. It is certain, however, that cutting a hole in the chimney was a step in the wrong direction, and if the chimney steams on the outside it is fair to suppose that the chimney is not air tight, which it must be in order to prove satisfactory in operation. Gas apparatus does not require so large a chimney, as a rule, as coal apparatus, and it is fair to suppose that the products of combustion condense before escaping from the chimney and cause the trouble reported. It is more than likely that the chimney has been used for other fuel in the past, and the condensation is colored by the refuse from the previous fuels. It is quite probable that better success can be secured with the apparatus and the trouble avoided by running a pipe inside the chimney clear to the top, and if the pipe is put together in the reverse of the usual way condensation will run down inside of the pipe to the bottom.

A Red Wood Coffin.

From J. J. D., *Cornwall, Cal.*—Although the subject may be considered by many readers of the paper as somewhat grewsome, I desire to ask those who possess the knowledge to furnish for publication a drawing showing the manner of constructing a red wood coffin.

Plans for a Town School House.

From H. L. A., *Wilmington, Vt.*—Will some of the readers of the paper submit plans for a graded school house with accommodations for 500 scholars, the frame of the building to be of wood?

Estimating "Shakes" For a Roof.

From J. J. D., *Cornwall, Cal.*—Will some of the many readers of the paper show me how to figure the number of "shakes" required to cover a roof when one half of their length is exposed to the weather? This is a matter in which I am greatly interested, and I trust that those who know will be free in furnishing the desired information.

NOVEL HOT BLAST HEATING PLANT.

THERE are many ways employed for heating buildings of all kinds, but in the case of structures devoted to manufacturing purposes the scheme utilized is governed largely by the peculiar requirements of the business which may be conducted within the four walls of the factory. An interesting instance of this kind has recently been brought to our attention, where a machine shop was last winter provided with a hot blast heating system embodying several novel features, more especially in the arrangement of the hot air piping. The designs for this system were made by Julian Kennedy of Pittsburgh, Pa., and the Buffalo Forge Company of Buffalo, N. Y., built and guaranteed the plant. Fig. 1 is a longitudinal sectional elevation of the building, Fig. 2 a plan view and Fig. 3 a transverse section. The hot blast apparatus is shown at the extreme left in Fig. 1. The building is 50 feet wide by 200 feet 2½ inches long, the machine shop proper being 155 feet 8½ inches long, the offices occupying the remaining portion. The drawings show the arrangement of the piping and also give the thickness and diameter of the several sections.

The heating apparatus consists of a 100-inch Buffalo fan and a 4000 feet capacity heater, the fan being driven by a 6½ x 8 inch direct attached upright engine. The wheel inside the fan casing is 71 inches in diameter by 33¾ inches wide. At 340 revolutions per minute the fan will displace 48,360 cubic feet of air.

The entire hot air piping is carried clear up to the roof trusses and thence is brought down, with outlets on second story, into the first story. This is an unusual application, and the piping would have been distributed equally on each floor but for the presence of so much machinery and shafting. As indicated in Figs. 1 and 3, the uptake from the heater is 43 inches in diameter. At the top this branches to each side, along which extends, on the roof trusses, a galvanized iron pipe, which is 30 inches in diameter where it joins the branch, and 24 inches in diameter at the other end. In these two lines of pipe are openings for heating the second story, and from them descend pipes for heating the first story, as shown in Figs. 2 and 3.

The temperature guaranteed on this plant was 65°, from zero outside, the calculation being to use exhaust steam from the main engine in the day time and the exhaust steam from the fan engine at night, together with live steam when necessary. Except during the coldest weather the exhaust steam from the fan engine is sufficient to heat the building above the freezing point at night. Outside of the repairs, there is practically no cost, with the exception of the live steam used for running the fan engine, which is a very small matter. Part of the air is taken from the factory and part from outside, most of the air being used over and over again as a matter of economy. There being comparatively few people in the building, per cubic foot of space, the air is not vitiated to a great extent by respiration. In a factory using more power it would be possible to do the heating in the severest weather with exhaust steam alone and taking all the air from outside the building.

The condensation in one of these heaters is from three to five times as great as in the same amount of direct heating, either running around the building in the form of 1 inch pipe, or per square foot of direct radiation. Of course, by drawing the air by the action of the fan direct from the outside and passing nothing but cold air over the coils a greater amount of steam is condensed than when taking the air from the inside. If there is no other use for the exhaust steam, however, then the amount condensed does not enter for consideration to any great extent.

We may add that under favorable conditions the larger part of the piping employed in the building just described could have been dispensed with. In many plants of this character, the apparatus would be placed near the offices, and a stand pipe would be run through the center of the building to the different floors, and this, with the office connections, would complete the layout.

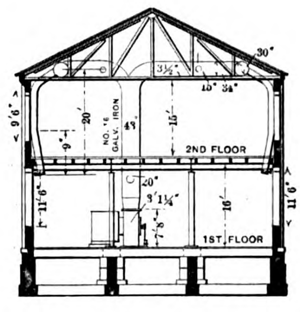


Fig. 3.—Transverse Section.

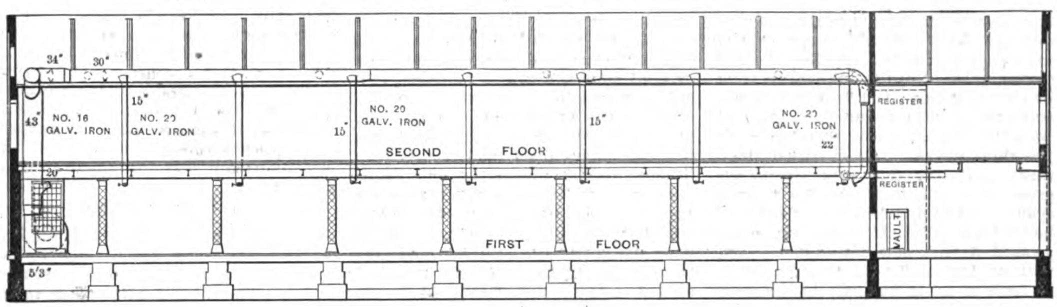


Fig. 1.—Longitudinal Sectional Elevation.

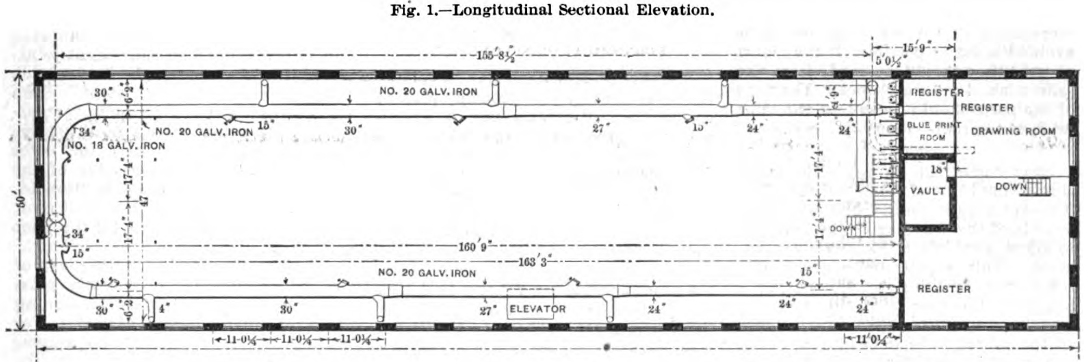


Fig. 2.—Plan.

Novel Hot Blast Heating Plant.

IT has been found necessary to place additional steel girders in various portions of the new Public Buildings of Philadelphia in order to strengthen them.

CONSTRUCTION OF GREENHOUSES.

At a meeting of the Massachusetts Horticultural Society held early in February of the present year the construction of glass houses was explained in a very able paper read by Henry W. Gibbons of New York City. The paper contains so much that is of interest to a large class among our readers that we present an abstract of it herewith:

Commercial greenhouses being in use solely for profit, the proprietors desire to have their structures built to force their various crops of flowers and vegetables at as small cost as possible. Therefore the architect of such structures must design these houses of such shapes, dimensions, &c., as shall be adapted to special localities; that all available light and also protection from strong winds or any other unfavorable influence shall be secured. With regard to the temporary or sash bar construction, it may be described thus: Posts to support the building may be of locust, cedar, cypress or chestnut lumber; the first the most durable and expensive, the last the least in both respects. For temporary economy I would use cypress, being easily procured at moderate cost and of fairly enduring quality. This description applies well to red cypress; other varieties are not so desirable. But the red cypress must be air dried only; if kiln dried it absorbs so much moisture that it will warp in drying, and is therefore unfit for this purpose. Of air dried stock make posts for side supports of the greenhouse. If the structure is an even span of 18 feet 6 inches the posts should be of 2 x 5 inch joist, cut to set in the ground 3 feet, and 6 to 8 feet apart, with another of 2 x 2 inch alternating. If there is to be no glass in the wall, 4 feet to the plate will be the right hight for the side wall. If gutters are not used so much the better, as they promote decay of the wall and should be avoided as far as possible. If they must be used they should be made from the solid stick, 4 x 6 (or 7) inch. The tops of the posts should be cut to the same pitch as the roof—about 32°.

SIDING.

Next comes the siding. The inner siding should be of "beveled ship," as it makes a tight joint. Nail it to the outside of the posts and take care not to allow any joints directly over another. This should be covered with rosin-sized building paper (weight ⅛ pound to a square foot) laid smoothly, and the outer siding at once nailed on, all the nailing to be done into the posts, all butted joints being made at those points, and no two successive ones at the same post. Novelty siding is preferable for the outside. The upper edge of this siding rises to enter a groove that is plowed in the lower side of the plate. The plate is made by 2 x 6 inch plank. Its under side has two plowed grooves, the lower and larger one to receive the top edge of the outer siding, while the upper one (¼ inch wide) serves to prevent the water or condensation from the roof from reaching the siding by causing it to fall at that point. On the upper side the upper edge should be cut to a slight bevel to give a better bearing for the sash bar. Beveling the opposite edge of this upper service would lessen the liability of ice to form there, to back up under the lowest lights of glass and cause breakage.

SASH BARS.

The sash bars are next in importance. Assuming that 16 x 24 glass will be used, sash bars, with supports only five feet apart, 1¾ x 1⅛ inch are ample; but with supports eight feet apart, 2¼ x 1⅛ is necessary. The rabbets for the glass upon the upper edges should be V-shaped at the bottom to retain the bedding putty. A groove is also needed on each side of the bar to carry off the water condensed from the moist air, which would otherwise fall upon the plants, causing injury. Be sure to cut away the lower sides of these grooves before they reach the plate, that the water may fall upon the earth instead of the plate. Avoid mortising or other cavity making in any of the wood work where moisture can collect, which always hastens decay. Columns to support a purlin midway from ridge to eaves should be of iron pipe. For the southern slope of an 18 foot 6 inch wide ⅜ span 1¼-inch gas pipe eight feet apart will serve. For each slope of an even span of the same width, inch pipes at the same distance apart are right.

The ridge of houses such as these should be of perfectly air seasoned timber sawn from a log that is perfectly sound, straight and true to the grain, free from heart or sap; otherwise yellow pine is preferable. It should be 2 x 6 inches and finished on either side, as necessary to receive sash bars and glass or ventilators. A cap 3 x 1¼ inches, machine finished to shape, is securely fastened to the upper edge. When the sash bars are all secured in their places to both eaves plate and ridge, the header, which connects the roof ventilating sash with the roof, is next fitted upon the sash bars. The ventilating sash is to be 3 feet deep and continuous on either or both sides of the ridge, to which they are now generally hinged. With this strain upon the ridge, the latter needs as supports 1¼ or 2 inch gas-pipe columns, or 3 x 3 wood posts, every 8 or 10 feet.

ECONOMICAL CONSTRUCTION.

We next present what may be termed the permanent or true economy plan of construction of greenhouses, in which, so far as practicable, the material is iron. When the site is leveled and the floor line fixed, cast iron post bases 2½ feet long are set their full length into the ground. To each of these a cast iron post is bolted. These posts are tied together by two lines of angle iron purlins; the lower is 18 inches above the ground and is 3 x 2 inches by ⅜ inch angle. Besides tying the posts together this purlin gives support to the 2¼ x ¼ inch eaves or gutter purlin and plate above, by means of a light intermediate post which connects them together. They also support the header of the side ventilating sashes, the gutter and the roof up to the lower roof purlin. The lower purlin also serves as the back support for the side bench instead of using back legs. To connect the rafters 2 x 1¼ x ¼ inch angle iron purlins are used, giving longitudinal stability to the roof and support to the sash bars. When a suitable bracket is used to unite rafter and post, and also the rafters together at the ridge, that, with rafters not over 7 feet between supports, a section of flat iron 2 x 1⅛ inches is ample, and for lengths of 7 to 11 feet 2 x 1⅛ inches will serve. The rafters are tied at their upper ends by iron brackets, which have also a socket to receive a wooden ridge, such as has been described. This ridge is far superior to any iron one that has yet been devised, as it meets all requirements the iron can and many others besides. The upper brackets should have provision for carrying the shaft of the ventilating apparatus.

IRON PURLINS.

For connecting the rafters, giving stability to the roof and supporting the sash bars, 2 x 1¼ inch by ¼ inch angle iron purlins are used. These purlins are spaced according to the length of the rafters and size of glazing bars; the upper one affords support for the upper ends of the glazing bars, of which ¼ to ⅜ inch rests upon the purlin and each is also toe nailed to the under edge of the cypress header, which supports a ventilator above and is firmly screwed to the purlin below it. The ends of the iron house are braced with one or more lines of purlins, as required by the size of the structure. Iron door-posts are bolted to iron bases, as are the side posts, and reach up to the rafters. An iron door sill is also fixed in place. End purlins run from end posts and rafters to the door posts; altogether making a well braced and stiff end, to which the necessary wood work is readily attached.

The gutters are the last part of the iron frame. As they are of cast iron, and if water is frozen in such they are quickly ruined, provision is made for a portion of the heat from the interior of the house to be taken into the gutters, thus preventing the freezing of the water therein. It is a complete success.

THE WOOD WORK.

Now, for the wood work of this iron house: The sides are covered to the ventilators the same as the wooden house. The sill is connected the same, but, as it serves as the sill of the side ventilators, is finished above to meet that need. The ventilator, usually 20 inches deep, hangs from a rabbeted top rail, making a weather tight joint; above this is a header, the under side being grooved to shed water. The eaves strip is screwed to the upper purlin and is fitted with a plow groove upon the under side, near the outer edge, to receive the upper edge of the gutter. Its upper surface is beveled, the outer side to the pitch of the roof, the inner to afford support for the foot of the sash bars.

An elaborate description was given of the construction of more costly glass structures for private estates, including those for different classes of plants. For glazing for rose houses he recommended French or Belgian glass, the double thick grade, second quality, as allowing more ready passage of the pure light. For almost all other structures he believed American glass well suited, and thought that the time is coming when manufacturers here will produce as good glass as any imported. Possibly the only reason that it is not now made is the present higher cost of labor, but improved methods of manufacture may overcome that difficulty.

As yet nothing better than light wooden bars with suitable putty has been found for satisfactory glazing purposes. The rabbeting should always be V-shaped, filled with putty; the glass placed, and rubbed down firmly to the sharp edge of the rabbet, and secured with strong zinc nails or other suitable points. Many other methods have been put forth, but in practice none of them has proved worthy of adoption.

METHODS OF HANDRAILING.*

BY J. V. H. SECOR.

THE THREE-POINT AND BRIEF SYSTEM.

THE sketches which are here given represent a plan of stairs drawn so as to give a variety of face molds, starting from a turnout with newel and mitered cap, a semicircle cylinder with winders in the lower quarter and a platform in the upper quarter landing, wi h the riser set in the cylinder so that the right hight will be reached for the method for B is drawn direct from the elevation. At right angles from the tangents 5 7 of Fig. 57 draw 7 8 extended indefinitely. Now, with one foot of the compasses in 9 and the other extended to 0, describe the dotted curved line cutting 7 2′ at 2′; then connect 2′ and 9, which gives the position of the tangents—namely, 2′ 9 5. The point 12 is found by drawing parallel to

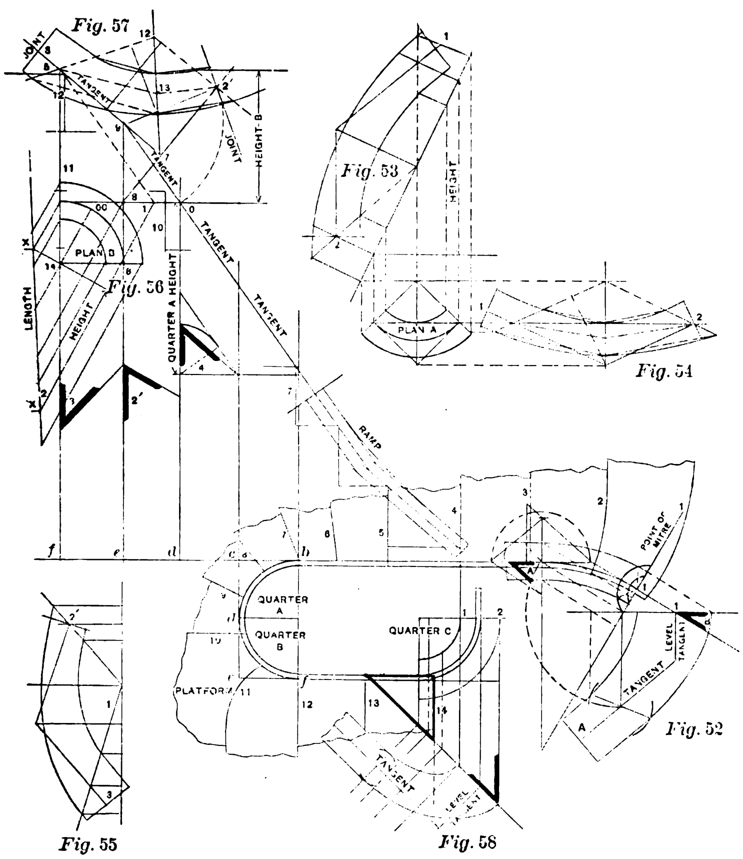


Fig. 52.—Face Mold for the Starting or the Offset Easement.
Fig. 53.—The Face Mold Over the Lower Quarter A—the First Method.
Fig. 54.—The Second Method for the Quarter A.
Fig. 55.—The Face Mold for the Upper Quarter B—the First Method.
Fig. 56.—Plan of the Ordinates from which Fig. 55 is Drawn.
Fig. 57.—The Face Mold for the Quarter B—the Second Method.
Fig. 58—The Face Mold for the Landing Quarter C.

Methods of Handrailing.—The Three-Point and Brief System.

level rail. The quarter A is covered with a mold, the tangents being the same length. Two methods have been employed and two molds drawn. The bevel is shown at 4 of the elevation, Fig. 56, and the hight is also marked. The curves are all drawn with a flexible strip through the points clearly shown. The quarter B is covered with tangents of unequal pitch. The first method is drawn from the lines in plan B, the directing ordinate being 1 2. This is obtained by running a line from the hight and parallel with the lower tangent, as 5 1; then draw 1 6 2. The hight is shown at X X and the bevels at 3 and 2′ of Fig. 56 The second both tangents. Connect 12 and 7. This would be the minor axis. Make 12 13 equal to 00 14 of the plan, Fig. 56. The width of the rail is marked from 13 as the center, and then by the use of parallel lines the width for the mold at the ends is obtained and the flexible strip used to mark the curves. The quarter C, Fig. 58, is a common mold which will be understood at a glance. The pitch board applied as shown will give the tangent and the width for the end from the lines 1 2. The bevel is the upper angle of the pitch board.

* Continued from page 71, March issue.

An exchange says that the nuisance of a steam or frost covered window in cold weather may be stopped by a very thin coat of glycerine applied to both sides of the glass. This will prevent any moisture forming thereon and will stay until it collects so much dust that it cannot be seen through. For this reason it should be put on very thin. Surveyors can use it on their instruments in foggy weather, and there is no film to obstruct the sight. In fact, it can be used anywhere to prevent moisture from forming on a surface.

New Roofing Slate Association.

For some little time past the condition of affairs in the Bangor slate region has not been altogether satisfactory to leading operators, and a meeting was recently held for the purpose of correcting, if possible, some of the existing evils. A movement was instituted which has resulted in the formation of what is known as the Bangor Roofing Slate Manufacturers' Association, the object of which is to maintain a uniform scale of prices for genuine Bangor slate, and to sell direct to the trade, or through the bands of four dealers, namely: Auld & Conger of Cleveland, Ohio; John D Emack of Philadelphia, and E. J Johnson & Co. and John Galt & Sons of New York City. The association will issue a card to the salesmen so that the trade will know that no one offering Bangor slate is authorized so to do unless he can show authority direct from the association. The latter have also adopted a certificate which will be stamped with the official seal as a trade-mark, being signed by the inspector, and will be attached to every invoice that goes out, certifying that car No. is loaded with genuine Bangor roofing slate. The architects of the country will be furnished with a copy of this certificate, and if they will request or compel the party furnishing the slate to produce the certificate, the purchaser will know whether or not he is getting what is called for. This course of procedure has been taken by the association for the reason that Bangor slate is largely called for by architects and to prevent the substitution of inferior grades when Bangor is distinctly specified.

The next best grade of Bangor slate is what is known as the Albion Vein, at Pen Argyl, located 8 miles from Bangor, Pa. The manufacturers in this section have suffered largely by having inferior slates offered as their own, and it is believed that they will form an association similar to that at Bangor, adopting the same rule of sending out a certificate. The best element of the trade has requested some such action as this to be taken so that they can be assured that prices will remain firm and that all will pay the same price for their slate. In Bangor the formation of this association has taken away the petty jealousies and envy that have existed for some time between different manufacturers, and it is probable they will all act in harmony in the matter of lowering or advancing of prices. The manufacturers have adopted a price-list and have made it from 15 to 25 cents a square lower than last year's list. We understand that in the formation of the association mentioned there has been no effort at combination for the purpose of putting up prices, but simply for keeping them at such a level as will pay a reasonable profit and at the same time protect the name of the goods.

HEAT LOST BY ROOFS.

IN discussing the subject indicated above, a well-informed writer says: It is very desirable that some reliable data should be collected on this subject. Box, in his treatise, speaks of it in cases where there is no interposed ceiling as being a large amount, almost impossible to calculate. I might cite numerous instances where the roofs of buildings are probably as important factors in the loss of heat as the glass. I know of a church roofed with slate, the roof being of the king post variety and having a high pitch. It has no ceiling under the roof trusses. This church, though consuming large quantities of coal in cold weather, has never been comfortably warmed when the outside temperature was low. Sometimes all the gas burners have been lighted to aid the four large furnaces, and yet, the latter being driven to the utmost, the church cannot be warmed sufficiently for comfort. There are few buildings of its size these furnaces could not overheat in any weather to which this edifice is exposed. The interior looks nicely with its richly decorated roof trusses exposed, and from this point of view the roof is satisfactory; but as a place for people to congregate in comfort in winter weather the structure is a decided failure.

I contracted for and superintended the erection of a steam heating plant in a suburban house several years ago. It was a frame house filled in with brick. The house was two stories high, nearly square in plan and had an unceiled attic covered with a high shingle roof with four gables, about as shown in Figs. 1 and 2, which are, respectively, a plan and elevation. The apparatus was finished and tested at a time when doors and windows were all in, and the house had been lathed and plastered throughout. Only the hard finished coat, the trim and interior were acking to complete the building. The foreman on the job reported to me that there was a deficiency in the heating power of the plant. I went out to see for myself what was lacking, and as I approached the house I noticed that, while the roofs of neighboring houses were white with snow, the snow on its roof was much melted away. As I entered the building, the foreman called my attention to thermometers placed in different parts of the house. The average indication was a little less than 60°. Telling him to follow me, I ascended to the second story and found the door at the head of the stairway leading to the attic had not yet been mounted. The heating of this attic, used for storage only, had not been comprised in my contract.

I had the door mounted, and closed it. Thereafter the apparatus filled its guarantee in every particular. In one hour after this door was closed a temperature of 70 was maintained everywhere in rooms containing radiators, with the automatic damper of the boiler closed down, and the boiler steaming freely with a moderate fire. By driving the apparatus the temperature could very easily be made excessive. Here was a practical illustration of the effect of roofs in transmitting heat from interiors of buildings.

I once placed a steam heating apparatus in a New England church having a high pitched slate roof with a ceiling of corrugated sheet iron under it, nailed on wooden supports. I allowed for this roof a transmitting power equal to the exterior surface of the two side walls of the church and added 25 per cent. I calculated the radiating surface necessary to supply the heat this roof would transmit on the basis named, while for walls, glass and ventilation I used customary methods. I found very little excess of capacity in the apparatus to meet the demands for severe cold weather. The roof in question was a veritable coal eater. The sheet iron ceiling transmitted heat to the space between it and the roof almost as readily as though a large opening had been cut through it. Several times I went up into this space with a thermometer and found it the warmest part of the building. This roof had about the form indicated in the diagram, Fig. 3, which may be regarded as a cross section.

In a building having a roof exposed interiorly, I once knew of an addition of about 30 per cent of radiating surface over that first put in before anything like satisfactory results were obtained. The amount first put in was more than enough for a building of equal size, having same walls and glass, but roofed and ceiled in the best manner with lath and plaster. I infer, therefore, that in this case the exposed roof increased the first cost of the plant something more than 30 per cent.; and as fuel consumption increases nearly in the ratio of increase of radiating surface needed in a building, in this case about 30 per cent. of the fuel burned was demanded by the unceiled roof.

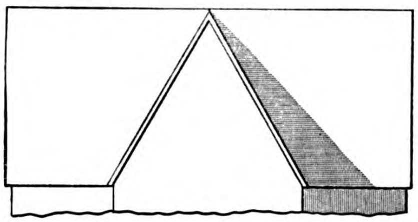


Fig. 1.—Elevation of Roof.

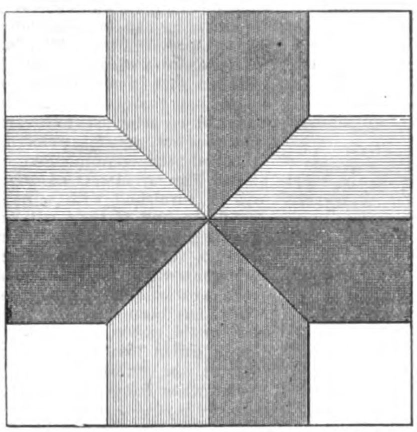


Fig. 2.—Plan of Roof.

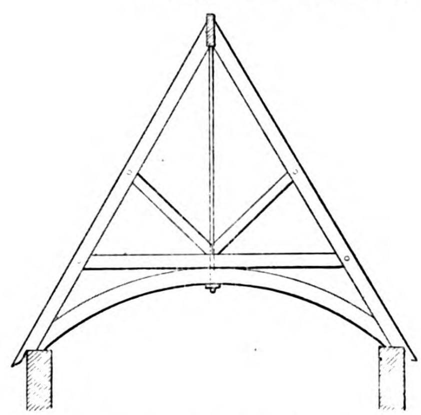


Fig. 3.—Section through Church Roof.

Heat Lost by Roofs.

THE George W. Childs Public School recently dedicated in Philadelphia is constructed of brick with granite base and trimming, and is covered with a slate roof. It has a frontage of 120 feet and is 3½ stories in hight. The building contains 21 divisions, and there are accommodations for 1074 scholars. An interesting feature is the system of ventilation employed. A double pipe system of air induction, regulated by means of quadrants under the control of the teacher in each classroom, diffuses fresh air at any required temperature through each apartment. A 12-foot fan forces the fresh air over an extended radiator surface, after which it is charged with a certain degree of moisture by passing over an exposed water surface and enters the rooms through the quadrants, escaping again by outlets on a level with the floors and carried by a ventilating shaft through the roof.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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Second vice-president, James Meathe of Detroit.
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Buffalo Builders' Exhibit.

The architects and builders of Buffalo have combined for the establishment of an exhibit of building materials to be under the control and supervision of the Builders' Exchange Association. The architects have expressed themselves as favoring such a project, and the matter is now well along toward establishment. The experience of the Philadelphia Exchange with its exhibit is the best possible example of the benefit to be derived from such an undertaking, and every builders' exchange in the country should follow this excellent example. For the benefit of exchanges that have not definitely considered the matter the following action by the Buffalo Chapter of the American Institute of Architects is given as not only showing a desirable co-operation, but as indicating an increased harmony between architects and builders:

Preamble and resolutions adopted by the Buffalo Chapter of the American Institute of Architects:

Whereas, The facilities for examining and taking advantage of the many improvements constantly being made in material and appliances used in the erection of buildings are limited in this city; and

Whereas, The growing tendency of the times is to combine the ornamental and artistic with the practical and substantial; and

Whereas, We, the Buffalo Chapter of the American Institute of Architects, feeling the need of some desirable place that we can recommend where the ingenuity of the architect and skill of the mechanic can be properly exhibited for the inspection of architects, builders, those intending to build and the public at large; therefore,

Resolved, That we, the Buffalo Chapter of the American Institute of Architects, in meeting assembled, beg to call the attention of the Buffalo Builders' Exchange Association to the preamble and the necessity of a permanent building exhibit in this, one of the most important cities at this time in the United States.

Resolved, That it is the sense of this meeting that the most desirable place for such an exhibit is in the Builders' Exchange; and we hereby agree that if the Builders' Exchange Association will establish such exhibit, we will give the same our assistance and support.

Preamble and Resolution adopted by the Buffalo Builders' Exchange:

Whereas, We are informed that the trustees of the Builders' Exchange Association (the organization which owns the building occupied by the exchange, and composed of its members) have under advisement the matter of establishing a permanent building exhibit; therefore,

Resolved, That we heartily approve the idea of said builders' exhibit, and beg to assure the trustees of the Builders' Exchange Association that we will co-operate with them and give our influence and support in making the same a success.

LAW IN THE BUILDING TRADES.

Right of Sub-contractors to Mechanics' Liens.

A sub-contractor for a house on a lot apparently owned by the contractor, in whose name the deed stood, and who was in possession and represented himself to be the owner, is entitled to a lien for material furnished prior to the time he knew or should have known that another was the owner, notwithstanding a secret agreement by the apparent owner to build and not allow any liens. —McCollum *vs.* Riale, Supreme Court of Pennsylvania, 30 At. Rep., 282.

Construction of Party Wall Agreement.

A deed between W. and J., owners of adjoining lots, and the former's mortgagees, recited that it was agreed that J. should convey to W. 5¼ inches lying between the western wall of his building and his boundary line, and pay W. $400, in consideration of which W. should execute a covenant to preserve the easement for light and air unto J., his heirs, assigns, &c., and also use 5¼ inches for the purpose of erecting a wall, 16 feet high only, to the eastern end of a certain addition which W. proposed to so build that its eastern wall should rest on the boundary line between the lots, and that neither W. nor any person claiming through him should make any erection on his lot or such strip higher than 16 feet, unless there was left between the buildings a clear space of 36 inches from the hight of 16 feet upward. It was held that J. could put windows in a seven-story party wall erected by him, 6¼ inches of which stands on W.'s ground.—Weigmann *vs.* Jones, Supreme Court of Pennsylvania, 30 At. Rep., 198.

Obstruction of Sidewalk.

Where the obstruction of sidewalks is forbidden by a city ordinance the placing of a flagstone against a tree in the sidewalk in front of premises, without permission of the city, is a nuisance, and renders such party liable for injuries caused by it. The falling of the stone and the injury of a party are sufficient evidence of negligence by the one putting the stone there to go to the jury.—Skelton *vs.* Larkin, Sup. Ct., 3d Dpt., 31 N. Y. S. Rep., 234.

Superintendent of City Buildings Not Entitled to Extra Pay.

The Supreme Court of Missouri holds that where a city ordinance requires the Department of Buildings to attend to the enforcement of all ordinances pertaining to the erection and alteration of buildings, and such other duties as might be required by the Board of Public Works, the superintendent of that department can be required to supervise the construction of a city hall; and an order directing such supervision does not authorize a recovery by him for his services in addition to his usual salary.—Chamberlin *vs.* Kansas City, 28 S. W. Reporter, 745.

Basis for Architect's Certificate.

The value of work performed should not be the sole guide in determining the amount due upon a building contract. The architect must have regard also to the amount and value of the work remaining to be performed; and if it is apparent that the expense of completing the contract from that point would be substantially the full amount of the unpaid contract price, then nothing is due the contractor. The court can hold the architect to only a fair and reasonably correct judgment in that regard; and the fact that the balance due such contractor, after another has completed the work is small, is conclusive evidence of such fairness and reasonableness of judgment.—Kelley *vs.* Syracuse, 31 N. Y. S. Rep., 284.

Validity of Contract Made Outside of State.

A lien for materials furnished for the erection of improvements on lands in Kansas may be maintained where the contract is entered into in Missouri as well as if it were made in Kansas. In order to create a lien on the homestead for improvements erected thereon, the joint consent of husband and wife is not necessary.—United States Investment Company *vs.* Phelps & Bigelow Windmill Company, Supreme Court of Kansas, 37 Pac. Rep., 982.

The Supreme Court of Minnesota holds that where an action is commenced to enforce a mechanic's lien against husband and wife, and the property is owned by the wife alone, and both answer by filing the same in the office of the clerk of the district court where the complaint in such action is filed, and the husband does not serve any answer upon the plaintiff, no reply need be served in such case.—Johnson *vs.* Lau, 60 N. W. Rep., 342.

New Publications.

RATIONAL BUILDING. By Viollet-Le-Duc. Translated by George Martin Huss. Size 6¾ x 9 inches; 368 pages; illustrated with 156 engravings; bound in heavy board covers; published by Macmillan & Co.; price, $3.

While Mr. Huss was preparing the drawings for a large cathedral in New York City the article on "Construction" in the "Dictionnaire Raisonne de L'Architecture Française" of Viollet-Le-Duc was much used and the idea was conceived of translating it into English. Great care has been exercised by the translator to obtain nice distinctions of meaning "and the endeavor has been to make the work appear as little like a bald technical translation as was consistent with the incisively keen remarks of the gifted author." The volume under review embraces ten chapters, the first of which deals with Greek and Roman construction; the next considers Principles; the third, Roman and Romanesque vaults; the fourth, Origin of the Pointed Arch; the fifth, Development of Principles, while the sixth is devoted especially to vaults. In the seventh chapter the question of materials is taken up; the eighth deals with Developments of the Thirteenth Century; the ninth, Civil Construction, while chapter ten has to do with Military Constructions. The closing pages of the volume contain a very comprehensive index alphabetically arranged.

Lessons in Carpentry for Girls.

One of the features of the work at the Elliott School at Jamaica Plain, Mass., is a weekly lesson in carpentry and wood carving, the surprising part being that the students are girls ranging from 10 to 14 years of age, who are pupils in the fourth grade of the Bowditch Grammar School. This is the first year that the experiment has been made with girls, and although some fears were entertained in regard to the enterprise, the first six months of practical work has proven that it is a decided success. The lessons are given each Friday, and the course is based upon a progression of ideas and not upon a series of models. In the first year drawing is the special feature, light tool work only being introduced. The drawings consist of plane figures, which are made up of horizontal, vertical and oblique lines, arcs of circles and some free hand curves. The tools include the bracket, rip and cross cut saws, chisel, brad awl and boring bit. The carving tools include the fluter, flat gouging tools and matting tools. The first exercises in sawing include straight and curved lines, the square, rectangle, triangle, &c. The use of nails, screws and glue is also taught. The principal models are the reel, sled bracket, calendar, pencil sharpener, silk winder, easel, brush rack, match box, paper holder and cabinet. In the first year's work ½-inch stuff is used, thus eliminating all question of form except the two dimensions—length and breadth.

The second year's work has to do with ½-inch stock, and length, breadth and thickness are considered. Templates are now used instead of drawings as in the first year. The woods employed are pine, white cherry, bass and gum. Among the models used the second year are the shelf, coat hanger, wall pocket, pen rack and brush holder. The school is very proud of the fact that mounted specimens of the work of both boys and girls have been sent to Colorado for a permanent exhibit.

Wood in Brick Work.

It is generally held that nothing but its own components should be admitted into a brick wall, except what is absolutely necessary for its connection with the other parts of a building, such as wall plates and wood bricks (and that these should be avoided as much as possible), templates, lintels, &c. Wall plates are required to receive the ends of the joists and distribute the weight of the floor to which they belong equally along the walls. If the joists tailed singly on the naked bricks their thin edges would crush those immediately under them, and the rest of the brick work would escape immediate pressure altogether. Wall plates may be superseded by the use of templates says a writer in the *Architect and Contract Reporter;* but this involves the necessity of framed floors, which are carried by a few large beams, under whose ends stout pieces of timber three or four feet in length are placed. These are intended, like a wall plate, to distribute the weight over a considerable part of the wall and prevent the necessity of placing the beam on the naked friable bricks, and are called templates. Lintels are used over square-headed windows and doors instead of arches in brick work. They are useful to preserve the square form and receive the joiner's fittings, but they should always have discharging arches over them, and should not tail into the wall at either end more than a few inches, that the discharging arch be not wider than is absolutely necessary. If, however, discharging arches be not turned over them, the lintels should tail in at each end considerably and have small templates or wood bricks placed transversely under them. They may generally be quadrants of a circle, or even flatter, and should be turned in two or more half bricks over doors and windows and other wide openings, but over the ends of beams they need not be in more than one half brick.

Strength of Old Brick Work.

An interesting piece of information respecting the strength of old brick work is the result of experiments carried out by A. G. Lyster, the assistant engineer to the Mersey Docks and Harbor Board, says the *British Clay Worker.* The brick work in question was part of a wall of the Albert warehouses in Liverpool, and was built about 50 years ago of hand made bricks laid in ground mortar made with lime from the Halkin Mountain, Flintshire. This lime is in a high degree hydraulic, and makes mortar of exceptionally good quality. Having to demolish the wall, Mr. Lyster conceived the happy thought of leaving a piece of it in the form of a horizontal beam, having a 12 foot span, and measuring about 2 feet square in section, seven courses in hight of a 2-foot wall. The ends of the beam were not cut free from the rest of the work. This beam was then loaded with all the weight that could conveniently be piled upon it in iron "kentledge," without appreciable deflection or other sign of weakness resulting. Two courses were then cut off, and the whole weight again put on, but without other result. The beam was further reduced by a course, leaving it four courses, or 14 inches deep, and the ends were also cut free from the other work, the mortar beds of the 12 inch bearings being left untouched. A centrally placed load of 5 tons, 15 hundredweight was then gradually piled upon it, and was borne for several days without apparent effect upon the brick work. Finally the weight was increased to 6 tons, 9 hundredweight, 28 pounds, which was sustained for 30 hours, when the beam collapsed during the night, and came down in pieces more like broken timber than anything else. Other tests were made with similarly astonishing results; but the above are sufficient to show what really first-rate brick work in hydraulic lime will stand

CONTENTS.

BRICK RESIDENCE OF MRS. A. J. TROTT, UNIVERSITY PARK, COLORADO.

GRODAVENT BROTHERS, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, APRIL, 1895.

For Elevations, Floor Plans, etc., see pages 81–85.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
The Builders' Exchange.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR
96-102 READE STREET, NEW YORK.

MAY, 1895.

Hasty Strikes.

The strike which tied up nearly all the surface railroads of Brooklyn during the month of January has been the subject of investigation by a special committee of the New York State Assembly. This committee has just handed in an exhaustive report on the matter which, whatever may be thought of the value of the conclusions and recommendations offered, contains at least one significant statement which is worthy of repetition as illustrative of the tendency of strikes in general. In connection with the failure to agree and the sudden declaration of a strike the committee says: "Arbitration had not been resorted to and not even suggested by either party previous to the declaration of the strike. Had that been done and an arbitration had there is no doubt in the minds of your committee that the entire difficulty might have been avoided."

Prevention Versus Cure.

In view of the history of the strike, as detailed by the committee, this statement is probably true. And it would apply just as truly to many other recent strikes, where the "ounce of prevention" afforded by arbitration or conciliation was not resorted to until a strike, hastily resolved on and carried out, had embittered and hardened the feelings of both parties to the dispute. Then began the "period of cure," represented by heated arguments or stubborn resistance on either side, culminating finally in a more or less unsatisfactory arrangement, after untold loss and trouble had accrued to all concerned. The cost of the Brooklyn trolley strike is estimated as at least $2,000,000, of which $750,000 was borne by the strikers, $275,000 by the city in suppressing disorders, and the balance by the railroad companies and the public generally. Moreover, of the 5000 men who went out not more than 10 per cent. recovered their places. All this would most likely have been avoided by a little prudence and forbearance on the part of both employers and employed, giving time for a possible amicable adjustment of their differences.

Architect and Builder.

The builder is entitled to a certainty that he is dealing with one person, no matter how many representatives that person may have, and it is for this reason that the architect should be made, by the terms of the building contract, the agent of the owner; otherwise the contractor is forced to do work under the order of a person ostensibly in authority, but whose orders may be denied and overruled by the owner, to whom the contractor must look for payment. In a contract where the architect is not made the agent of the owner the contractor must execute the orders and submit to the supervision of a paid employee of the owner (the other party to the contract), but for whom the owner is in no way responsible. It is necessary that the architect should supervise his work, and he should therefore be made the agent of the owner, in order that all the responsibilities of one side may be fixed upon the owner and all on the other side fixed upon the contractor. For the purposes of a contract the architect who is made the judge as to whether or not the contractor is complying with the terms of the contract, should be made responsible in some way, and as he is in the employ of the owner it should be as the owner's agent. He should not be permitted to occupy the anomalous position of a paid agent of one party to a contract without the power to fix the responsibility of that agency upon the party for whom he is agent. This condition is provided for in the uniform contract, which has the approval of the national organizations of both architects and builders.

Princeton's Commencement Hall.

There are probably few structures in course of erection in this country which, when completed, will possess more of interest to the student of architecture than the Alexander Commencement Building, now under way at Princeton College, N. J. It will be notable in many particulars, as the building will doubtless resemble, more than any other modern effort, the structures of the middle ages, and will constitute the one type of its kind in the country. It is constructed of Worcester granite and brown stone, and forms what will eventually be one side of a square. The style of architecture is Romanesque of the eleventh century, the interior being so arranged as to resemble a Greek theater. The ornamental features will be of a high order of merit and suggestive of the purposes for which the building is intended to be used. The auditorium, semicircular in shape, is about 70 feet in diameter and will seat 1500 people, with standing room for 300 more. The seats and gallery are of oak and the sides and rear wall of the rostrum will be lined with Sienna marble, of which there will be three panels, each 10 feet high and 35 feet long. These will be filled with glass mosaic pictures, the central one representing Homer reading the "Iliad" to his characters in the story, while the panel on the left portrays the Greek warriors and the panel on the right the Trojans. On either side of the rostrum are retiring rooms, while above are two small music galleries for orchestras. The cost is placed at more than $350,000, the hall being planned and the money for it contributed by Mrs. C. B. Alexander, whose husband was a graduate of Princeton College.

Heating and Ventilating.

That better ventilation can be secured in public and manufacturing buildings is well evidenced by the working of the law controlling this matter in the State of Massachusetts. The enforcement of this law being delegated to the State Board of Police, the report of the chief of that body, Rufus R. Wade, is always an interesting volume and clearly indicative of the progress in this particular line. The report for 1894, which has just appeared, although detailing the work of the department in all its various branches, devotes by far the larger portion of its pages to reports upon schoolhouse inspection. Of particular value is a series of lithographed plates illustrating model heating and ventilating arrangements for schoolhouses. These embody the ideas of the inspectors, the result of years of close observation, and may well be taken as illustrating the best practice in the State. The individual reports of the inspectors show clearly that good ventilation, as indicated by a supply of from 30 to 50 cubic feet of air per minute per pupil, can be secured when the system is properly designed. They advocate the use of mechanical means in the shape of a fan for moving air wherever possible, and illustrate one building in which one small fan forces air to hot air furnaces and another withdraws it through the ventilating flues. Each year thus makes simpler the enforcement of the law because of the better understanding of the principles involved in ventilation and a realization that good ventilation can after all be easily secured and at moderate cost.

Faults in General Contracting.

One of the conditions involved by the system of general contracting, or the letting of an entire contract to one man, is that the obligation for payment to the sub-contractors rests with the general contractor. When a general contractor takes an entire contract he becomes liable to all sub-contractors for their share of the work. In other words, for the purpose of the contract he assumes the position of owner to the sub-contractor. It is frequently the case under this system that a general contractor takes a job without sufficient capital to carry it through, depending upon payment by the owner, as the work proceeds, for the money wherewith to pay the sub-contractors. This condition of affairs so places the sub-contractor that if the portion of work being done by the general contractor, as the carpentering, for example, is unsatisfactory to the owner, the latter can delay payment, and all the sub-contractors are compelled to wait for their money until the difference between the general contractor and owner is settled. Again, if the plumbing work is unsatisfactory to the owner the general contractor becomes responsible, and the owner may delay payment until the fault is rectified. In this case all the other sub-contractors, whose work may be perfectly satisfactory, are compelled to wait for their money until a fault in no wise their own is corrected. The fault is not so much in the system as in the manner in which it is practiced. Every contractor who takes an entire contract should, in justice to himself and as a proper protection to the sub-contractors, be possessed of sufficient capital to pay the sub-contractors when their accounts are due, regardless of any conditions that may exist between himself and the owner. Contractors lacking the requisite amount of capital should resist the demand of the owner that all parts of the work be included in one contract.

Apartment House Fires.

Within the last few weeks an extraordinary epidemic of apartment house fires has occurred in the residential district of New York City west of Central Park. The circumstances attending many of these fires point to the conclusion that they were in the majority of cases the work of incendiaries, undertaken presumably for purposes of robbery. These occurrences bring up the inquiry: How was it possible for incendiaries to carry out their work in this wholesale manner without detection? The fact is that property owners and tenants are themselves largely to blame in the matter. They have in a measure paved the way for arson by their neglect of common precautions. In the first place, in the majority of instances, apartment house cellars are left unguarded and accessible to every comer, often by night as well as by day. In the second place, in most of these houses, especially those of the older class, the dumb waiter shafts are, as a rule, incased in wood, offering the most favorable conditions, in readily combustible material and a good draft, for the spread of a fire started below. If tenants would insist upon these shafts being fireproofed by means of metal sheathing, incasing at least their lower parts, and arrange to properly guard their cellars from intruders, their houses would be rendered comparatively safe from incendiary fire, to which, under the present hazardous conditions, they are always subject. Property owners, too, will find it to their interest to adopt these simple precautions, both by securing the safety of their property and also in a lowering of the rates of insurance. It has been announced that the fire underwriters of this city are now raising very considerably the rates on risks of this character.

Sliding Roof for a Theater.

Among the latest uses to which electricity has been put is that of operating a sliding roof for a theater in Paris. According to a foreign publication the oval roof of the hall is divided into two parts, each of which is carried on four rollers traveling on a track. When once open the movable parts of the roof travel and press upon two sheltered platforms placed one above the stage and the other above the entrance hall. The rollers nearest to the center of the roof are arranged on each side on two axles, which are put respectively into motion by means of a sprocket chain and a train of gearing, the latter including a pinion arranged on the shaft of an electric motor. The two motors are arranged on each side of the roof. They are calculated for a speed of 1000 revolutions. On one side of the roof are suspended seven hard copper wires, upon which rub sliding contacts fixed to the two parts of the bridge. These wires are numbered, and are connected to insulated conductors leading to the switchboard, from which the roof is operated. The two circuit wires are brought in through a double pole cut out protecting a two-pole switch. From this switch one of the conductors is led to two switches, or magnetic cut outs, which are regulated in such a manner that the circuit of each motor is automatically opened if the intensity of the currents exceeds 10 ampères. Leaving these appliances the two circuits are conveyed each to a changing switch having suitable resistances for regulating the current. These changing switches carry two movable contacts which are insulated from each other. The upper is for putting in or out of a circuit a smaller or larger amount of resistance, and consequently varies the intensity of the current, this corresponding to alterations in the speed of the motors. Moreover, it assists the lower one in serving as reverser and in changing the direction of the current in the armature without altering that passing through the magnets in such a manner as to assure the change of the direction of rotation of the motors. In the positions occupied by the changing switches the switches are out of circuit and no current traverses the motors, which are, of course, stationary. The two large semicircular segments placed at the bottom of the two switches are connected to the bare wires. The brushes connected at the entrance of each of the armatures make contact on these wires. On starting the motors absorb between 9 and 10 ampères, but once in operation the current used ranges from 5 to 7 ampères. The operation of putting the sliding roof in or out of position is effected in less than one minute at a cost of about a penny.

Arranged upon the two halves of the roof and on the vertical face of the bridge are two contacts, which, shortly before each part of the roof reaches the end of its travel, press upon two buttons, each actuating an electric bell placed under the switchboard. The latter are arranged in a battery circuit, and on ringing they indicate to the attendant, first, that stoppage is near, which allows the man to manipulate the rheostat so as to diminish the speed, and, secondly, on ceasing to ring, that the sliding parts have reached the end of their course, the contacts having passed over the buttons. If at this moment the attendant were to forget or neglect to interrupt the current, it might happen, the motor being unable to revolve because of its being wedged up, that the current would reach a value which would put the motor out of use. At that moment, however, the magnetic cut out acts and breaks the circuit. This apparatus is simple and is said works well.

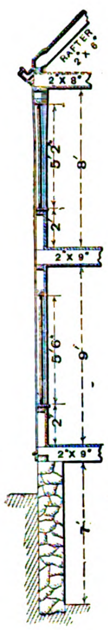
Broken Ashlar.

This style of construction is gaining favor rapidly and is destined to occupy a large place in building operations. Some of the reasons for this are worthy of consideration. To begin with, it appeals to the artistic taste, for while the elements of its construction are few and simple it produces an endless variety of shading, owing to the inequalities of projections. It is this variety of expression which constitutes its charm, says W. D. Lewis, in a late issue of *Stone*. Like the shading of foliage, where variety produces the picturesque. In work of uniform coursing there is too sharp a contrast to the variety of shade, lacking that harmony of expression so characteristic of broken work. As in varied gradations of shade in foliage there is a general uniformity of masses peculiar to the kind of growth, so there is a uniformity of massing necessary to the best effect of this class of work. A certain proportion must be observed which will insure diversity and obviate complexity. The key of proportion is found in the "riser" or "jumper," whose length and hight should be nearly equal, the stretcher two thirds the hight and about twice the length of the "riser," the "snip" one third the hight and of various lengths, being easily fitted when needed. With this method of preparation the mason's work becomes easy and expeditious. Observing the rule of "two to one," two stones abutting the larger one, so as to coincide in hight, and carefully breaking joint to avoid vertical lining, distributing the different sizes evenly as possible, the work grows into "beauty which is a joy forever."

A MOVEMENT is on foot looking to the establishment of a permanent exhibit of building materials and of the allied arts in New York City. The general plan of the undertaking involves a permanent exhibition where constructive material, finishing equipment and decorative goods, together with new devices and appliances designed for use in modern construction, shall be presented so as to constitute instructive object lessons, affording opportunity for intelligent inspection, study and comparison. For the purpose named the management have secured floor space 100 x 165 feet in area in the Cammeyer Building at the corner of Sixth avenue and Twentieth street. The exhibit will be under the personal direction of Edward H. Bowen, who for some years was in charge of the building material exhibit in Brooklyn.

A SUBURBAN COTTAGE.

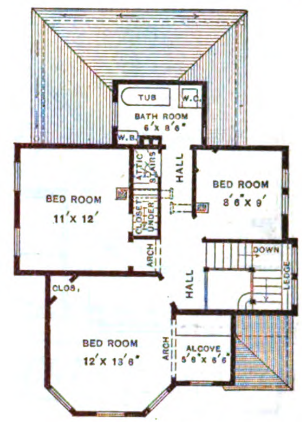
CONVENIENTLY located on a pleasant street in that resident portion of the city of Newark, N. J., known as Forest Hill, is the cottage which we illustrate by means of the supplemental plate, elevations, floor plans and constructive details presented herewith. The design is one well adapted for a suburban site, and embodies features which cannot fail to interest a large class among the readers of the paper. The exterior is neat and attractive, the particular style of treatment being clearly indicated in the half-tone reproduction of a photograph taken especially for the purpose. On the main floor there are four rooms and a good sized hall, while on the second floor are three sleeping rooms, one being provided with an alcove and a bathroom. The special arrangement here shown was designed to meet the requirements of Mr. W. E. Carlson, for whom the dwelling was erected about two years ago at a cost of $3000, from plans prepared by H. Galloway Ten Eyck, architect, of Newark, N. J. The foundation walls are 16 inch stone work, faced with ashlar above the grade line. The cellar, which is 7 feet in the clear, has a concrete floor. The timber employed for the frame of the house is hemlock, the sills, tie plates and corner posts being 4 x 6 inches, the first and second floor beams 2 x 9 inches, the third floor beams 2 x 8 inches, placed 16 inches on centers; the rafters 2 x 6 inches, placed 24 inches on centers, and the studding 2 x 4 inches, placed 16 inches between centers. The frame of the building is covered with 1 inch hemlock sheeting, upon which are laid 6-inch white pine clapboards. The roof is covered with 18 inch sawed cypress shingles. The exterior has two coats of paint and the roof is finished with creosote stain. The flooring is of No. 1 North Carolina pine and the stairways are of oak. The stair landings are lighted with colored leaded glass sash, as indicated in the side elevation. The interior trim and doors are of white wood finished in the natural color. The laundry and bathroom are fitted with the usual plumbing fixtures, which are installed in a first class manner. The house is heated by a furnace, the position of some of the registers being indicated on the floor plans.



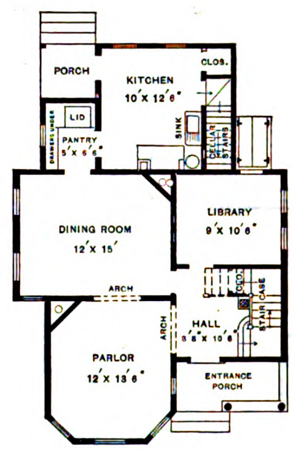
Section.

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

A Suburban Cottage.—H. Galloway Ten Eyck, Architect, Newark, N. J.



Second Floor.



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

Points on Acoustics.

One of the papers read before a recent meeting of the Ontario Association of Architects dealt with the subject of acoustics, and what the author, D. G. Baxter, had to say is of such interest to many of our readers that we present the following extracts:

Acoustics, the science of sound and hearing, it is to be regretted, is but dimly understood. We are groping around in the dark, following a will-o'-the-wisp that we seem seldom able to catch, and when we do catch it it appears more by chance than by a previous certainty of scientific fact.

Instead of using acoustical science as the primary basis in constructing the design of a public speaking place, we too often leave it to a mere secondary place, letting it take care of itself, and apologizing for bad acoustics by an artistically proportioned or decorated interior.

In designing a church, theater or public hall the first consideration should be proportion, length and breadth, with galleries, to seat our required audience, and proportionate hight of ceiling to accommodate all. Saunders' experiments give as a result that an ordinary speaker, in the open air on a still day, may be heard distinctly 92 feet in front, 75 on each side and 31 behind. Wren, however, claims less, his observations giving 50 feet in front, 30 on each side and 20 behind. It will thus be seen that the circumscribed area will seat, roughly, about 1000 people. This area being inclosed and galleries inserted, as many as 2000 persons might be accommodated; and allowing for conduction and retention of the sound waves, we might increase the area to accommodate 4000 or more.

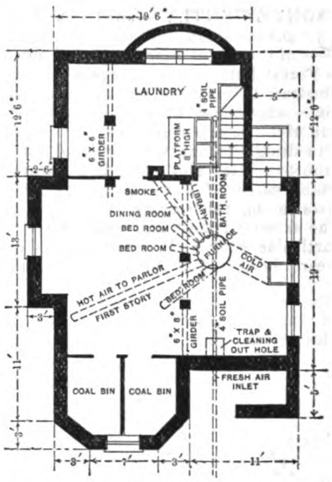
Large buildings may roughly be divided into two classes: 1. Those in which the audience hears by direct radiation only, such as theaters or music halls, when high shallow rooms are advisable. 2. Those in which the audience hears by conducted radiation, such as cathedrals or other large churches without galleries, when long low buildings are best. In either construction it is bad policy to have the auditorium contain any more air than is absolutely necessary. The more air there be, the more vocal exertion neces-

sary to set it in vibration. For ventilation have good quick circulation, preferably from the speaker to the rear, or what is still better use the "plenum" system, which is exceptionally good, on account of the heavier sound wave produced in the slightly condensed air.

FLOOR AREA.

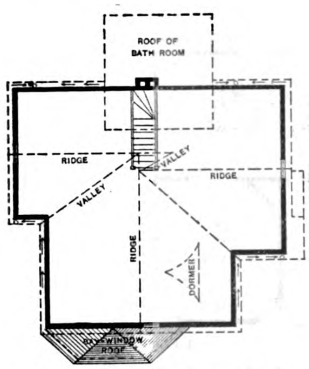
In designing an auditorium to seat a given number of persons, a certain shall be the contour and hight of ceiling, are indeed vexed questions, calling for a great deal of personal observation and ingenuity; bounded by no iron rules, governed by few fixed laws, affected by the restrictions of site and finances, these limitations, together with the whims and caprices of the proprietors, make the problem to the architect indeed a difficult one.

For lecture and school rooms a hight where the speaker is on the shortest axis, a hight of 1, width of 2 and depth of 3, has proven good.

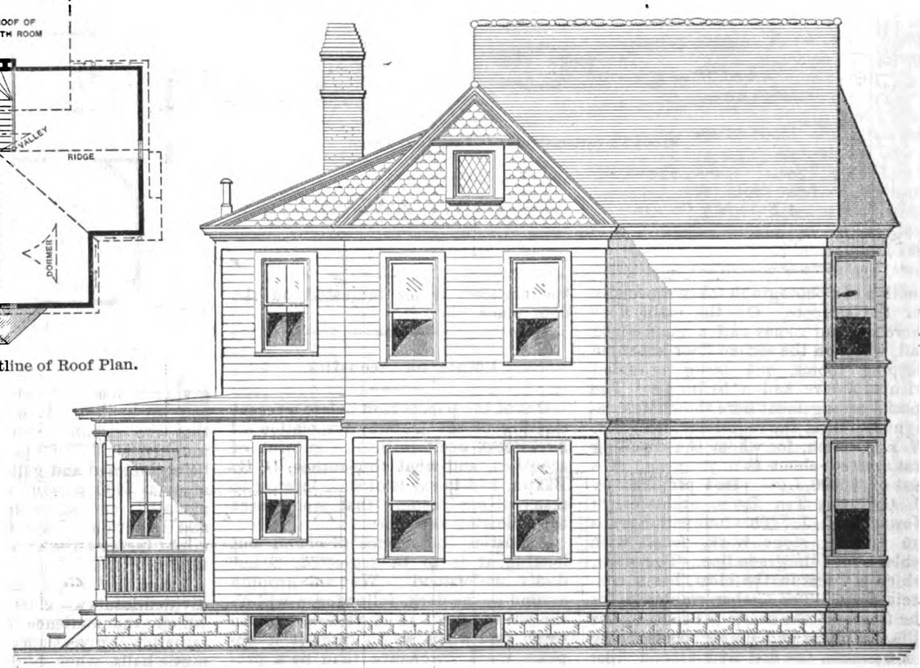


Foundation.

Side (Right) Elevation.



Attic with Outline of Roof Plan.

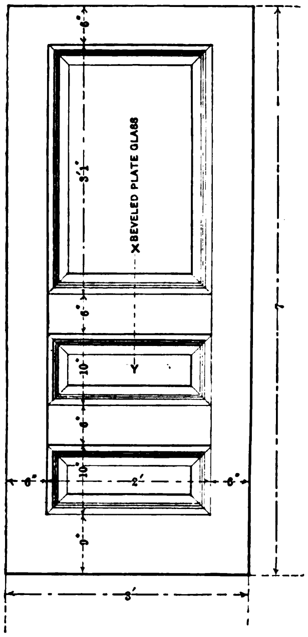


Side (Left) Elevation.

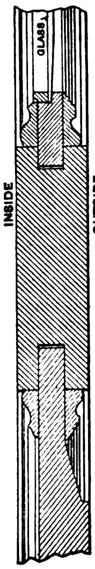
A Suburban Cottage.—Elevations—Scale, ⅛ Inch to the Foot.—Plans—Scale, 1-16 Inch to the Foot.

floor area is required, but how to divide this required area into main floor and galleries, to come within a proper proportioned width and length, and what of 2, depth of 3 and breadth of 4, has proven extremely satisfactory, the speaker being on the longest axis. For small churches, court or other rooms,

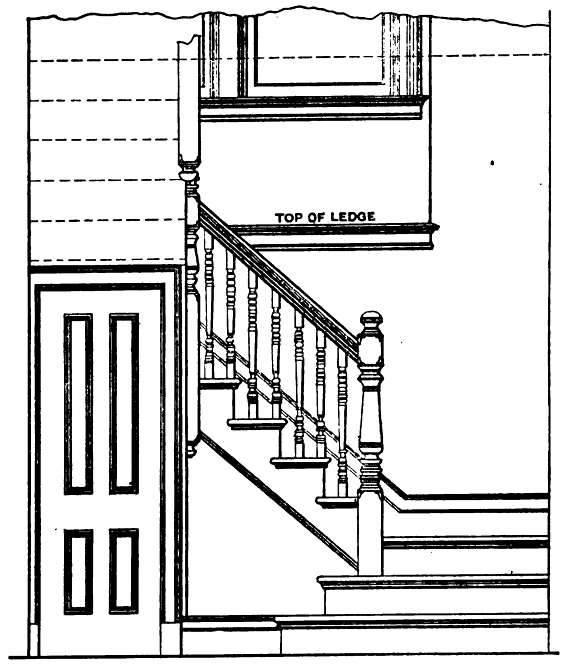
On account of the nodal points established by the columns in nave and aisle churches, a length of 4 to 5, width of 2, and hight of 1 to $1\frac{1}{4}$, work well; this



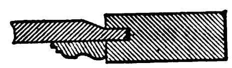
Detail of Front Door.—Scale, ⅛ Inch to the Foot.



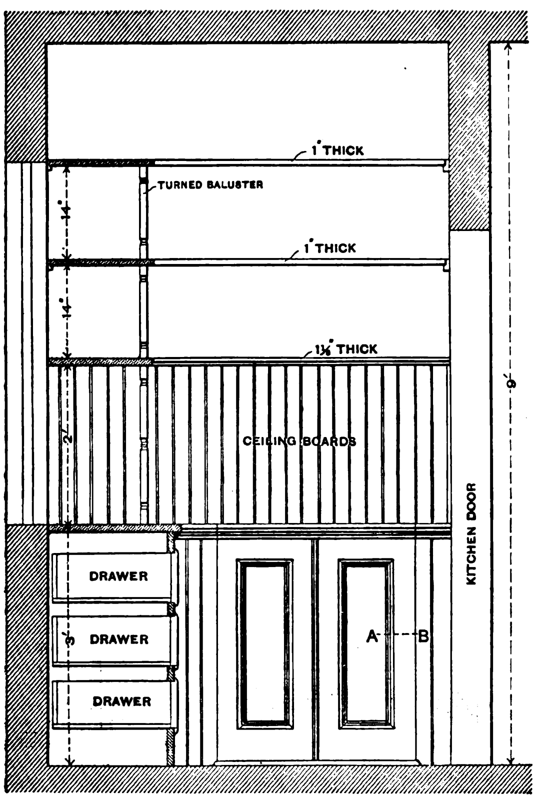
Section through the Front Door at X Y.—Scale, 3 Inches to the Foot.



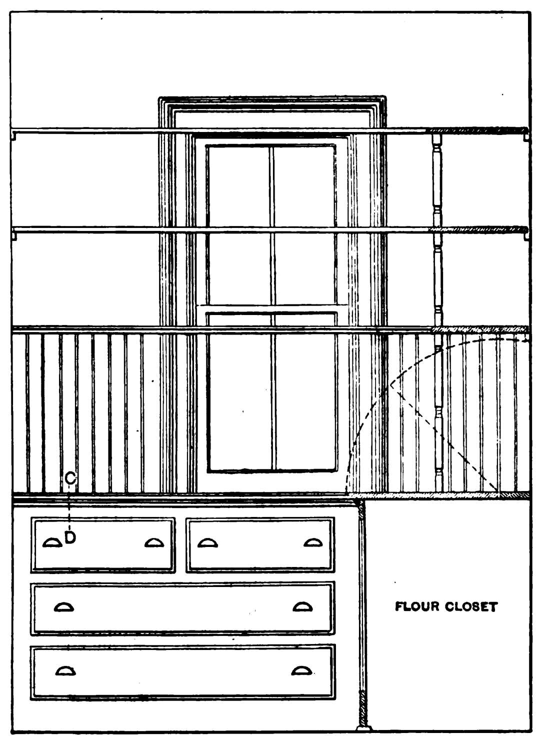
View of Main Stairs Looking from the Parlor.—Scale, ⅜ Inch to the Foot.



Section through Cupboard Door at A B.—Scale, 3 Inches to the Foot.



View in Pantry as Seen from the Dining Room.—Scale, ⅛ Inch to the Foot.



View in Pantry as Seen from the Kitchen.—Scale, ⅛ Inch to the Foot.

Miscellaneous Details of a Suburban Cottage.

is for cubical contents, but on account of the lower ceiling in the aisles the nave ceiling may be greatly increased in hight over the above proportions. On account of limitations of site no definite rules can be given for theaters; generally speaking a hight of 3, breadth of 4, and length of 5, is satisfactory. Many successful Chicago theaters are of this proportion. In all buildings for public speaking, except perhaps cathedral churches, floors should be constructed on the isacoustic curve plan, straight slopes being as bad for sighting as a level floor and, if anything, worse for the passage of the sound curves.

CEILINGS.

Ceilings greatly affect sound. Where flat they should never join the walls at right angles, but in sweeping curves or cores, and are best lightly paneled. Skylights, if introduced, should have a sash at the ceiling line to cut off the contained air, which, starting in a sympathetic vibration of its own, would cause an echo, or if not would form an eddy, much to the detriment of the free passage of the sound. If possible it is well to bring down the ceiling on a regular curve or jogging slope, as low as possible, above and behind the speaker. This considerably reduces the volume of air to be set in motion, eliminates all chance of echo caused by the eddying of sound vibrations at this point, and directs the waves out into the hall. In theaters a line should be drawn from the top of the proscenium arch to the top of head room over the highest gallery at the rear wall and the ceiling kept on this line—of course, not a straight slope; cut the ceiling up into steppings, coves and panels. This helps artistically, and also breaks up the continuous reverberation which would cause echo from the rear wall. It is also advisable to have theater ceilings follow the curve of the proscenium arch for some little distance out, at least as far as the last box. Vaulted ceiling churches are exceptionally good for speaking in. The ceiling breaks up continuous vibration and the columns help to direct the sound forward by forming nodal points on which the sound curves turn.

WALLS.

Walls have no mean part to play in the acoustical properties of rooms. They should always be broken with slightly projecting pilasters or shallow recesses. In theaters it is advisable to draw in the walls at the boxes at an angle of, say, 45° or even longer. This contraction at the proscenium, together with the sloping ceiling, gives the interior a speaking trumpet or funnel shape which is extremely easy to speak in. Like the expansion of the circles produced on still water by the dropping of a pebble, so also do sound waves expand as they recede from the speaker. In addition to this, all air space is cut off where it is not required and where lines of sight die out. The less air to be set in motion the easier it must be on the speaker.

Galleries are never good when of excessive projection; the greater the projection the higher they should be. The ceiling underneath and the floor below should on section be shaped like a wedge, not as is generally the case, small end out and big end in, but with wide end out and narrow end in, thus counteracting the absorption of sound by the soft clothing of the audience and the gradual lessening of power in the sound as it recedes from its source. Besides, this shape is a great gain in structural strength, the only objection being, of course, ventilation, which is extremely hard to perfect in this construction, especially if the gallery be low.

The proper location for the choir in non-ritualistic churches is hard to arrive at, and varies with whims of the proprietors altogether too much. In front and below the preacher is not admissible for several reasons. They should not be behind him and on nearly the same level, for a great deal of effect is lost from the discourse by the preacher being surrounded by a halo of beaming femininity; therefore I incline to believe that a choir is better when raised up above the speaker's head and placed in a groined recess. This form raises up the volume of choir sound above the heads of the congregation, and there being a recess, the tendency would be for the sound to travel in a greater volume and further ahead.

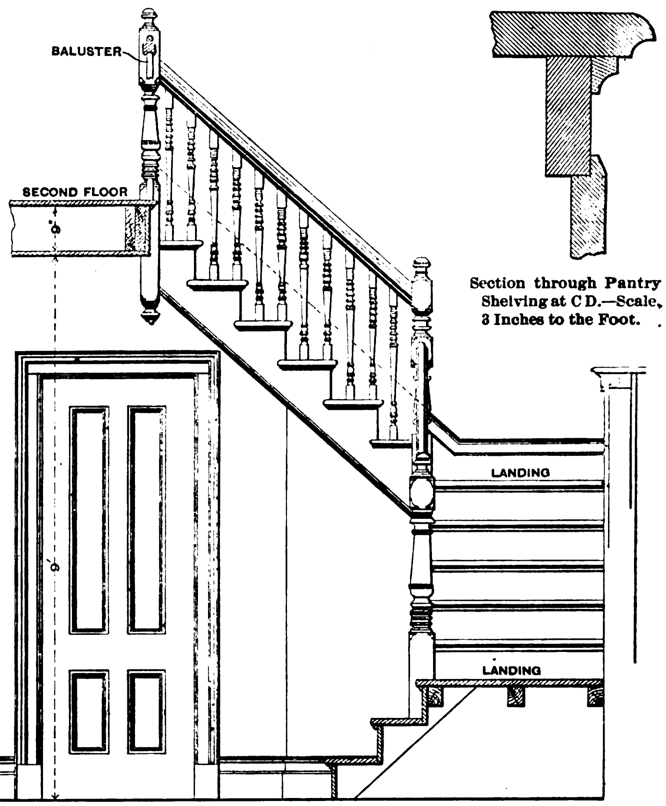
In designing ritualistic churches, care should be taken that the chancel arch does not project more than a few inches on each side of the walls on the chancel side. If the chancel width be contracted very much at this point the sound therefrom will be greatly muffled and appear flat and dead.

The orchestra in theaters should receive careful consideration. Around it resonant materials should be used, and the shape must be such that the sound will be directed up and out over the audience.

All buildings present obstacles and auxiliaries to the passage of sound and the direction of it properly over the audience. In designing, auxiliaries can often be introduced, but as they are of doubtful result—doubt, not only as to their proper working, but that they will not prove formidable obstructions—it is advisable to discard all experiments thereon and confine our attention to the elimination of as many obstacles as possible.

SURFACE MATERIALS.

A great deal might be said about what materials are best to use on the surface of our work, and what are not. Thin pine boards in long lengths are exceedingly good; or, in plaster work, I know of nothing better than "Adamant," on account of its extreme hardness and uniform elasticity. Any soft covering is never good, as it deadens sound by absorption. Walls and ceilings vibrate in unison with the vocal chords of the speaker, and any lining which is resonant and elastic enough to keep up a sympathetic vibration throughout the entire wall or ceiling length only is admissible for use, preference being given to such materials as are capable of sustaining or augmenting the vibrations. Again, in rooms where an echo is perceptible, while the room contains its full capacity of auditors, a judicious use of drapery or curtains will generally remove it. If these be not admissible, then some soft surface covering over that part or surface which causes the trouble will have the desired effect. In rooms where the acoustical properties are poor, to improve them resonant materials for walls and ceilings are usually good in result; often only a sounding board behind and above the speaker will have the desired effect, or it may be necessary to change the shape and contour of the walls and ceiling.



Section through Pantry Shelving at C D.—Scale, 3 Inches to the Foot.

Section and Elevation of Main Stairs Looking Toward the Library.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of a Suburban Cottage.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND

THE design which is represented in connection with this article is rather more difficult to cut than any that has preceded it, but with the aid of the general views and the sections the student should find little trouble in producing a satisfactory piece of work. The design shown in Fig. 66 is that of a Grecian ornament, and is intended to be repeated so as to form a continuous band, as indicated in Fig. 67. The first step necessary in executing the design is to sketch it upon the block intended to be cut and then work down to the plane or background in the manner previously indicated. The plane in this figure is of different hights, as will be seen from an inspection of Fig. 68, which represents sections taken on various lines of Fig. 66. The cross sections and views have been prepared, using the portions marked x x x, Fig. 66, as a base line, and which are represented in the sections given in Figs. 68, 69, 70 and 71 by dotted lines, thus enabling the student to see at a glance the relative position and proportion of the various parts one with another. After the planes are worked down sufficiently, take some thick paper or very thin cardboard and prepare molds or templates according to the cross sections. Neatly work the portions down to the points required, and after these are correctly executed shave the balance of the design until it assumes proper shape and accords with the views given in Fig. 66, marked M N and 1 2 3, shown also in the extended view, Fig. 69. It will be noticed that the line 3 shows two very different shapes, depending upon the position from which it is viewed. In looking directly down upon the plan its outline is semicircular, while viewed edgewise or from the side it has the appearance of a flattened V. The greatest difficulty will be found in making these two views coincide. Cross sections of them are indicated in Fig. 68 on the line A B, and marked O O. I would advise the student to study the plan and details so as to get the correct shapes well fixed in mind before beginning to cut the figure. It is no loss of time to have the general plan well studied out before commencing, for difficulties which seem almost insurmountable at first glance will then vanish with a little application. It is understood, as I mentioned before, that the sections apply with equal force to all similar portions of the figure represented as well as to those particularly marked.

The only tool, other than those already mentioned, necessary to cut this design is a chisel for working into the sharp angles. The views presented in Fig. 72 will give a good idea of what is required. Grind with a bevel or basil on both sides, so as to enable the tool to be used right or left handed, as may be required.*

(*To be continued.*)

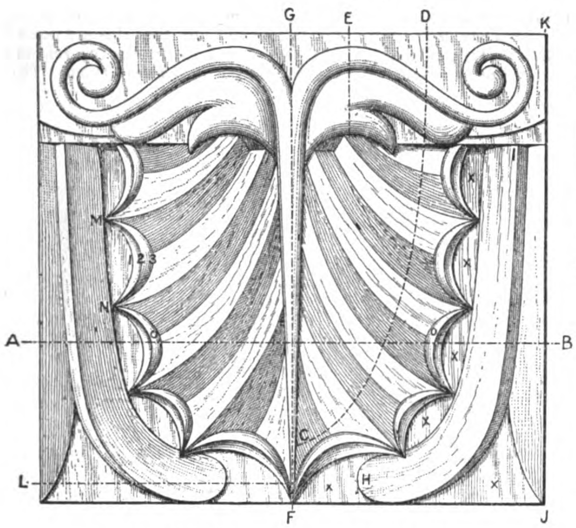


Fig. 66.—Design for a Grecian Ornament.

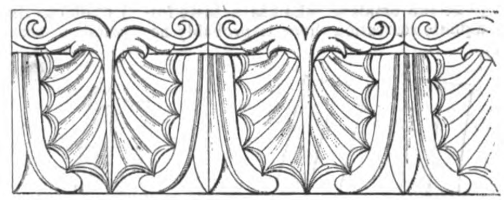


Fig. 67.—Appearance of the Ornament when Used as a Molding or Border.

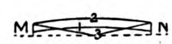


Fig. 69.—An Extended View from M to N of Fig. 66.

Fig. 70.—Extended View on Line Running from I to H.

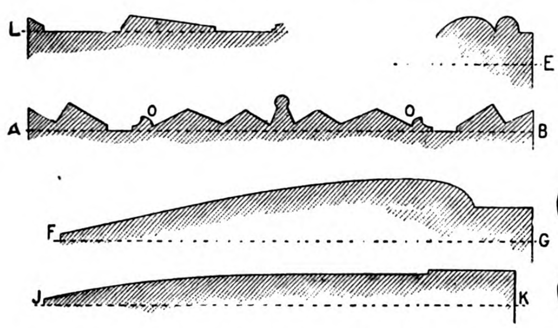


Fig 68.—Sections Taken on the Various Lines Indicated.

Fig. 71.—Extended View on Line C D.

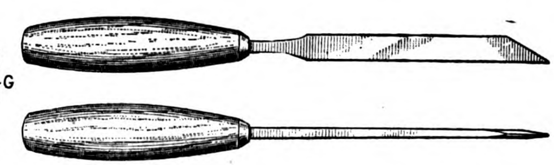


Fig. 72.—Chisel Required in Cutting the Grecian Ornament.

Hints on Wood Carving.—By Charles J. Woodsend.

* Copyrighted, 1894, by David Williams.

AT the thirty-fourth semi-annual meeting of the National Association of Master Builders of Great Britain, held at Birmingham, England, the old officers were unanimously re elected.

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

BOAT BUILDING FOR AMATEURS.—I.

SOME years ago we presented in these columns a very interesting series of articles on boat building for amateurs, by H. L. Campbell, which attracted widespread attention. In fact, the inquiries for copies of the paper containing these articles became so numerous as to finally exhaust the entire edition, after which we received many requests to reprint the matter in full. As there are doubtless thousands of readers of the paper whose names were not on our lists at the time the articles were originally published, we take pleasure in complying with the requests noted, and trust that the directions for building a boat here given will prove both timely and instructive. Mr. Campbell says:

To the amateur who has a taste for aquatic recreation there is probably no intended for deep and rough water would hardly be suitable for a broad, shallow river or for marshy places where the tide ebbs and flows. For the latter there is probably nothing better than the old fashioned punt, with flat bottom and straight sides, as it draws very little water and can be dragged over wet grass and mud quite easily. The shallow bays on Long Island Sound have been the means of improving the punt till it has reached perfection in the form of the sharpie –a sailing boat with overhanging stern and fine bow, and which can hardly be improved upon for sailing in smooth and shallow water.

As the construction of flat bottomed boats is not difficult, we will pass them by for the present and select as the subject of our illustration a type of boat in common use among the fishermen on required to make the joints or seams between the planks perfect, it is not a very good method to use for boats with the planking less than ⅝ inch thick, as planks thinner than this are liable to spring between the ribs. The ribs must also be made heavier, as they take all the strain of holding the boat together. The planks must also form close joint on the inside and be slightly open on the outside to allow the calking material to be introduced easily and prevent it from being shoved through.

The "ribbon carvel" method is similar to the carvel, with the addition of a ribbon or batten laid along the joint on the inside, both planks being nailed through it and the nails clinched on the inside; sometimes the ribs are placed next the planks, as in the carvel, and the ribbons cut in between them. This

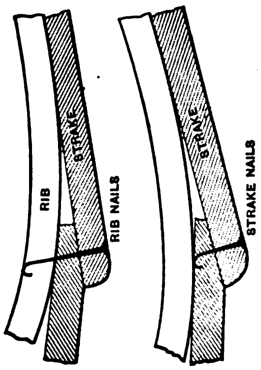


Fig. 1.—Two Examples of Lapstrake Construction.—Scale, 6 Inches to the Foot.

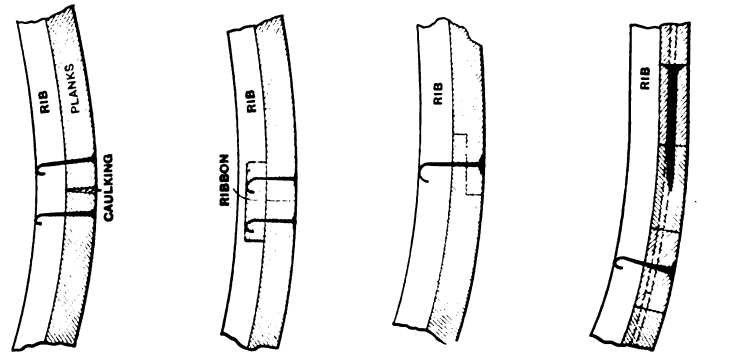


Fig. 2.—Carvel. Fig. 3.—Ribbon Carvel. Fig. 4.—Shiplap. Fig. 5.—Strip Laid.

Methods of Construction.—Scale, 6 Inches to the Foot.

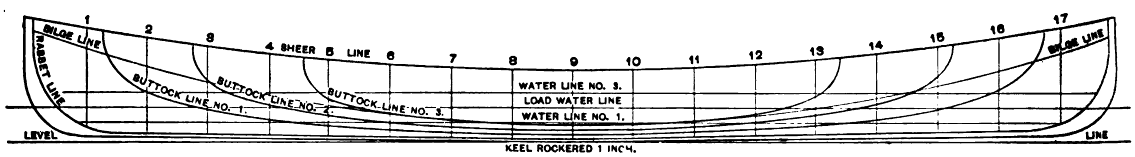


Fig. 6.—Lines for an 18-Foot Clinker Boat.—Sheer Plan.—Scale, ⅜ Inch to the Foot.

Boat Building for Amateurs.—By H. L. Campbell.

mechanical occupation so interesting as that of boat building, but as professional boat builders are rather chary about giving information in regard to their work, and books relating to the subject have heretofore been very expensive and difficult to procure, the amateur who has attempted to build his own craft has found such a great number of obstacles in the way of a successful termination to his labors that he has ofttimes given up in disgust before the work was fairly commenced, and reinforced the kindling pile with a varied assortment of barrel hoops and mutilated pieces of lumber. Bearing this in mind, we will endeavor to explain the principles that govern the designing of boats in general, together with the mechanical manipulations necessary to build them successfully in such a manner that any one possessed of a fair amount of mechanical ingenuity and tolerably handy with tools can design and build a boat that he can regard with satisfaction when it is completed. The character of the waters in which a boat is to be used should in a great measure govern its design, as a boat the Great Lakes, which for strength, safety, buoyancy, lightness, ease of management and general all around purposes cannot be excelled. These boats are generally known as "clinkers," a corruption of the word "clincher," which alludes to the manner in which they are built, the planks or "strakes" being lapped over each other like the clapboards on a house, and nailed through and through, the nails being clinched on the inside; hence the name. This form of construction is properly called "lapstrake" or "lapstreak," Fig. 1, and is probably the best method of constructing small boats, the other methods being "carvel," Fig. 2, "ribbon carvel," Fig. 3, "shiplap," Fig. 4, and "strip laid," Fig. 5. In the "carvel" method the planks are laid edge to edge and nailed to the ribs close to their edges, the joint being afterward filled with a thread of cotton run in with a knife or small tool designed for the purpose. This method is the one principally used for all large boats and vessels, but as all the ribs have to be set up before the planks are nailed on, and as considerable skill is method does away with the necessity of calking, and is stronger than the carvel, but it requires just as delicate workmanship and is heavier than either it or the lapstrake methods. In "shiplap" construction the planks are rabbeted half their thickness the width of the lap, and nailed through and through, the nails being clinched on the inside. This method is lighter than the lapstrake, and gives a smooth surface inside and out, but it is weaker and requires very skillful handling with thin planks.

In "strip laid" construction the planks are about 1 inch wide at their widest part and taper toward each end. They are laid edge to edge and nailed through and through edgewise, from 2 to 3 inches apart, the nails being long enough to pass nearly through two strips. This makes a heavier boat than any of the other methods, as it requires so many large nails, but the principal objection to its use is that it is almost impossible to replace a broken strip on account of the intricate manner in which they are fastened together. By the four last mentioned methods of construction a smooth outer surface is obtained, but aside from this they do not compare favorably with the lapstrake for small work. A lapstrake cedar canoe made for cruising in Florida weighs 10 pounds and a few ounces and is capable of carrying a man and 30 to 40 pounds of "dunnage" quite comfortably. It would hardly be possible to attain the same degree of lightness and strength combined by any other method of building. The lapstrake method, however, is not applicable to large boats and vessels, from the fact that its water tight qualities depend on the closeness of contact between the wood surfaces caused by the driving and clinching of the nails, and the strains which a large boat is subjected to in a heavy sea causes these surfaces to work on each other and loosen the fastenings. When once loosened they cannot be tightened, nor can the seams be calked, because any attempt to drive calking material into the seams only has the effect of pulling them further apart. In carvel boats the seams open and sometimes the calking is worked out, but they can be easily recalked, as the strain produced by calking is at right angles to the fastenings and does not injure them. A small lapstrake boat may be built perfectly tight without the use of paint to fill up the seams, and it will stand a great deal of knocking about before getting "shaky," when a coat of paint will make it as good as new.

The "clinker" is generally built sharp at both ends, although a great many are built with square sterns. The latter are not so good for rough water; the stern, being cut away below the water line, lacks buoyancy, and in riding a sea sinks a great deal deeper than the bow and is very liable to take the crest of a wave inboard, especially if it happens to break as the boat goes over it. When both ends are alike the stern lifts a great deal quicker and the chances of taking in water are considerably lessened. The average size of a clinker is about 4 feet beam, 18 feet in length over all and 13 inches deep at the center. Some are built larger and some smaller, but there are more built of those dimensions than of any other, a boat of this size being easily handled with either one or two pairs of oars, will carry four persons safely and can be drawn out of the water readily by one man.

After deciding on the size and style of the boat the next step is to make the drawings. These consist of the body plan, the sheer plan and the half-breadth plan, with as many details as the size and importance of the boat may demand. The drawings are called "plans," but the body plan is really an end elevation, while the sheer plan is a side elevation. The first part to be considered is the midship section, corresponding to line No. 9 on Figs. 6, 7 and 8, as the shape of this has a great influence on the entire shape of the boat. This section is always taken at the widest part of the boat and is not always placed at an equal distance from each end, some designers contending that it gives better results when placed nearer the bow, on the "cod's head and mackerel tail" principle, but in this instance it is placed exactly in the center, as we believe it is the proper place for it. The midship section may be divided into three component parts—the floor, the bilge and the freeboard or topside. When the floor rises from a level line, as in Fig. 9, it is called a "rising floor," and the distance between it and the level line A B is called the "deadrise," generally expressed in a certain number of inches to the foot. In this instance it is $1\frac{1}{4}$ inches to the foot. When the floor is level and coincident with the line A B it is called a "flat floor" and has no deadrise. A boat with a flat floor will not draw so much water and is not so "cranky" to move about in as one with a rising floor, but a rising floor behaves better in rough water and is productive of finer lines fore and aft.

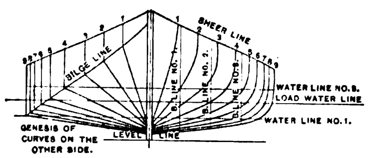


Fig. 7.—Body Plan.—Scale, ⅜ Inch to the Foot.

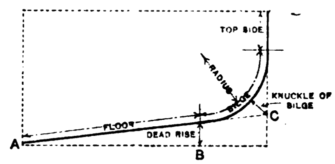


Fig. 9.—Midship Section.—Scale, ¾ Inch to the Foot.

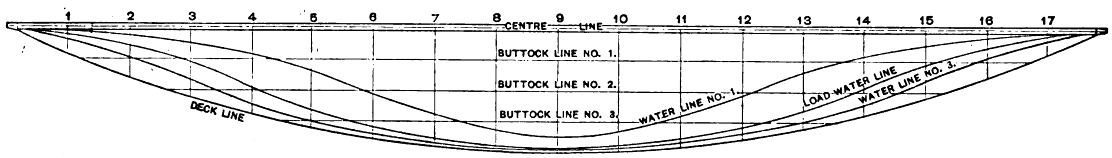


Fig 10.—Lines for an 18-Foot Clinker Boat.—Half Breadth Plan.—Scale, ⅜ Inch to the Foot.

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Care must be taken, however, not to give too much deadrise to the floor, or the boat will require ballast to make it steady enough for comfortable use. The depth of the topside is generally equivalent to the width of the top strake, as this strake should always be vertical, but some builders extend the curve of the bilge to the gunwale, doing away with the topside entirely. This is bad practice, however, as it diminishes the bearings or "knuckle" of the bilge and impairs the sailing qualities of the boat. The bilge may be any curve that the fancy of the designer may dictate, but we consider the part of a circle forming a tangent with the topside and floor to be the best and easiest applied.

The next drawing to be made is the half-breadth or deck plan. Here again the fancy of the designer may dictate a variety of curves, making the bow full and stern slender, or by carrying the midship section well forward and aft, making a parallel middle body and bluff ends. Many builders depend on their eye and trace a curve that pleases that sometimes deceptive organ; but the truest curve and one that gives the finest lines is an arc of a circle struck with a radius touching both ends and the midship section. Before striking this line deduct the width of the stem and stern from each end and lay off half the thickness of stem and stern at one side of center line as a starting point. In drawing the sheer plan we commence with the keel. This may be from 1 to $1\frac{1}{4}$ inches deep, and we have rockered it 1 inch. The reasons for raising the keel at each end are, first, to counteract the tendency that every boat has to become "hogged" or dropped at the ends, caused by the center receiving more support from the water than the ends; second, the boat turns easier, and, last, it will run up further on a beach when making a landing.

The sheer is the distance that the ends rise above the center at the deck line. It is generally an inch or two more at the bow than at the stern, and, like the deck line, the sheer line should be an arc of a circle. Plenty of sheer makes a boat suitable for heavy seas and rough water, and it also makes a boat difficult to row against a head wind. We have selected 11 inches as being a moderate sheer and made it the same at each end. The stems should be plumb for half their depth, the curve joining them to the keel being a quarter circle; the line of the planking should also join the upper line of keel with a quarter circle struck with a longer radius than the face of the stem, so as to leave as much wood as possible to be tapered to a fine edge. After the keel, stem and stern have been drawn and the sheer line struck, the bilge line may be struck. This is also an arc of a circle, starting at the bottom of the top strake at stem and stern and touching the point at C, Fig. 9, where the lines of the floor and topside would meet if extended. We now divide the sheer plan vertically by lines 12 inches apart, according to scale, as shown in Fig. 6, and number them consecutively from stem to stern, as shown; we also divide the half-breadth plan in the same manner and number the lines to correspond with those on the sheer plan. This done, we can commence to fill out our body plan. Draw a vertical line on each side of the center line of body plan, to represent the thickness of the stem. Now measure up from the level line in Fig. 6 to where line No. 1 intersects or stops at the rabbet line, and lay off the same distance on the stem in Fig. 7, measuring up from the level line. Now measure the distance from the level line to where line No. 1 intersects the bridge line in Fig. 6, and transfer this distance to the stem in Fig. 7, measuring up from the level line as before. Through the point thus found draw a light horizontal line; now take a third measurement from the level line in Fig. 6 to where line No. 1 starts from the sheer line and transfer this point to the stem in the same manner as the two preceding measurements, also drawing a light horizontal line through this point. The first horizontal line represents the hight of the bilge line where it intersects with line or station No. 1, and the upper horizontal line the hight of the sheer line at the same place. We now go to the half-breadth plan, and on station No. 1 we measure the distance from the line representing the thickness of the stem to the deck line, and lay this distance off on the upper horizontal line on the body plan, measuring from the side of the stem. Now, draw a straight vertical line from this point to the lower horizontal line bilge point and connect the bilge point with the rabbet point on the stem by another straight line. We have now the shape of station 1 on the body plan, as shown on the left side of Fig. 7.

We now go through the same process at each station up to and including No. 9, which is the midship section, and drawing a line through the upper points to represent the deck and sheer lines and one through the lower points to represent the bilge line, we have the body plan completed as far as shown on the left side of Fig. 7. We now have a flat bottom or plane curving gradually from an almost horizontal position amidships to a vertical position at each end and a vertical side intersecting it, the line of intersection being marked by the bilge line. Quite a number of boats are built in this manner with perfectly straight timbers on bottom and sides, principally on Long Island Sound and vicinity. They are known as "skipjacks," being an evolution of the sharpie and possessing somewhat better sea going qualities than that craft.

Our next step will be to replace the sharp angles shown on the left side of the body plan with the curves shown on the right. This might have been done as we proceeded with each line, but we wished to show that the body of a boat was formed by two curved planes, the intersection of the planes forming the bilge line, and being left angular in the skipjack model, but in a round modeled boat the angles are replaced by a series of graceful curves. The curve of the bilge at station 9, or the midship section, is shown in Fig. 9, and the curve at each station is obtained in the same manner, the radius increasing at each station toward bow and stern, and the point from which the arc is struck being nearer the sheer line at each station approaching the ends. It is not necessary to be exceedingly particular in drawing these curves in at first, with the exception of the midship section, as subsequent operations may require the alteration of some of them. When finished the body plan will appear like the right hand side of Fig. 7. When both ends are alike it is only necessary to draw the lines on one side of the center line, but when the ends of the boat are dissimilar half of the stations are drawn on one side and the remaining half on the other.

Our next step will be to draw the water lines on the body and sheer plans. The first is drawn 3 inches up from the bottom of the midship section, where it joins the rabbet line, and the other two at intervals of 3 inches each. After drawing them in on the sheer and body plans we proceed to transfer them to the half-breadth plan in the following manner: Commencing with the water line, No. 1 on the sheer plan, we measure from the extreme end of the stem to where the water line intersects the rabbet line, and transfer this distance to the half-breadth plan, marking the point on the stem line; this will be the starting point of the water line at each end. Now we go to the body plan, on the right side, and on the same water line measure from the side of the stem to where the water line intersects with the line No. 1, and transfer this distance to the half-breadth plan, measuring from the stem line at station No. 1 out toward the deck line; we also lay off the same measurement at station No. 17. On the same water line on the body plan we take the measurement from stem line to line No. 2 and transfer it to stations 2 and 16 on the half-breadth plan, and so with every station till we come to the midship section. Through the points thus laid down on the half-breadth plan we trace the first water line, as shown in Fig. 8. If the curve increases and diminishes gradually, without any sudden kinks or crooks, we may infer that our curves in the body plan are satisfactory, and proceed in the same manner to lay down water lines Nos. 2 and 3. When the water lines are traced, any defects in them may be remedied by altering the curves in the body plan and making the resultant alterations in the water lines, always recollecting, however, that the floors of all the lines and the top side and bilge curve of the midship section are fixed quantities and must not be tampered with after their shape has once been decided upon. The concave portion of the load water line forward is called the "entrance," the concave part aft the "run," while the convex portion between is generally called the "middle body." We now come to the last series of lines with which we have to deal, called "buttock" lines. These are longitudinal lines dividing the half-breadth plan into four equal parts and appearing on the body plan as vertical lines dividing it in the same manner. They bear the same relation to the sheer plan that the water lines do to the half-breadth plan and might be called "vertical" water lines.

We commence with buttock line No. 1, and on the half-breadth plan measure the distance from station No. 1 to where the buttock line intersects the deck line, and transfer this measurement to the sheer line in the sheer plan. It will be noticed that the deck line and sheer line are the same, but are looked at from different directions. We now go to the body plan and measure downward along buttock line No. 1 from the deck line to where the buttock line intersects line No. 2, and transfer this measurement to lines Nos. 2 and 16 on the sheer plan. We repeat these measurements with each line on the body plan down to the midship section. We now have a series of points on the sheer plan through which we must trace a curve, as shown in Fig. 6. This curve, like the water lines, must be easy and gradual from end to end. If it shows any abrupt changes or kinks they must be straightened out by further changes in the curves of the body plan and the water lines. Buttock lines Nos. 2 and 3 are drawn in exactly the same manner as No. 1, and when these are put in, the drawings or lines are completed. It will be seen that each set of lines depends on the others for its form, and one set cannot be wrong without deranging the others. The intersections of the lines in each plan make it an easy matter to verify them and insure absolute correctness. After being drawn on a small scale they should be drawn full size on paper or on the floor of a loft where they need not be disturbed till the boat is completed, as it will be necessary to refer to them from time to time as the work progresses. We might go further with the drawings and mark out the planks or strakes, but this is not necessary, as the shape of each plank can be found as it is required for use.

(To be continued.)

New York Trades School.

The fourteenth annual commencement exercises of the New York Trades School were held at Sixty seventh street and First avenue, New York City, on the evening of Thursday, April 4, in the presence of a large audience. Previous to the regular exercises of the evening the friends of the pupils inspected samples of their work which were displayed in the various departments. An interesting feature was the miniature house which had been constructed by members of the class in carpentry. The work was well executed and reflected great credit upon the pupils concerned. Addresses were made by R. Fulton Cutting, Lewis Hopner, president of the New York Association of Master Painters and Decorators; Edward Murphy, well known to the plumbing trade of the city, and ex-Mayor Abram S. Hewitt. The 300 pupils present listened to the remarks with deep interest and showed their appreciation by frequent applause. Interspersed between the speeches, certificates were presented to 34 carpenters, 40 painters and decorators, 18 bricklayers, 24 blacksmiths, 136 plumbers, 6 printers and 13 steamfitters. A medal furnished by W. H. Allison is presented every year to the pupil showing the greatest proficiency in the painting class, and this year it was awarded to John L. Lacock of St. Thomas, Canada.

Sugar in Mortar.

In reply to an inquiry published in an English trade journal relative to the use of sugar in mortar a correspondent says: It is customary in India to mix with the lime, whether for mortar or for plastering, a proportion of coarse sugar-syrup or molasses. The effect is to retard the evaporation of moisture, and it is generally considered that the coarsest syrup assists the setting of the mortar and increases its strength. For mixing mortar about ½ pound sugar syrup is dissolved in two gallons of water. Or from ½ to 1 per cent. by weight of the syrup is added to the lime, or 1 pound of molasses to 1 bushel of Portland cement. Refuse molasses is said to be composed of 49 per cent. of cane sugar, 10 per cent. of carbonate of potash, 18 per cent. of vegetable matter and mineral bodies, and 22 per cent. of water. About 35 per cent. by weight of the sugar syrup liquid may be used to the unit of lime for mortar mixing.

At the eleventh annual meeting of the London Institute of Builders, held on March 5 John M. Burt was elected president, Henry Holloway vice-president and George Plucknett treasurer. George Burt, Henry Gough, B. E. Nightingale and Samuel Wheeler were elected ordinary members of the council and J. W. Duffield and Benj. Hannen, Jr., auditors.

WHAT BUILDERS ARE DOING.

GENERAL CONDITIONS in the building trades throughout the country have not changed during the past month, unless a feeling of greater hopefulness in some of the dull localities may be so considered. Up to the present time the predictions of the earlier season seem to be generally correct, and unless an unexpected activity develops itself the present year will not be remarkably prosperous for builders. The majority of the larger cities of the East and a few in the middle West look, with some warrant, for about an average amount of business. On the Pacific coast and in the South the outcome is still uncertain. In a large number of the smaller cities, scattered all over the country, that have been heard from business is reported dull, the majority of work being either repairs or new buildings that could no longer be postponed.

The condition of affairs between employers and workmen is very free from open differences, work being so scarce that there is little to be gained by strikes, etc., save in the large cities, where a certain amount of disturbance exists all the time.

Boston, Mass.

The amount of work in Boston and vicinity is steadily increasing as the season advances, and with few exceptions builders anticipate a busy season. There is some complaint about the keenness of competition, it being thought that bids have been made at an unnecessarily low figure on work near the city. The cause of complaint is that such low bids have a tendency to depress the prices throughout all branches of building. So far this season there has been no serious difference between employers and workmen, and no disturbance seems likely to occur in the near future.

The plumbing school conducted by the North End Union held its graduating exercises for the class of 1895 on April 10, in their rooms at 20 Parmenter street. The work of the pupils which was exhibited previous to the examinations was of a high order, and was commended by all present. The list of speakers who made short addresses to the pupils was as follows: David Smith, president of the Master Pumbers' Association; William H. Mitchell, president of the State Association of Master Plumbers; William H. Sayward, secretary of the National Association of Builders; Charles W. Parmenter, Master of the Mechanics Art High School; John Cuckson.

After the examinations, which were conducted by the Committee of Examination, composed of William H. Mitchell, Thomas J. Tute, John Cooper, E. C. Kelly, David Smith and W. A. Johnson, the diplomas were awarded.

Baltimore, Md.

The building business promises well for Baltimore, and judging from the amount of work now in sight the season will be a busy one. Some little trouble has been experienced between the bricklayers and their employers during the past month, but the matter was adjusted without serious disturbance. The men objected to working more than eight hours.

The Builders' Exchange is reported as being in good condition, and as having already begun the preliminary work regarding the entertainment of the ninth convention of the National Association, which occurs in that city in October next.

Chicago, Ill.

The general condition of the building interests of Chicago remains about the same as was reported last month. Everything is quiet for this season of the year, and it is predicted that the total of work for 1895 will fall below that of '94, unless unlooked for improvement occurs. In addition to the difference between the three branches of carpenters' unions, which remains still unsettled, the painters have fallen out among themselves. The Painters' District Council has denied the authority of the Executive Council of the American Federation of Labor, and declared allegiance to the Painters' International Union. The Chicago unions repudiate what is called the Elliott faction, and will refuse to let men bearing its cards work in the city.

The carpenters are still trying to adjust the breach between the Knights of Labor, the United Brotherhood men and those of the Amalgamated Association. The situation seems to be about as follows: The K. of L. men insist on retaining their allegiance to the Knights and will not desert. The Amalgamated men have a beneficial feature, which provides for idlers and sick members, and will not relinquish it, and the Brotherhood men, being so much more numerous, cannot give up their organization. The Executive Committee has formulated a plan by which the organizations can be united for all material purposes. It is the formation of a Carpenters' Executive Council, in which all shall have equal representation, and which shall have original jurisdiction over all matters pertaining to work and wages. It is understood to have received the indorsement of the K. of L. and Amalgamated bodies, and is now being circulated among the Brotherhood unions for their approval. As far as reported the project has been well received by the latter, and the promoters of the plan are sanguine of a strong, unanimous, central executive organization.

Several small strikes have occurred in different parts of the city, but none of them seriously interfered with the progress of work.

It was recently reported by the Chicago *Dispatch* that an investigation of the attitude of the various trades unions had been made, with the intention of learning the prospects in the labor world of the city during the year. The unions were reported as being unanimously opposed to striking during the quiet times which now exist and when so many men are idle. It was believed that the wage scale and union hours could be maintained without strikes, and a season unusually free from labor troubles was predicted.

Detroit, Mich.

There will probably be no trouble during the coming season in the building trades of Detroit. This fear, which has come to haunt contractors and builders every spring, is obviated by the recent action of the employers and employees. The bricklayers, ever since the defeat of the carpenters' strike several years ago, have been the principal element to be considered in making calculations for the season, and it is with them that the builders have come to a full and amicable understanding. Their contention was for a restoration of the old wage of $3.50 a day for nine hours' work. This has been conceded by practically every contractor in the city, and that scale was signed by thirty-seven contractors, including the eighteen leading men and firms of the Builders' Exchange.

In view of the large amount of building in hand and in prospect for the season the contractors considered it better to concede the advance, and all figure on a common basis when reckoning on jobs, than to have the men dissatisfied and run the risk of trouble at a critical period. The journeymen are now satisfied, notwithstanding it is claimed that bricklayers are paid $4 a day in Toledo. The plasterers are also known to be well organized and to have a satisfactory understanding as to their scale for the season. The carpenters are the only element still a little at sea, but it is thought the better class of the trade will be able to secure a scale that will be acceptable and prevent any discontent.

Business promises to be fairly active, although it is feared that the total will not be up to the mark set by the years which preceded the panic.

Milwaukee, Wis.

The Milwaukee Builders and Traders' Exchange is thoroughly opposed to an ordinance providing for bids in the aggregate on public buildings.

After the publication of the views of Supervising Architect Koch, who favors the ordinance, a meeting of the exchange was held and a committee was appointed to draft a petition to the council. The members do not agree with Mr. Koch at all, and think it would be a serious matter to pass the ordinance. The petition, signed by President C. A. Sercomb, Vice-President H. Ferge and Secretary L. A. Clas, the committee, was sent to the council, and is as follows:

At a meeting of the Builders and Traders' Exchange, we, the undersigned, were selected and instructed to communicate to your honorable body that it was the express wish and desire of the exchange that for the best interests of the city contractors and manufacturers, that better work, more satisfactory results and lesser cost to the city can be obtained by permitting the present ordinance to stand, and that they desire that no change be made, viz.: That all bids for public work be called for separately and not in the aggregate. This applies to new work only, not repair work.

The council committee, to which the ordinance was referred, made an adverse report on the matter.

Strong efforts are being made by the city government to secure more stringent building laws, especial attention being devoted to better protection for the business portion of the city. The Builders and Traders' Exchange is active in all matters concerning the welfare of the city, and is reported as being in good condition.

The situation among the unions seems to indicate that there will be little disturbance to the building trades from that quarter, unless something unexpected turns up.

Important changes were made in the by-laws of the Builders' and Traders' Exchange at a meeting held April 10. Arbitration has now become the settled policy of the association with reference to the settlement of all disputes, and the action taken was with a view to the amicable adjustment of differences that arise between owner and contractor, heretofore one of the most fruitful sources of litigation. A change was also made in the manner of holding the annual election, which is to take place at the December meeting. The polls are to be open from 2 to 6 o'clock p.m., and the annual banquet is to follow the election.

The arbitration matter had been under consideration for several months, and was disposed of by the adoption of the following resolutions:

The National Association of Builders, in convention assembled, have always recommended arbitration as the best means of settling honorable differences between contractor and owner. Through its efforts a satisfactory solution has been devised, wherein the rights of the employer and employee have been subserved and the strained relations heretofore existing have been alleviated, thus bringing about a peaceable settlement of apparent differences; and

Whereas, Arbitration has been resorted to in the settlement of controversies arising between nations, as being the only honorable course to pursue for a just and peaceable settlement; and

Whereas, Differences will arise between the contractor and the owner; disputes be had on public work let on contract by cities, counties, villages, State and corporations with the contractor or contractors, and as a last resort expensive litigation and long delay is entered into and final judgment being rendered by the court, no satisfaction is had to the parties engaged therein; be it

Resolved by the Builders' and Traders' Exchange of the city of Milwaukee, Wis., that we recommend arbitration in all cases where differences are apparent (except in cases where fraud or a conspiracy is entered into to defraud), and especially do we recommend that differences can more justly and amicably be settled by arbitration.

To give effect to this declaration chapter III of the by-laws was amended as follows:

SEC. 1. When application is made to the Board of Directors by two members, in writing, requesting arbitration upon any special grievance or dispute in matters of business, said application shall be referred to three members, as follows: Each party to select one and these two to select the third.

SEC. 2. Each member of such committee shall be entitled to a fee of $2 for each sitting, to be paid by the party against whom the decision may be rendered.

Heretofore the exchange has had a permanent arbitration committee, but under the new plan a special committee will act in each case. The matter of a new building ordinance was discussed, and a committee consisting of Messrs. Clas, Ferge and Bentley was appointed to confer with the city authorities and advocate the passage of a proper measure.

New York City, N. Y.

During the past month there has been but little disturbance in the building trades of New York City. Several small strikes have occurred, affecting only individual employers, and these have been settled without serious interference with work. The painters struck on several jobs about April 1 against non-union wages, and the contractors at once agreed to pay the union scale, $3.50 for eight hours, and the men returned to work.

The Employers and Builders' League

formally opened its new club house at 24 East 125th street, on April 11. President John P. Leo, in a few well-chosen words, outlined the history of the association, and stated its objects and purposes, after which a collation was served. The purpose of the club is to promote good feeling between the master and man. It proposes to appoint a committee to treat with the labor organizations on questions of strikes and other differences, and wishes it understood that it is not the foe of organized labor. The club was organized in October, 1894, and the following are its officers : John P. Leo, president ; Francis J. Schnugg, first vice-president ; Richard G. Platt, second vice-president ; Arthur Grosch, secretary ; C. A. Du Bois, assistant secretary ; Alexander A. Jordan, treasurer. Since its inception the league has gained a membership of 225, which number is expected to reach 1000 before the end of another year. At present thirty different trades are represented.

Shortly before April 1 the Mason Builders' Association made its agreement for 1895 with the bricklayers' unions and the several divisions of Laborers' Union Protective Society, under which work will be carried on during the coming year. The agreement with the bricklayers' unions is as follows, and the one with the laborers' unons is substantially the same :

It is hereby agreed to by the Mason Builders' Association of New York City and the Bricklayers' Unions Nos. 4, 7, 11, 33, 34, 35, 37 and 47 of New York City, members of the Bricklayers' and Masons' International Union :

I. That the wages of the bricklayers from May 1, 1895, to May 1, 1896, be 50 cents per hour, eight hours six days in the week, and that the hours of labor be from 8 a.m. to 5 p.m., with one hour for lunch.

II.—The unions, as a whole or single union, shall not order any strike against the members of the Mason Builders' Association, collectively or individually, nor shall any number of union men leave the works of a member of the Mason Builders' Association before the matter in dispute is brought before the joint Arbitration Committee for settlement.

III.—That no member of the unions shall be discharged for inquiring after the cards of the men working upon any job of a member of the Mason Builders' Association, nor will the walking delegate be interfered with when visiting any building under construction.

IV.—Except in cases of extreme necessity no work shall be done between 7 and 8 o'clock a.m. and 5 and 6 o'clock p m on six days in the week, and all overtime shall be paid a double rate. Overtime means all time between 5 p.m. on Saturday and 8 a.m. on Monday ; also all time between 5 p.m. and 8 a.m. on other days, and the following legal holidays : Washington's Birthday, Decoration Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day.

V.—That the members of the Mason Builders' Association shall do their own fire proofing, preference being given to the men employed on the construction of the walls.

Each bricklayer must be provided with a kit of tools consisting of a trowel, brick hammer, hand hammer, level, plumb rule, bob and line and chisel.

VI.—That all cutting of masonry or fire proofing be done by those best fitted for the work, and that the members of the Mason Builders' Association make the selection ; but cutting of light brick work or fire-proofing which properly belongs to the bricklaying trade shall be done by bricklayers.

VII.—That the bricklayers be paid every two weeks before 5.30 p.m., Saturday ; pay time to close the day before pay day.

VIII.—That no complaints for waiting time are to be considered by the Arbitration Board unless a man has been laid off for more than eight hours, after which time he shall have a right to demand his wages.

IX.—That any member of the unions, upon showing his card of membership, be permitted to go upon any job when seeking employment, unless notified by a sign, "No Bricklayers Wanted ;" and that preference of employment be given to members of New York City unions.

X.—That no laborer be allowed upon any wall or pier to temper or spread mortar.

That the Arbitration Committee meet on the fourth Thursday in every month, or at the call of the chair on either side ; and that the second Thursday in January be a special meeting for the consideration of the yearly agreement, which must be signed on or before March 1, to take effect from May 1 to May 1.

The Society of Architectural Iron Manufacturers held their annual meeting on the evening of April 15, in the Building Trades' Club House, 117 East Twenty-third street, and elected the following officers, trustees, &c., for the ensuing year, viz : President, John Cooper ; vice-president, James I. Healey ; treasurer, B. E J. Eils ; secretary, William J. Fryer. Trustees, William H. McCord, William H. Van Tassel, J M. Cornell, Chas. H. A. Cuny, William A. Lindsay and Chas. E. Cheney. Delegate to the Board of Examiners in the Building Department, William J. Fryer.

Omaha, Neb.

Omaha's brickmakers, members of the Builders and Traders' Exchange, have taken a census of the brick in the market in the city, and find that considerable have already been bought this season for the new opera house and some small jobs, and all that are now available amount to not over 2,500,000. With this small supply any considerable work will start up the yards. They cannot be set going before the middle of the month for fear of frost, but that will be ample time if some of the building projects now hatching materialize.

The Omaha Exchange has, in the face of little building the last two seasons, held together remarkably well, and its members have obtained contracts all over the State, which their facilities for doing good work at low prices and their good reputation have enabled them to undertake. The latest of these bids is that of Rosenbery for the telephone building at Lincoln, which he won against the sharp competition of six other bidders from different cities.

The chief topic for discussion at the April meeting of the exchange was, "Where shall the contractor go to get the necessary bond required under his building contract ?" Material men have usually been his bondsmen, but this practice has its drawbacks, and one of them is evidenced by the fact that the estate of a material man lately deceased is entangled with bonds given for ex-contractors who have long pending suits.

The matter was thoroughly discussed, the general opinion being that there should be no personal obligation in the matter, but the builders should obtain bonds when necessary from the Guaranty Bond Companies. No definite course was recommended, the subject being assigned to the next regular meeting for further consideration.

The outlook for building is improving, several large contracts having been recently begun The general feeling among business men is better than it was, the rains of the past month having greatly improved the prospect for good crops.

Philadelphia, Pa.

During the past month the builders of Philadelphia have been disturbed by the prospect of a break between the bricklayers and their employers. The difference between the two is on account of wages and the employment of a "steward" on each job who shall be appointed by the workmen. The men are holding out for a level wage of 45 cents per hour, and the employers want to reduce the pay to 40 cents per hour. On April 4 the joint committee of employers and workmen reached the following decision : "The journeymen will form two classes, each with a scale of wages. Smooth hands will receive from 45 to 50 cents per hour and rough hands from 40 to 45 cents." The agreement was signed by the five duly appointed commissioners of both associations.

The report of the committee of the workmen was rejected by the union, and the matter remains, at this writing, still unsettled.

The master builders are not disturbed by the action of the journeymen bricklayers in rejecting the report of the Conference Committee of both bodies. No serious trouble is anticipated, as there are said to be sufficient bricklayers to do twice the work that usually presents itself in a season, and this fact renders a general strike improbable.

At a recent meeting of the Lathers' Union, it was unanimously resolved that on and after Monday, May 6, 1895, a demand be made for $2 per 1000 laths on all architect work, and $1.75 per 1000 laths on all row work.

The regular meeting of the Master Builders' Exchange, held March 26, was made the occasion of a feast and speechmaking. It was the first meeting presided over by the newly elected president. There was a large attendance of members and visitors, including a delegation from the Buffalo Exchange. After a very substantial repast was disposed of, Franklin M. Harris, the retiring president of the exchange, called the assemblage to order, William Harkness acting as secretary. Mr. Harris made a few remarks, and then introduced the newly elected president, Charles Gillingham, who was received in a pleasing and enthusiastic manner. Mr. Gillingham spoke briefly, and took his seat as president amid much applause. The names of First Vice-President Wm. B. Irvine, Second Vice-President John Kisterboch, and Third Vice-President C. G. Wetter were then announced. The new president stated that a life-size portrait of Mr. Harris, the retiring president, had been secured, and he called on John S. Stevens to present the portrait to Mr. Harris on behalf of the members of the exchange. Mr. Stevens made a happy and witty presentation speech which was responded to by Mr. Harris in a fitting manner.

Then followed routine business, after which the meeting adjourned.

Portland, Maine.

About seventy-five members of the Builders' Exchange partook of a clam supper at the rooms of the organization in the First National Bank Building, Tuesday evening, April 2. Following the supper an excellent musical entertainment was given. This was the programme : Piano solo, A. F. Smith ; baritone selection, H. Files ; banjo and guitar duet, Messrs. Hatch and Skillings ; piano solo, H. F. Smith ; vocal selection, J. M. Watts ; xylophone solo, A. S. Hatch.

The exchange is reported as being in good condition, both financially and as regards its membership.

Building is still quiet, though the more hopeful are looking forward to an improvement over last season.

St. Louis, Mo.

At a meeting of the Builders' Exchange, held April 9, President Thos. J. Ward in the chair, the report of the treasurer showed a balance of $7000. The question of withdrawing from the National Board of Trade and the National Association of Builders was discussed. Messrs. W. J. Baker, Henry Fairback, Wm. A. Rutter and P. Mulcahy were in favor of remaining, and claimed it was a source of great benefit to contractors, &c. Messrs. Thos. C. Higgins and John W. O'Connell spoke against it, failing to see the benefit derived. On motion of Mr. Higgins, the matter was laid over until the meeting Tuesday, April 16, at noon, at which time the question of withdrawing was further discussed, and upon being put to vote was overwhelmingly defeated by a majority of nearly 8 to 1.

The exchange has decided to send a delegation to represent the builders of the city on the maiden trip of the new American liner, St. Louis, which is to sail from Philadelphia on June 5. Work has been commenced on an addition to the rooms of the exchange, in order to give much needed accommodation to persons having business with members. The use of the rooms for purely business purposes is steadily increasing, and members appreciate more and more the value of attendance during 'change hour.

The prospect for building during the year continues to improve. The reports from architects, work already awarded and the building permits issued promise a busy season.

Worcester, Mass.

At the adjourned monthly meeting of the Worcester Builders' Exchange, held April 10, President Kendall occupied the chair. Three firms were admitted to membership. A. C. & F. G. Burnham, brick manufacturers of Montague City ; Joseph Grennier & Brother, cornice makers, of 25 Sargent street, and Richard French, architectural iron work, 122 Exchange street.

F. D. Perry was elected a member of the Board of Directors to fill the unexpired term of C. D. Morse of Millbury, deceased.

Business among builders is not very active, though most of the contractors have something on hand. It is feared at this time that the total of building for the season will be below the mark.

No trouble between employers and workmen has occurred since last year and everything is amicable between the two at present.

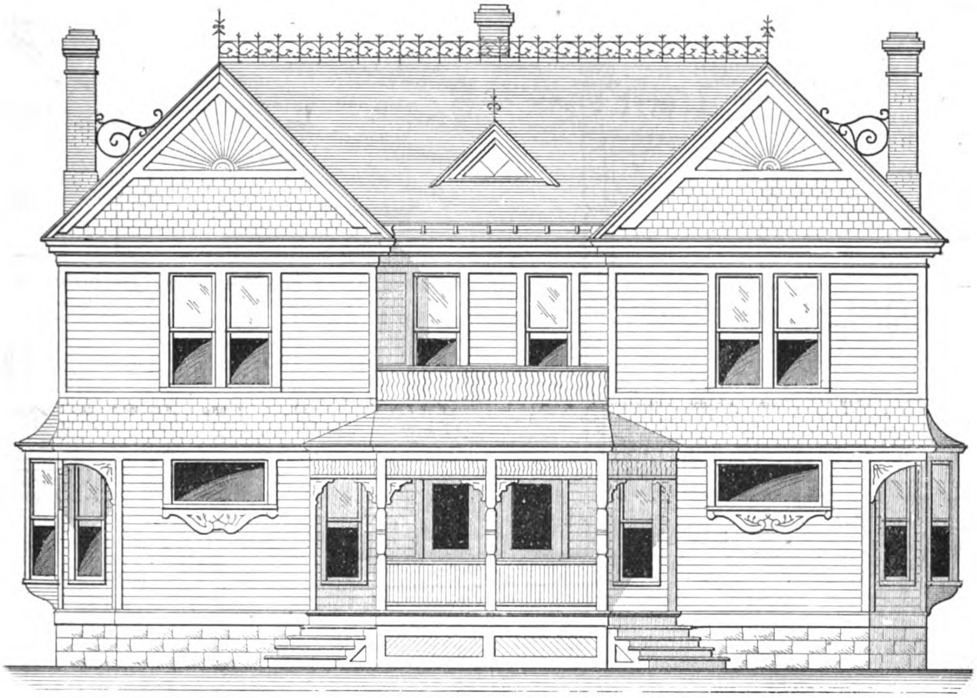
Notes.

The committee of the Carpenters' Union, of Flushing, L. I., appointed to confer with the contractors and builders, held a conference on April 2, when the question of an increase of wages from $2.50 to $3 was adjusted. The employers decided to pay the scale demanded after the contracts in hand are completed. This is all the men desire, and they are rejoicing over their victory The new scale of wages will go into effect about June 17.

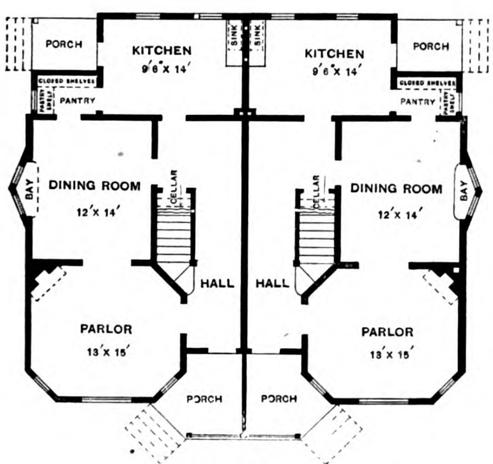
A movement is on foot to organize the builders of Newport, Ark., in which E. Phillips is one of the most actively interested.

A Cottage for Two Families.

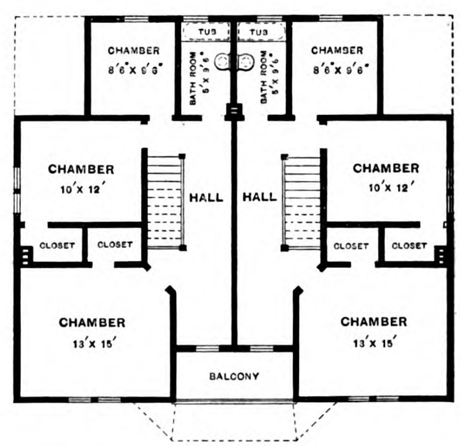
A dwelling house arranged with accommodations for two families is illustrated upon this and the page which follows. It will be seen that the house is divided in the center so that each family has six rooms and a bath, there being three rooms on the first floor and three on the second. All the rooms on introduced if preferred. Communication between the kitchen and dining room is established through a butler's pantry provided with doors swinging both ways. The stairs to the cellar are in the main hall and under those leading to the second floor. The bathrooms are so located that one set of pipes answers for both and one chimney also serves for both kitchen ranges. The doubled at the corners and openings; the rafters are 2 x 4 inches, placed 2 feet on centers, and the valley rafters are 2 x 6 inches. The roof is covered with Oregon red cedar shingles laid 4½ inches to the weather. The sides of the building are sheeted and then covered with lap siding having building paper underneath. The belt course between the upper and lower windows



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



First Floor.

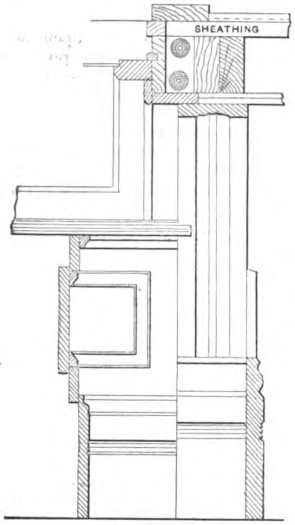


Second Floor.

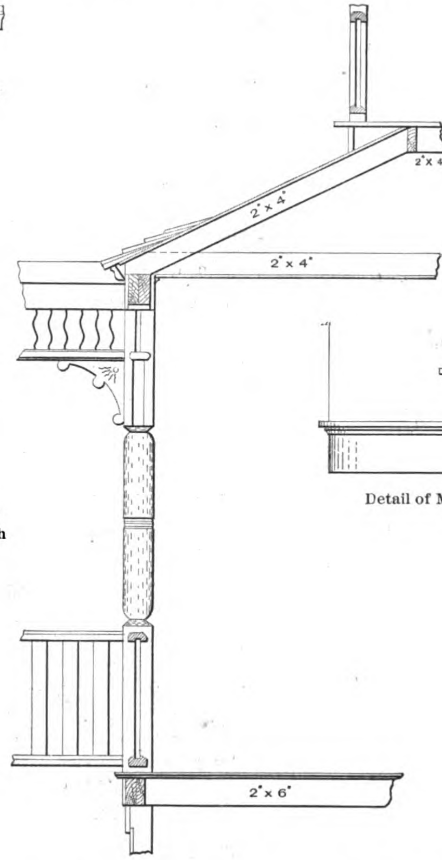
Scale, 1-16 Inch to the Foot.

A Cottage for Two Families.—C. S. Bates, Architect, Chadron, Neb.

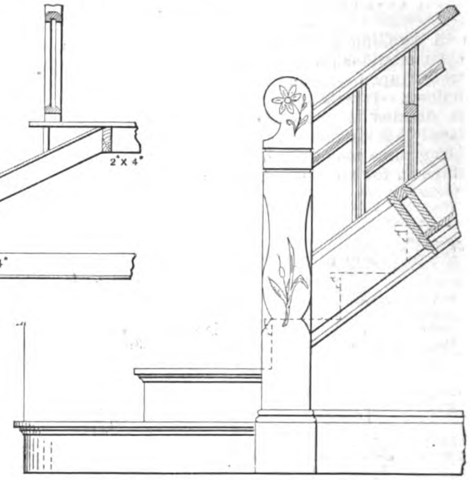
the first floor communicate directly with the hall, which is reached from a porch at the front. The parlor has an octagon front and is provided with an open grate and mantel. Next to the parlor is the dining room, having a small two-window bay with a wide seat for flowers or plants. The parlor and dining room may be separated by *portières*, although sliding doors can be interior of the house has Southern yellow pine trim, finished in the natural wood with one coat of shellac and two coats of hard oil. From the architect's specification we learn that the sills are 2 x 8 inches, bedded on the walls; the joists are 2 x 8 inches for both floors and 2 x 6 inches for the ceiling, placed 16 inches on centers; the studs are 2 x 4 inches, placed 16 inches on centers and is shingled, the same as the roof, the shingles being laid 5 inches to the weather. All exterior wood work has two coats of paint. C. S. Bates, the architect, of Chadron, Neb., states that the cost of erecting a two family house of the class illustrated and described is about $2000. The arrangemant is such that the entire building can be heated from one furnace in the basement.



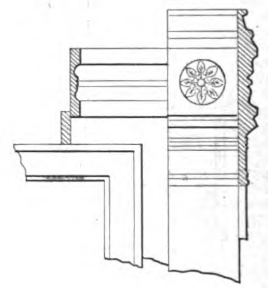
Detail of Inside Finish.—Scale, 1 Inch to the Foot.



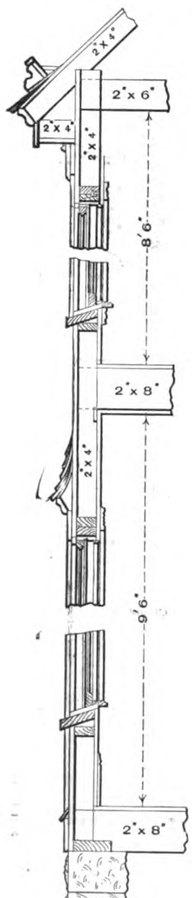
Details of Porch and Balcony.—Scale, ⅜ Inch to the Foot.



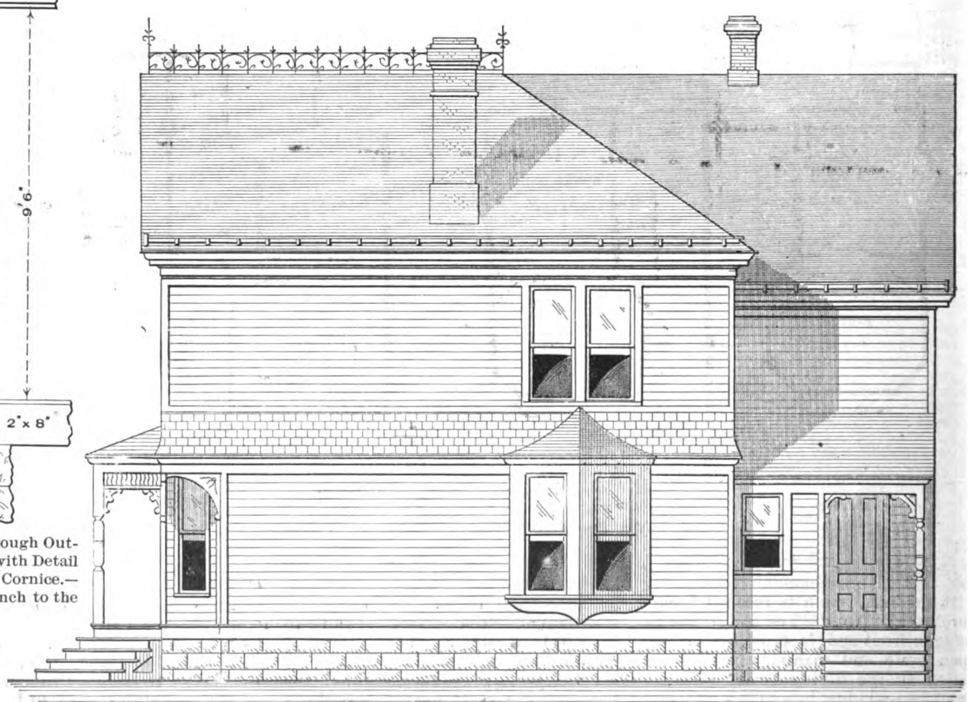
Detail of Main Stairs.—Scale, 1 Inch to the Foot.



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



Section through Outside Wall with Detail of Main Cornice.—Scale, ⅜ Inch to the Foot.



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

Elevation and Miscellaneous Details of a Dwelling for Two Families.

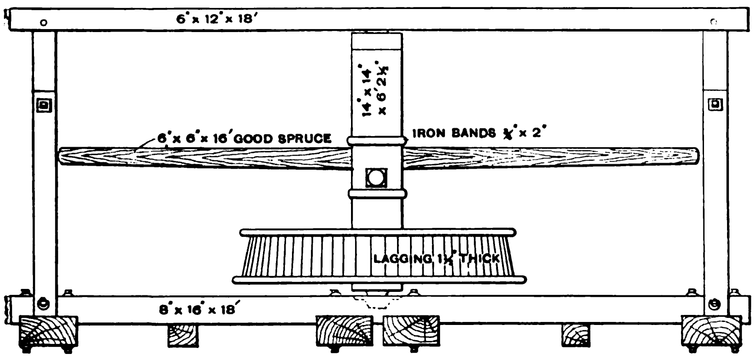
CORRESPONDENCE.

Address Wanted.

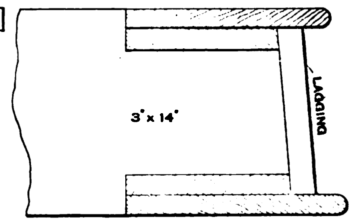
Will the correspondent writing with regard to cement construction and signing the letter William C. Wahl, kindly send his full address, so that the Editor may communicate with him concerning the sketches submitted. In this connection we would emphasize what was said in the first issue for the year with regard to the importance of every correspondent giving with his letter the full name and address.

Design for a Capstan.

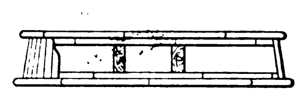
From C. B., *Norfolk, Va.*—As no one has answered the inquiry of the correspondent which appeared in the December number relative to the design for a capstan, I take the liberty of sending some sketches which, although they may not suit the particular requirements mentioned, may prove of interest to others. The sketches represent a capstan which is used extensively by the fishermen of Chesapeake Bay for seine pulling and is frequently employed for hauling small craft on marine railways. As may be readily seen, the construction gives a very simple and powerful purchase, and when set well in the sand and weighted with stone will do good work.



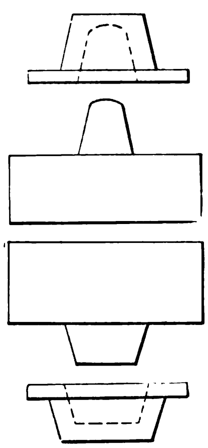
Front Elevation of Capstan.—Scale, ¼ Inch to the Foot.



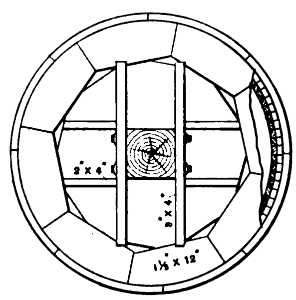
Detail of Outer Edge of Drum.—Scale, 1 Inch to the Foot.



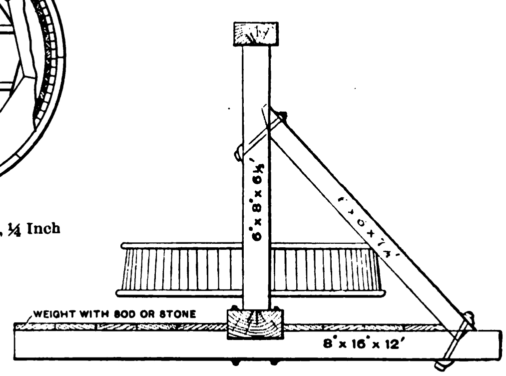
Side View of Drum, with Portion of Outer Casing Removed.—Scale, ¼ Inch to the Foot.



Details of Upper and Lower Castings.—Scale, 1 Inch to the Foot.



Plan View of Drum.—Scale, ¼ Inch to the Foot.



End View of Capstan.—Scale, ¼ Inch to the Foot.

Design for a Capstan Contributed by "C. B.," Norfolk, Va.

Value of the Slide Rule.

From W. G., *Cresco, Ill.*—In the March number of *Carpentry and Building*, on page 57, Mr. William Cox tells us something about the slide rule. He says that "two things are necessary—the predetermination to begin at the beginning and a continued determination to persevere and practice with it." As I know very little about the slide rule I determined to begin at the beginning, so I read the article over, taking out my slide rule, and endeavoring to use it as Mr. Cox described; but something appeared to be wrong. At the bottom of the middle column on the page named he says: "Draw the slide out toward the right until the left index of the slide is exactly over the second primary line of the rule marked 2, and we find the following figured lines coinciding

Slide 1 2 3 4 5
Rule 1 2 4 6 8 1,"

but on my rule it is just the other side up. Just before this Mr. Cox says: "It will be seen that the two top scales A and B are divided exactly alike, as are the two bottom scales C and D." On the rule I have the first three scales; A, B and C, are exactly alike, while the one marked D is different and is marked "girt line." I would like to ask what kind of a rule Mr. Cox has, where it was made and by what name it is called. The rule I possess consists of two equal pieces of box wood each one foot long, connected by a folding joint. In one of these pieces is a slide on which are marked the letters A and D. The same numbers serve for both the two middle lines B and C, the one being above the numbers and the other below. Three of these lines, A, B and C, are double lines, as they proceed from 1 to 10 twice over. These three lines are exactly alike both in division and numbers, and are numbered from the left toward the right 1, 2, 3, 4, 5, 6, 7, 8, 9 to 1, which stands in the middle. The numbers then continue 2, 3, 4, 5, 6, 7, 8, 9 to 10, which stands at the right hand end of the rule. The lower line D is a single one numbered from 4 to 40, and, as stated, is marked "girt line." If the slide is moved out of the groove the back of the slide is seen to be divided into inches and parts, so that the whole rule is 86 inches long. I would like very much to have some reader of the paper or Mr. Cox tell me how to use the slide rule which I have, and, if it is of any use after I have learned how to operate it. I can multiply together two numbers, as three times three equal nine or some other small numbers. I can also do simple examples in division, but it is so much bother and so slow to have to figure it out to see if I have set the rule properly that I consider the slide rule of not much practical value. Perhaps Mr. Cox has a better rule. I would also like to know if there is any book published that will tell about the rule which I have, or is my rule different from the rest?

Note.—The letter of our correspondent was submitted to Mr. Cox, who furnishes the following in reply:

It is evident the slide rule which "W. G." has is a Coggeshall's or carpenter's sliding rule combined with a two-foot folding rule. This form is becoming obsolete for purposes of calculation, though it may sometimes be convenient in its combined form. The "Mannheim," which I have described, is very much more convenient and is adapted to any kind of calculation, whereas the carpenter's is more limited in its application, having been specially designed for taking the dimensions and ascertaining the contents of timber. As "W. G." has given an accurate description of this rule I will at once show by a few examples how it is generally used for ascertaining the cubical contents of squared or round timber.

How many cubic feet are there in a round piece of timber 24 feet long and having a quarter girt of 10 inches?

C	Set 24 feet	Find 21.2 cubic feet.
D	To 10.63 inches	Over 10 in. quar. girt.

If the timber is square, then the length on scale C must be set to 12 inches on scale D, instead of 10.63 inches. Sometimes for round timber, if rough, the gauge point 12 is used instead of 10.63, as it gives an allowance of about 21 per cent. for bark, &c., while to allow for the loss in squaring, amounting to about 33 per cent., the gauge point 13 can be used. These gauge points give in the above case 16.6 and 14.2 cubic feet.

For round or square tapering timber the mean quarter girt must be taken, the result obtained in this way being very nearly but not quite correct, unless the prismoidal formula be used to obtain the true mean girt. Another method which is correct is as follows:

C	Set length in feet	Find cubic feet
D	To 10.63	Over half sum of quarter girts of the two ends;

then

C	Set one-third length	Find cubic feet
D	To 10.63	Over half difference of quarter girts.

The sum of these two results will be the total contents of a piece of round tapering timber. If it is square, set the length on scale C to 12 on scale D.

For squared timber of unequal sides, such as beams, the common method is to take quarter girt and proceed as for square timber, but when there is a great difference between the sides, the cubic contents come out much too high. The best method to adopt in this case is to use scales A and B as follows:

A	To 144	Below square inches in section
B	Set length in feet.	Find cubic feet.

Scales A and B can also be used for proportion, multiplication and division, as explained in the March number of *Carpentry and Building* in reference to scales C and D.

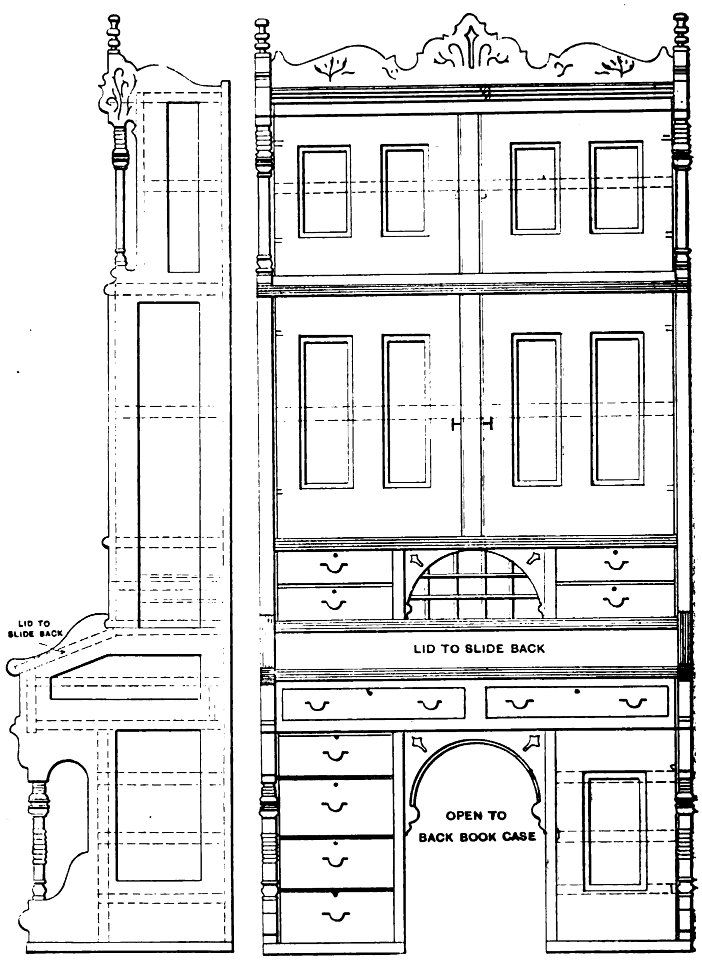
The best slide rule for all purposes is undoubtedly that one known as the "Mannheim," which has the scales A and B alike, and scales C and D alike. It is made in different styles, but the best, clearest and most distinct that I know of is of mahogany coated with celluloid, the graduations being dark blue on a clear creamy white ground. A manual of instructions is supplied with it, or a more complete book at a small extra cost. Any of the calculations just explained can be worked out on it; thus for round or square timber,

A		Find cubic feet
B		Over length in feet.
C	Set 12 or 10.63	
D	To quarter girt in inches.	

These slide rules are controlled in this country by Keuffel & Esser Company, who have sold many thousands of them.

Design for a Bookcase.

From J. F. W., *Danville, Pa.*—In answer to "W. A. M." of Mifflinburg, Pa., who inquired in a recent issue for drawings of a bookcase, I take pleasure in sending front and side elevations of an article which, I trust, will prove of interest to him. The bookcase will look well in walnut, ash or oak; even pine or poplar can be used, although the other woods will, I think, give more satisfactory results. If walnut, ash or oak are used I would suggest to the correspondent that he give the bookcase an oil finish.



Side and Front Elevations of Bookcase Contributed by "J. F. W."

Are Gravel Roofs Durable?

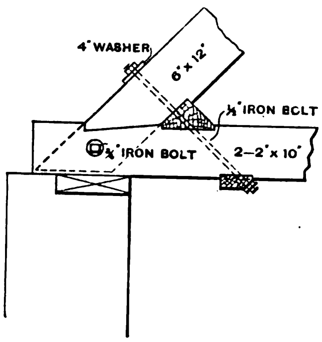
From G. F. WHEELOCK, *Birmingham, Ala.*—I notice in the paper for last month that "G. D. B." of Greenville, S. C., makes the assertion that he can put on a good tin roof at $4 per square, and make more money on it than he could with a gravel roof at $5 per square. Being engaged in both tin and gravel roofing, and being of a very inquiring turn of mind, I would like to have him inform me where he buys his plate, it being presumed that to furnish a good 20-year roof he would only use a good redipped tin, and the best I have been able to do is $15 per box in the market for this grade, and this, without any freight added, is equivalent to $4.80 per square for tin alone for a standing seam roof. I cannot help thinking that you have misquoted "G. D. B." as to the $4 roof; either this, or he is basing his calculations on a very cheap plate; and unless he has the advantage of buying a superior plate at a price that others would pay for wasters, he certainly must have a very poor opinion of a gravel roof. A gravel roof, in my opinion, especially where asphalt is substituted for coal tar composition, is the best material for a roof where the pitch does not exceed ¾ inch to the foot. It has the advantage of a tin roof, when properly applied, of being a first-class roof under any climatic conditions, which is not the case with the metal. In this city tin roofing, where laid flat locked and soldered, has proven very unsatisfactory, due, I suppose, to the presence of our iron furnaces to a great extent. There is one argument which is a good sized club in the hands of the gravel roofer: the roof does not require painting every two years, which is a fixed charge on a tin roof that in a few years amounts to the first cost of the roof.

As the result of my experience, I want to make the "assertion," which will not probably meet with the approval of "G. D. B.," that a first-class gravel roof can be laid for less money

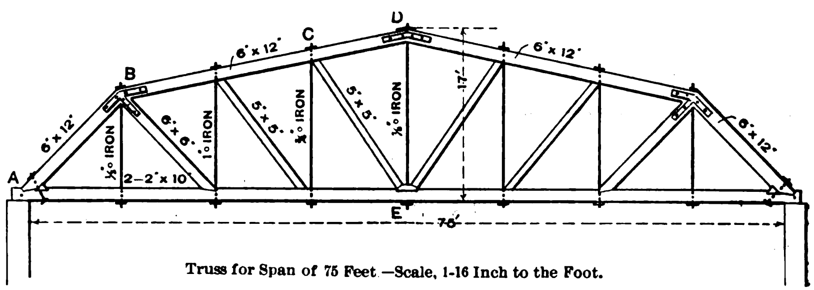
than a first-class tin roof, with a greater profit for the roofer, if gravel or shell can be procured within 200 miles of the work.

Criticisms of Self Supporting Roof.

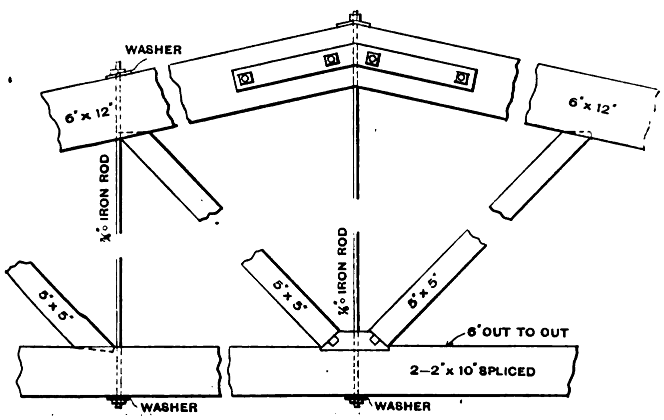
From H. D., *New York City.*—In the January number of the paper "I. P. H." invites criticism and comparison of his truss with that submitted by "J. N. H." in a previous issue of *Carpentry and Building*, and in reply I will endeavor to give my views on the subject, in the hope that others will do the same. I have carefully examined both trusses, and reach the conclusion that the one submitted by "J. N. H." is the one to be preferred. My reasons for this opinion are that "J. N. H." has arranged the members of his truss in the simplest and most effective manner consistent with the governing conditions of the roof line. There is one member less than in the truss of "I. P. H.," and the connections are such as to insure a rigid and substantial structure. On the other hand, "I. P. H." has not arranged the members of his truss as well as the correspondent "J. N. H." If, as "I. P. H." says, a weakness is apparent at the center of the 19-foot timber one perpendicular strut or brace would be ample reinforcement for the same and not two unequally inclined struts. It is manifest that the strain coming down the struts is taken up by the suspension rods and transmitted to the principal rafters, but "J. N. H." does the same thing with less material, and therefore gains a point in economy of construction without any loss of strength. He has, however, used timber in the tension members instead of iron, which was done purposely for the reasons which he states. Although "I. P. H." has designed a very substantial structure, yet it lacks the simplicity which is to be found in the truss of "J. N. H." Now, as for the same form of truss being serviceable for greater spans, I think better forms could be secured and eagerly await the opinions of others engaged in the building trades. As being of interest, however, I send sketches of my idea of a roof truss of 75-foot span for a similar roof outline. The roof load is 50 pounds per square foot and the trusses are placed 12 feet apart, constructed either of white pine or spruce. I send the sketches to substantiate the statement that better forms can be secured than the one submitted by the correspondent inviting criticism.



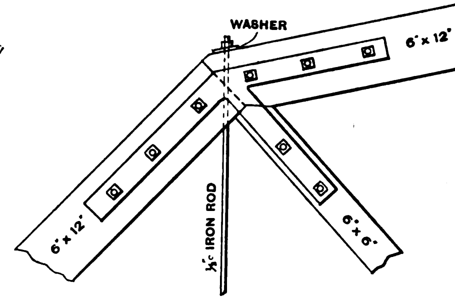
Detail of Joint at A.



Truss for Span of 75 Feet.—Scale, 1-16 Inch to the Foot.



Details of Joints at C, D and E.



Detail of Joint at B

Criticisms of Self Supporting Roof.—Sketches Illustrating Ideal Roof Truss of "H. D."—Scale of Details, ¾ Inch to the Foot.

Construction of a Silo.

From S. F. W., *Le Roy, Pa.*—I would like very much to have some of the readers of the paper tell me the best method of constructing a silo. The one I have in view is an eight square, or an octagon, with the sides 10 feet long and 20 feet high. What I desire particularly to know is the best method of building the corners or angles. Will some one give a plan of the building, showing the arrangement of timber and the method of keeping the structure from spreading? I hope those who have had experience in silo building will furnish the desired information.

Plastering Outside Instead of Weather Boarding.

From C. W. J., *Virginia.*—I am about erecting a dwelling and desire to plaster upon the outside instead of weather boarding. The building will be frame and I propose lathing direct upon the outside sheeting boards with two thicknesses of lath laid diagonally like lattice work, the lath being placed 1 inch apart. I wish to know if this method does not form a better key for the outside plastering than furring and then lathing in the usual way? I want to know if plaster will stand well when done in this way, especially in a locality where the building is exposed to the storms of the sea coast? I hope some of the readers who have had experience with this kind of work will discuss the subject for the good of all.

Face Mold for Square Cut System.

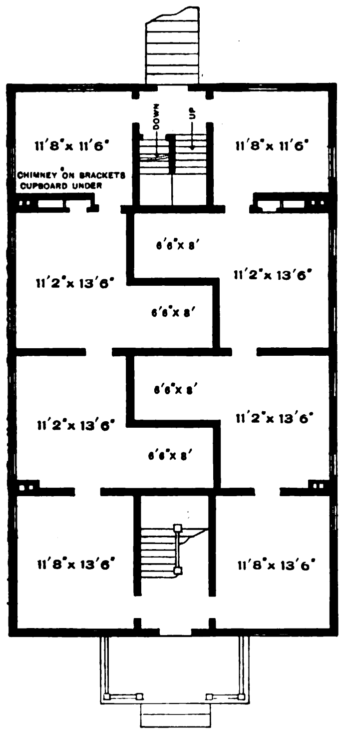
From W. G. P., *Toronto, Canada.*—I have a question on the old subject of handrailing which I should like to present, provided every one is not tired of this topic. It was said by an old correspondent of *Carpentry and Building* that there is not a book published which contains a correct face mold for the square cut system. The assertion was made by "J. H." of London, England, in the issue for August, 1889. "W. H. C." (Croker O'Rilla), I believe, made the same assertion in the *Illustrated Carpenter and Builder*, an English publication, previous to the period named. Mr. Croker at that time had his book in the hands of the engravers, and I wish to know if it was ever published. If so, I would like to see it, knowing that it will be second to none on the subject of handrailing. Since the time of which I speak I have examined all the works on handrailing on which I could lay hold, and I found one giving what is supposed to be a correct face mold for the square cut system. It appears in Newland's work and is by Peter Nicholson. It was taught by him, but was not published in his book. Now, I want to know if Mr. Croker has seen this, and if he has, does he consider it a correct mold? I would like him to give his opinion of it. I will not give the editor the trouble to reproduce it, as I do not think he will have any trouble in obtaining the book, as it is a standard work. Mr. Croker has given us many good things and I hope he will give us more.

I met with a curious reproduction in an old volume by J. C. Portrush and entitled "Stereographic Handrailing."

It was a clever production, and if the readers of the paper care to have it I will copy it for them. It will be a nut to crack for those who enjoy such things. It is the tangent system pure and simple.

Plan for a "Four-Tenement" House.

From J. B., *Grand Rapids, Mich.*—I notice in a late issue of the paper



First Floor Plan of "Four-Family" House Contributed by "J. B."—Scale, 1-16 Inch to the Foot.

that a subscriber in Johnston, R. I., wants a "two-tenement" house. I inclose herewith the first floor plan of a four-family tenement which may prove of possible interest to him.

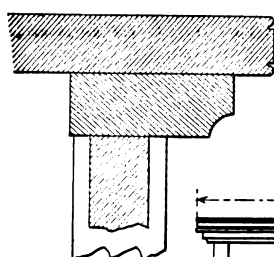
Squaring the Circle.

From J. L. S., *Catasauqua, Pa.*—I send you herewith an account of how the circle is squared by M. Roche, Ph.D., of the Polytechnic Nautical and Mechanical College of Philadelphia. Given any circle to construct a square that shall be in area equal to it. Let a horizontal line be drawn tangent to the circle. Revolve the circle on its circumference until the original point of tangency touches the line again. Then will the distance between the two points be exactly equal to the circumference of the circle. Bisect this distance and draw a perpendicular equal to the radius of the circle and complete the rectangle, which will be exactly equal to the area of the circle, for it will be one-half of the circumference multiplied by one-half of the diameter.

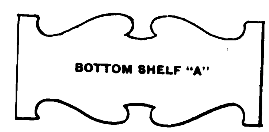
Note.—We are very glad to print this interesting communication showing that a mechanical method has been devised for approximating the area of a circle. We cannot, however, consider this a method of squaring the circle. Our correspondent, of course, is aware that a man might take a tape measure and measure the circumference of a circle and multiply it by one-quarter of its diameter and the result would be the area. The point is to solve it mathematically. We might say that to find the area of a circle it would only be necessary to cut a sheet of lead to its exact size, then remold it into a square, and measure the square. Or, take a lot of shot and squeeze them from the form of a circle into that of a rectangle. All of these methods are more or less approximate, but they do not come within the definition of squaring the circle. Our correspondent will readily perceive that with the relationship between the diameter and circumference known to over one hundred decimal places, there will be less error in calculating the area according to the old fashioned rule than there would be in applying a mechanical method such as here described.

Design for a Small Table.

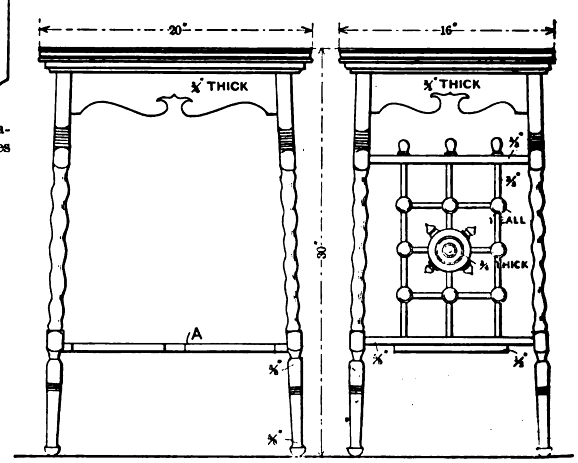
From J. G. F., *Denver, Col.*—I send inclosed some sketches of a small table which may be of interest to many readers of the paper. The design is not especially difficult, and will afford a pattern for those who are handy with their tools to test their skill. The drawings show so clearly the construction that they almost speak for themselves. I would say, however, in this connection that the design was not original with me, but it may prove of



Detail of Top of Table.—Scale, 6 Inches to the Foot.



Plan of Bottom Shelf.—Scale, 1 Inch to the Foot.



Front and End Elevations of Table—Scale, 1 Inch to the Foot.

Design for a Small Table Contributed by "J. G. F."

as much value to those interested as if it were.

Ventilating a Barn.

From J. A., *Vermont.*—Some time ago I received an order to put an 8 inch ventilator into a barn, the space to be ventilated being 20 by 27 feet, 8 feet high, and the basement of the same size. There is an opening 2½ inches wide and 10 feet long under the basement door which is to furnish fresh air. I ran the pipe direct from the basement through the floors and roof and carried it about 8 feet higher than the ridge. I put two 8-inch square holes in it in the stable part, one near the floor and one near the ceiling, and provided them with sliding doors to regulate the draft. The ventilator, however, does not work and my opinion is that the pipe is too small. There are six horses and a cow kept in the stable and pigs in the basement. The pipe is placed at one end of the stable floor. Would it be possible to get as good results in ventilating both rooms with one pipe as with the use of separate pipes, and if so, what size pipe would it be advisable to use? Would it make any difference whether the pipe went up in the center of the room or at one end? I will be glad to have the opinion of the readers on this subject.

Fire Proof Floors in Concrete.

From A. B. BLITZ, *Pittsburgh, Pa.*—In the March issue of the paper I notice a letter from "Inquisitor," Nanaimo B. C., with regard to fire proof floors in concrete, and in reply to it I will endeavor to give the information required. For corridors of public buildings and other fire proof structures the saving of steel beams is a great item, as it not only decreases to a considerable extent the dead weight of the building, but the size of foundations as well. By way of illustration I would state that in McCoy Hall, Johns Hopkins University, Baltimore, Md., there is a corridor 175 feet long and 20 feet wide. This floor, by the use of the Golding system, was made without adding a single I beam and the floor developed a strength of 200 pounds uniform with a factor of safety of 4. This system is somewhat based on the Monier principle so much used in Europe; that is, concrete and steel binding. For floors constructed according to the system named, resting on I-beams placed, say, 14 feet between centers (this distance having proven the most satisfactory), place on the lower flange of the I-beams curved channel irons from 5 to 7 inches and from 6 to 10 pounds to the foot, the curve being of such a radius as to give about 8 inches between the intrados of channel and the level top of the beam. Between the channel irons, which are placed from 4 to 6 feet apart, wood centerings are placed, leaving the channel irons and I-beams exposed. These arched ribs and haunches are first filled with concrete over which expanded metal is laid, crossing the arches and covering the false floor. Above these concrete is put on to the required thickness. As soon as the concrete is set the false floor and all other wood work are removed from underneath, and the floor is complete. The construction is continued block by block, varied only by the special requirements of the floors of the building.

Self Supporting Barn Roof.

From D. P. S., *Waverly, N. Y.*—I send herewith sketches of a barn having a self supporting roof, which I built two years ago. Referring to the sketches, Fig. 1 represents an end bent showing the size of timber employed, the system of construction and the different pitches of the roof. The lower rafter has a run of 7 inches to the foot rise and the upper rafter a run of 1 foot to 7 inches rise. The lower rafter from the outside corner of the building to the hip is of the same length as the upper rafter. The rafters are placed 2 feet on centers. The sheeting is ⅞ inch thick and 10 inches wide, there being two nails in each board. Fig. 2 of the sketches represents an intermediate bent without posts or girts. Above the cross beam the entire space is clear with the exception of the iron rods in either side, and they are so placed as not to be in the way. I have been a reader of *Carpentry and Building* for two years and think it a first-class paper. I make my living with hammer and saw and send the inclosed sketches for the benefit of those who do likewise.

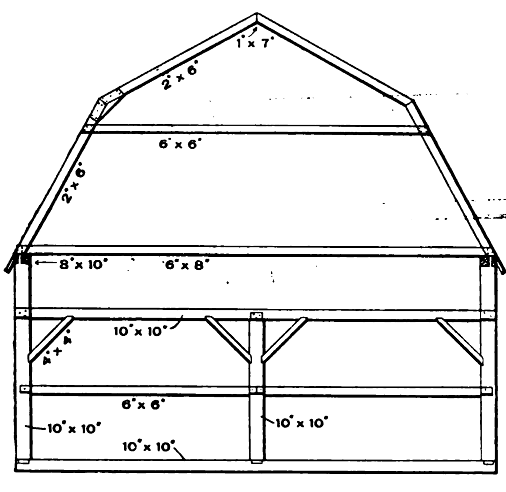


Fig. 1.—View of End Bent.

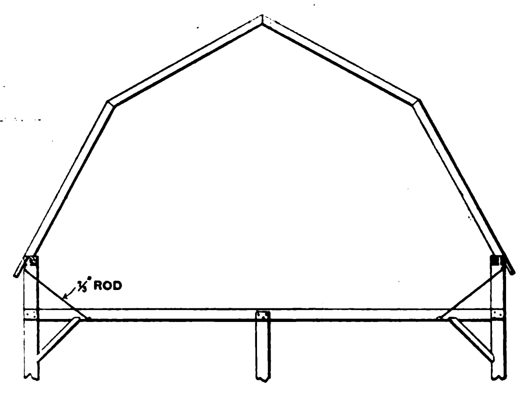


Fig. 2.—An Intermediate Bent.

A Self Supporting Barn Roof.—Sketches Accompanying Letter of "D. P. S."

Measuring the Top Square on Balusters.

From J. V. H. SECOR, *New Jersey.*—The correspondent who asked in the last issue of *Carpentry and Building* with reference to the correct way to measure the top square on balusters seems to be in the same quandary as many others concerning this particular point. Referring to the sketches inclosed, Fig. 1 shows the heel or short side, because of the position of the baluster C. If this were measured through the center then *d d* would be the line. This, however, would make the short side too near the rail. Again, it occasionally happens that the gib on the baluster head is ornamented, as shown at B, and must correspond with the heads on the level. In Fig. 2 of the sketches is shown the center line to be used. In this instance the position of the baluster G requires it to be a double header, and this head is located, as shown, by the curved line intersecting the center line of the balusters. With regard to the correct point, I should say measure all from the short side, for the reason that it is the most conspicuous and shows any variation in length more readily than would be the case if measured on the long side or center line. It also gives better satisfaction.

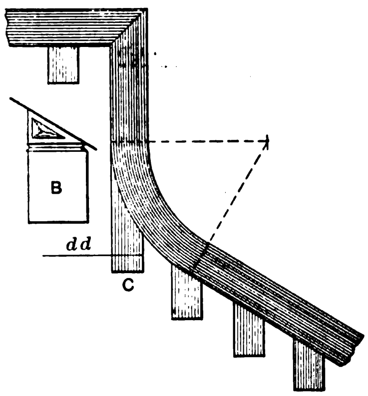


Fig. 1—Showing the Heel or Short Side.

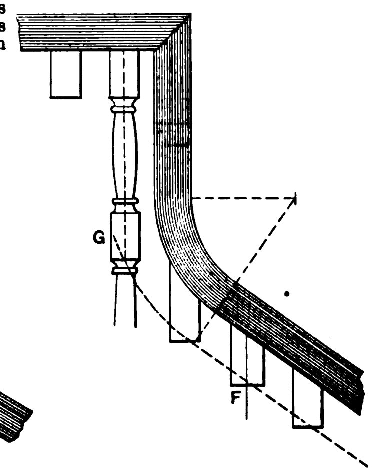


Fig. 2.—Showing the Center Line to be Used.

Measuring the Top Square on Balusters.

Setting Plane Bits.

From E. R. G., *Asheville, N. C.*—In answer to the inquiry made by "J. J. D." of Cornwall, Cal., in regard to setting the top piece on plane bits, I take great pleasure in referring to the device used by the Gage Tool Company, and advise him to try one of their planes. Set the top piece or cap as far through the stock as it will go without coming in contact with the surface of the work. When the cutting bit is put in place, which is always done before the cap is put on, the cap is fastened in position without the least trouble to the operator, as it fits perfectly in but one place and remains stationary or fixed until taken out. It does not slip in or out with the cutting bit, and the adjustment is complete. When it is necessary to have the bit very shallow the cap is on its edge as it should be, and as the bit is run out it leaves the cap, and the jarring and choking so common with ordinary devices is avoided.

Wax Finish for Hardwood Floors.

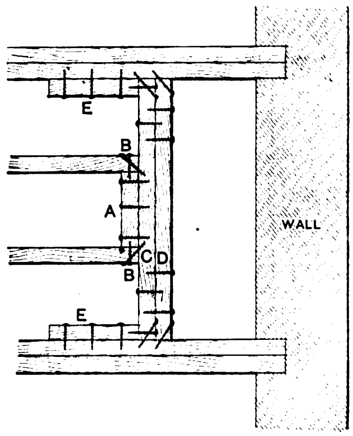
From E. C. S., *New York City.*—I desire to ask how to treat hardwood floors in order to obtain a dull wax finish. What filler shall I employ?

Note.—A preparation for waxing hardwood floors, with very good results, is made according to the following formula, taken from the *American Druggist:* Yellow wax, 25 ounces; yellow ceresin, 25 ounces; burnt sienna, 5 ounces; boiled linseed oil, 1 ounce; spirits of turpentine, 1 gill, or about 3 ounces. Melt the wax and ceresin at a gentle heat, then add the sienna, previously well triturated with the boiled linseed oil, and mix well.

When the mixture begins to cool add the turpentine, or so much of it as is required to make a mass of the consistency of an ointment.

Trimming Joist.

From JOHN TREADRISE, *Louisiana, Mo.*—In the December number of the



Sketch Illustrating Method of Trimming Joint Suggested by John Treadrise.

paper is an excellent article on the subject of trimming joist about flues and openings. The article in question gives the proper method of doing the work, but in this section the "cheap way" is usually the one that appeals to the heart of both builder and customer. As a general thing the builder, especially in connection with ordinary structures, must compete against every jackleg that is out of a job and unable to secure a berth in the poorhouse. Under such delightful circumstances the builder must find the "Yankee way" of doing the job. I send herewith a sketch illustrating the method generally employed in trimming in connection with ordinary work where no great weight is expected to be sustained. Spike two joist together to form the double trimmer C D; saw off a piece of joist equal in length to the distance the joists are to be apart and spike to the double trimmer. Referring to the sketch, A represents this piece of joist or block nailed in position. After this has been done nail to it the joists B B, as indicated, the sketch clearly showing how the nails should be driven to hold the best. Of course two or three may be driven straight into the block, while others are driven diagonally into the double trimmer C D. The joists bearing the trimmer on either side of the flue or opening should also be double and blocks nailed on as shown at E E. The reason for doubling is that when two pieces are spiked together they are much stronger than a single thick piece. The construction here shown gives a good trimmer, and when the work is properly done the job is sure to be satisfactory in every respect.

Tempering Wood Cutting Tools.

From J. J. D., *Cornwall, Cal.*—In looking over the March number of the paper I saw a letter from "F. H. K.," Los Angeles, Cal., in which the writer asks for an easy method of tempering wood cutting tools. In reply I would say: Heat the chisels or plane bits or whatever the tools may be to a cherry red, then cool in cold water, after which polish them so as to see the temper. Next heat a piece of iron sufficiently hot and place the cutting tools on it. Draw the temper to either a dark straw yellow or a slightly brown yellow. If the coal used contains too much sulphur throw on some salt. I would also mention that a little salt used in the water is very good.

Roof for Store Building.

From J. S. Z.—In the October issue of last year "M. E. G." of St. Anthony, Idaho, asks for a plan of a roof for a store building 30 x 50 feet in size. I submit the accompanying sketches showing the method of construction which I have used with satisfaction on several store buildings erected last year. I submit the matter in the hope that the correspondent making the inquiry will find in this arrangement all that he desires in the way of a store roof.

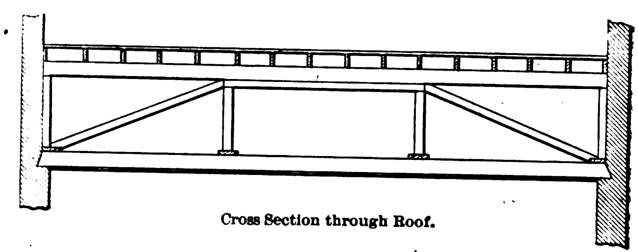
Filling for the Walls of Frame Buildings.

From J. C. W., *Pine Hill, Pa.*—I notice in the January issue of the paper that "L. L." of Leroy, N. D., wishes to be informed with regard to the best material to be employed for filling vacant spaces in the side walls to secure warmth, cleanliness and durability. The correspondent mentions sawdust, lime and sand. He also states that the studding are 1½ x 3 inches, set 1 foot apart, leaving a space 3 x 10 inches in the wall to be filled. I cannot see just how he makes this, but let the space be what it will, my plan would be to lath it and plaster inside the wall. As he mentions sand and lime, the only additional material required is hair. For lathing it will require strips say 1 inch square or probably less. These can be nailed up along the studding, and then, as the space is only 3 x 10 inches, the lath can be cut 10 inches long and put in between the studding, nailing them on to the inch strips. One coat of plaster will do, but two are better. Now, what cracks may occur along the side of the plaster caused by shrinkage will be found to be closed behind with the strip nailed against the studding. It might be lathed up and down, but the mortar would not stick as well. Plastered in this way it gives two air courses—1 inch behind the plaster and 1 inch in front. This method will certainly prove warm and clean, as I have seen it tried in dwellings with good results and at a moderate cost.

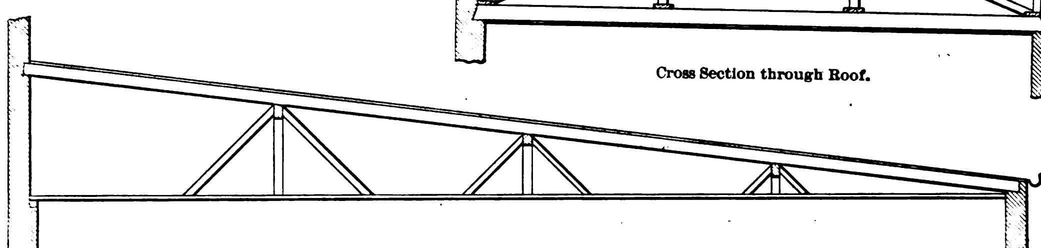
Finding the Radius of a Circle When the Chord and Rise are Given.

From J. P. W., *Knoxville, Tenn.*—I have a problem I would like to have answered through the paper. I want to know if there is any arithmetical rule by which the radius of a circle can be obtained when the chord and rise of a segment are given. For example, I want to know the greatest segment which can be obtained from a board say 12 inches wide and 10 feet long, the curve beginning at the extreme end of the board, sweeping up until it just touches the upper edge at the center and then downward, terminating at the other end of the board. I can obtain in different ways the radius of the circle to which such a segment belongs, but I cannot do it by means of figures. I want some method by which I can set my trammel points just right and strike the curve without making marks all over the board.

Answer.—The problem of our correspondent, as we understand it, resolves itself into one of finding the radius of a circle when the chord and rise are given. As the board is 10 feet long and 1 foot wide the lower edge will represent the chord of the segment of a circle, and the width of the board will represent its rise. The rule for such a problem is the "square of one-half the chord, plus the square of the rise, divided by two times the rise, gives the radius." Applying the rule we find that one half of the chord in this case is 5 feet, or 60 inches, which squared gives 3600 inches. The square of the rise, 12, is 144 inches, which added to the square of half the chord gives 3744 inches. This sum divided by twice the rise, which is 24, gives 156 inches, or exactly 13 feet. Therefore a radius of 13 feet is necessary to describe the greatest possible arc of a circle on a board 10 feet long and 12 inches wide.



Cross Section through Roof.



Longitudinal Section through Roof.

Roof for Store Building.—Sketches Submitted by "J. S. Z."—Scale, ⅛ Inch to the Foot.

Novel Foundations of the Marquette Building.

One of the finest office build ngs now in course of erection in the West is the "Marquette," located at the southwest corner of Dearborn and Adams streets, Chicago, Ill. In many ways the building is interesting to the architect, contractor and builder, and brief reference to one or more features of novelty embodied in its construction may not be out of place in these columns. The building covers an area of 25,000 feet and rises to a hight of 16 stories. It is of steel frame construction with an average thickness of wall of 16 inches and a projection of cornice of about 6 feet 6 inches. Each floor is constructed in such a way as to be entirely self supporting, so that all partitions on any given floor may, if necessary, be wholly removed without affecting the other floors. The most striking feature, perhaps, in connection with this building is the foundations of the western wall, which are designed to carry on the adjoining lot a structure of the same size as the Marquette. The difficulty encountered here grew out of the fact that the loads which will at first be placed upon the foundations differ greatly from the loads which will be carried at some future day, for the reason that in some places the building is 16 stories in hight, in others it is 8 and in one place it is only 1 story high. Now, in some parts of the foundations only one-half of the future load is placed, while in others three-quarters are carried, and in another a still larger percentage. The idea has been to so construct the foundations as to overcome uneven settling, and to accomplish this the form of column support shown in Fig. 1 of the accompanying illustrations has been employed. This support consists of a cast steel shoe about 3 x 5 feet at the base, resting on six plates, each of which is about 1 x 5 feet in size and ¼ inch thick. These plates in turn rest on two heavy iron castings, or, in other words, a split shoe having its two parts exactly alike. These pieces are 2 feet high, 5 feet long at the bottom and about 20 inches wide, tapering toward the top, where they measure 14 inches. This split shoe rests on rails bedded in concrete, there being several series of the rails, one layer running east and west, another north and south and so on, each layer being at right angles to the one immediately below it. The space between the two parts of the split casting measures 12 inches in width and is designed for the reception of an hydraulic apparatus, so that the upper plate may be raised or lowered according to circumstances. The hydraulic device has four lifts which act uniformly and with the same pressure. This lift is inserted in the open space between the two parts of the casting and the pressure is exerted upward directly on the shoe to support the columns. The idea is that in case any part of the wall settles in the near or distant future it can so easily be readjusted with the other parts of the wall that there will be no serious danger of the walls or even the exterior finish being cracked or damaged by the settling. The lift, a top view of which is shown in Fig. 2, is intended to be operated with one pump which can be worked by one or two men. Should the wall at any time give indications of settling or cracking the hydraulic pressure can be exerted on the shoe supporting the column and the thin plates above referred to can be removed if it is necessary to lower the wall, or additional ones can be inserted in case the wall is to be slightly raised.

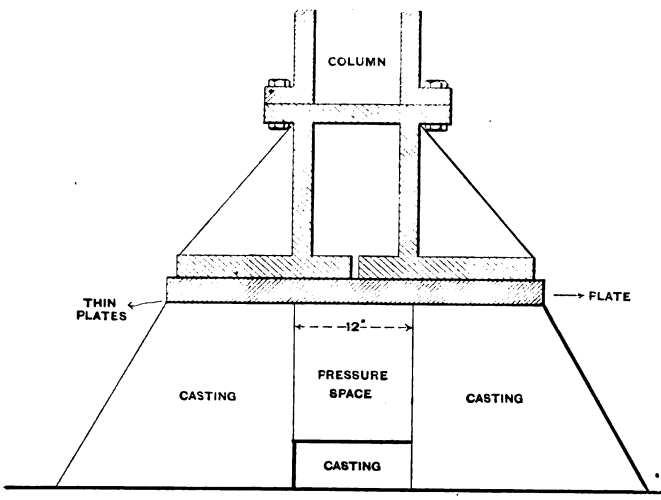


Fig. 1.—Sectional Elevation of Column Support.

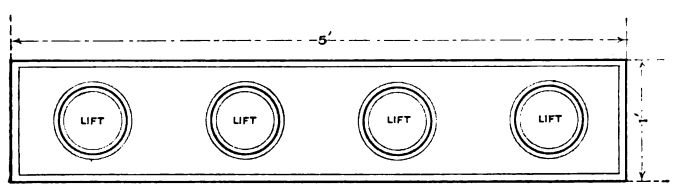


Fig. 2.—Top View of Hydraulic Apparatus Designed to Occupy the "Pressure Space" of Fig. 1.

Novel Foundations of the Marquette Building.

Facing Bricks.

Building in brick has been resorted to in this country for a long time, says a writer in an English journal. Not so on the Continent, where brick has come into more extended use only in recent years. The taste for brick work is spreading everywhere, not only in districts poor in quarry stone, but all over France, Germany and Switzerland, where, even for buildings of some architectural importance, rough masonry work was the prevailing mode. In Switzerland especially, where the workmen have had little experience, building with brick is looked upon as expensive and luxurious. In consequence of the prevailing tendency of combining the beautiful with the useful, facing bricks of various sizes are now manufactured in Germany and Switzerland, by the employment of which builders are enabled to erect walls for nearly their whole thickness of bricks or cement slabs, even partially of quarry stones, which may be obtained everywhere at very low rates, especially now, and to face them afterward with a finer description of bricks. Bonding is preserved in the usual manner by joining the inner bricks in such a manner as to use for facing alternately quarter, half or three-quarter bricks. This way has the advantage, besides cheapness, of permitting the facing bricks to be put in afterward, so that they cannot be soiled or damagd.

The greater the distance of the building site from the place of manufacture of the facing bricks the greater is the saving by a reduction of carriage, the charge for which is very high, in Switzerland especially, and tells so much with heavy materials. The bricks are, therefore, made hollow, and in order to secure a better hold for the mortar provided at the sides with ribs and grooves. It is evident that, for the manufacture of facing bricks of the description indicated, only clay which in burning becomes hard and compact, and acquires a nice color, is suitable. Bricks which are brittle, porous, of an inferior color, are not adapted for elegant and durable building, are consequently lower in price and will not bear increased expensive working. Architects who have visited recently Northern Germany, and in Southern Germany, especially Frankfurt and neighborhood, will have seen numerous instances of the application of partial facing bricks. At Amsterdam the new railway station is being built with those bricks. In Switzerland, as far as we know, those bricks have been used only in two instances, at Basle and at Geneva. In Switzerland they are made in dark red, yellowish white, and various shades between those two colors. The bricks are said to be of very great hardness and of close grain, carefully made and well burnt. There can be no doubt that these facing bricks will find a more and more extended application.

WE have received a letter from Charles B. Howe, Secretary, Port Deposit, Md., stating that the next annual meeting of the Manual Training Teachers' Association of America will be held at the Armour Institute, Chicago, Ill., on July 16, 17 and 18 of the present year.

TRADE SCHOOLS.

AN exceedingly interesting address was recently delivered before what is known as the Monday Evening Club of Boston, Mass., by Prof. Charles R. Richards, Director of the Department of Science and Technology in the Pratt Institute of Brooklyn, N. Y., the subject being "Trade Schools, their Place, Education and Industry." The speaker first referred to the trade school movement in this country, the causes which led to the creation of this institution and what has been accomplished in its development in the older countries of Europe. He then considered at some length the relations existing between the apprentice and his master, together with the attitude of the labor unions toward young men desirous of entering the trades; the effects of the constant influx of foreign workmen, the great majority of whom are not of the better class, and the necessity of some provision better suited than the apprenticeship system to modern industrial conditions. After describing somewhat in detail the trade school systems followed in various European countries the speaker drew some interesting conclusions therefrom.

He then traced the history of the New York Trades School from the inception and foundation in 1881 by the father of the American trade school movement—the late Col. Richard T. Auchmuty—to its present position of power and usefulness, showing how in this case, and of that of institutions subsequently established on similar lines, the problem has been practically solved. He pointed out that it was not their design to turn out the finished mechanic, but to equip the learner with a fair amount of skill in the varied operations of the trade, together with a thorough grasp of the principles involved, sufficient to fit him at once to become the money earning factor. The economic problem of not encroaching too seriously upon the money earning period of life with the school training was met, he showed, by Col. Auchmuty; first, by means of the evening classes which allowed the students to be engaged in a livelihood occupation during the day; and, second, by reducing the length of day classes to the minimum in which it was felt an efficient preparation for active work could be gained—namely, to three months. In conclusion the speaker said:

"The trade schools of the Pratt Institute and of the Philadelphia Master Plumbers' Exchange were founded upon the New York school as a type. At the Pratt Institute a policy obtains in regard to the length of day courses somewhat different from that pursued at the New York schools. In Brooklyn the length of day courses is made nine months, with the idea of giving more extended instruction in the trade school itself, at the cost perhaps of reaching fewer students. The belief is also held that the legitimate function of the evening classes is rather to extend and broaden the training of those entered in the trades than to train beginners. In all of these American institutions the principle obtains of confining the instruction given in the schools to an essentially practical preparation for the trade and to pupils of sufficient age (17 to 25) to learn rapidly, leaving the general education to be gained in the common schools previous to entering.

"This system of trade school training received the indorsement of the National Association of Master Builders in their convention at Cincinnati in 1888. At this meeting resolutions were passed that a lad who wished to enter the building trades should go first to a trade school to learn the science and practice of his trade. When the trade school course is finished, and he has proved by an examination held by a committee of master mechanics that he has profited by it, he is to enter a workshop as a 'junior.' When old enough and able to do a full day's work he is to apply for a second examination, which, if passed, entitles him to be considered a journeyman. This system seems well suited in its essentials to the needs and genius of the pupil of the United States, and destined to develop throughout the country. The only serious obstacle to its progress is the attitude of the labor unions, who oppose the entrance of the trade school graduate into the trade, upon the same ground that they seek to limit the number of apprentices.

"The short sighted and inconsistent policy which thus seeks to close to young men all entrance to the trades, and at the same time allows, without protest, the great influx of foreign workmen, needs little comment. It is intrinsically selfish and unnatural, and being such, cannot long continue. The trade school has come to stay. It has come in answer to a great need and must develop in answer to that need. The right of American youths to enter the trades and to equip themselves in the most economical manner for a livelihood cannot much longer be gainsaid or set aside. What might under other conditions become the tyranny of a class cannot long exist beside the free institutions of our country. On the contrary, the true interests of organized labor are to be found, not in futile opposition, but in active participation. The opportunity is at hand for the labor organizations of the country to actively influence, and, to a certain extent, direct the trade school movement. By co-operation with the schools they can do much to realize the highest opportunity for usefulness that is open to them. By selfish and bigoted opposition they will do much to cripple and narrow their own power. A comprehensive system of trade training suited to the times would involve the recognition of the trade school graduate by the trade organizations of the journeymen, as well as of the masters, and his establishment with a definite place and a definite economic value in the industrial world. Such a system, while effectively preventing the admission of imperfectly trained workmen, would afford ample opportunity to every naturally qualified candidate. An arrangement of this kind would open the doors of the trades to American youth, without requiring the sacrifice of all opportunity for culture that is now demanded. Such an arrangement would mean, to a large extent, the Americanizing of the trades—it would mean the addition to our industrial army of young men who have had the opportunity of a good public school education, and who are fitted to assume the duties of citizenship with intelligence and patriotism, as well as to attain to the highest efficiency in the operation of labor."

LAW IN THE BUILDING TRADES.

Contract with Owner necessary in Lien for Materials.

A person claiming a right to a lien for labor or material furnished in the construction of a building must show that it was performed or furnished at the instance of the owner or his agent. —Sellwood Lumber & Mfg. Company *vs.* Monell, Supreme Court, Oregon, 38 Pac. Rep., 66.

Liability for Injuries to Adjoining Owner.

One who erects a chimney on his land is liable for injuries to an adjoining owner by its fall, when it is not the result of inevitable accident or wrongful acts of third persons.—Cork *vs.* Blossom, Sup. Jud. Court of Mass., 38 N. E. Rep., 495.

Obstruction of Light.

The easement of light and air cannot be acquired, according to the general current and weight of authority in this country, even by prescription, and of course no right to object to the obstruction of one's windows by a wall erected on the land adjoining can be said to exist. Therefore, one who leases rooms in a building is not entitled to damages from an adjoining land owner because the latter builds so as to shut off the lessee's light on the side of the leased premises.—Lindsey *vs.* First National Bank, Asheville, 20 S. E. Rep., 621.

Liability for Negligence of Fellow Servants.

Where a workman is injured by the fall of a derrick, occasioned by the neglect of another employee in charge of the derrick to provide a check rope, the master is not liable.—Jenkinson *vs.* Carlin, City Court of Brooklyn, General Term, 30 N. Y. Supp. Rep., 530.

Rights of Assignee of Contract.

Where a vendor has made advances to the purchaser to enable him to erect a building on the land under an agreement that he should be secured by a lien, specific performance in favor of the assignee of the purchaser will be decreed, subject to the vendor's judgment for the money so advanced. The assignee of an oral contract for the purchase of land, which has been partly performed, has the same right to specific performance as the assignor.—Dodge *vs.* Miller, Supreme Court, 5th Dpt., 30 N. Y. S., 726.

Liability of Architect for Want of Care and Skill.

In an action by an architect for commissions for designing and supervising the construction of a building the owner alleged that the plans were faulty and the building not constructed according to specifications and claimed damages. The work performed was to be paid upon certificates by the architect, and the owner paid for some work which he knew was not according to specifications. It was held that it was error to refuse to charge that such payments, made with such knowledge, would not preclude the owner from recovering damages suffered by failure of the architect to use proper diligence and skill in drawing the plans and specifications, or in supervising the work done thereunder.—Pierson *vs.* Tyndall, Civ. Ct. App. Tex., 28 S. W. Rep., 232.

Veneer Construction.

The subject indicated by the above title has been discussed to some extent in past issues of the paper, but has not by any means been exhausted. It possesses deep interest to a large class in the building trades by reason of its growing popularity in many sections of the country and the variety of methods in vogue. One plan is to first construct the frame as for an ordinary wooden building, making use of a foundation wall 6 inches wider all around than the frame which it supports. This 6 inches is taken up by devoting 1 inch to sheeting, 1 inch to an air space between the sheeting and the brick and 4 inches to the brick work, which is built out flush with the foundation wall. The frame work is generally sheeted and in cold climates the sheeting is covered with paper on the outside. Before the brick work is commenced the frame should be perfectly plumb and stand in the same position in which it is to remain. By placing braces on the outside corners a more substantial piece of work will result. When the frame work is completed the brick may be laid as indicated in the illustrations presented herewith. For the purpose of securing the brick to the frame what is known as a Morse veneer tie may be employed with very satisfactory results on each studding and at every five courses of brick as the wall goes up. In cases where the air space is an inch or more, a tie with drip may be employed to advantge, as indicated in Fig. 1 of the engravings. This tie is made of $\frac{3}{16}$ galvanized steel wire and any moisture that penetrated through the brick will drip from the tie to the water table, where waterways should be provided at convenient intervals between the lower courses of brick and the water table. There are many cases where the sheeting and air space are not employed, the brick being laid close to the studding and secured with veneer ties of the character indicated in Fig. 2 of the illustrations, which represents the general method of construction followed in connection with half timbered buildings, cemented outside. These veneer ties are made by J. B. Prescott & Son, Webster, Mass., who refer to them as specially applicable for bonding hollow and veneer walls, terra cotta work, face brick, ashlar, &c. Buildings constructed in accordance with the methods above indicated are very popular in many sections of the country, this style of architecture being specially adapted for country residences, seaside cottages, hotels at watering places, &c.

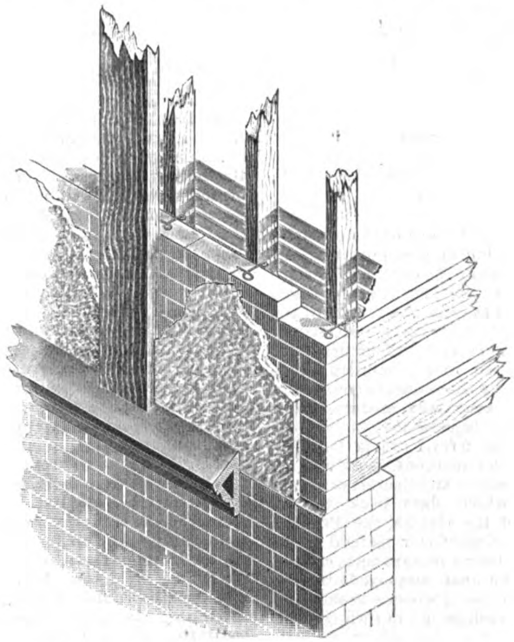
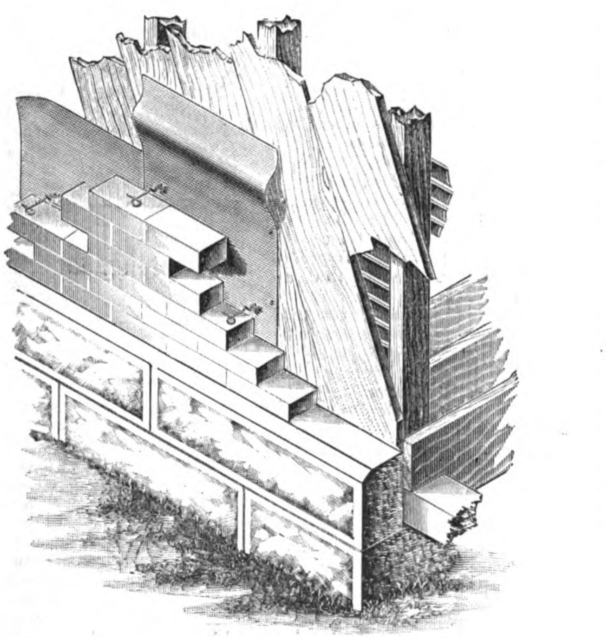


Fig. 2.—Half Timbered Building Bonded with Veneer Ties.



Veneer Construction.—Fig. 1.—Showing Method of Bonding by Means of Veneer Ties when there is an Air Space of an Inch or More.

The Williamson Trades School.

The second commencement of the Williamson Free School of Mechanical Trades, Media, Pa., took place on Saturday, March 29, when 32 young men, after completing a three years' course of manual training as machinists, bricklayers, carpenters and pattern makers, were given their diplomas. The occasion was made one of special interest by the presence of a number of distinguished persons. The boys, of whom 168 are now receiving instruction in the school. were addressed, among others, by Governor Hastings of Pennsylvania, Ex Postmaster-General Wanamaker, who is president of the Board of Trustees of the school, Job H. Jackson, president of the Jackson & Sharp Company, Wilmington, Del., and representatives of the Philadelphia Master Plumbers' Exchange, as well as members of one or two trade unions. The Williamson School is now firmly established on the lines laid out by its founder, the late Isaiah B. Williamson, and it has turned out a number of well-trained and efficient mechanics. Its condition is reported to be in every respect satisfactory. The trustees have established the school on a broad and liberal basis; and the boys, who all live at the institution, are there surrounded by the best influences, and in every way fitted to start on a useful industrial career under the best auspices.

Building by Machinery.

The cost of building is wonderfully reduced by the use of machinery, says a writer in the *Manufacturers' Gazette.* Walls made of brick, stone, cement, plaster, &c., are reduced in cost more than one-half. Large buildings, the estimate of which is about $1 per cubic foot, can be built for 30 or 40 cents per cubic foot by the employment of labor-saving machinery and devices. Cement and mortar, all the materials for stone work, with the brick and stone itself, may be mixed and handled almost entirely by machinery. A derrick, lifter and crane will perform in an incredibly short space of time work that it formerly took days and scores of men to complete. It would be advantageous if the same power and appliances could be so arranged as to be utilizable in small towns on the same principle as those used in large cities. As it now is in suburban localities almost everything is done by hand.

Structural and Ornamental Terra Cotta

The revival of some of the excellent methods and building materials of earlier ages is one of the encouraging signs of the times, and has been nowhere more marked than in the revival of the manufacture of terra cotta, both structural and ornamental. Structural terra cotta, employed in our modern buildings, especially those used in connection with iron, is essentially modern, says a writer in the *Brickbuilder*, but our use of ornamental terra cotta is but a revival of earlier methods, mainly those of the Renaissance architecture of North Italy, but which date back to the Romans and the Greeks, the Persians and the Assyrians. Our method of inclosing iron beams in terra cotta casings is not unlike that employed by the Greeks for incasing wooden beams. As a rule our casings are in turn covered over with plaster, but we might well take a hint from the Greek builders of Sicily, 500 or 600 years B. C., and make these terra cotta casings themselves ornamental. Much is to be learned from the study of these Greek terra cottas used in the structure and decoration of buildings. The making of such a finial or akroterion, as that of the temple of Hera, at Olympia, a great plaque, over 7 feet in diameter, and richly decorated, which dates back to the eighth century B.C., is a feat our best terra cotta manufacturers would be proud of to-day, and no colored *faience* or terra cotta has been made which can compare in either beauty or brilliance with the great frieze of the arches which decorated the palace of the Persian monarchs at Susa. We mention these things to emphasize the advantage of studying the best work of elder days. Our terra cotta manufacturers have made great strides, and the recent rediscovery of methods of producing glazed colors which will stand the weather opens up "fresh fields and pastures new" to the designer. A careful and loving study of the splendid work that has been done in similar materials in the past will help us to make the best use of these resources, still so new to us, and stimulate to further progress. The increasing use of a method of construction which is essentially an iron frame, incased in terra cotta, ought to lead to a consistent development of decorative forms in terra cotta in harmony with the new method of construction, and in this new development we believe that colored *faience* is sure to play an important part. In France, especially, some not altogether unsuccessful attempts in this direction have recently been made, which ought to be helpful in our endeavors to apply these old methods to new conditions. In our high buildings, especially, the use of traditional architectural forms which are the outgrowth of what might almost be referred to as the opposite method, the method of construction in courses, does not seem to be quite in place. As yet the method of construction itself may be said to be on trial, and there are not wanting architects of the greatest experience who condemn it altogether.

Trade Education in India.

An East Indian exchange states that Lord Elgin, the present Viceroy of India, is very much interested in trade and technical education. He has under consideration the establishment, under government auspices, of schools where the Indian mechanics will be offered opportunities of learning their trades in a more efficient manner than is the case at present. Native workmen are very conservative. A trade or profession is followed in a family from father to son. All the trade education that they get is such as is received practically in the shop from their parents. Consequently but little progress or improvement is made in the mechanical arts in that country, the native artisans keeping in a certain groove which has never altered from age to age. The Government has at last had its eyes opened to the fact that much might be done in this field to improve not only the condition of the workman, but also the quality of the work he turns out, if better opportunities were afforded him of learning his trade by means of such institutions as the trade and technical schools which have proven so valuable in this country and in Europe.

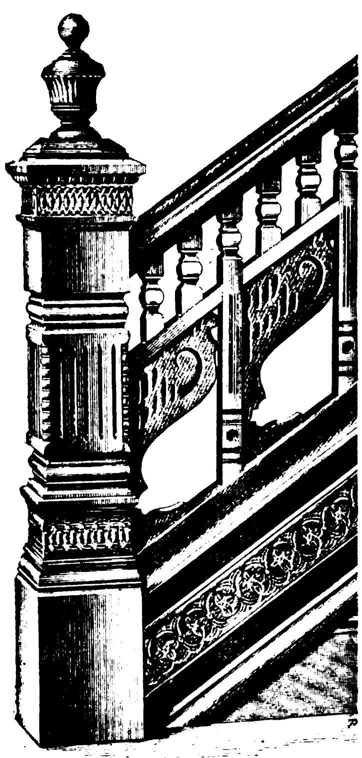
Construction of Hospitals.

In the construction of the most improved hospitals in Germany, says a writer, cellars are abandoned for the pavilions of large establishments—as they have long been for small ones—the opinion being that no use can or should be made of them, a much better plan being to allow the air to blow freely through under the first floor. The proper number of patients for a ward in general hospitals is generally agreed to be 30, with 20 as the maximum for wards devoted to certain kinds or classes of patients. To secure the best effects of sun and air the long axes of the wards are made to run north and south, instead of east and west, as in many of the older hospitals, this new arrangement giving sun on both sides of the room during some part of the day and allowing the "day room," or "sunning room," which is now an indispensable part of every large hospital ward, to be placed at the south end. Flat roofs are preferred, without air spaces between the rafters and ceiling, and covered with wood cement or similar material. Opinions vary as to the best flooring, some still preferring wood, but the best material for walls is agreed to be brick.

A WRITER in one of our exchanges says that in painting wood which has been long exposed to the weather it is economical to add whiting to the oil paint for the first coat, and if the subsequent coats are of lead, or lead and zinc, the job will be thoroughly durable. About a quart of whiting paste to the gallon of oil paint will be about the proportion required, and as much more oil and turpentine added as may be necessary.

Design for Stair Finish

In years long since past the carpenter was compelled to work out by hand, at the expense of no little time and trouble, the various ornamental portions employed in connection with the interior finish of a building, but now, with the introduction of improved machinery and the important strides which have within recent years been made in the production of ornamental wood work of all kinds, this part of the carpenter's labor is comparatively easy. He has only to select from some manufacturer's catalogue the styles of work required, and upon their receipt fit the material to its proper place. The field for the display of artistic taste in the designing of ornamental work of this kind is a broad one and, in connection with stair finish especially, permits of very rich and handsome effects. There are many concerns engaged in the production of stair builders' goods, each vieing with the other in turning out rich and attractive designs to meet the constantly varying requirements of taste and location. Among the new styles of stair finish which have recently been brought out is that shown in the accompanying illustration. It represents a copyrighted design of the well known firm of S. E. Smith & Brothers, 199 West Seventh street, St. Paul, Minn. The carving shown is not pressed, stamped or burnt work, but is carved by a process of their own in attractive geometrical patterns, which can be varied and modified so as to produce a great variety of pleasing designs.



Design for Stair Finish.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President, Noble H. Creager of Baltimore.

First vice-president, C. A. Rupp of Buffalo.

Second vice-president, James Meathe of Detroit.

Secretary, William H. Sayward of Boston.

Treasurer, George Tapper of Chicago.

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The Uniform Contract.

The use of the Uniform Contract is steadily extending, and calls for sample copies are being continually received by the National Secretary from all parts of the country. Among the many calls received during the past month was one from a firm of architects in Montreal, who also wished to know where the document might be had in quantity.

Every contractor should insist upon the use of the form, for, aside from the fairness of its provisions and the fact that it has the approval of the national organizations of both architects and builders, the uniformity in methods which must follow its use is of the greatest benefit to the fraternity at large.

Arbitration for Builder and Owner.

The attention of the members of local exchanges is called to the action of the Builders and Traders' Exchange of Milwaukee, reference to which appears under the head of "What Builders are Doing." Such action as this recommends itself and places the exchange upon a most desirable footing before the public. It proves beyond question that the organization, recognizing that differences and misunderstandings are likely to occur, desires to have it clearly understood that it advocates and provides a means for settling all disputes between owner and builder out of court. By this means all concerned are assured of fair treatment, and the pledge of honorable dealing is made by every member of the exchange. All filial bodies would do well to follow the example of the Milwaukee builders in this matter, as well as in some of the other desirable features of their organization which have been mentioned in this department from time to time.

Boston Apprenticeship System.

The establishment of some definite form of apprenticeship in the building trades is a need which is felt in every branch of the business, both among employers and workmen.

The following is a summary of the system adopted in 1892 by the Mason Builders' Association and the Bricklayers' unions of Boston with the view of eliciting criticism and suggestions for improvement. This system has been in operation for three years and has worked to the complete satisfaction of all concerned. In order to prevent apprentices from beginning work at a time when they should be in school and when they are physically unfit for the arduous labor of an apprenticeship, the following conditions as to age are fixed.

No individual shall be taken as an apprentice until he is sixteen years of age.

No individual shall be taken as an apprentice after he is twenty-one years of age.

An apprentice taken under eighteen years of age shall serve until he is twenty-one years of age.

An apprentice taken at eighteen years or over shall serve three years.

No person shall be taken as an apprentice who cannot read and write the English language.

The members of the Employers' Association must agree that he will keep an apprentice under legitimate instruction, as such, for the full term, as well as to comply with the other requirements of the joint agreement.

When a member of the Mason Builders' Association desires to take an apprentice, he must notify the secretary of the association, giving name, age and term for which he is taken.

The secretary shall then notify the clerk of the Joint Committee, and also the secretary of the Bricklayers' unions, and a record shall be kept by both associations and by the Joint Committee, so that a complete registry of all apprentices shall be available.

A card shall be issued to each apprentice by the Joint Committee, which he shall hold during his term as evidence that he is properly registered as an apprentice.

The Joint Committee of Arbitration between the employers and workmen under which the system operates has general supervision of all questions relating to apprenticeship, and has authority to cancel any apprenticeships for cause, to place an apprentice with a new employer for the unexpired term if his employer should die, and to issue graduation papers when the apprentice has satisfactorily completed his term.

An employer shall have the right to appeal to the Joint Committee to terminate or cancel an apprenticeship for evidences of incapacity or insubordination or failure to carry out his agreement with his employer.

An apprentice shall have the right to appeal to the Joint Committee should his employer fail to keep him under legitimate instruction, or to keep his agreement with him in any other respect.

He shall have the right also to appeal to the Joint Committee and secure through them opportunity to complete his apprenticeship, should his original employer die, or from any other cause fail to give him opportunity to complete the same.

Apprentices shall be paid at the rate of eleven cents per hour during the first year, twelve cents during the second year, thirteen cents during the third year, and fifteen cents for any additional years they may be obliged to serve under these rules. These sums to be paid weekly.

Deduction may be made for absence from work without sufficient cause.

No deduction from the pay of an apprentice, however, shall be made, provided he report for duty at proper times, but is unable to work because of weather, or failure of his employer to provide work.

In addition to the pay stipulated, each apprentice shall have an allowance of $50 the first year, and $75 for every additional year, payable in quarterly installments.

Each apprentice shall be entitled to one week's vacation each year, without loss of pay, or two weeks with one week's loss of pay, but shall not be allowed more than two weeks' vacation each year.

A certificate of graduation shall be accepted as evidence that the apprentice has properly graduated and is entitled to recognition as a journeyman, and he shall be eligible to membership in the Bricklayers' unions when he has such certificate.

Recognizing the fact that special instruction in the fundamental features of the bricklaying trade (which instruction shall comprehend education of both mind and hand, so that the individual shall gain a proper knowledge of quantity and strength of materials, and of the science of construction) is of as much importance as special instruction in other trades or professions, and, realizing that the chances of an apprentice getting as much instruction as he is entitled to, while at work on buildings, is necessarily limited, the parties to these rules agree that they will join in an effort to establish an institution in this city where all the trades shall be systematically taught; that when such school is established they will unite in the oversight and care of the same and will modify these rules so that a reasonable deduction shall be made from the term of an apprentice by virtue of the advantage gained through instruction in said school.

Employers and workmen as well are urged to consider the foregoing for the purpose of offering suggestions as to improvement in the system.

Architects' License Law.

A bill known as the Architects' License law, which was presented in 1892 and only failed of enactment because the Governor declined to sign it, is again before the Legislature of New York State. The bill provides for the appointment by the Regents of the University of New York, with the approval of the Governor, of a board of seven members, to be known as the New York State Board of Architects. The duty of the board shall be to examine all applicants who desire to practice the profession of architecture, and to issue licenses to such as they deem worthy. All persons who may be practicing architects at the time of the passage of the bill shall be entitled to a license upon making affidavit of the fact before the board. The board is to have the power to revoke any license for gross ignorance, recklessness or dishonest practices, but the holder of a revoked license may have 20 days' notice in which to prepare his defense. For such purpose the board shall have the power to summon witnesses, &c., the same as a court of record.

The fine for practicing architecture in New York State after the passage of the law shall not be less than $50 nor more than $500. Nothing in the bill shall be construed to prohibit any person in New York State from acting as

designer of his own building, or as designer for any person employing him, with full knowledge on the part of such employer that the person so employed is not a licensed architect in accordance with the act ; nor to prohibit architects residing in other States and not having an office or carrying on a general business in New York State acting as architect for any building, or from visiting the State for such purpose in person ; nor to prohibit students or employees of licensed architects from acting for or upon the authority of such licensed architects.

The license fees received by the board may be expended for the payment of the traveling and other expenses of the members of the board.

Any surplus of such fees exceeding $500 shall be paid annually by the board to the treasurer of the State.

The members of the board are to serve without compensation.

The bill has a large following of earnest supporters all over the State, and it is being urgently pushed for passage in the present Legislature. The architects have appealed to the Builders' Exchanges for the help of their members, and the following resolution, passed by the Building Trades Club of New York, is a sample of the action the builders have taken in some of the other Exchanges :

Resolved, That we, the Building Trades Club of the City of New York, duly assembled, do most heartily approve and indorse the enactment of such a law, and that we, as a body, give this measure our unqualified support and influence: that we firmly believe that such a law will be for the public safety, and that its provisions will prevent uneducated, incompetent and unscrupulous persons from practicing as architects, to the serious detriment and pecuniary loss of both contractors and owners.

New Publications.

MODERN OPERA HOUSES AND THEATERS. By Edwin O. Sachs and Ernest A. E. Woodrow, architects. Three volumes; size, 23 x 16 inches; illustrated by 220 plates; substantially bound in buckram; published by B. T. Batsford.

The above mentioned treatise now in preparation will, when completed, be issued in three volumes containing examples selected from play houses recently erected in Europe, with short descriptive text, together with a consideration of the subject of theater planning and construction. Supplements will relate to stage machinery, theater fires and protective legislation. The series of 220 plates used in illustrating the work are to be photo-lithographs from line drawings specially prepared for the purpose, while several hundred diagrams in the text will be reproduced from original working drawings, all plans and sections being drawn to a uniform scale. The plates will be about 12 x 18 inches inside the margin, references on the illustrations being made in English, German and French. The three volumes will be published at intervals, the first appearing the coming summer, the second during the winter, while the third will be issued some time next year. We understand that the work is intended as a continuation of the "Atlas on Theaters of an Early Period," which was published by M. Constant of Paris in 1842. A special feature of the treatise on planning and construction will be the quotations of opinions by the leading authorities of all countries who have either been personally interviewed or have specially prepared papers from which extracts will be made. There will be an introductory chapter on the various conditions under which play houses are erected in different countries and the purposes they have to fulfill. Great care will be taken to make the contents valuable as a thoroughly practical text book, and the illustrations will be selected solely with this view. The latest examples of cantilever construction and iron roofs will be illustrated from the engineer's details, and there will be separate chapters on acoustics, lighting, ventilating, warming, decoration and furnishing.

THE ARCHITECTS' CARD INDEX. Issued in monthly parts of 50 each : 600 cards per year ; published by The Index Company ; price $3.

It is well known that at the present time a very general use is made of card indexes, especially in the cataloguing of books and authors, as well as for reference in public libraries, insurance offices and for mercantile purposes. The index usually consists of a number of cards of uniform size placed on edge in a tray, box or drawer, and divided into divisions by means of guide cards of a different color. These guide cards are stamped at the upper edge with the divisions they are intended to indicate and distributed through the index in their proper places. The advantages of an index of this kind are such that the concern above named have brought out and are now publishing an index designed for the use of architects, carpenters, builders, and in fact all having to do with the building trades. It is an index of addresses, catalogues, city building laws, cost of materials, elevations, views and plans, details and designs, literature, problems, specifications and private notes. The idea is to enable the architect, builder or contractor to immediately turn to articles of importance in the building line which have been published and illustrated, and to this end a number of the leading trade journals and books have been indexed upon the cards referred to. The list of important works on all subjects connected with building is to be increased as rapidly as possible, so that the scheme will cover a wide range. For general office use the index can be kept in a case of drawers, while for individual use it is intended to keep the cards in a drawer at the drafting or writing table, so that they can be referred to at any time without leaving the work in hand. In the card index under review the various departments are divided into special subjects, alphabetically arranged so as to make reference rapid and easy. The division cards are in red, while the cards containing the information are in white. There are also a number of blank cards of proper size, so that the builder or architect may add his own list of addresses of various kinds. As the cards are published and received each month, it is intended that they be immediately placed in their proper places in the index.

IT is stated that the late J. G. Wilmerding left to the State University of California a bequest of $400,000 for the purpose of erecting a trades school for boys. The opinion seems to be that the school will be located at Oakland, Cal.

A VERY good idea of the degree of activity likely to prevail in the near future among the building trades of New York City may be gathered from a perusal of the statistics of the Building Department for the first three months of the year. During January, February and March 1098 buildings were projected, estimated to cost $27,201,844, these figures comparing with 533 buildings, estimated to cost $9,087,805, for the corresponding period of 1894. From these figures it will be seen that while the number of new structures contemplated is just about double the number projected in the first three months of last year, the estimated cost is nearly three times greater, which would indicate that the structures to be erected are largely office buildings.

CONTENTS.

HOUSE OF W. E. CARLSON, AT FOREST HILL, NEW JERSEY.

H. GALLOWAY TEN EYCK, Architect.

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1895.

CARPENTRY AND BUILDING

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The Macy Manual Arts Building.

A week or two ago the Macy Manual Arts Building of the Teachers' College, this city, was formally opened for the first time to the public, giving an excellent opportunity of observing the benefits derived from a course of study pursued at this institution. The building is 147 feet long, 71 feet wide, five stories and basement in hight and equipped with all the appliances necessary for the purpose. In the basement is the Department of Elementary Metal Working, including the foundry and forge, adjoining which is the polishing room, where the final touches are given to the pieces turned out. Four rooms are devoted to metal working, chipping and filing, soldering, molding, casting and forging. On the first floor are offices, conference rooms, library, lecture room, machine tool room and wood turning room. The second floor is occupied by the Department of Elementary Manual Training, in which the rudiments of designing and color working are taught; the Architectural Department; the joining room for cabinet making and carpentering, and the wood carving room. The third floor is devoted to the Department of Mechanical Drawing, Clay Modeling, &c.; the fourth floor to the Museum and Art Department, and the fifth floor to the lecture room. At the formal opening of the building the teachers and pupils gave exhibitions of wood carving, joining, turned wood work, iron work, clay modeling, mechanical and architectural drawing, charcoal and pen and ink sketching, color work and needle work. The school will be open to receive pupils in September next, and will be under the direction of a committee of the Teachers' College faculty, consisting of the Board of Directors of the Manual Training and Art Education. The aim is first to train teachers and supervisors of manual training and art students, and second to give instruction in manual training and art work to students pursuing courses in other departments of the college, to special students and to pupils in the Horace Mann School, the latter being the academic part of the college.

Location of Registers.

The proper location of supply and exit openings in apartments of the character of schoolrooms is a matter regarding which there is evident difference of opinion. Almost without exception the older school buildings, whether heated by steam or by furnace, will be found to have the supply registers at the floor, usually, but by no means always, near the inner walls. The outlet registers will be found as diversified in their location as are the buildings. Modern practice almost universally recommends placing the supply register in an inner wall at least 8 feet to the bottom above the floor. From this opening the air, in any system of adequate capacity, will issue at a velocity of about 400 feet per minute. This will give it sufficient impulse to cause it to pass above head level to the outer walls, where their cooling action will cause it to fall to the floor, along which it will travel in a mass toward a properly provided outlet register in the same inner wall as the supply register, but at the floor level. The most equable heating will result from the location of the supply register so as to force the air along one cold side of the room, while the location of the outlet register in the same wall as the supply, but as far from it as possible, will compel the most complete circulation of the air within the room. Registers for exit near the ceiling are useful when the supply of air from the ventilating apparatus is replaced by that from open doors and windows in mild weather; but such registers at the ceiling should never be employed when the air supply is from the regular opening in the inner wall.

American Industrial Union.

Some details have lately appeared in the public press regarding a new departure in the field of labor organization which has been initiated in the West, and which in its principles and objects appears to embrace some commendable features. It is an organization which has just been started in Chicago under the style of the American Industrial Union, the general plan of which is somewhat on the lines of the American Railway Union. Its aims are briefly as follows: The establishment of employment bureaus, general co-operation and the introduction of a uniform eight-hour working day on September 1, 1897. In addition, it seeks to secure the adoption of the principle of arbitration in all differences between employers and employed and the entire elimination of strikes. The co-operative feature appears to be the point most strongly insisted on by the constitution. To this end the association proposes to ask for the establishment of postal savings banks for the benefit of wage earners; the accumulated funds of which should be used to establish industries which will absorb the unemployed and provide them at least sufficient work to enable them to be self-supporting. Instead of setting aside large sums of money for strike funds and the maintenance of highly salaried officers the available funds of the association are to be used for the furtherance of the co-operative idea, particularly in the direction of establishing and aiding co-operative colonies, of which a considerable number are already in existence. The organization is to be all-embracing, for every trade and profession, no discrimination of nationality, color, sex or religion being allowed. This bare outline of the objects of the new organization is sufficient to show that its aims are higher and less self-seeking than those of the average trade union.

The Drift Cityward.

A business man of New York, well known for his active interest in the younger men of the laboring classes, and whose personal acquaintance with the condition of the city's poor is both wide and sympathetic, was lately lamenting the growing tide of unskilled labor which sweeps into this city every year from the country districts. Did they but realize it, most of the country boys and young men who add themselves to the population of New York City from month to month could, he argued, secure a far better position for themselves in the smaller towns, where the labor market is usually not overstocked. They foolishly elect, however, to go to the large centers of population, where the struggle for existence is always of the most stringent and bitter character. This fact has been particularly noticeable during the past year or two, when times have been unusually hard. Not only young persons, but older people, out of work and perhaps in want, start away from the small towns and country districts with the idea of finding a wider opportunity to better their condition in New York or some other great city. This class of labor has been arriving in shoals during the recent period of depression, recruiting the already unwieldy army of unemployed in most of the greater cities. No graver mistake could be made. As a rule, small towns and villages have less excessive poverty to relieve than the great centers of population, in proportion to their resources. Able bodied single men, especially, should make their way to the country rather than to the cities. Many farmers would be glad to give one or two men, at least, a chance to earn their board and lodging by work in clearing up fields or making improvements in farm buildings, &c. This provision would be, for a while at any rate, far preferable to tramping the city streets day after day in a hopeless search for work, half starving meanwhile.

The Trades School Movement.

The effort of the builders of New Bedford, Mass., to incorporate trade training in the public school system, to which reference has been made in these columns, has been further prosecuted by presenting the matter to committees of the Board of Aldermen, Common Council and Board of Education in the form of addresses delivered at the fourth annual dinner, held on May 1. The position taken by the National Association of Builders in regard to trades schools was presented, and Rev. Charles S. Murkland, president of the N. H. College of Agriculture and Mechanical Arts, delivered an extended address, strenuously advocating the establishing of trades schools and the great importance of trade education in general. Manual training is already a part of the public school system and a textile school is about to be added. The strong plea of the builders is based upon the fact that trade training is equally important with any other technical education, and that the building trades, from a point of equity, are as much entitled to consideration as are textile industries. In considering the practical side of the question, the speaker laid particular stress upon the fact that lavish education is given in the so called higher branches of education, and that so far as technical instruction is concerned, a great gap is left between the bottom and the point where the higher education becomes operative. Statisticians show that 92 per cent. of the pupils in the public schools never pass beyond the elementary grades, and that only about 6 per cent. attend institutions of higher education. The need of trade education for so vast a majority of young Americans is self evident and should be provided as freely as in other lines. The Rev. Murkland stated in his address that the so called Land Grant Fund, which furnished the means for support to so many agricultural colleges throughout the country, is so worded as to be applicable to any institution for instruction in the mechanical arts, and is available for trades schools as much as for the institutions to which it seems to be solely applied at the present time.

Foreign Forms of Contract.

There are many things in connection with foreign building practice which possess no little interest to members of the trade in this country, particularly those methods and systems of doing work which are greatly at variance with the course pursued at home. A very good illustration of the methods involved in certain building operations in London is found in the proposed forms of contract governing new buildings, alterations, &c., ordered by the School Board in that city. The old forms of contract are to be changed so as "to give more definiteness to the clause relating to the payment of the London scale of wages to workmen," and it appears from the *Architect* that for every failure to pay the prescribed rate the contractor is liable to be called upon to pay the sum of £5 (about $25) as "liquidated damages." Some of the other conditions to be observed in connection with the new form of contract are given as follows:

The contractor shall, during the continuance of this contract, display and keep displayed upon the site of the works, and in every factory, workshop, or place occupied or used by the contractor in or about the execution of this contract, in a position in which the same may be easily read by all workmen employed by the contractor in or about the execution of this contract, a clearly printed or written copy of the said schedule hereto, and for each and every breach by the contractor of this condition, and notwithstanding the condonation of any prior or other breach, the contractor shall on demand pay to the board as liquidated damages and not as a penalty the sum of £1 for every day during which such breach shall be or continue. The contractor shall to the satisfaction of the board provide and keep proper books, in which shall be correctly and promptly entered from time to time the names of all such workmen as aforesaid and the wages paid to such workmen respectively, and shall from time to time when required produce such books to any person or persons appointed by the board or by any committee of the board, to whom the matter or business out of which this contract arises may have been or may be referred, to inspect the same, and allow such person or persons to take copies of or extracts from such books or any of them, and for each and every breach by the contractor of this condition, and notwithstanding the condonation of any other or prior breach, the contractor shall on demand pay to the board as liquidated damages and not as a penalty the sum of £3.

While such conditions attached to a contract would hardly meet with universal favor at the hands of contractors and builders here, it is interesting to note the peculiar requirements governing certain building operations in an important foreign city like that mentioned.

Arbitration and Organization.

BY W. H. SAYWARD.

A very satisfactory example of the beneficial results of arbitration has developed during the past month. Some time ago Stephen M. Wright, the genial secretary of the Building Trades Club, delivered an address before the Twilight Club of New York City, taking for his theme arbitration as advocated by the National Association of Builders. The president of the Cloak Manufacturers' Association being present on that occasion applied to Mr. Wright for the form of arbitration referred to and such other information as he could give. The cloak makers and their workmen were then in the throes of a very bitter labor struggle, both sides being exceedingly hostile and uncompromising. The several features of the form of arbitration recommended themselves so forcibly to the president of the Cloak Manufacturers' Association, and the whole plan appeared so manifestly fair to both sides, that he at once set about securing its adoption. The matter was finally acted upon favorably by the Manufacturers' Association and just prior to May 1 a plan embodying all its features was put into operation. This example is an excellent evidence of the result which has followed the work of formulation and dissemination that has been so carefully carried on by the National Association of Builders since it was established. A great many cases have arisen to prove the beneficial influence of the association both in and out of the building business. The principles and methods advocated are being continually adopted by builders all over the country, and have been copied in England, Scotland and Australia. This imitation has not been accidental, but is rather the result of recognition of the wisdom of the methods advocated.

It is manifestly to the interest of all builders to aid in the improvement of the conditions under which their business is conducted, and as the association of builders mentioned works systematically for the accomplishment of that end it should receive the practical support of organizations of builders everywhere. The question is not, How much can we get out of it? but, How can we benefit each other? It is as true as it is simple that if we benefit each other we benefit ourselves, and if this principle supplies the motive for the formation of builders into an exchange there is no reason why it should not prove the motive for the formation of exchanges into a national organization. The benefit an exchange receives from the National Association of Builders is the greater uniformity, facility and safety with which the building business can be conducted, and these improvements have much more to do with creating profits than is either understood or conceded. Anything that will enable the builder to conduct his business with greater safety must of necessity enable him to conduct it with greater profit, and this thing, whatever it may be, gives a direct return upon the cost of its maintenance. In this instance the "thing" is the National Association of Builders, and if the wisdom of its existence is clear it must be equally plain that all builders are bound, in duty to themselves and their fellows, to contribute to its influence and support.

A VERY interesting exhibition of drawings and models of the free school connected with the General Society of Mechanics and Tradesmen was given in the class room, Mechanics' Hall, 18 East Sixteenth street, New York City, on Tuesday and Wednesday, May 7 and 8. Specimens of the students' work were displayed in such a manner as to be readily inspected by hosts of visitors during the two days mentioned. There were many fine examples of drawing, designing and modeling which reflect credit not only upon the students executing them but also upon their instructors, James H. Monckton of the mechanical drawing class, John Ph. Volker of the free hand decoration and cabinet wood working class and Mr. Morgan of the class in architectural drawing.

THE new buildings at the naval torpedo station, Newport, R. I., are about completed. Extraordinary precautions are taken to insure the buildings against fire, which destroyed the former factory. Every building has 14 automatic sprinklers, and near the structures is a line of five hydrants, each with a pressure of 60 pounds. Each hydrant is supplied with an abundance of cotton rubber lined hose, which may be attached to the hydrants or to a stationary fire engine at will.

HOUSE AT SPARTA, WIS.

THE dwelling which forms the basis of the half tone supplemental plate this month was erected not long ago for Mrs. N. J. Kemp of Sparta, Wis. The floor plans, elevations and constructive details here presented indicate the arrangement of the rooms as well as the main features of construction, while the supplemental plate gives a good idea of the appearance of the completed structure. By referring to the plans it will be seen that there are on the main floor a parlor, sitting room, dining room, kitchen, one sleeping room and a bathroom, in addition to which is a good sized hall that can be used as a reception room should circumstances require. On the second floor are five sleeping rooms with numerous closets and a tank room.

The cellar extends under the entire area of the house, and is divided as shown on the foundation plan. The walls are 18 inches in thickness, cut stone being used above grade. The wall at the line of the chimney and dividing the vegetable cellar from the furnace room is of brick, while the other partitions are set with 2 x 6 placed 2 feet on centers and carry the girders which support the floor joist. The partitions are sheeted both sides with shiplap. The sills are 2 x 8 inches bedded on the wall. The joists are 2 x 8 inches, placed 16 inches on centers and well bridged; the studding being 2 x 4 inches. The joist is lined with ⅞-inch surfaced lumber.

The first story is 9 feet 6 inches in the clear and the second story 9 feet. The frame is covered with shiplap and building paper, over which is placed reveal siding. The roof is covered with surfaced hemlock shingles, and there are four courses of cut shingles, forming a belt course.

The front hall and dining room is finished in southern pine, with quarter sawed red oak floors, finished in oil. The other rooms are painted three coats. The house is plastered with three coat work and has plaster of paris finish. All the trimmings on the first floor are old copper, while on the second floor the trimmings are bronze. The house is piped for hot and cold water and wired for electric lighting. The drawings of the house were prepared by W. W. Hubbard of Sparta, Wis., who states that $2750 was the cost of the building.

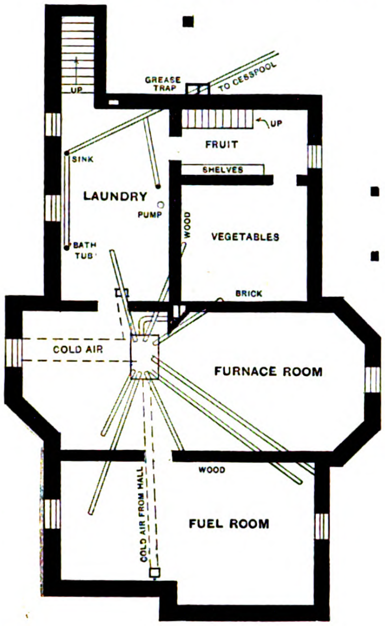
Front Elevation.—Scale, ⅛ Inch to the Foot.

House at Sparta, Wis.—W. W. Hubbard, Architect.

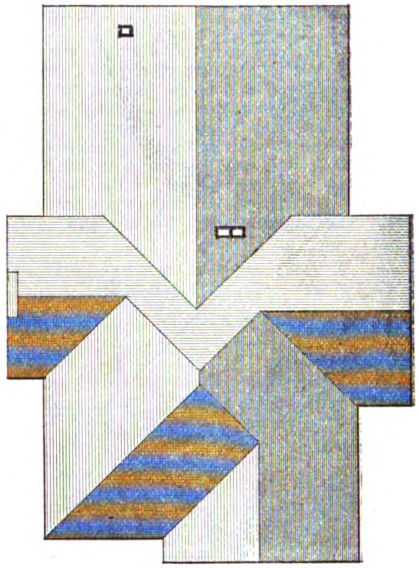
Moving a Stone Dwelling.

A rather interesting piece of work in the way of moving a dwelling house was recently completed in the city of Brooklyn, N.Y., where an old stone mansion, covering an area of 58 x 68 feet in size and weighing about 1300 tons, was carried a distance of about 50 feet and placed upon new foundations. The work was of such a nature that many were skeptical as to its successful performance, but such progress has been made in late years in the methods of moving buildings that the structure was transferred without the development of any visible cracks in its walls. One of the difficulties encountered in the execution of this piece of work was the lack of solid side walls to the house, these being composed of rock faced ashlar with a backing of broken stone. There were also window openings on all four sides which had to be taken into consideration in the moving.

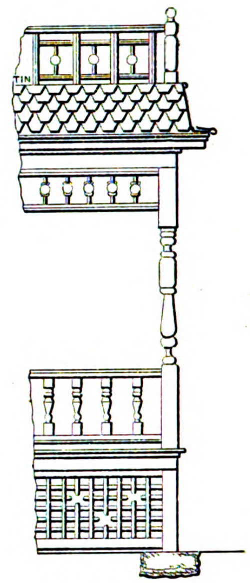
The first step was the cutting of a large number of openings in the stone foundation walls so as to admit the timbers which were to support the building and carry it to its destination. The blocking used was of spruce and yellow pine measuring 10 x 10 and 12 x 12 in cross section and cut in lengths of four feet each. This was arranged in position under the building, and by means of hydraulic jacks and screws the structure was lifted from its foundations. Immediately under the first tier of floor beams were placed 12 x 12 inch timbers, the ends of which pierced the front and rear walls. Under this tier of timber and at right angles to it was another tier of 14 x 14 inch pieces which pierced the two side walls, these two tiers of timber being the ones having an immediate bearing on the walls of the house. Under these was placed a tier of 14 x 14-inch timber to serve as sliding ways, these moving on 14 x 14-inch pieces placed upon the ground and extending in the direction of the new site of the building. These were known as "ground ways" or skids, and between them and the sliding ways lubricants were placed for the purpose of reducing friction to a minimum. When this had been done 10 screws were placed in position along the side of the house, one end of each screw abutting against a piece of heavy timber secured to the ground ways by means of heavy chains, while the opposite end of the screw worked in a hollow log called a "pump" which pressed against the timbers upon which the building rested. In moving the structure two men took position at each screw and upon a given signal by the foreman the screws were given a quarter turn. This was continued until the screws had been run out practically to the full length, when the chained pieces were moved forward and again made fast, the operation being continued until the building had been forced forward 20 feet. The bearings were then changed and the structure moved in a direction at right angles to the first for a distance of 30 feet. Such care was taken in the moving that one day was required for the 20 feet and nearly two days for the 30 feet. When the building had reached its destination 100 screws and 10 hydraulic jacks were placed under the timbers and the house raised to an elevation to correspond with its new foundations. The



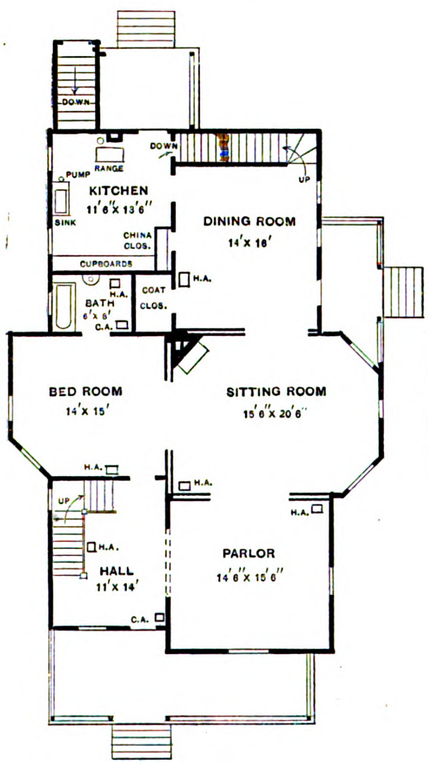
Foundation.



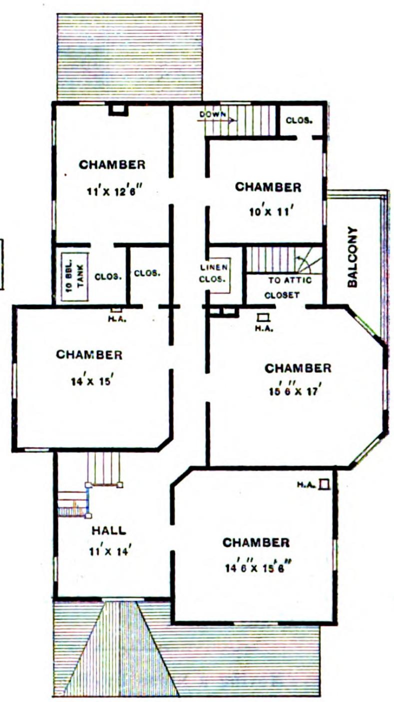
Roof.



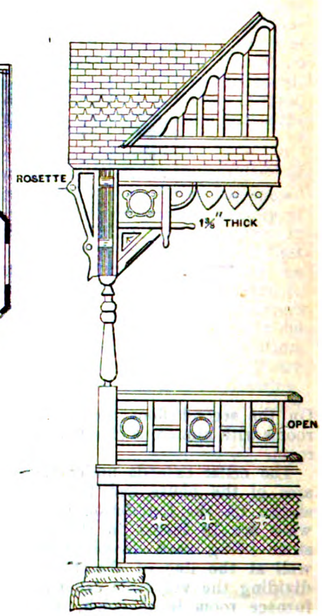
Detail of Side Porch.



First Floor.

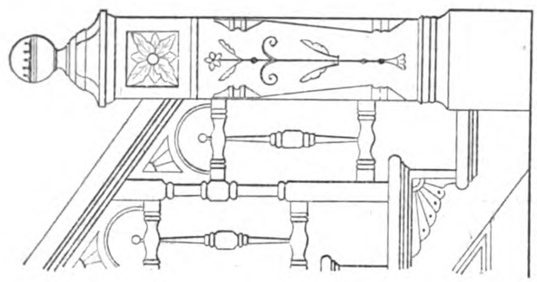


Second Floor.

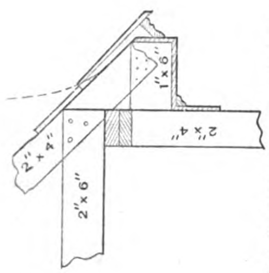


Detail of Front Porch.

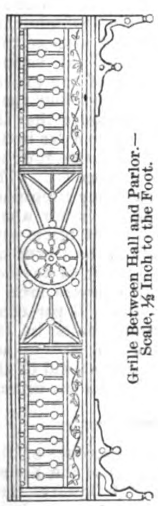
House at Sparta, Wis.—Floor Plans—Scale, 1-16 Inch to the Foot.—Porch Details—Scale, ¼ Inch to the Foot.



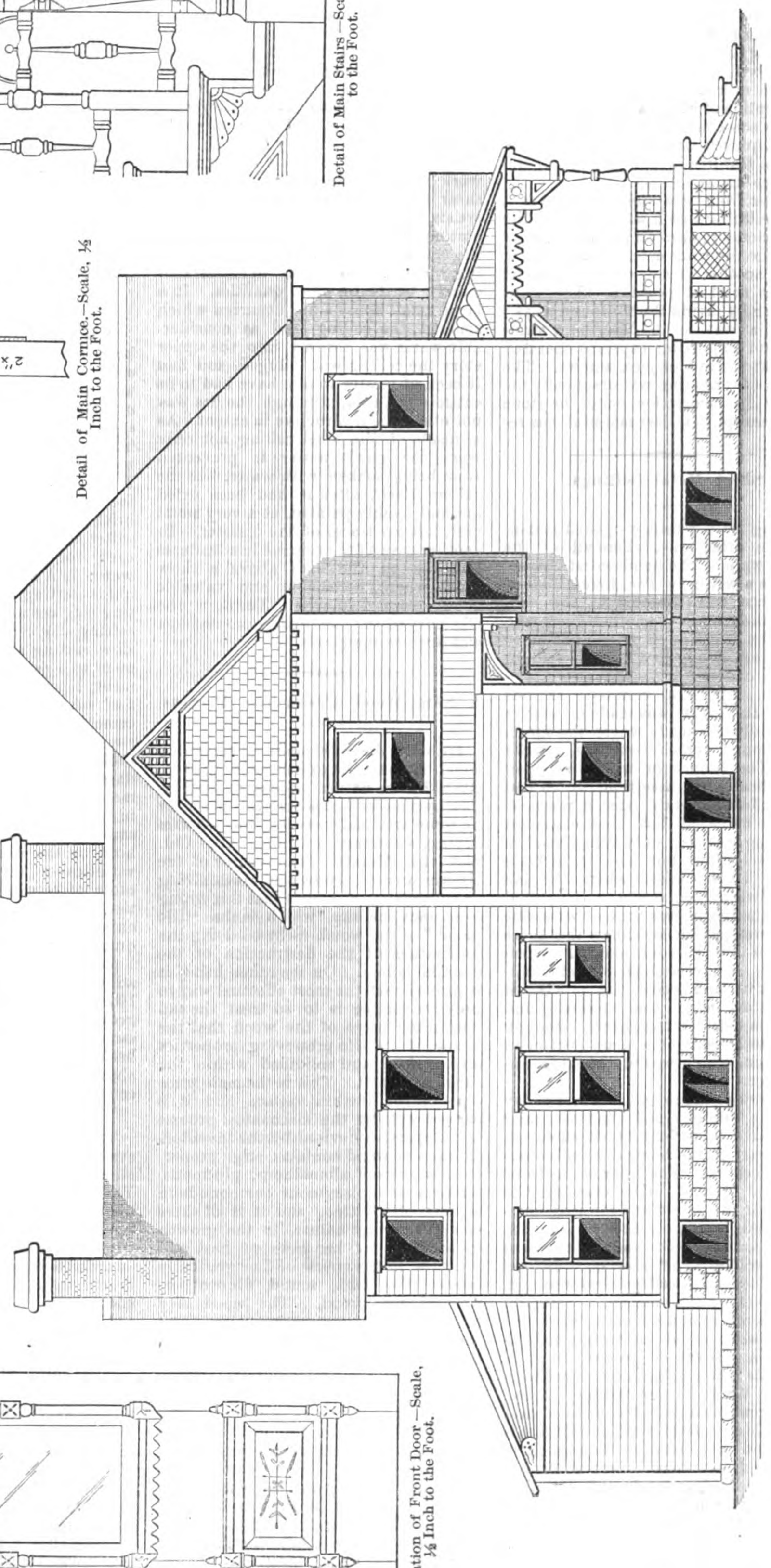
Detail of Main Stairs.—Scale, ¾ Inch to the Foot.



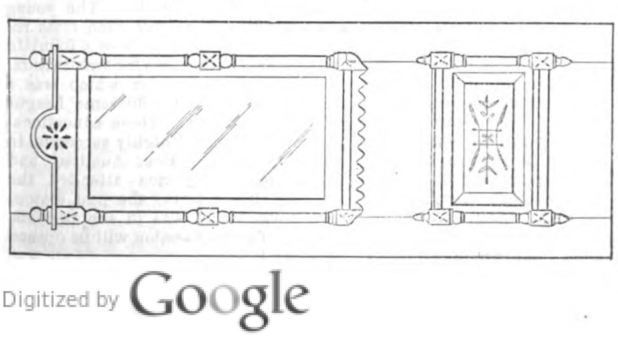
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



Grille Between Hall and Parlor.—Scale, ½ Inch to the Foot.



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



Elevation of Front Door.—Scale, ½ Inch to the Foot.

House at Sparta, Wis.—Side Elevation and Miscellaneous Details.

latter were left with openings to correspond with the position of the projecting timbers under the building, so that when it was lowered in place the blocking could be removed and the timbers easily withdrawn.

The work was done by B. C. Miller & Son of Brooklyn, N. Y., who, our readers will recall, successfully moved the brick railroad station at Mott Haven, a description of which appeared in these columns some months ago. The scheme there employed was followed in all its essential features in the moving of the Brooklyn house.

Not far from this stone house was a frame building which was moved by the same concern in nearly a half circle, so as to change the front around and make it face on another street, running parallel with its original position. The work was done by laying the "ground ways" in such a way as to describe a semicircle and employing capstans operated by horses instead of jack screws. The method of timbering was practically the same as in connection with the stone house, except that less material was required.

Sheet Metal Ceilings.

Sitting in a recently opened restaurant, the other day, where all of the fittings were of the handsomest character, says a writer in *The Metal Worker*, my notice was directed to the ceiling by the remark of another guest who called the attention of his companion to the ceiling, saying that it was said to be made of steel.

Some argument resulted, as one claimed that if it was made of steel a joint would be made where the sheets were lapped, which could be readily seen. The proprietor was called upon to vindicate the assertion which had been made. He stated that it was steel and that he found that that character of ceiling was not only being used in public buildings but also in private houses. He was asked where the lap was between the sheets. He stated that, although he was present when the ceiling was put up and knew that there were laps in it, he could not point them out now. I have seen sheet metal ceilings put up and know the process of manufacture and I was unable to find the joints between the sheets, although there was considerable plain surface in the design, which was of the high relief order.

This caused me to call on some of my friends in this line, and I find that their plants have been very much enlarged, due entirely to the demand for this character of ceiling. The trade seems to be somewhat divided. One class may be termed of the gaudy and striking character, and is largely used in saloons, barrooms, restaurants and buildings of that character. Another class is used in churches, halls and public buildings, some effects which are truly beautiful being gained in church work, where the ceiling panels are of one design with an appropriate frieze or border and the side walls partly down are covered with panels. While I was talking in one shop a gentleman called who stated that he had had another ceiling fall in his house, and only just after the occupants of the bed had risen. He now wanted a steel ceiling put up in this chamber and also in his dining room, as the ceiling there gave promise of demolishing his china if not removed at an early date. He stated that he desired the same design used in his dining room as had been used in his parlor. After his departure I asked if there were no objections raised against this ceiling for residences, and if some had not claimed that it had a sheet metal or cheap tin appearance. This brought me in contact with the order book, where numerous orders for sheet metal ceilings for various rooms in residences were recorded; and I was shown how, by good workmanship, the joints could be so made between the sheets that they were difficult to discern, and when properly painted could be entirely covered.

It is claimed that this character of work is increasing in demand through sheer force of merit. Some excellent artists are designing panels and decorating them when in place. One of the advantages of a sheet metal ceiling, which has been demonstrated clearly, is its fire proof qualities. In a large retail house a fire occurred which smoked the ceiling, and as considerable water was thrown into the upper story the ceiling was deluged, and had it been of plaster would have had to be entirely replaced, although the fire was not otherwise destructive in extent. As a result of the steel ceiling not only were the goods under it prevented from being soaked with water, but the ceiling itself, after it had been dried out and freshly painted, at a very small cost, left no traces of the disaster. In another case a fire occurred in a business building on the floor above a show room where perishable and valuable goods were displayed. Through the efficiency of the steel ceiling no damage was done to the goods.

A New Wood Preserving Process.

Hitherto the only mode of seasoning wood has been the extraction of the sap, either by the natural process of desiccation by time and exposure to the air, or by some artificial process, such as kiln drying, steaming, washing, &c. Col. Samuel E. Haskin, the inventor of the Haskin process, known as Haskinizing or vulcanizing, contends that it is wrong to extract the sap, which is the "life blood" of the wood, as by so doing the foundation of the destruction of the material is laid. On the other hand, it is proved that the most effectual way to preserve timber is to so treat the sap within the pores of the wood that the whole of its life preserving properties are retained and solidified within the substance itself. This is the main principle of the Haskin system, and it is carried out by the mechanical process and apparatus devised by the inventor. The sap of wood contains large proportions of certain albuminous, glutinous, resinous and oleaginous compounds in a state of solution, and it is of these compounds that nature, in the growth of the tree, by her laws of heat and pressure, in the course of time gradually creates the hard, sound, fibrous portion of the wood. The wood may be taken in its green state, and the various compounds then in the sap are by great heat and air pressure distilled and retained within the wood without losing their antiseptic and preservative properties. By this means the albuminous, glutinous, resinous and oleaginous compounds become coagulated in the pores of the wood and impregnate the whole substance. The soluble sap thus becomes insoluble, filling up the pores, binding the fibers and together forming one homogeneous mass, incapable of absorbing moisture, impervious to atmospheric changes, unshrinkable, easily worked and practically indestructible. Vulcanizing wood is far superior to creosoting, in that the timber is treated through and through, at less cost, is without smell, and can be worked with tools with the greatest ease. Among the principal uses for vulcanized wood are the following: Railroad ties, wood paving, telegraph, telephone and signal poles, railroad cars, road vehicles, ship and boat building, piling, dock work, bridge work, mining timber, fencing, agricultural implements; for brewery purposes, such as vats and barrels; in the fittings of houses and other buildings, greenhouses and also cabinet work and furniture.

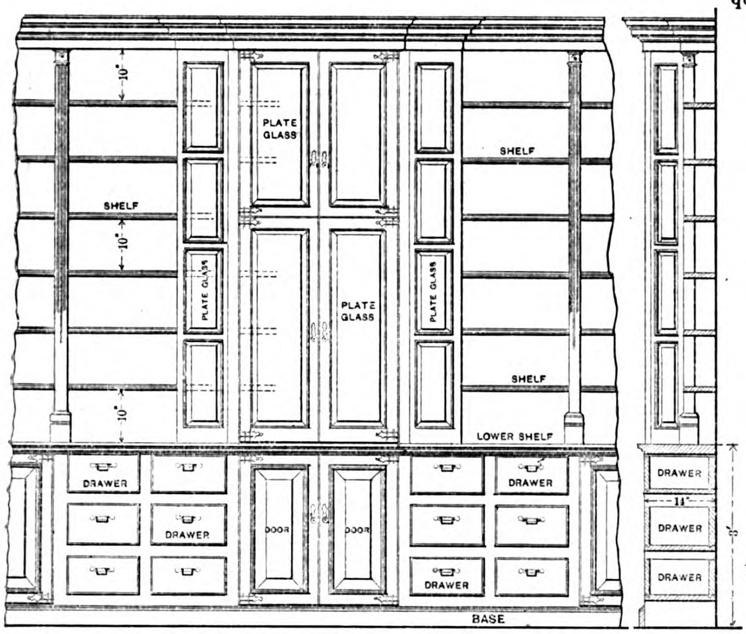
Adhesion of Cement Mortar to Brick Work.

A large number of experiments have been lately conducted to determine the adhesion between various cement mortars and makes of brick. Five kinds of brick were subjected to the test, says the *Building News:* 1, Hard, well burnt, machine made, and repressed bricks, having well finished surfaces; 2, soft machine made bricks, used for facing; 3, hard clamp burnt hand made bricks; 4, hand made facing bricks, softer and weaker; 5, sun burnt bricks, used for foundations. The cements were: 1, A slow setting Portland; 2, a quick setting Portland; 3, a slow setting slag cement; 4, a moderately slow setting slag cement; 5, another make of slow setting cement. First, 1 part cement to ½ part sand; second, 1 part cement, 1 part sand; third, 1 of cement to 2 of sand. The bricks were carefully cemented together, before which they were soaked in water, and after setting their adhesion was tested at various dates. From the mean of the experiments, which were repeated four times in each case, it was ascertained that the smooth pressed brick gave a far better hold to the mortar than the rougher varieties—a result unexpected. The table of results shows many irregularities. The highest result is for a machine made, repressed, hard brick with quick setting Portland (1 part cement, 1 part sand), which give at 44 days an adherence in pounds per square inch of 106.7 pounds, more than 50 per cent. greater than the other results in the same column, showing the greater adhesion of quick setting Portland of the above proportion to the slower setting cement.

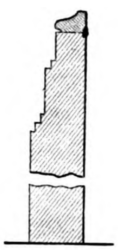
THE commencement exercises of the evening education classes of the Young Men's Institute, 222–224 Bowery, New York, closing the ninth year's work of the institution, were held in the Institute Hall on Thursday evening, May 2, when certificates and prizes were awarded to 65 young men for proficiency in arithmetic, bookkeeping, stenography and typewriting, freehand, mechanical and architectural drawing, carriage drafting, steam engineering, practical electricity, plumbing, &c. The young man standing highest in each class received, as a prize, a book or a fountain pen, except in the class for architectural drawing, the prize for which was a scholarship in the Art Students' League of New York City. These educational classes have proved highly successful in their operation. Four hundred and sixty-three young men attended the evening classes during the past season, as compared with 425 in the previous season. The next session will be opened October 1, 1895.

STORE SHELVING AND COUNTERS.

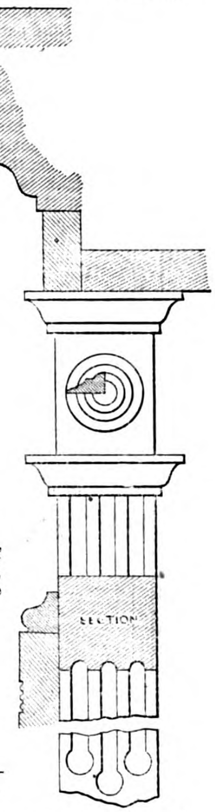
A CLASS of work which the carpenter is frequently called upon to execute is the fitting up of the interiors of stores intended for a variety and for that reason it is to his interest to have at his command as great a variety as possible in order to meet general as well as special requirements. Many tions, details, &c., of counters, shelving, cases and drawers suitable for the interior furnishing of a store, intended in this particular case to meet the requirements of a druggist or apothecary.



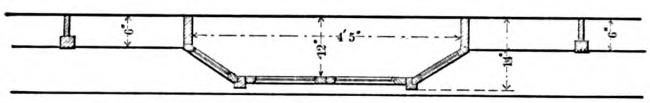
Front Elevation and Section of Wall Shelving with Inclosed Case.—Scale, ⅜ Inch to the Foot.



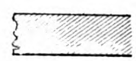
Detail of Base of Counter.—Scale, 3 Inches to the Foot.



Detail of Pilaster and Cornice. — Scale, 3 Inches to the Foot.

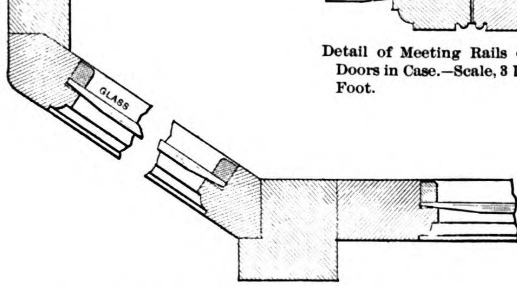


Plan of Wall Shelving, &c.—Scale, ⅜ Inch to the Foot.



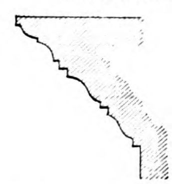
Detail of Wall Shelving.—Scale, 3 Inches to the Foot.

Detail of Meeting Rails of the Glass Doors in Case.—Scale, 3 Inches to the Foot.

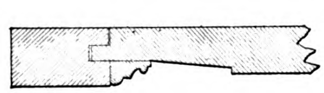


Detail of Inclosed Case.—Scale, 3 Inches to the Foot.

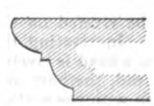
Detail of Counter Molding at B.—Scale, 3 Inches to the Foot



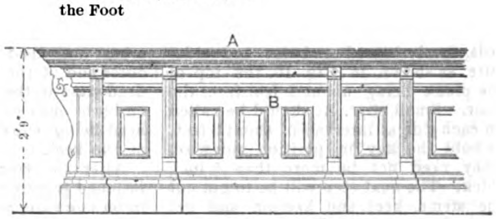
Detail of Counter Molding at A.—Scale, 3 Inches to the Foot.



Detail of Door Paneling.—Scale, 3 Inches to the Foot.



Detail of Lower Shelf. —Scale, 3 Inches to the Foot.



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

Details of Store Shelving and Counters.

of purposes. This involves the construction of shelving, counters, cases, cupboards, the fitting of drawers, doors and a multitude of other little jobs which go to make up the whole. Very often he is called upon to furnish the designs for the counters and shelving, readers have expressed a desire for designs of fixtures suitable for store interiors, covering counters, shelves and the like, and those making such inquiries are likely to be interested in the illustrations which are presented upon this page. They represent elevations, sec- With slight modifications, however, the fittings can be adapted to meet other requirements, and as the principle involved is practically the same whatever be the purpose for which the store is to be devoted, we trust the designs will serve a useful purpose.

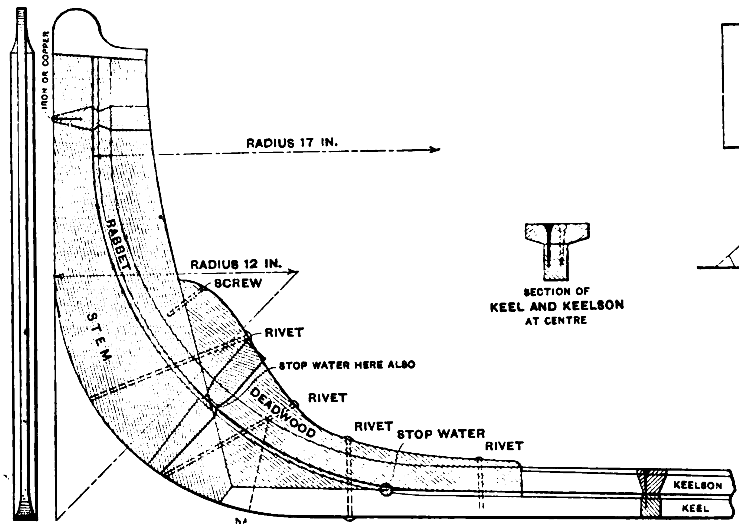
BOAT BUILDING FOR AMATEURS.—II.

BY H. L. CAMPBELL.

THE amateur should, if possible, select a straight, level floor to commence operations on, as it will be of great assistance in transferring measurements from one part of the boat to another, forming a permanent base line. Having selected a place to begin operations, a building plank must be set up. This is a plank the length of the boat and from 8 to 12 inches in width. It should be the exact thickness of the keel, but may be thicker, the upper part of the plank being planed down on each side to the required thickness. Set the plank upon three or four standards, firmly braced endwise and sidewise, as shown in Fig. 10, the top of the plank being about 2 feet from the floor. Small clips, A, should be nailed on each side at intervals of about 3 feet, to hold the key in position sidewise. They need not be more than ⅝ inch thick. The next step will be to get out the stems, keel and keelson and get them in position. The stems must be got out 1⅛ inches thick when finished. If possible they should be a natural crook of hackmatack (the aboriginal name for tamarack), but as these crooks are somewhat difficult to procure in some sections of the country we will make our details for straight grained white oak, which is the next best thing obtainable, the deficiency of the natural crook being supplied by two pieces, the stem proper and its supporting piece, called the "deadwood," Fig. 11. The steam and deadwood must be riveted solidly together, the rivets being ¼-inch round iron, cut off to the proper length and driven through the stem to the deadwood. The hole being 3/16-inch, and a slight head being upset on the rod while driving, makes the rivet hold the stem firmly. Burrs are put over the ends of the rod on the deadwood, and a head riveted on; the face of the stem having to be bearded down to about ⅝ inch in thickness will not allow a burr and head to be riveted on the outer end of the rod. In riveting the deadwood to the keel a head is riveted on both ends of the rod, the burr and head being sunk flush with the surface of the keel.

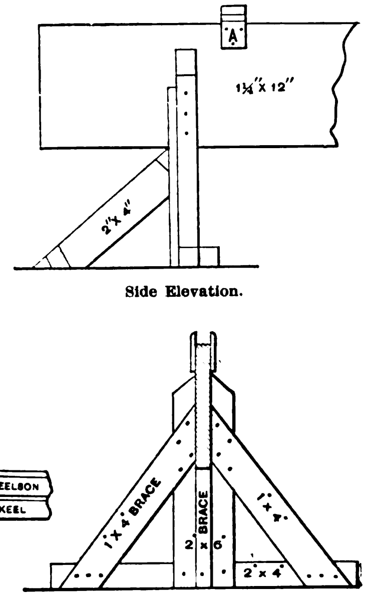
After the stem and deadwood are fastened together the rabbet may be cut in on one side, as shown in Fig. 11. It must be cut deep enough to receive the ends of the planks, ⅝-inch thick; and the fore side of the rabbet, against which the ends of the planks abut, must be worked to a smooth, straight line with a sharp chisel. A great deal of time and care should be expended on this part of the work, as it is in a very conspicuous place, and if badly done it will be impossible to make a creditable job in fitting the planks. The fore side or short bevel of the rabbet should be at an angle of about 45 degrees to the face of the stem, and should continue at this angle down to the keel. From this point it gradually assumes a vertical position as it approaches the midship section, where it has died away entirely, leaving the keel perfectly straight vertically. It will be noticed in Fig. 11 that after the fore side of the rabbet leaves the deadwood it is continued entirely on the keel, while the after side or long bevel continues on the keelson. The after bevel of the rabbet becomes longer from the top of the stem toward the deadwood and then shorter after it leaves the deadwood, and continues along the keelson till it reaches the midship section. The bevel of the keelson and deadwood at each station is taken from the lines on the body plan, less the thickness of the planking, as all the lines on each plan are drawn to the outside of the planking. The keelson is made of ⅞-inch oak, 8 inches wide at the center and diminished toward each end, with a curved taper to the width of the deadwood.

The keelson must be screwed to the keel at intervals of about 6 or 8 inches, the screws being put in on each side of the center, the reason for which will be explained hereafter. The keel may be



SECTION OF KEEL AND KEELSON AT CENTRE

Fig. 11.—Details of Stem, Keel and Keelson.—Scale, 1½ Inches to the Foot.



Side Elevation.

End Elevation.

Fig. 10.—Showing Construction of the Stocks. —Scale, ¾ Inch to the Foot.

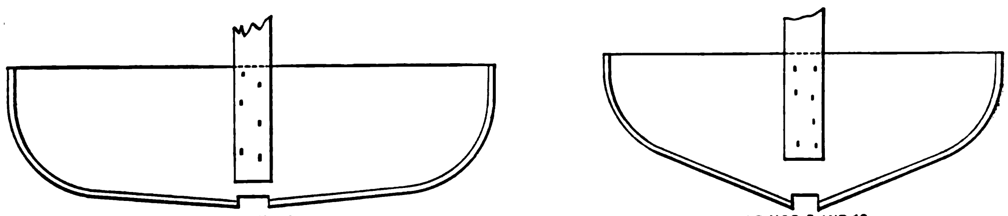


Fig. 12.—Views of Midship and Quarter-Molds.—Scale, ¾ Inch to the Foot.

Boat Building for Amateurs.—By H. L. Campbell.

got out $1\frac{1}{4}$ inches thick and $1\frac{7}{8}$ inches deep at the center, diminishing in depth gradually to $1\frac{5}{8}$ inches at each end. This leaves it 1 inch at each end and $1\frac{1}{4}$ inches deep at the center when the planks are on. The timber for the keel should be selected so that the grain points aft. If this is not done the water will raise the grain and make the whole surface rough. After the stems and deadwoods have been riveted to the keel they may be tapered from the rabbet toward the front of the stem to about $\frac{5}{8}$ inch in thickness, care being taken not to cut into the rivet holes on the stem. The top part of the stem may be left thicker, the thinnest edge being at the water line. In cutting the after bevel of the rabbet on the stem, deadwood and keelson, care must be taken not to cut away too much. Although the lines stem, deadwood and keel should be put together with white lead, and stop waters must be put in the rabbet where it crosses the joint between deadwood and stem, and also on the joint between deadwood and keel. After the three are fastened together bore through the intersection of the angle of the rabbet with the joint with a $\frac{1}{2}$ inch bit and drive in a pine plug moderately tight. This is worked out to the shape of the rabbet and is entirely concealed by the planking. It prevents the water from soaking along the joints to the interior of the boat.

We are now ready to make and place the molds in position. Three of these are necessary, and they will be placed on stations 5, 9 and 13. These are simply solid patterns made of $\frac{7}{8}$ inch pine lumber, around which the planks shores secured permanently at the ceiling.

We are now ready to commence planking. It is generally conceded that while cedar is the best wood that can be used for planking small boats, both as regards weight and durability, it is rather difficult to get in some sections of the country and if procured in any of the large cities it is apt to be expensive. The next best wood is white pine. It weighs only 3 pounds per cubic foot more than cedar, is easily worked, and with ordinary care a pine boat will last just about as long as a cedar one. The timber for the planks should be selected from clear $\frac{3}{4}$-inch thick dressed stock lumber, only those boards being selected that are sawn from the center of the log or not far from it. They should also be straight of grain,

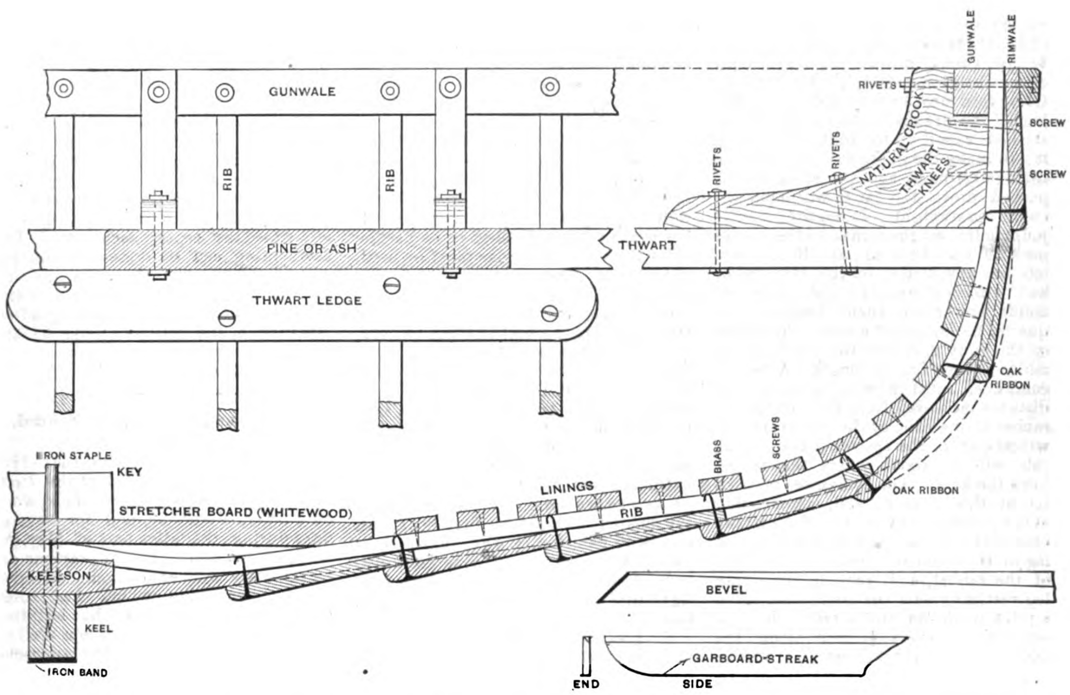


Fig. 13.—Details of Midship Section, Showing Thwarts, Knees, Linings, Stretcher-Board, Gunwale and Rimwale.—Scale, 3 Inches to the Foot.

Fig 14.—Top View (Half Size) and Side (Scale, ¾ Inch to the Foot) of Garboard Strake

Boat Building for Amateurs.—By H. L. Campbell.

in the body plan show the bevels, it is better to be on the safe side and take off some with a chisel when fitting the planks, as each plank will show exactly how much must be taken off to give it a solid bearing.

The keel and stems are now ready to set up on the building plank. The top of the plank must be hollowed to fit the rocker of the keel, $1\frac{1}{2}$ inches at center, and curving gradually to nothing at each end. A piece of 3 x 4 must then be fastened to the ceiling above the building plank, nearly the same length and directly in line over it. The keel, with the stems attached, may now be placed in position, and shores cut in between the piece on the ceiling and keelson and driven tightly home. These shores must be placed at about stations 2, 6, 12 and 16. Before tacking these permanently the keel must be perfectly straight from end to end. The stems must now be made perfectly plumb and two side braces carried from each stem to the ceiling. The joints between are bent into position. No. 9 is made identical with the midship section, and Nos. 5 and 13 correspond with line No. 5 on the body plan. These are shown in Fig. 12. Both sides of the molds must be exactly alike, as each plank on the boat is precisely the same as the corresponding one on the other side, and discrepancy in the molds would throw the planks out of position. After the molds are laid out according to the lines on the body plan the thickness of the planks must be taken off all around. They must then be notched down on the keelson till the continued line of the floor intersects the joint between keelson and keel. Mold No. 9 may be left square edged, but molds Nos. 5 and 13 must be beveled on the edge and the standing edge placed directly on the line. A shore must now be cut in between the ceiling and keelson at each mold and the mold firmly nailed to it. The mold must then be adjusted at right angles to the line of the keel, made perfectly level on top and the free from knots, sap and shake, and quite soft and free working. The boards must then be resawed and planed down to $\frac{5}{8}$ inch thickness. The next step will be to divide the midship section into eight equal parts, the number of strakes there will be on each side. This can be done with a pair of compasses, commencing at the keel and stepping along the periphery of the mold to the deck line. These divisions must be plainly marked on the side of the mold on both sides of the boat. The quarter-molds, or molds 5 and 13, must be divided in the same manner into the same number of parts. We now measure the hight from where the rabbet joins the keel to the top of the rabbet on the stem, using a stick for a measure and the floor for a base line. Dividing the distance on the stick into eight equal parts and using the floor as a base line, we mark each division on each side of each stem. We now have the width of each strake marked on each mold and on the stems, and may commence to put on the first or garboard strakes. A plank 18 feet long and 6 inches wide will be large enough for these. The amateur will find this to be the most difficult strake to put on in the whole boat, as the entire bottom edge and each end must be fitted perfectly. In putting the strakes on the boat the same precaution must be observed as with the keel. If any grain runs out on the surface it must be pointed aft. Place the garboard in position against the keel at the midship section, and have some small shores long enough to reach from the keelson to the floor. Put one of these under the midship mold, pressing the plank firmly against the mold and keelson.

It will be found that the strake will only touch the keel at the midship mold, leaving it as it runs to each end. This distance must be equally divided on the quarter molds and the strake shored up tightly to each mold. The ends of the strake must now be clamped to the stems, a pair of iron screw clamps being necessary for the purpose. Great care must be exercised in clamping all the strakes to the stems. If the strake is raised up too high on the stem it will make the curve too full between the quarter-mold and the stem, and if pushed down too far it will make the curve too straight. It requires a little judgment to set the strake in the proper position on the stem, and if the amateur has any doubts on the subject he had better make another pair or two of molds and place them between the quarter-molds and the stem. The lines on the body plan give the shape of the molds at each foot of length. A pair of compasses must now be taken and the distance measured from the edge of the rabbet to the edge of the strake at the widest part of the space between them; this will be about where the rabbet joins the keel. The compasses must be set at this distance, and, commencing at the point where the edge of the strake crosses the rabbet on the stem, set one leg of the compasses on the outer edge of the rabbet, and, keeping the upper leg vertically over the lower one, make a prick mark on the strake. Do the same about every ½ inch along the curve of the rabbet to where it dies in the keel, when the prick marks may be made further apart, always keeping the legs of the compasses parallel with the vertical lines of the molds.

After the strake has been pricked from end to end it may be taken down and a line drawn through the prick marks and the strake worked down to the line, giving the edge and ends the proper bevel to fit the rabbet. Never cut away the wood behind to make a tight joint in front. It may do in house joiner work, but in boat work it is a delusion and a snare. If you cannot make a tight fitting joint all through, leave it open in front so that it can be filled with cotton. If the prick marks have been carefully made the plank should fit along its entire length. It is better to fit the forward end of every plank first, and do it well, and trust to luck to get a good fit on the after end without getting the strake too short. It must be remembered that the bow of a boat is being continually forced through the water, and a defective joint there will admit a great deal more water than a similar one at the stern. When the bottom part of the strake has been fitted we give it the proper shape on top by getting the width of the divisions previously laid out on the molds and stems, and adding ¾ inch for the lap. We now trace a line through the points thus marked and work our plank down to it. It will be found that the strake will be nearly straight for quite a distance on each side of the midship section and will then curve rapidly to the end. All these curves should be fair; all short kinks must be avoided. The strake should now be smoothed, planed and sandpapered on both sides and the ends beveled to receive the next strake. First run a pencil gauge line all along the top edge of the plank on the outside, ¾ inch from the edge; this will be the distance that the next strake will overlap. With a smooth plane commence about 2 feet from each end and plane a winding bevel, running out to about 1/16 inch at the end and taking care not to go below the gauge line. This is indicated in Fig. 14. The garboard strake is now ready to be put in place. Before putting on the one we have fitted in place we lay it face down on the plank intended for the other side and mark it off. If our molds and the rest of our work are correct the same pattern should exactly fit on each side.

The next subject to be considered is that of nails. If the boat is to be used in salt water all the fastenings should be of brass and copper, as iron will corrode very rapidly in that element. If the boat is to be finished in its natural color the same fastenings must be used, as iron will discolor the wood if not painted. If for use in fresh water, and the boat painted inside and out, iron fastenings are the best that can be used, as they oxidize slightly in the wood and hold more firmly than copper. Tinned nails will not corrode in fresh water and will last some time in salt, but they hold very poorly—in fact, they seem to be lubricated in some way and are greasy to the touch; they will hold nothing if not clinched and are not to be recommended. We would advise the amateur to build his first boat with a view to painting it when finished, as paint, like charity, will cover a multitude of omissions, and will make a boat tight that would otherwise leak like a sieve.

A great many sizes of nails are necessary, from tacks ¾ inch long up to clout nails ⅞ inch and 1 inch long. The nails should be clinched at least 3/16 inch, and as the planks are thickest through the lap at the midship section the longest nails are used at that point. As the laps diminish in thickness toward each end the nails must diminish in length accordingly, and the smaller the nail the less must be allowed for clinching. The wide, flat-headed clout nail is the one that must be used. In driving the nails use a light, round-faced hammer and drive the nail with light, quick strokes. The clinching is done by holding the face of a heavy hammer or similar piece of steel against the inside of the plank and driving the nails against it. This causes the nail to turn over and clinch without coming through the wood, and leaves it almost invisible on the inside. If the nails are too long they will have a tendency to bend on the outside before clinching, and when clinched will leave ugly scars in the plank. The outside plank must in all cases be bored with a bradawl to receive the nails, the awl being slightly smaller than the nail. The ends of the planks, technically called the "hood ends," should be attached to the stems with screws, Nos. 5 or 6, from ¾ to ⅞ inch long. The planks must be bored to prevent splitting, and the screws put in at least an inch from the end; about four screws to a plank are sufficient. Copper nails being softer than iron they clinch more readily, and longer ones can be used without danger of splitting. When both garboards are on, firmly nailed to a keelson, the nails being 1 inch apart and screwed to deadwoods and stems, the ribs may be spaced off on the keelson 4 inches apart from stem to stern. For a short distance on each side of the midship section the keelson must be rounded, as shown in Fig. 13, or gains cut in the corners of it, to allow the ribs to bend down to meet the first lap. As the floor rises toward each end this will not be necessary, the garboards showing when to stop.

The next step is to bevel the garboards along the upper edge to receive the next strake. This bevel is found by laying a straight piece of stick, say 6 inches long, against the mold, one end resting on the mold ¾ inch higher up than the division line and the other end running down on the strake below. The strake must be beveled from the gauge line to the edge till the stick has a flat bearing the full width of the lap. This is done at each mold, the bevel being greater at the quarter molds than at the center. The bevel can then be planed off between the mold by the eye, increasing it gradually from the center each way. The same thing can be done between the quarter molds and the stem, joining the bevel already made at the stem. When finished it should be a gradual taper from the quarter mold to the stem and very smooth and even.

(To be continued.)

Pratt Institute Trades School.

The evening classes of the 1894-1895 term at the Trades School of the Pratt Institute, Brooklyn, closed their work on Friday, March 29, and for several days during the latter part of May the work of the pupils in the various departments was on exhibition. In spite of the depression which has ruled during the winter in the building trades the number of pupils was well up to the average, showing the appreciation that exists in the trades of the value of the instruction given there. The number of pupils instructed in the various evening classes in the past season was 183, divided as follows: Plumbing, 51; machine shop, 22; carpentry, 19; fresco painting, 22; house and sign painting, 18; sheet metal pattern work, 6.

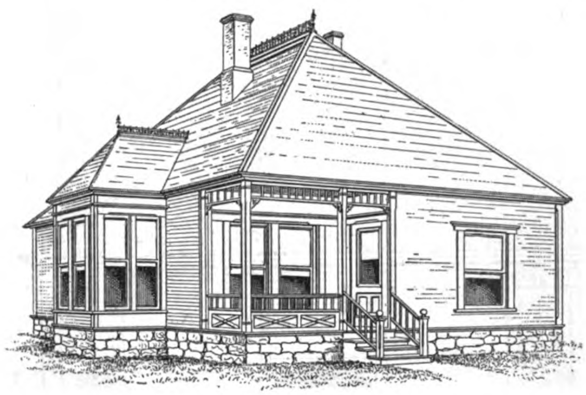
The Cleveland Architectural Club.

The announcement recently made by Secretary Herbert B. Briggs of the Cleveland Architectural Club states that the drawings for the April competition were hung in the club rooms and the results announced at the meeting held on April 18. The subject of the competition was "Boat and Bath House for Edgewater Park," the latter being one of the new park sites recently acquired by the city of Cleveland and located on the shores of Lake Erie west of the city. The opportunities in natural features for bathing are said to be excellent, hence the subject for the competition. Messrs. Knox and Elliott, architects, were the judges and rendered the following decision: First, Charles P. Weeks; second, L R Rice; third, M. J. Bowman; fourth, E. E. Noble, and fifth, A E Skeel.

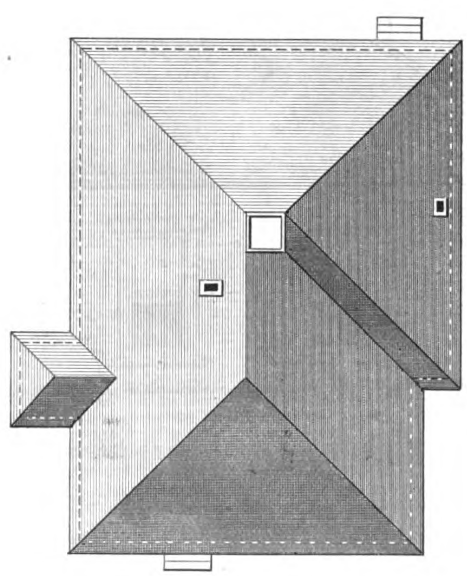
CORRESPONDENCE.

Elevations of a Woman's House.

From H. V. S., *Butte, Mont.*—In answer to the request of "B. F.," Fairfield, Neb., I submit a perspective view, also east and south elevations, together with roof plan. I would suggest a dormer window in the roof on the east side and also a stairway from the kitchen to the attic. The upper portion of the house could be used for storage purposes, although, if desired, a very pleasant chamber could be fitted up with a front view and a window in the front part of the house which would add greatly to the appearance of the building. I would also suggest that the bay window on the south side be 8 feet wide by 4 feet deep. The correspondent making the inquiry might also have a cellar under the kitchen with stairs leading down to it. These could be placed under the attic stairs. The kitchen is sufficiently large for this purpose, and the arrangement would be improved by the change. If the building is to be frame the chimney on the north side of the house might be moved to the east wall of the kitchen, which would bring it to the same place on the north side of the roof as the other chimney is on the south side. If, however, the house is to be constructed of brick I would advise letting the chimney remain where it is, for the reason that it will be cheaper to build. Another suggestion which I would make is that the correspondent heat the house from the cellar instead of by stoves, and in doing this use hot water for the purpose. The hot water plant might cost a little more than hot air or steam, but it will make up the difference in a few years in the saving in fuel. Another thing, the electrical appliances for regulating the temperature work to perfection on the dampers of the hot water boilers.



Elevations of a Woman's House.—Perspective View Submitted by "H. V. S."



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

Healthfulness of Stone Cutting.

From R. M. L.—I would like to learn through the columns of *Carpentry and Building* whether stone cutting is a healthy occupation. Would a stone carver or stone cutter who takes good care of his health, is of good habits and has no lung trouble, and takes special care when working, be apt to live as long as the majority of men who work at other trades?

Note.—Here is a good opportunity for the readers who are experienced stone cutters to give their views as to the points raised by our correspondent above. Let the discussion be full and free.

Rule for Kerfing.

From T. W. S., *Sterrettania, Pa.*—I noticed in a late issue of the paper a letter from "G. N. Y." of Woodbine, Iowa, asking for a rule for kerfing. In reply to the request I would say: First draw a circle upon a smooth board with the same radius as that of the circle to which it is desired to bend the molding, then tack a straight edge upon the circle alongside of the center in such a way that only half of the circle will show. Gauge a line along the edge of the band or molding, about ⅛-inch or ¼-inch, according to the thickness of the stuff to be bent, to regulate the depth of the kerf. Then saw a kerf in a piece of the stuff to be bent and place it against the straight edge so the kerf will be directly over the center of the circle. Hold the part below the center of the circle against the straight edge and draw the upper part away from it until the kerf is closed. The distance between the straight edge and the band or molding on the circumference of the circle is the distance apart to which to saw the kerfs.

From P. J. W., *De Pue, Ill.*—At the request of "G. N. Y.," Woodbine, Iowa, I will endeavor to answer through the columns of the paper his question relative to kerfing. I will give a rule that is based on common arithmetic and which I think is easily understood. For example, we will take any diameter that may be desired, but our kerfs will be regulated by the thickness of the wood as well as the diameter of the opening. The first thing to do, therefore, is to take the desired diameter and obtain the inside circumference of the frame; then add the thickness of the wood to the first diameter, or, counting from the outside, the diameter of the frame. As there will be noticed a difference between the outside and inside diameters, so there must be a difference in the inside and outside circumferences. The next thing to do is to find this difference by subtracting the difference between the larger and smaller circumferences. The result is in inches and fractions thereof. Next select the saw it is intended to use for the job, for there is a decided difference in the thickness of the various saws, so we must select a certain one. Try it on a little piece of waste stuff in order to see how big a kerf it cuts. Take the exact measure of the kerf in the block and then ascertain how many such kerfs are contained in the difference between the inside and outside circumferences. After we know how many kerfs are required for any given circle, take the dividers and apply to the board, dividi g the inside circumference into so many equal parts. After the kerfs are all laid out, care must be taken that they are cut to a uniform depth and yet be deep enough. Another important thing is to obtain a nice straight grained piece of stuff, for cross grained brash stuff would be almost impossible to bend. Now bend the board carefully, securing the end well. Sometimes it requires a mold to obtain good results, but in most instances it can be dispensed with.

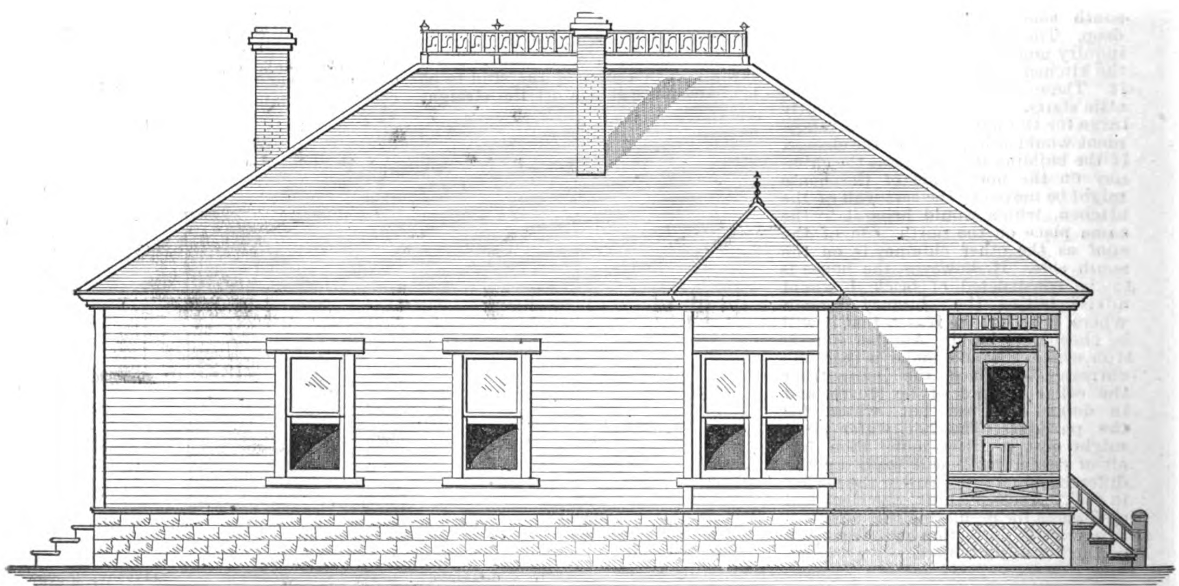
I have also another method which I have found very simple and satisfactory. It is to cut a casing to fit any desired diameter. Then take a piece of stuff the same thickness as that which is to be bent, select the saw and cut half a dozen or more kerfs in the stick according to judgment. One can almost tell how they will have to be cut and can then try them on the inside casing. If the stuff bends up nicely to the casing well and good; if not, it needs a little adjusting and another trial is necessary. For example, if the kerfs are open it is evident they are too far apart, while if too tight they must be spaced at greater intervals, so in a few minutes' experimenting any one can obtain satisfactory results. The dividers, however, must not be forgotten when laying out the kerfs on the stick so as to get them all an equal distance apart. Some of the readers of the paper may take this for a "cut and try" rule, but I think it is an easy one for any person not very well posted in the common branches of arithmetic. With a little care very neat work can be done.

Porch, Portico and Veranda.

From W. J. W., *Merrimac, Ky.*—I would like some one to explain to me the difference between porch, veranda and portico. In what respect do they differ in construction? Is it the size, form or locality that gives rise to the different names? In some sections I find the people calling everything in the shape of a covered entrance to a building a porch and in others a veranda. I hope some one will explain the difference.

Note.—The terms mentioned by our correspondent are often employed interchangeably in many sections of the country to designate the covered entrance to a building, although strictly speaking there is a difference in the form and construction by which each may be distinguished. Locality also has something to do with the use of the terms by which these portions of a dwelling are often called, "veranda" or "piazza" being common in the New England States and some other parts of the North, while in the West and certain sections of the South "porch" is the word generally employed. In some parts of the extreme South and Southwest "gallery" is the designating term, but in every section it seems to be more or less a matter of taste. Webster's Dictionary defines "porch" as "a covered and inclosed entrance to a building, whether taken from the interior and forming a sort of vestibule within the main wall, or projecting

Front Elevation.



Side (Left) Elevation.

Elevations of a Woman's House.—Scale, ⅛ Inch to the Foot.

without and having a separate roof." The same authority gives the definition of "portico" as "a colonnade at the entrance of a building." In the one case, therefore, it is an inclosed entrance which may be just within the main wall or projecting outside, having a separate roof and in the other it is a covered entrance having a row of columns placed at regular intervals along its front. The word "veranda" is defined by Webster as meaning "an open roofed gallery or portico adjoining a dwelling house and forming an out-of-door sitting room." A more popular idea of the meaning of the term is a covered approach to a dwelling which extends along two or more of its sides, while if it extends only across the front or a portion of the front it is either a porch or a portico according to the fancy of the individual. Our correspondent will see from the above that while porch, portico and veranda differ somewhat in construction and form, their uses are similar, and probably for this reason the terms are often interchangeably employed. The subject raised by our correspondent is a good one for discussion and we hope the readers in different sections will write us concerning the local use of the terms named.

Strength of Skating Rink Roof.

From A. B. C., *Brandon, Manitoba.*—I inclose sketches of roof construction for a skating rink which I have lately completed. The building is 175 feet long by 65 feet wide. The principals are constructed as indicated in Fig. 1 and are placed 16 feet on centers. The roof is sheeted with ⅞-inch lumber placed diagonally and covered with shingles laid 7½ inches to the weather. All the material used in the framing is of spruce. The pieces marked 2 x 6 in Figs. 1 and 3 are independent of the 6 x 6 inch trusses which, as stated, are placed every 16 feet throughout the building. Fig. 2 represents a framing plan of a portion of the truss, Fig. 3 a detail of the joints at C and D and Fig. 4 a detail of the truss at A. I would like to get the opinion of the many readers of the paper as to the strain this roof will stand.

Note.—For the purpose of starting the discussion we submitted the sketches of our correspondent to a civil engineer in this city, who furnishes the following in the way of comment. In what he has to say the strains and the breaking weights of certain pieces are given in order to make it more readily comprehensible to the average reader. There is also submitted a diagram, Fig. 5, showing a skeleton of the truss and illustrating the effects of sudden gusts of wind upon the structure. The writer is unable to say what weight this roof will support, but after a careful study and analysis of the problem he has come to the conclusion that a truss built as shown in Fig. 1 is inadequate to sustain the weight which is liable to be imposed thereon. The reasons for this conclusion are as follows: Most of the members are not of sufficient size to safely support their respective loads. In one case the strain is dangerously close to the breaking weight and the framing is not done in a manner to insure a very rigid structure. The correspondent has made a serious error in not running the principal rafters from the wall plate or top of the post to the ridge—in other words, from B to E. This in itself would be sufficient to impair the stability of the structure.

The distance between the trusses is also greater than safety would demand, and there seems to be no provision made to insert any bracing from truss to truss. In constructing trusses of large span the factor of safety ought never to be less than three, so as to allow for any defects in material or workmanship. It may be stated here, however, that a truss similar to the one shown in Fig. 1, if constructed properly, would require no tie rod to keep it together.

In calculating the strength of the members of this truss a roof load of 40 pounds per square foot has been assumed. Each 2 x 6 inch purlin or stringer is loaded with 1280 pounds, equally distributed, which is more than such a beam can support without sagging, the deflection under the above load being over 2 inches. The collar beam C D receives a compressive strain along its axial line of 14,500 pounds, and its breaking weight is 17,696 pounds, which shows that the timber is not safe enough, as all the breaking weights here quoted are those of first-class material. If a king post were introduced and the timber secured firmly midway of its length by iron straps it would answer. The rafter B C is in compression 29,500 pounds, and its breaking weight 61,876 pounds, but it is also subject to a transverse strain, due to the equally distributed load of 6240 pounds.

The tie rod receives a pull of 26,500 pounds and its breaking strength is 26,880 pounds. Being a bar of considerable length, and unsupported throughout its entire length of 60 feet, its own weight will tend to produce an additional strain. The difference between the breaking weight and the actual strain is only 380 pounds. This difference is really wiped out when we consider that the tie rod is in three pieces, and hooked together as shown. The tie rod should have a sectional area of at least three times what it has and should be provided with turnbuckles and upset ends. Fig. 5 illustrates the manner in which this truss would act having a strong wind blowing against one side of the roof. As long as the load is distributed symmetrically on both sides of the truss no distortion is possible, but under the influence of unequal loading, as by wind pressure, the truss would take the form shown by the dotted lines. If the main

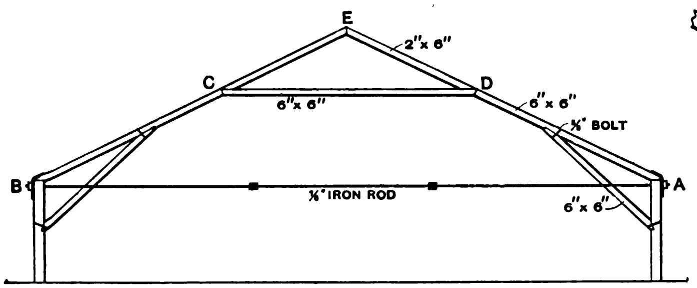


Fig. 1.—Sketch of Truss Submitted by "A. B. C."—Scale, 1-16 Inch to the Foot.

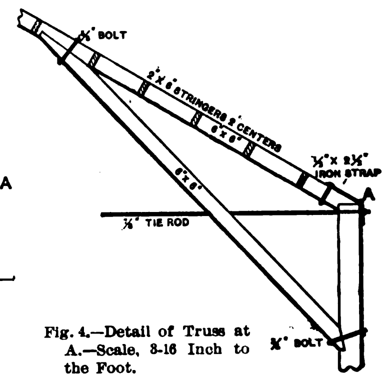


Fig. 4.—Detail of Truss at A.—Scale, 3-16 Inch to the Foot.

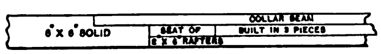


Fig. 2.—Framing Plan of Truss.—Scale, ⅜ Inch to the Foot.

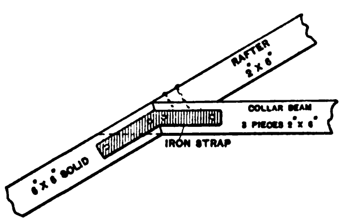


Fig. 3.—Detail of Joints at C and D of Fig. 1.—Scale, ⅜ Inch to the Foot.

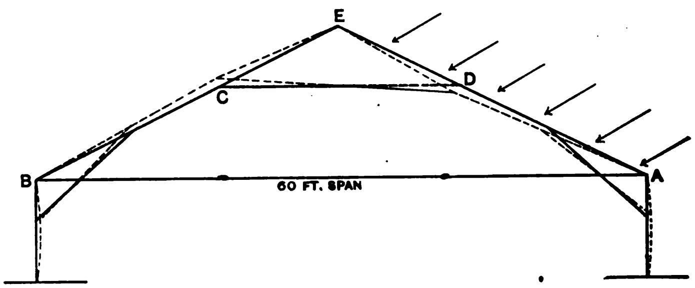


Fig. 5.—Skeleton of Truss, showing effect of strong wind blowing upon one side of the building.

Strength of Skating Rink Roof.

rafters were run from plate to ridge the truss would be considered more rigid and the chances for distortion would be materially reduced.

Transferring Designs for Wood Carving.

From F. B. E., *Lasalle, Ill.*—I would like to ask the author of the article on wood carving to tell the readers a little more about drawing the design or stencil. He tells us in the first article to draw the design on cardboard or heavy paper, just as though we knew all about drawing ; or it may be that a person who cannot draw has no business to try to carve? I cannot draw even a little bit, so it will be seen that my first trouble in carving comes about as soon as I think of this sort of work. I have wondered for some time if designs could be bought. I believe I have obtained some good points from the paper during the past winter, as I have been trying to follow the lessons given on drawing, carving and hand-railing.

Note.—We submitted the inquiry of our correspondent to Mr. Woodsend, who furnishes the reply given below, together with sketches from which the accompanying diagrams have been produced :

In answer to the correspondent in Lasalle, Ill., I would say that instruments can be purchased with which, by simply tracing the different lines of a design with a point, it can be enlarged

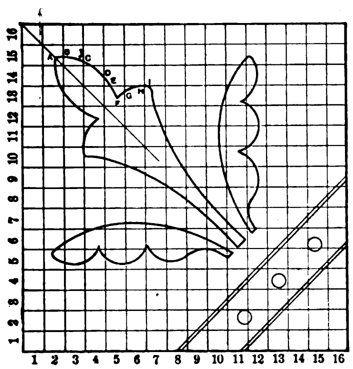


Fig. 1.—The Design to be Transferred.

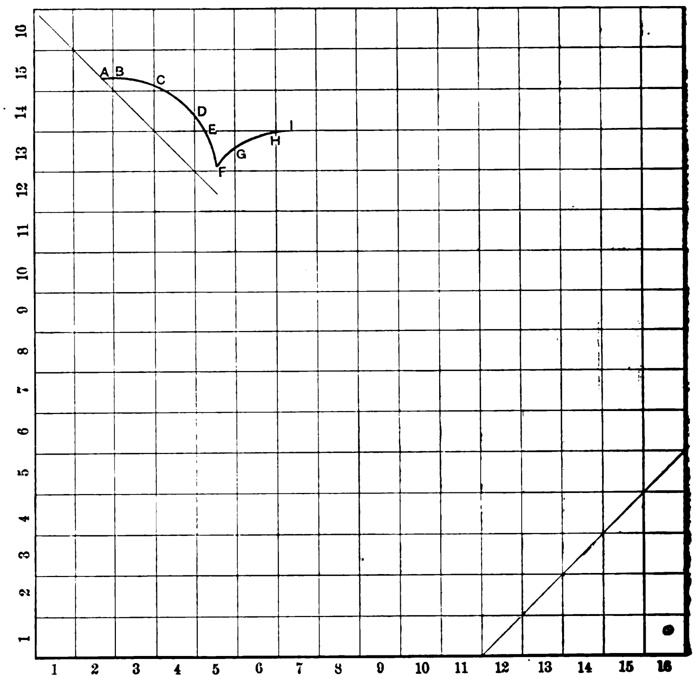


Fig. 2.—Method of Transferring the Design to a Block of Wood.

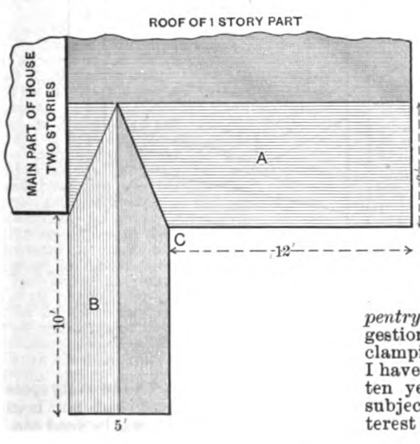
Transferring Designs for Wood Carving.

or diminished upon another piece of paper, as desired. Believing, however, that the correspondent wishes to obtain some little insight into the methods for copying designs with the fewest instruments and technicalities, I send sketches which will enable him to do the work. For the purpose of illustration I will use Fig. 14, given in the December issue of *Carpentry and Building*. It will be found upon examination that the outer lines of this figure measure 2 x 2 inches. Now suppose, for instance, a corner block is desired which shall measure 4 x 4 inches, the design to be the same as that shown in Fig. 14, but enlarged proportionately to suit a 4 x 4 block. Referring to Fig. 1 of the accompanying illustrations, divide the outer lines of the square into any number of equal spaces, as, for example, 16, and draw the connecting lines as indicated. Now, as the block is 2 x 2 inches, it brings the small squares ⅛ inch each way. Take the paper or cardboard which it is intended to use for a stencil and mark out upon it a square 4 x 4 inches. Divide each side of the square into the same number of equal parts as indicated in Fig. 1—that is, 16 each way—and draw the connecting lines, as shown in Fig. 2. All is now ready for transferring the relative distances of the design from Fig. 1 to Fig. 2, and in transferring these distances those taken from Fig. 1 must be multiplied two times before being platted upon Fig. 2, as the latter figure is two times larger each way than Fig. 1. Suppose now a start is made at A of Fig. 1. It will be seen that this point is upon a diagonal line drawn from the upper left hand corner to the lower right hand corner of the square and is numbered 15 in hight and 2 toward the right. Find this square upon Fig. 2 and draw the diagonal, taking the distances with the compasses from either end of the diagonal line of Fig. 1, and transfer twice the distance to the diagonal line in Fig. 2, measuring from similar positions in each case. Next take the point B of Fig. 1 and measure from the intersection of lines between Nos. 14 and 15 in hight and 2 and 3 toward the right, and transfer twice the distance obtained to Fig. 2, measuring from the intersection of lines similarly numbered. Proceed in like manner until the points A,B,C,D, E,F,G,H,I, are found and transferred ; then trace the curved lines through these points, using a thin strip of wood bent so as to touch each point. Proceed in like manner until the whole of the design is transferred. In this case there are quicker methods of arriving at the same result using the same instruments, but this method is applicable in all cases no matter how irregular may be the designs.

Sharpening a Cabinet Scraper.

From C. J. WOODSEND.—In answer to "J. C. W.," Pine Hill, Pa., I would state that sharpening a scraper is not a difficult matter. A good "toner" is required, which can be made from a half round or half oval 6 or 8 inch file. Grind until all the marks made by the file cutter are obliterated and then rub upon an oil stone until perfectly smooth. Now take the scraper and file the edge square and straight, running the file from end to end. Next rub upon an oil stone to take out all the marks made by the file, and after that is done lay the scraper with its side upon the oilstone, rubbing until it is smooth. Then do the other side in the same way. After this has been done rub a few drops of oil upon the convex side of the "toner" and also upon the edge and the two sides toward the edge of the scraper. Now lay the scraper flat upon a clean piece of board and nearly to the edge. Then rub the "toner" over it, using the convex side and working from end to end of the scraper and nearly flat upon it. After going over one side a few times turn the other and repeat the operation. Now stand the scraper upon end, hold it firmly with one hand and with the "toner" held tightly against the edge and slightly out of square with it make one solid stroke with it ; then reverse the ends and repeat the process, which completes the operation. The cutting edge of a scraper is a small portion of the steel turned over or past the side, and if properly done should feel smooth and regular when the thumb nail is run over it. The last part of the operation is the most particular one, as if sufficient pressure is not used it will cut off the edge in the shape of a fine steel wire. The same result will happen if the "toner" is not perfectly smooth.

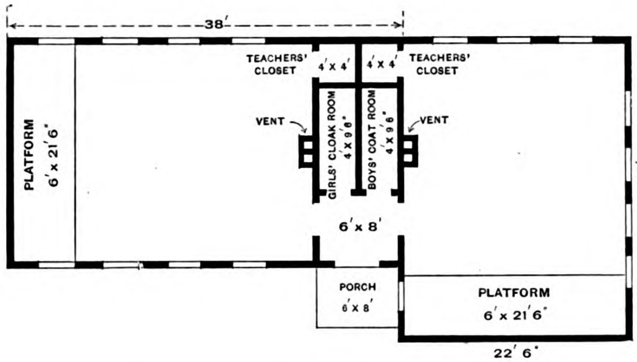
From T. H., *Brainerd, Minn.*—I send herewith a reply to "J. C. W." of Pine Hill, Pa., who asks in the April issue for a description of a method of sharpening a cabinet scraper. This tool is perhaps one of the most difficult to sharpen and requires some practice in order to acquire the knack. One of the first things to be considered is the selection of one of proper temper, as this is quite as important as that of any other of the edge tools. A piece of saw blade sometimes proves very good, but not always. If it is so hard that the edge appears to crumble it is unsuitable, and this is also the case if too soft. In sharpening, first joint the edges with a fine file, keeping the edge perfectly square and rounding the corners slightly so as to avoid scratching the surface of the work. Then hold the edge of the scraper square on the side of the oil stone which is straight and by a few strokes remove the rough wiry edge, the latter being then ready for burnishing. A saw file will answer a very good purpose by first grinding it until smooth and removing the angles. It is better to be very hard. Hold the scraper firmly in the left hand, pressing downward on the bench, with the edge to be sharpened inclining to the right. Then hold the burnisher firmly against the edge almost square with the sides and make several strokes up and down, being careful not to hold too much on the corner, and treat each edge in the same manner. When resharpening place the scraper flat upon the bench near the edge ; hold the burnisher level on the scraper, pressing down, and make quick strokes backward and forward several times. Treat both sides the same near the edge ; then it is ready to be edged again as in the first instance. After it has been sharpened a few times the edges become rounded and must be jointed square again. The proper angle to hold the tool when being used depends somewhat on the angle the burnisher is held when sharpening.



Sketch of Roof Plan Accompanying Letter from " Jack."—Scale, ⅛ Inch to the Foot.

Ventilating a School House.

From A. S., *Lancaster, Ill.*—I inclose floor plan of a school house and desire some of the readers of the paper to describe a good scheme for ventilating the building. The latter is one story high, 13 feet in the clear from floor to ceiling. There are two rooms, as indicated in the sketch. There will be a belfry on top of the building, and I desire to know which is the best point for it. I would like to have a roof plan, together with a description of the method of covering the building.



Ventilating a School House.—Sketch Submitted by " A. S."—Scale, 1-16 Inch to the Foot.

Framing Roofs of Different Pitch so that Cornice and Moldings Will Member.

From JACK, *Ontario, Ohio.*—I would like to ask readers of the paper what is the best and most practical method of framing a porch roof of different pitch to that of the house so that the box cornice and molding will member. The porch is built in an angle, as shown in the sketch which I send. The part marked A is 6 feet wide and has a shed roof with a rise of 2 feet 6 inches and joins the roof of the one-story portion of the house. The part marked B is 5 feet wide and has a gable roof with a rise of 2 feet 6 inches, which is the same as the rise of the shed roof A. Now, I would like to know how to frame it so that the cornice will member at C, the plate of the porch being on a level throughout.

Sash and Door Clamp.

From I. H. F., *Sykesville, Md.*—I would like some of the practical readers of *Carpentry and Building* to furnish suggestions for a device suitable for clamping together sash and doors. I have been a reader of the paper for ten years, but have never seen this subject discussed. I think it will interest others as well as myself.

Carpenters' Work Bench.

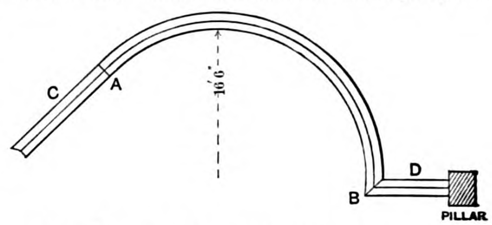
From J. D. R., *Orchard Lake, Mich.*—I would like some one who has had experience to tell me how to build a carpenters' bench which will be suitable for all general purposes of carpenter work. I would like to have the correspondent give the hight, length, breadth, and name the best material, with its thickness, to use for the top. Could there not be some adjustable arrangement at the front of the bench which would do away with boring it full of holes and using a plug to hold up the rear end of a board while dressing the edge? I think this question will stand a thorough discussion when it covers a bench for general purposes.

A Ramped Stone Coping.

From SCOTTIE, *Tiffin, Ohio.*—I shall be glad to have some one of the many readers of the paper tell me how to obtain the lines for the working drawings of a circular ramped stone coping 18 inches wide and 9 inches thick, so as to intersect or miter at A and B of Fig. 1 of the sketches which I send. The radius is 16 feet 6 inches from inside of coping, as shown. There is a fall of 5 feet from A to B, while the walls at C and D are level. A section of the coping wall is shown in Fig. 2. Early attention on the part of the practical readers will be a favor.

Secret Finishing.

From G. A. H., *Erie, Pa.*—In the issue of the paper for September last a reader asked for illustrations and explanation of a method of secret finishing by keying and wedging. I was very much interested in that article and watched the different issues since that time for a reply, but thus far have failed to find any. I would like to remind the readers of this inquiry, and express the hope that some of them will give the subject early attention.



A Ramped Stone Coping.—Fig. 1.—Ground Plan.—Scale, 1-16 Inch to the Foot.

Finding the Side of a Regular Octagon.

From B. F. M., *Wheatland, Cal.*—Some problems which I have been compelled to work out in regular practice may prove of interest to some of my fellow craftsmen, and I present them herewith. The first one is finding the length of any side of a regular octagon when the distance between the two opposite and parallel sides or the side of the circumscribed square is given. The rule is, square the distance or side, multiply by 2, extract the square root of the result and from the root thus found subtract the given distance. The remainder will be the required side of the octagon.

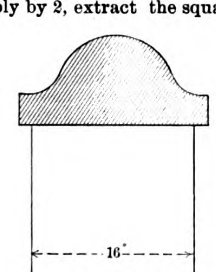
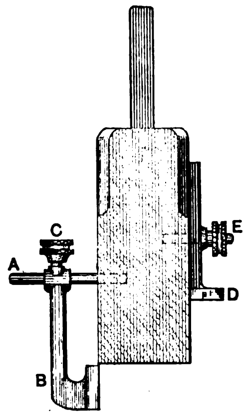


Fig. 2.—Section of Coping Wall.—Scale, ¾ Inch to the Foot.

The next problem is to find any side

of a regular octagon when the radius is given. The rule for this is to square the radius, multiply by 2 and extract the square root. Take half the root found and subtract it from the given radius, when the remainder will be one side and half the root so found as above will be the other side of a right angle triangle, of which the side of the octagon is the hypotenuse. Square the two sides thus found, add the squares together and from their sum extract the square root, which will give the side of the octagon required.

The following is a mathematical



Gauge for Rabbet Plane.—Fig. 1.—End View.

curiosity that may also be interesting: In any right angle triangle which has as its base and perpendicular as 3 is to 4, the hypotenuse is equivalent to the sum of the other two sides less two-thirds the shorter side.

Gauge for Rabbet Plane.

From D. E. B., *Fort Worth, Texas.*—I was glad to see the article concerning the gauge for rabbet plane from "E. S. C.," Easthampton, Mass. I can extend the invention of the old wood rabbet plane a little further. I take the short arms and one gauge from my 45 plow plane and apply them to my rabbet plane, which makes it

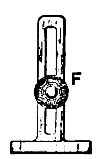


Fig. 2.—View of Gauge.

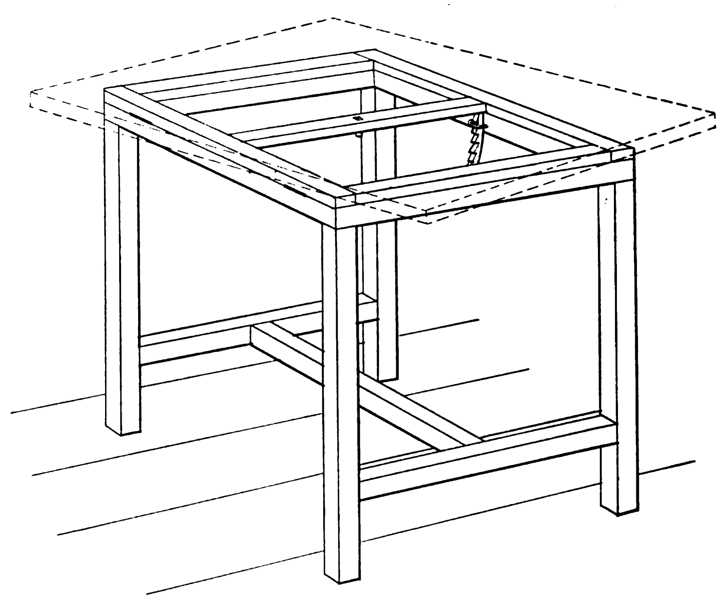
much handier. I present a few sketches which will make my meaning more clear. Fig. 1 is an end view, Fig. 2 represents the gauge, while Fig. 3 shows a side view of the fence. Referring to Fig. 1 of the illustrations, A is the short arm; B is the fence which belongs to my 45 plow plane; C is the thumb screw to the fence; D, the gauge; E, thumb screw to the gauge, and F, shown in Fig. 2, represents the face of the gauge. In order to set the gauge loosen the thumb screw and slide the gauge up or down until it is properly set, then tighten the thumb screw. Set the fence to the desired width of rabbet, tighten the thumb screw and the plane is ready for use. I think this will prove interesting to readers of the paper, as I know some carpenters throw away the short arms to their 45 plow planes; I laid mine away in the tool chest until I invented a use for them. I would like to ask my brother chips to give their experience in using the old style wood plane made of apple tree. I am falling out with the lately patented planes, as they do not hold the bits firmly as did the old style wedge. The only objection I see to brother "E. S. C.'s" plane is that he has the gauge on the wrong side of the plane. I have been a constant reader of *Carpentry and Building* for two years and think it a grand journal. Much can be learned from its columns.

Water Closet for a Large School.

From T. G., *Vicksburg, Miss.*—Will some one please contribute to the columns of the paper plans and specification of a modern water closet for a school with accommodations for 500 pupils. The closet is to be built in the yard and so arranged as to have seven rooms with one for the teachers. I do not recollect ever having seen a design of a building of this kind, and in our Southern country they are, in my opinion, the best closets for the purpose.

Design for a Drawing Table.

From C. R. R., *San Francisco, Cal.*—I have been taking *Carpentry and Building* for three years and would not dispose of the copies for five times what they have cost me. In one of the recent issues I notice an inquiry from "R. B. W." of New Orleans, La., relative to a drawing table. I submit for his inspection a sketch of a table I have used and like very much. The top is hinged so as to give it an inclination if desired. It is very simple in construction, as may be seen from the sketch, and I do not think an extended description is necessary. It is arranged on a center so that it can swing around, as indicated by the dotted lines.



Sketch of Drawing Table Submitted by "C. R. R."

Moving a Frame House.

From S. R. D., *Martin's Mill, Texas.*—I would like some reader of the paper to give me a method for moving an old house having a tall, slender brick chimney. The house is frame and is to be moved 30 feet and turned half way around. I would like to have practical readers give this attention at once, as the work is to be done right away.

Note.—Our correspondent may possibly obtain some valuable suggestions for his undertaking from the article on the subject indicated published in another column.

Tin and Gravel Roofs.

From "W. C. F.," *St. Louis.*—Having seen several articles in *Carpentry*

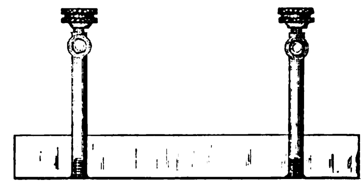


Fig. 3.—Side View of Fence.

and Building intended to show the superiority of gravel roofs and others of the same class over tin roofs, and in view of the fact that anything in support of the durability of metal roofs will be likely to win the interest of the readers, I desire to rise in my place and relate a little of my own experience. I was called upon recently to examine some copper gutters that I made and placed in position in 1841, and finding them in good condition I was curious to go a few doors north, to 518 North Main street, to examine a tin roof that I worked on for O. D. Filley in the same year. I found that with the exception of a few nail holes and a few rusty spots (for I am sure the roof had not been painted in ten years) it was in good condition, and I undertake to say that with two days' repairs and a light coat of paint it is good for another ten years. Now, if your contributor who is so loud in his recommendation of gravel roofs should visit our city he can see roofs, not to mention the roof above referred to, that are doing good service at the age of 37 years.

WHAT BUILDERS ARE DOING.

GENERAL CONDITIONS in the building business seem to have improved to a considerable extent during the past month. There has been an increase in activity in the Middle States sufficient to warrant the belief that the season will exceed in work done both 1893 and 1894, providing contracts now in sight are carried out. Conditions in Milwaukee, St. Paul and Minneapolis have improved, especially in the first named, since the last report, and a more hopeful spirit prevails in the cities between the Mississippi River and the Rocky Mountains. The situation throughout the East is practically unchanged.

The only disturbance of a serious nature that has occurred among the workmen is a strike of hod carriers at St. Louis for higher wages. At the present writing the men are still out and the building trades of that city are materially crippled.

Boston, Mass.

The building business in Boston continues to improve, there being steady though gradual increase in the volume of work on hand as well as in prospect. The season promises to be better than was thought possible at its opening. No trouble between employers and workmen has occurred to interfere with the progress of work, and there seems to be no danger of serious strikes or lockouts in the near future.

On May 10 the Master Builders' Association held a special meeting for the purpose of listening to a description of a new system of light shaft for high buildings. The prominent architects of the city were invited.

There are at present in the courts of the city two cases relating to the rights of the contractor in his relationships with others that may result in important precedents. The results will be announced in these columns when reached.

Buffalo, N. Y.

The Buffalo builders are reported as being fairly busy, though the season at present does not promise to be a remarkable one.

The election of the Builders' Exchange Association, the corporation that owns the building occupied by the Builders' Association Exchange and composed of members of the latter, was held on April 24, with the following result:

Trustees, Charles A. Rupp, H. C. Harrower, Alfred Lyth, George W. Carter, A. A. Berrick, John Feist, Jacob Reimann, Henry Schaefer, Emil Machwirth.

Inspectors of election, John W. Henrich, George Duchscherer.

The officers elected by the trustees were:

President, Charles A. Rupp.
Vice-president, H. C. Harrower.
Treasurer, Alfred Lyth.
Secretary, J. C. Almendinger.
Building Committee, George W. Carter, John Feist, A. A. Berrick, Jacob Reimann, and Emil Machwirth.

The secretary's report showed the corporation to be in excellent financial condition, having paid a 6 per cent. dividend and added a considerable sum to the surplus. The permanent exhibit which has been added to the exchange has proven a successful venture, the revenue from half the space, all that is taken at the present time, amounting to $1831. Thirty-five of the forty-six offices in the building are rented at a total increase of $370 for that number as against the amount received last year.

The National Secretary visited the exchange on May 22, and delivered an address on the National Association and the local exchanges. There was a large attendance of members and others. The exchange has made the *Intending Builder* its official organ, and that journal will in future be largely devoted to the interests of Buffalo and its builders.

Chicago, Ill.

It is stated that Chicago building interests show signs of improvement and that greater activity is expected. Comparatively little disturbance has occurred in the labor world during the past month. The several divisions of carpenters' unions are well along toward consolidation. It is stated that the Masons and Builders' Association during the last few weeks has added over one hundred to the membership. They report the building outlook good and all seem to be busy.

An organization known as the Trade and Labor Assembly is seeking to bring all organized labor under one head. The following excellent view of the situation is the opinion of the new president of the assembly, M. R. Grady.

While I am in sympathy with any movement that will advance the cause of organized labor, yet I make bold to say that we are not prepared for amalgamation. I do not advocate such premature action. Labor must be harmonious before it attempts to close ranks. A few of the rough edges need to be knocked off. The interests of the workingmen are in a stage of transition; in fact, we scarcely know what we want. It would be well for us to realize just where we stand before taking any such important course. Labor is in no condition to amalgamate. A sudden attempt to put in such a close compass so varied elements will result in a violent explosion and will send us further apart than ever.

We have two distinct classes of men in the labor ranks to-day. Take a man from each. Both may be equal in intelligence and ability, but trained in different schools; both are honest and sincere in their convictions, but one has had the good fortune to mingle with people who form opinions after mature deliberation and only can be convinced by reason. He is the conservative man.

The other man has associated with those of radical ideas on every question. He claims that everything is wrong and clamors for an immediate change. If society does not conform to his extreme views he is ready for open rebellion. This radical element, unfortunately, can be found many times over in the local labor circles.

I must openly condemn such classes. Such men cause many germs of discord to work harm. I think that labor men see the folly of worshiping such leaders. I believe that we are coming to our senses and desire to follow men of reason—men who fully recognize their rights and will assert them only in a legal way. Men of sterling worth, preferring to be guided by past experiences rather than some false, hair brained philosophy, will be the labor leaders of to-morrow.

Until we can rid ourselves of this fanatical class and force men to appeal to the interests of reason and common sense we cannot perfect a central organization. I think labor will profit by its past experience. Labor men in Chicago have blindly followed a set of men who had the gift of harangue and could utter with a loud voice a set of airy nothings. They held the offices, were put forth as representatives of labor, and public opinion was gauged by them. Men of self respect, of clean morals, of talent, are now taking their places.

Such are the signs of the times. I predict more will be accomplished during the next five years for organized labor than has been done in the last 20. When we get rid of these blatant leaders we can then talk of centralization.

Cleveland, Ohio.

The builders of Cleveland are generally busy, though the total of work now on hand is below the mark of previous years.

There have been no serious troubles between employers and workmen in the building trades this season and none are expected. The carpenters are at work perfecting their unions, which have been allowed to become weak from lack of interest by the workmen. A prominent member of the union is quoted as saying: "Before the late trying times came we had no trouble in getting $2.50 a day, but now we think we are doing well if we get $2, and some of the men receive much less than that. While it is true that several contractors pay $2.25 per day, I doubt whether the average carpenter receives $2."

A special meeting of the Builders' Exchange was held on May 21, the occasion being a visit from Wm. H. Sayward, secretary of the National Association of Builders. The attendance was good and the remarks of Mr. Sayward were listened to with interest. In his talk he defined the National Association and its functions, pointed out how its work could be made more beneficial to the local bodies, and explained the nature of a local exchange and its relation to the national body.

The Cleveland Exchange is reported as being in good condition.

Detroit, Mich.

Building is reported to be in good condition in Detroit, although not up to the standard of former years. May 1 was the date specified by the Detroit Bricklayers' Union when wages should be increased from $3 to $3.50 per day. Some time ago the members of the Builders' Exchange drew up an agreement complying with the request of the bricklayers, and it was signed by every member of the exchange, as well as by 20 contractors who were not members. It was argued by the members of the association that $3.50 was little enough, and certain of the contractors, together with both street car companies, have been paying $3.50 per day since the opening of the season. Several of the contractors who had taken work figured on the basis of $3 per day for bricklayers declined to grant the advance and their workmen struck. One by one the contractors yielded the demand of the workmen and the last of the strike was over on May 12. No trouble in any other branch of the building trade is anticipated.

On May 20 a special meeting of the Builders and Traders' Exchange was addressed by the secretary of the National Association on the relations of the national body and the exchanges to each other, and ways and means for increasing the efficacy of each. The meeting was well attended, and the secretary was given a cordial welcome. The exchange is in excellent condition, with a steadily increasing membership.

Indianapolis, Ind.

The painters of Indianapolis have had trouble with the employers during the past month over the employment of non-union workmen. The Master Painters' Association were requested by the union to employ only union men, and in reply stated that there would be no discrimination made against non-union workmen. As a result of this condition the union ordered a strike. Up to the time of writing the strike has not been declared off, but the employers claim that they have all the men they need. Business is in fair condition, the majority of the contractors being busy. The Builders' Exchange is reported as being in good condition.

Lowell, Mass.

The annual election of the Master Builders' Exchange of Lowell, which recently took place, was preceded by a supper at which Mayor Courtney was the guest and made a felicitous speech. Behind closed doors the Master Builders then re-elected the following officers for the ensuing year:

Frank L. Weaver, president.
Patrick Conlon, vice-president.
Charles P. Conant, secretary.
George H. Watson, treasurer.

Directors.

Frank L. Weaver. Patrick Conlon.
Charles P. Conant. George H. Watson.
Robert Goulding. William H. Kimball.
Patrick O'Hearn. Patrick B. Quinn.
George H. Kirby.

An unimportant strike of bricklayers for nine hours occurred early in May, but the contractors were not seriously inconvenienced, owing to the supply of non-union men.

Lynn, Mass.

The carpenters of Lynn have practically secured the adoption of the eight-hour day, only a few of the contractors refusing to adopt the shorter time. It is expected that eight hours will be generally conceded without disturbance. Secretary P. S. Curry of the Master Builders' Association is making a strong effort to revive the interest of the members to a point where the organization will become of greater practical benefit to the builders and their interests.

The business prospects in the building trades are unusually bright, there being more work in sight than at any time for several years past.

Milwaukee, Wis.

It is reported that an unusual activity exists in the building trades of Milwaukee, and that the prospect for the season is better than it has been at any time during the past three years. It is expected that the unions in the several trades will take action looking to the restoration of the wages to the point where they stood before the depression of 1893 and 1894. The carpenters and stone cutters have already taken action looking to this end, and it is stated that the attempt to increase the wages will be made without resort to strikes. A few years ago, says a local paper, the stone cutters of Milwaukee were all busy and made good wages—running as high as $5 a day. Now the vast majority of them are idle and cannot obtain work at any price. By one of those freaks of trade, the stone is now cut and fitted ready to go into a building when it reaches this city, so that the resident stone cutters have little to do. The union will attempt to remedy this. An attempt will be made to influence the aldermen and secure the passage of an ordinance making it obligatory upon contractors on city work into which cut stone enters to have the work done in the city by local men. With this as a starter, the stone cutters hope to be able to induce the same conditions in private work.

A Building Trades Council has been formed with the following officers: President, Thomas Male of the Bricklayers' Union; vice-president, Joseph English of the Steam Fitters' Union; recording secretary, George Haskins of the Bricklayers' Union; financial secretary and treasurer, John Bettendorf of the Carpenters' Council; sergeant-at-arms, Paul Mateseck of the Steam Fitters' Helpers' Union; trustees, Charles Hoyer of the Carpenters' Council, George Bloodgood of the Painters' Union, and Frank Raymond of the Electrical Workers' Union.

The Builders and Traders' Exchange is continuing its energetic work in behalf of the needed improvements surrounding the builder and his business, and is in good condition for the work.

New Bedford, Mass.

The Builders' Exchange of New Bedford, which has been advocating the incorporating of trade training into the public schools of that city, made its fourth annual dinner on May 1 the occasion for presenting the need of trade schools to members of the Board of Aldermen, Common Council and Board of Education. The following gentlemen responded to toasts, prepared with a view to giving the speakers an opportunity to say something about trade schools: President Butler of the Senate, Mayor Parker, Oliver Prescott, Jr., president of the Common Council; William E. Hatch, superintendent of schools; William L. Sayer, editor of the *Standard;* Alderman L. G. Hewins, Jr., Councilman Mortimer McCarthy, D. B. Garnsey, assistant secretary of the National Association of Builders; Rev. Charles S. Murkland, president of the New Hampshire College of Agriculture and Mechanical Arts, and the following members of the School Committee were among the invited guests: F. A. Milliken, vice-chairman; George H. Batchelor, George W. Hillman, Dr. F. A. Kennedy, Seth W. Godfrey, Dr. E. T. Tucker, Mrs. H. M. Knowlton, Dr. L. Z. Normandin.

Mr. Garnsey, for the National Association of Builders, explained the position taken by that organization in regard to trade schools and the treatment of the graduate from the time of leaving school until entitled to be considered a journeyman, and pointed out the erroneous idea in the minds of many as to the competition between trade school graduates and full fledged journeymen, showing such competition to be impossible in the plan advocated by the National Association. Rev. Mr. Murkland made an extended and very interesting address, urgently setting forth the need of such schools upon moral, ethical and practical grounds. The affair was interesting and enjoyable and reflected credit upon the exchange.

The Committee of Arrangements was C. G. Randall, A. E. Buffington, E. F. Penney, Z. B. Davis, C. O. Brightman, J. H. Murkland.

The officers of the New Bedford Builders' Exchange are as follows:

President, Z. B. Davis.
Vice-president, C. R. Sherman.
Secretary, C. O. Brightman.
Treasurer, C. S. Paisler.
Directors, Z. B. Davis, C. R. Sherman, C. O. Brightman, C. S. Paisler, William B. Jenney, F. T. Akin, C. G. Randall, E. F. Penney, C. E. Peirce.

New York City.

The past month has been a comparatively uneventful one in the building trades of New York City, so far as labor troubles are concerned. Building operations are in active progress in every part of the city, and there is a fair degree of activity in the surrounding places. Each week witnesses the granting of a goodly number of permits by the Department of Building, and these during the month aggregated in the estimated cost of erection many millions of dollars. The following letter based upon the form of arbitration advocated by the National Association of Builders has been sent to all unions by the Board of Delegates:

OFFICE OF BOARD OF DELEGATES OF THE BUILDING TRADES OF NEW YORK AND VICINITY.

To the Affiliated Unions Represented in the Board—Greeting:

The Board of Delegates of the Building Trades of New York has had under advisement a plan whereby strikes may be avoided as far as possible in the building industries in the future.

In brief, the plan would be that the employers and employees of each trade should come together and legislate for the best interests of their respective trade, and in case they should be unable to arrive at a conclusion satisfactory to both sides the matter in dispute should be referred to an arbitration committee consisting of ten employers of the various trades to the building industry and ten members of the Board of Delegates of New York and vicinity for final settlement.

If your organization think favorably of a plan of this kind after it has been brought before your meeting and thoroughly discussed please notify the Board of Delegates at 189 East Fifty-ninth street, New York City, of your position in the matter. We urge that the matter be taken up as soon as possible, as it is one of paramount importance to the entire building industry, and we therefore hope that you will give it your earnest and speedy attention.

Yours fraternally,
EDWARD DALTON, Secretary.
WILLIAM J. O'BRIEN, President.

Such an agreement as is proposed in the letter is already in existence in several trades and is working with great satisfaction.

Providence, R. I.

Building is in good condition in Providence, there being sufficient work on hand to keep the contractors busy. No differences between employers and workmen have occurred recently, and everything is going along very satisfactorily.

The Builders and Traders' Exchange has been honored in the appointment of Richard Hayward, an ex-president, as postmaster of the city. Mr. Hayward has been prominently identified with the best building interests of Providence for many years, and has several times represented his exchange in the conventions of the National Association. In 1892 he was elected to the Legislature to represent the Fifth ward for his party. He was re-elected in 1893, and in the latter year was Chairman of the Committee on Finance of the House of Representatives.

Rochester, N. Y.

The Carpenters' Union of Rochester is endeavoring to compel the Board of Education to observe the statute regarding the letting of contracts, by prescribing the number of hours that shall constitute a day's work. The union is also seeking to prevent the employment of non-union men. A certain plasterer has begun suit against the Bricklayers, Plasterers and Stone Masons' Union for $10,000 damages for an alleged boycott declared against him. The plaintiff, who was a member of the defendant union at the time the difficulty arose had an offer to go to work on the Government Building. He feared at first that the union would object to his working with non-union men, but upon receiving its permission took the job. After he had worked a short time the union concluded that in permitting its men to work on the Government Building it was violating the rules of the international organization. A resolution was accordingly passed reconsidering its former action. The plaintiff refused to obey the order and was fined $25. Being unable to pay the fine he was expelled. Resolutions were then adopted requiring every member of the order to refuse to work on any job with the plaintiff. This, it is alleged, was a boycott.

The members of the Builders' Exchange listened to the secretary of the National Association of Builders on May 23 at a special meeting called for the purpose. The secretary discussed the nature of the National Association, its filial bodies and their relation to each other. The meeting was well attended and keen interest was manifested in the subject under consideration.

St. Louis, Mo.

During the past month the building interests of St. Louis have been seriously interfered with by a strike of hod carriers. In the latter part of April the workmen made a demand for 35 and 37½ cents per hour for brick and mortar carrying respectively, and the employers declined to increase before June 1. The Builders' Exchange at a special meeting submitted a proposal of arbitration which was approved by the Master Bricklayers' Association, but the unions declined to have anything to do with it. The report of the action of the hod carriers caused much indignation, and the Master Bricklayers adopted a resolution declaring that they "will continue to act according to the course formerly adopted, namely, that they will pay no more than 30 cents per hour to competent brick carriers, and not more than 32½ cents per hour for competent mortarmen, and that this scale of wages be continued until such time as this association may see fit to change it."

It is stated that a labor bureau established by the employers has been the means of giving many non-union men work, though the number has not been great enough to afford much relief. At this writing building interests are beginning to suffer from the effect of the strikes. While work continues upon contracts in process of execution, the master bricklayers are not anxious to undertake any new work, and the result is a general postponement, which is a source of annoyance alike to workmen and to dealers in building material.

On May 11 the Hod Carriers' Union resolved to recede a point from the position previously taken, and to allow the question of wages to remain an open one for 39 days, with the proviso that 35 and 37½ cents an hour be paid after that time. This proposition was laid before the Master Bricklayers' Association and was rejected by unanimous vote.

The proposal was as follows:

It was resolved at a meeting of our committee to arbitrate the scale of wages with the master bricklayers for 39 days, equivalent to the time from April 23 to June 1, said 39 days to start from the time of our going to work, providing the master bricklayers agree to 35 and 37½ cents per hour after such 39 days.

The reply of the Master Bricklayers' Association was as follows:

We respectfully beg to acknowledge the receipt of your communication. Please allow us to draw your attention to the fact that you refused to accept our offer to you—viz., 30 cents and 32½ cents, and 35 cents and 37½ cents on and after June 1, 1895. We would also say that you refused to arbitrate the differences between your unions and our association. We consider that we can do no more to settle this question than was done when it was resolved at our meeting of May 7 that we will pay not more than 30 cents and 32½ cents for competent hod carriers.

The situation is complicated by a strike of the workmen in the brick yards, said to be in sympathy with the hod carriers. The brick yard strikers are contending for a restoration of the scale in force in 1892. The wages fixed by that scale are for burners and engineers, $3.87½; setters, $2.80; firemen and loaders, $1.80; wheelers and teamsters, $1.70; clay shed and hill men, $1.50; grinding-room boys and fancy brick boys, $1, and cart boys, 62½ cents a day. The scale recently in force ranges from 50 cents a day for cart boys up to $3.50 a day for engineers and burners.

The builders of St. Louis have been looking forward to the best year in the history of the city. The work on hand and being planned, together with the permits issued, seemed to promise that the records of past years would be exceeded in 1895.

The Builders' Exchange has made arrangements to hold its annual outing on June 20, and has engaged the "Grand Republic" and "City of Providence," two of the largest steamers on the river, for the occasion. The day is to be spent at Montesano Park, where there will be the usual games and other forms of amusement.

An effort is being made to interest builders who are not members in the work of the exchange. It is proposed to hold frequent meetings throughout the year to which outsiders are to be invited, and at which addresses on the functions and benefits of the organization will be given by the members.

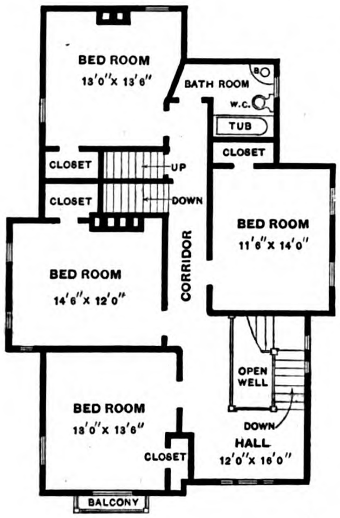
Notes.

A new exchange is being formed at Bloomington, Ill. An organization has been effected, of which R. F. Berry is secretary, and methods which have proved successful in other cities are now being investigated.

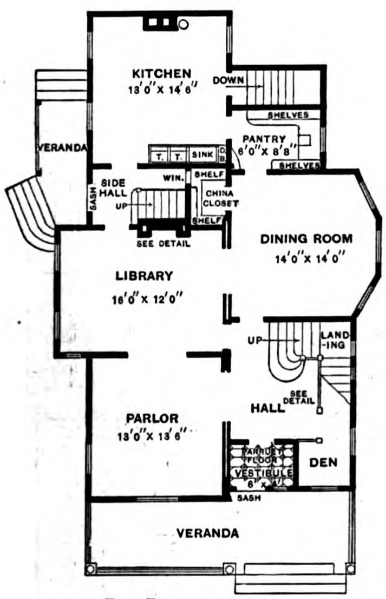
(*Continued on page 158.*)

A STUDY IN HOUSE DESIGNING.

A STUDY of the disposition of rooms in a dwelling with a view to combining convenience of arrangement with economy of construction is interesting alike to the builder and architect and constitutes a subject which cannot be too fully discussed by the practical readers of the paper. An



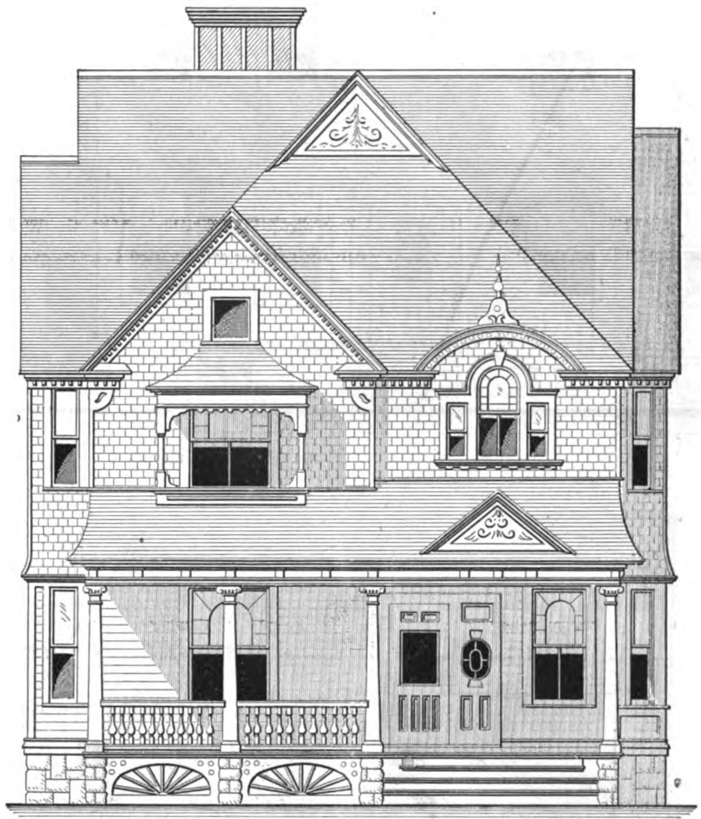
Second Floor.



First Floor.

Scale. 1-16 Inch to the Foot.

intelligent consideration of the topic tends to bring out a multitude of views intensely interesting, by reason of their variety, concerning the manner in which a given space may be divided to meet the requirements of individual preference, and at the same time suggestions are presented which cannot fail to prove valuable to many engaged in the building line. As affording an opportunity for study and criticism we present illustrations of a two-story dwelling designed by Henry F. Wenzel of Waterbury, Conn. It will be noticed that the house is entered through a vestibule, having accommodations for hats, coats and umbrellas. The main stairs are so disposed as to present a rather striking effect as one enters the front hall from which open the parlor, dining room and library. There is also a little nook or den partitioned off at the corner of the house and just to the right of the vestibule. The finish in these two rooms is in quartered oak, a very good idea of the effect produced being gained from an examination of the detail of the main staircase shown on page 151. At the left of the hall is the parlor, separated from the library by *portières* or other means, according to the taste of the owner. The library is located on the west side of the house, where it receives the afternoon sun. It is furnished with a fire place, the design of which is indicated in the details. Directly in the rear of the library is a side hall, through which the kitchen is reached from the outside. The dining room is directly in the rear of the hall and communicates with the library by means of folding doors and with the kitchen through a pantry provided with conveniences in the way of shelving, drawers, bins, &c. The kitchen is at the rear of the house, and from it the cellar is reached by a flight of stairs, as indicated on the plan. The sink and laundry tubs are placed side by side so as to concentrate the plumbing fixtures. The sink is also convenient to the pantry, a feature which cannot fail to be appreciated by the domestic as well as the housewife. The author of the design states that he has often noted cases where the sink was on one side of the room and the pantry on the other, thus increasing the cost to some extent while rendering the arrangement exceedingly inconvenient for members of the household. The author believes that the sink and pantry should always be in close proximity to each other, thus avoiding unnecessary steps. It will also be seen that the china closet is just across the corner of the dinning room from the pantry, so that it is but a step or two from one to the other. The closet is designed for fancy dishes and silver ware and is fitted with shelves, a cupboard with glass doors and a small window giving light from the side hall.



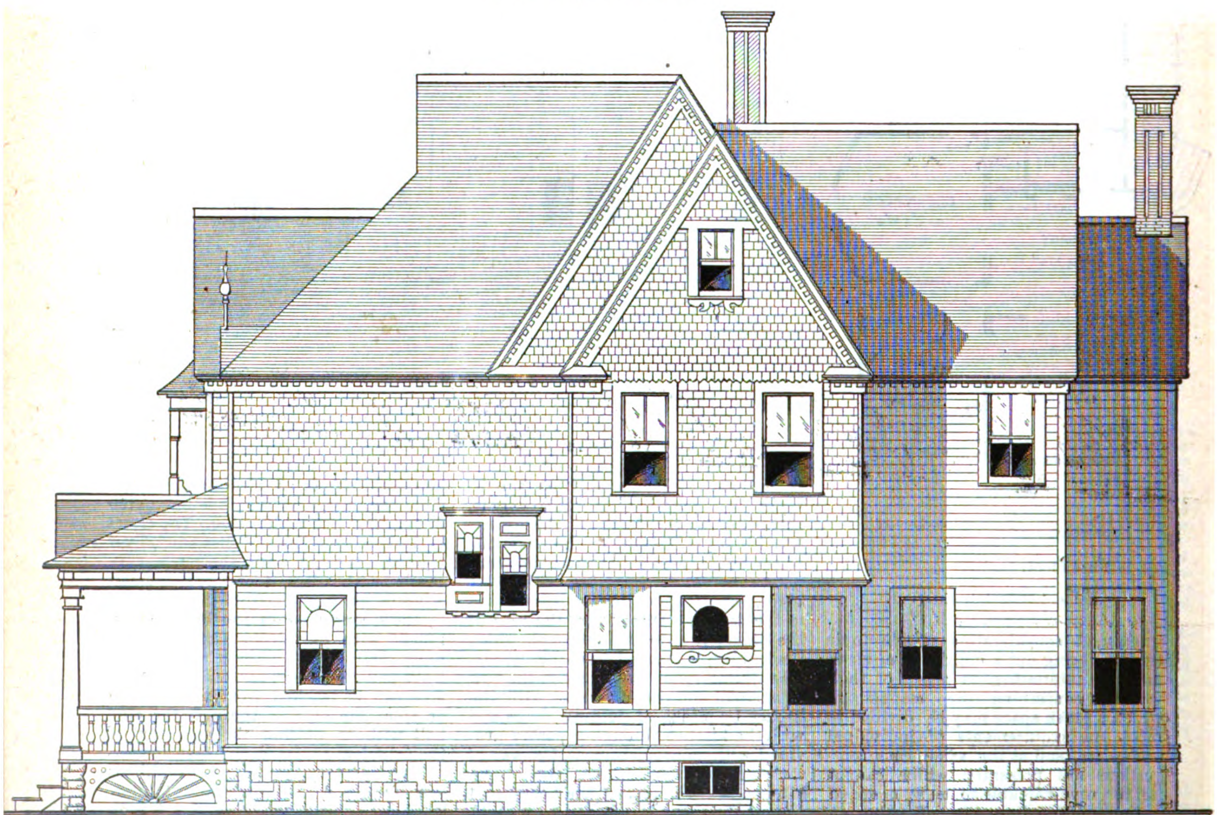
Front Elevation.—Scale, 1/8 Inch to the Foot.

A Study in House Designing.—Henry F. Wenzel, Architect, Waterbury, Conn.

The second floor of the house is arranged with four sleeping rooms, bathroom and ample closets. There are front and rear stairs, so that the second floor can be reached from the kitchen or from the outside through the side hall without passing through any of the principal rooms on the first floor.

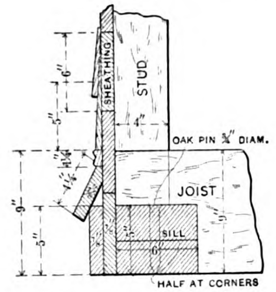
The specification of the architect calls for 3 x 4 inch outside studding, 2 x 4 inch inside studding, 4 x 4 inch posts, 2 x 10 inch joist for the first floor, 6 x 6 inch sills, 6 x 8 inch girders, 2 x 9 inch joist for the second floor, 2 x 4 inch plates, doubled, and

North Side (Left) Elevation.

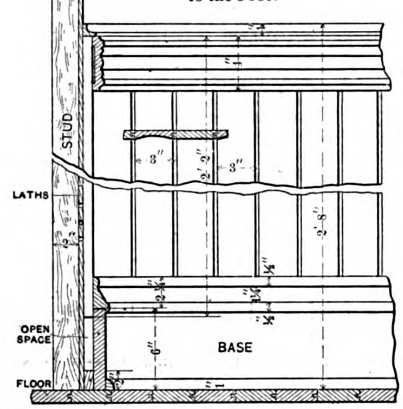


South Side (Right) Elevation.

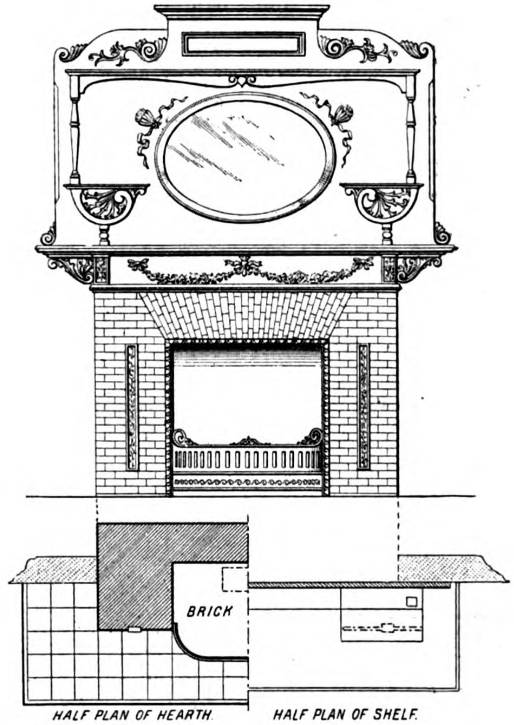
A Study in House Designing.—Elevations.—Scale, 1/8 Inch to the Foot.



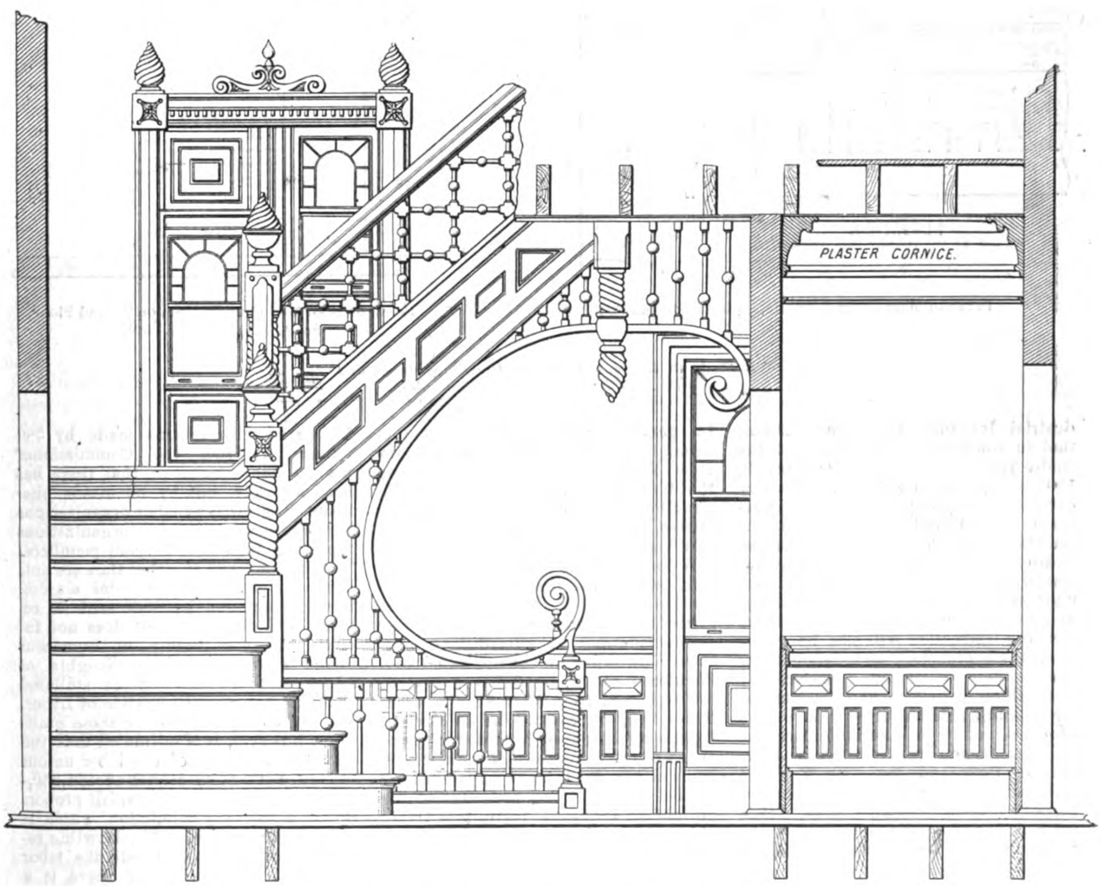
Detail of Water Table.—Scale 1 Inch to the Foot.



Detail of Wainscoting, Base and Cap Moldings in Bath-room and Kitchen.—Scale, 1 Inch to the Foot.



Details of Library Mantel.—Scale, ⅜ Inch to the Foot.



Detail of Main Staircase in Quartered Oak.—Scale, ⅜ Inch to the Foot.

A Study in House Designing.—Miscellaneous Details.

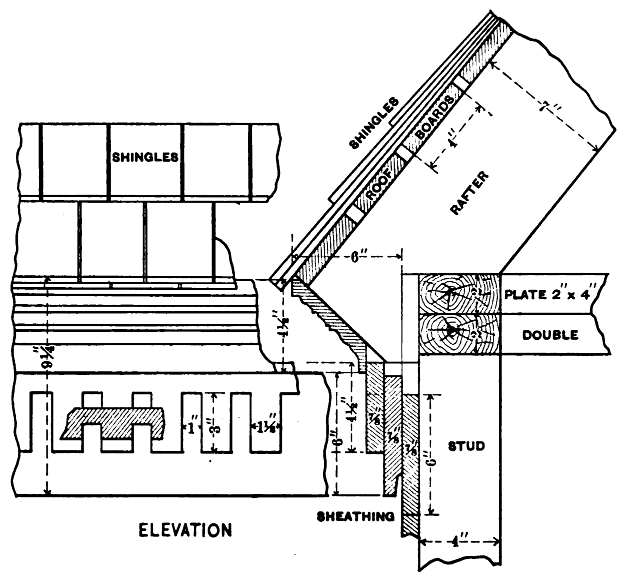
rafters 2 x 7 inches, the material being of spruce. The sheeting is of ⅞-inch hemlock boards 9 inches wide, covered with clapboards and cypress shingles, as indicated on the elevations. The hall, parlor, library and dining room have maple floors, while the kitchen and bathroom floors are of North Carolina pine laid in strips not wider than 3 inches. All other floors throughout the house are of white pine. With the exception of the kitchen, side and front halls, the interior finish is of ash well seasoned and kiln dried, while the finish of the second floor is of white pine. The architect states that $4500 is the estimated cost of the building.

Trades School at Springfield, Mass.

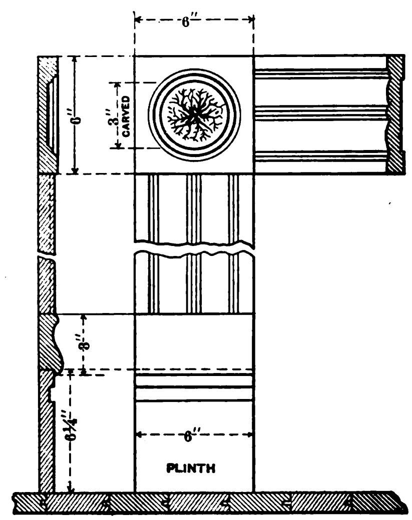
We are glad to learn from circulars, forwarded to us by the Springfield Industrial Institute, Springfield, Mass., that in the forthcoming season of the trades school, opening on October 2, 1895, its operations will be considerably extended. Both day and evening classes are to be held; and their number will be increased, including, in the day classes, instruction in plumbing, bricklaying, plastering, stone cutting, sign and carriage painting, cabinet making, pattern making and machine shop practice. Evening instruction will also be given n all these branches, and, in addition, classes will be opened in electricity, tinsmithing, engraving and blacksmithing. A fine new building is in course of construction on a suitable location on the Boston road, between Winchester Park and the New England Railroad. The building will contain a carpentry shop, machine shop, forge room, iron and brass foundries, plumbing shop, shops for bricklaying, plastering and stone cutting, physical and chemical laboratories, mechanical and free-hand drawing rooms, recitation rooms and a large assembly hall.

The trades school, which is only one of the five departments constituting the work of the institute, is under the direction of L. P. Strong. In each of the trades offered a graded course of instruction has been laid out, beginning with elementary work and progressing to the more difficult and complicated stages. The manual instruction is in the charge of skilled mechanics. Theoretical instruction is also given by means of lectures and diagrams. The day classes, which cover a period of from four to six months (the time varying in different trades), are open daily, during the working week, from 8 a.m. to 5 p.m. The evening classes are intended more for the benefit of young men who are already engaged in trades, but who are desirous of improving themselves. These classes cover a period of six months, the ground traversed being very similar to that of the day classes. In general principles the curriculum throughout the school is founded on the New York Trades School system. At the termination of the courses of instruction, in both day and evening classes, examinations will be held and certificates awarded to those who pass.

A commendable feature of the institute, which was first adopted in connection with the New York Trades School, is the announcement that living accommodations are offered for pupils, at very low prices, in the institute itself. Furnished rooms, lighted and heated, can be had at from $1 to $1.50 a week. Board is also provided at $3 a week. By this means pupils from distant parts of the country are given a comfortable home at reasonable rates while working at their trades. The president of the Springfield Industrial Institute is David Allen Reed; the vice-president Milton Bradley.



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



Detail of Door and Window Trim on Second Floor. Scale, ¾ Inch to the Foot.

A Study in House Designing.—Miscellaneous Details.

PLANS have been drawn for the erection of a 15-story office building at the corner of Fifth avenue and Smithfield street, Pittsburgh, and known as the old Post Office site. This property was purchased several years ago by D. E. & W. G. Park, of Park, Brother & Co., Limited, operating the Black Diamond Steel Works, Pittsburgh, Pa., who will erect the new building. The proposed building will cost between $600,000 and $700,000, and will be a steel frame skeleton structure. It will contain all modern improvements throughout.

Labor Organizations.

The annual report of Thomas J. Dowling, State Commissioner of Labor Statistics, contains some interesting figures relative to the growth of labor organizations. In response to circulars sent out by the Commissioner last year, replies giving the information required were received from 689 labor unions and other similar organizations. These reported an enrollment of 155,808 names on their membership books. Compared with returns made by 580 unions in 1888, the Commissioner reaches the conclusion that there has been a steady, but by no means phenomenal, growth of labor organizations in the interval. The 580 organizations reporting then had 118,628 members. The figures given at either time are not, however, conclusive, as some associations throughout the State sent no returns and the statement does not include the membership of numerous mixed assemblies of the Knights of Labor and Federal unions affiliated with the American Federation of Labor. Making all allowances for these omissions, however, it is estimated that the actual membership of the labor unions in New York State cannot exceed 250,000 people, a sufficiently small proportion of a working population which is more than 6,000,000. Mr. Dowling reports that "throughout all the labor organizations of the State there is a manifest unity of action to reduce the hours of labor to keep pace with the productivity of the machines."

HINTS ON WOOD CARVING.*

By CHAS. J. WOODSEND

THE subject for treatment at this time is a small scroll shown in Fig. 73, and constitutes something of a departure from what has preceded, not alone in design but also in the method of cutting. The design is intended for use upon a very much larger background, relatively, than those previously given, and such being the case it would obviously be a useless expense to cut down the background with chisels, routers, &c., so in this and in similar instances we will glue the scroll upon the background. The first thing necessary is to decide upon the size it is intended to make the carving, then select the block or plank, as the case may be, taking care to have just enough thickness for the occasion. Mark the design upon the wood, or, if preferred, upon very thin paper, and paste upon the block with starch or flour paste. Saw to the outline with a band, jig or other saw, using care in all cases to saw square through the plank, for if the sawing is not square it will be necessary to trim the block until it is true. Care must also be used in sawing to the mark; that is, keeping to one side of it—the outside—as cutting into or through the line means crippled or irregular work.

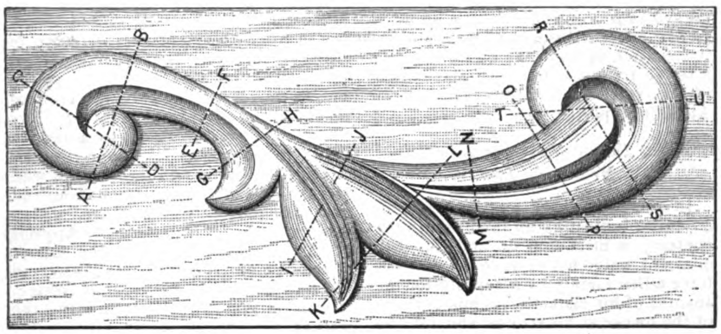


Fig. 73.—Scroll Design for Carving.

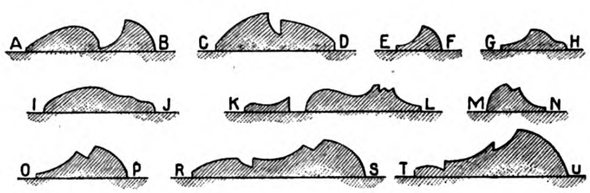


Fig. 74.—Sections of Scroll Taken on Lines Indicated.

Hints on Wood Carving.—By Chas. J. Woodsend.

Now, having the scroll neatly sawn, the next thing is to prepare for gluing it upon the background. If the background has been planed upon a machine, smooth it off with a smoothing plane set very fine; then scrape and sandpaper until perfectly smooth. Next take a shaving off the scroll upon the side that is to rest upon the background; try it and see if it fits—that is, that there are no irregularities either in the scroll or on the background to prevent the two faces from coming in close contact. Supposing now the joint is perfect, the next thing to be done is to go over the two faces with a "toothing plane." This is a tool similar to a smoothing plane, but has only one bit, which has running longitudinally upon its face small grooves the shape of saw teeth. The pitch of the bit in the plane is more perpendicular than in other planes, and after being ground in the same way as other plane bits and properly set in the stock it presents a small serrated edge below the face. It is used for roughening the surface of work to allow the glue to penetrate better and consequently make a stronger job than would otherwise be the case. A fine file held diagonally across the grain of the wood, using both hands and working backward and forward lengthwise of the grain, makes a very good substitute for a toothing plane. For very small places, where a file or toothing plane cannot be used, a comb made from a piece of old saw blade is very useful. The comb is made exactly as if one took a chisel and filed fine teeth upon the cutting edge. In using it is held nearly perpendicular and drawn over the surface with the grain of the wood, bringing to bear sufficient downward pressure to slightly roughen the surface. In using the toothing plane, file or comb, care must always be taken not to spoil the joint, as this will prevent it fitting perfectly.

We will now assume that the joints are perfect and the scroll part properly toothed. The next step is to lay it upon the background in the exact position it is intended to have it remain. Then mark around it with a fine pencil and neatly comb the background between the pencil marks, taking care not to extend beyond them. Prepare some nice fresh glue and have it hot and thin. Do not be afraid of putting in a little water, as up to a certain point the thinner the glue the stronger the joint. Just how thin to make the glue cannot be explained, as it must be decided largely by experiment on the part of the operator. Different makes of glue, and even the same glue at different altitudes, require different treatment. In practice I have found that in order to bring it up to the point of its greatest efficiency the same glue will require several ounces more of water to the pound in the altitude of Leadville, Col., than it will in New York City. Do not upon any account use any of the prepared glues upon carved work. Supposing now the glue is of the proper constituency and as hot as can be made, warm the two surfaces of the work which come together, but do not make them hot. They will be right if the temperature is such that the hand can be borne upon the work without discomfort. Use a small brush to apply a thin, even coating of glue to the scroll and to the space between the pencil marks on the background, keeping away from the edges of the scroll and the pencil marks a sufficient distance so that when the work is cramped up the glue will have extended to the outer edges, but not beyond them. Place the two surfaces together and apply the hand screws, and if the room is warm and the gluing properly done, the work should be ready in about one hour.

Before proceeding to carve, or in shop talk "cut," this figure, study the plan and details thoroughly, as it is desirable for the student to try to cut directly by eye without the aid of molds. In commencing finish out the "eye" of the scroll at A B and C D of Fig. 73, then work the hollow upon the side D E G. In cutting this or any other hollow hold the gouge so as to cut the upper side first, causing the tool to make a drawing cut in place of a thrust cut. After the hollow is taken out partially round up the opposite side, using the concave side of the gouge. First work one side and then the other until, as nearly as possible, the correct shape is obtained without interfering with any other member, finishing the hollow first. Now take the other end, cutting the "eye" shown on sections R S and T U. A portion of this, it will be seen, is cut perpendicular, while the other portion is cut sloping. Next proceed with the hollow upon the side toward the letters L N T O; then take the V portion shown upon the upper part of sections K L, M N, O P and R S of Fig. 74. This, after passing the section R S, assumes the shape indicated upon section T U previously cut. The student will notice that there are two V's indicated upon the section K L, one V showing a side perpendicular, being the continuation of the outline of the leaf and ending at J upon the section I J, while the other side of the V is the start of the round portion that is toward the letters M P S U R. It is also shown upon the sections indicated by these letters in Fig. 74. Now work the rounded part—that is, toward the last mentioned letters—working each portion alternately until the desired shape is obtained. This part can be neatly finished before proceeding with the others, as the perpendicular cut next to the other member allows that to be done without any interference. We will now proceed with the parts which are intermediate between the portions already cut. It will be noticed that upon the

* Copyright, 1894, by David Williams.

highest part of section K L of Fig. 74 there is a small portion shown perfectly flat. The section at K L shows it at its broadest part and it diminishes each way, as indicated, between the two connected lines upon the plan. Next proceed to cut the hollow from the flat part down toward and upon the leaf side of it. This hollow commences a little back of section I J and continues through to the point of the leaf. Round up such portions of the leaf as you can, then take the hollow in the other leaf, which starts a little back of section G H and continues through the same leaf to the point. Now work the round toward the letters I K and shown upon the sections in Fig. 74. The student will not be able to work any of these portions quite down the first time, but first work one part and then another, taking a shaving off here and one off there until the whole is harmonious and every curve graceful. Leave all edges sharp that are so shown, making them as sharp as possible. After all is worked as nearly correct as the eye can determine, make some small molds or templates according to the sections and prove the work by them. The heavy lines upon the plan which are shown separate and distinct represent lines cut with a parting tool. They are not shown upon the sections, being very fine, and they would have a tendency to make the sections look too complicated. Their omission from the finished work neither adds to nor detracts from the beauty of it. After all parts are worked satisfactorily, eliminate with the file and sandpaper all gouge and other marks, making the work nice and smooth. Afterward varnish if so desired with alcohol and resin, then rub down with very fine sandpaper.*

(*To be continued.*)

Law in the Building Trades.

Binding Effect of An Award.

Where parties to a building contract agreed to refer any question arising under the contract to a certain architect, whose decision should be final, and disputes arose and were referred to such architect, who made an award, and one of the parties by mistake omitted to submit in evidence the payment of $2250 to the contractors, there being no claim of fraud the award is binding and conclusive upon the parties.—English *vs.* School District, &c., Sup. Ct. Penna., 30 Atlantic Rep., 506.

Rights and Liabilities of Contractors.

Where a contractor sues for the reasonable value of extra work without setting out the building contract, the defense that its value has not been submitted to arbitrators, as stipulated by the contract, is waived by pleading to the merits. Where the specifications require the contractor to rub down all brickwork on street sides, he cannot claim pay for cleaning street walls with acid as for extra work. A modification of a building contract so as to require pressed brick walls impliedly requires pressed brick chimneys, which are a part thereof. A contractor is not liable for failure to keep the walls plumb, as required by the contract, where the defect is due to the addition of an extra story without strengthening the foundations. The measure of damages for failure to use the grade of plastering required by a building contract is the difference between the class of work contracted for and that which was furnished.—Chamberlin *vs.* Hibbard, Sup. Ct. Oregon, 38 Pacific Rep., 437.

Mechanic's Lien on Wife's Property for Husband's Contract.

The Supreme Court of Pennsylvania holds that, where a building is erected upon land owned by the wife, she having full knowledge of the contract for same, and took part in the conversations between her husband and the contractor relative to the work as it progressed, and made no objection at any time, though the contract is made in the name of the husband, he will be regarded as her agent, as much so as if he had acted with her express authority, as such agency may be legitimately inferred from the relations and actions of the parties.—Jobe *vs.* Hunter, 30 Atlantic Reporter, 452.

When Taking Note Does Not Waive Mechanic's Lien.

In the absence of an agreement or anything indicating an intention to the contrary, a mechanic or material man does not waive his right to file and enforce a lien merely by accepting for the amount of his claim the promissory note of the owner at his request and for the sole purpose of suspending his right to foreclose such lien for 60 days, at which time such note, according to its terms, matures.

Neither will the mere assignment of such note operate as a waiver or extinguish the lien nor prevent the assignee from obtaining a decree of foreclosure, provided he has the note and offers to surrender it at the trial for cancellation. Hill *vs.* Alliance Building Company, Supreme Court, S. D., 60 N. W. Rep., 752.

Dangerous Premises

The occupant of land is under no obligation to strangers to place guards around excavations made by him, unless such excavations are so near a public way as to be dangerous, under ordinary circumstances, to persons passing upon the way and using ordinary care to keep upon the proper path, in which case he must take reasonable precautions to prevent injury from happening therefrom to such persons. But where the owner of land expressly or by implication invites others to come upon his land, if he permits anything in the nature of a snare to exist thereon which results in injury to anyone availing himself of the invitation, and who at the time is exercising ordinary care, such owner is answerable for the consequences. If, however, he gives but a bare permission to cross the premises the licensee takes the risk of accidents in in using the premises in the condition they are in.—Witte *vs.* Stifel, Supreme Court, Mo., 28 S. W. Reporter, 891.

Effect of Failure to Affix Notary's Seal to Claim or Lien.

The omission of a notary to affix his seal to the jurat in a notice or claim for a lien cannot be cured, at a trial of an action to foreclose the lien, by the introduction of parol evidence that the claim was in fact sworn to; and where the seal is affixed, and the name of the notary is omitted, parol evidence to the effect that the claim was in fact sworn to is equally incompetent, and the omission in each case renders both claims for a lien insufficient, when filed, to constitute constructive notice of the existence of such liens. Such failures do not defeat the lien, but operate to postpone it to purchasers or incumbrances in good faith, without notice, whose rights accrued after the time within which the verified statement should have been filed. They are not available to one who with actual notice of the existence of such lien takes a quit claim deed to the property, subject to all valid liens, under circumstances that fail as a matter of law to make him a purchaser in good faith.—Hill *vs.* Alliance Building Company Supreme Court S. D., 60 N. W., 752.

Effect of Agreement as to Party Wall.

A party agreed in writing that another might use the wall of his building as a party wall, in consideration of a certain sum to be paid when the latter found that the wall was safe, and a proper conveyance had been executed by the owner of the old building. The prospective builder also covenanted to save the other harmless from loss or damage, and after finding that the wall was safe, tendered the amount agreed and demanded a conveyance, which was refused. The Court of Appeals of Maryland held, under the above statements of facts, that the owner of the wall was not entitled to an injunction to restrain the other from using the wall as agreed, but could recover for any damage that might ensue from the use of the wall. Poultney *vs.* Depkin, 30 Atlantic Reporter, 705.

A LATE issue of *Stone* is authority for the statement that "peace is likely to prevail throughout the entire granite region of New England during the year, the Manufacturers' Association and the cutters in the principal centers of production having come to a friendly agreement that there shall be no suspension of business on account of differences that may arise between them until arbitration shall have failed. The outlook for an active season was never more promising."

THE enlargement and raising of the New York terminal station of the Brooklyn Bridge is an engineering work of considerable interest which is being rapidly pushed to completion. The improvements secured by it will consist of a much larger station, with new platforms double the width of the former ones and four tracks in place of two, the whole being raised 10 feet above the present levels. To obviate the last named inconvenience a series of elevators will be operated between the lower levels and the platforms. The approaches will also be vastly improved, a promenade approach 36 feet wide taking the place of the present stairs and bridge. The new facilities will enable the trains to run at quicker intervals and obviate the pressure now existing on the platforms. The whole of this work is being done without closing the bridge for traffic even for a brief period. It is expected that the new accommodations will be ready for use by July, although a good deal of work on the new structure will remain to be done after that date.

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* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

Design of a Bathing Pavilion.

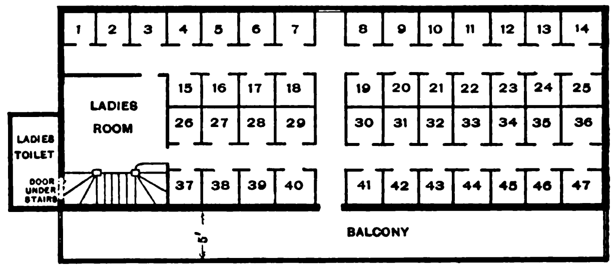
We take pleasure in presenting for the consideration of our readers this month the accompanying illustrations made from drawings of a bathing pavilion erected last summer on the shores of the Hudson River, at the foot of West 151st street, New York City. The first floor of the structure is devoted to a series of robing rooms for ladies, while the upper floor is intended to be used as an open balcony for those who prefer to watch the bathers. The bath houses for the men are adjacent to the pavilion and extend along the shore. From the specification of O. B. Maginnis, who prepared the drawings, we learn that the framing of the pavilion is of a modified balloon style and rests upon rubble stone piers 2 feet square by 5 feet high. The main sills are of 6 x 12 spruce, set on edge, the corners being halved and all thoroughly spiked. The first floor beams are 3 x 8 spruce, set on edge, spaced 24 inches on centers and thoroughly spiked to sills and girder. The main posts are of 6 x 6 spruce, framed in the following manner: At the sill the foot of the post is halved out so as to rest 4 inches on the sill and strongly bolted to it with ¾ inch wrought iron bolts with washers, as indicated in the transverse section. They are gained out for the stringpieces which support the second story floor beams so as to admit half the thickness of the timber. The stringpieces are of 4 x 10 spruce let into the inside face of the posts, as indicated in the engravings. These occur at the front and rear and are bolted to each post with two ¾ inch bolts, as shown in the transverse section. The second floor beams are 3 x 12 spruce, spaced 16 inches on centers and strongly nailed to the stringpieces with tenpenny nails. Supporting the center of the second story floor beams is a longitudinal center beam measuring 4 x 8 and carried on uprights measuring 4 x 6 inches. The joints of the beams are halved together, each joint resting on an upright. Similar upright posts of 4 x 4 inch spruce spaced 5 feet between centers are placed to support the stringpieces on the outside walls. The wall plates are 6 x 8 spruce, halved together on top of the posts and at the corners. The system of bracing employed is clearly shown in the sectional views.

The roof trusses are framed as shown in the transverse section and carry 2 x 4 inch spruce purlins spaced 24 inches on centers and nailed in position. The purlins project over the gable ends 2 feet. The first floor and balcony are covered with 1 x 9 inch tongued and grooved spruce flooring laid with broken joints and nailed on every beam. The second story flooring is of 1 x 4 inch yellow pine. The entire first story is covered with 1 x 10 inch matched pine ceiling boards with a crescent shaped opening cut for each dressing room. There are swinging shutters at the rear portion of the pavilion hung with T hinges. The partitions forming the dressing rooms on the main floor are of 1 x 9 inch double faced pine nailed to 2 x 2 inch strips spiked to the flooring and ceiling. It is stated that $2000 was the cost of the structure, including the painting.

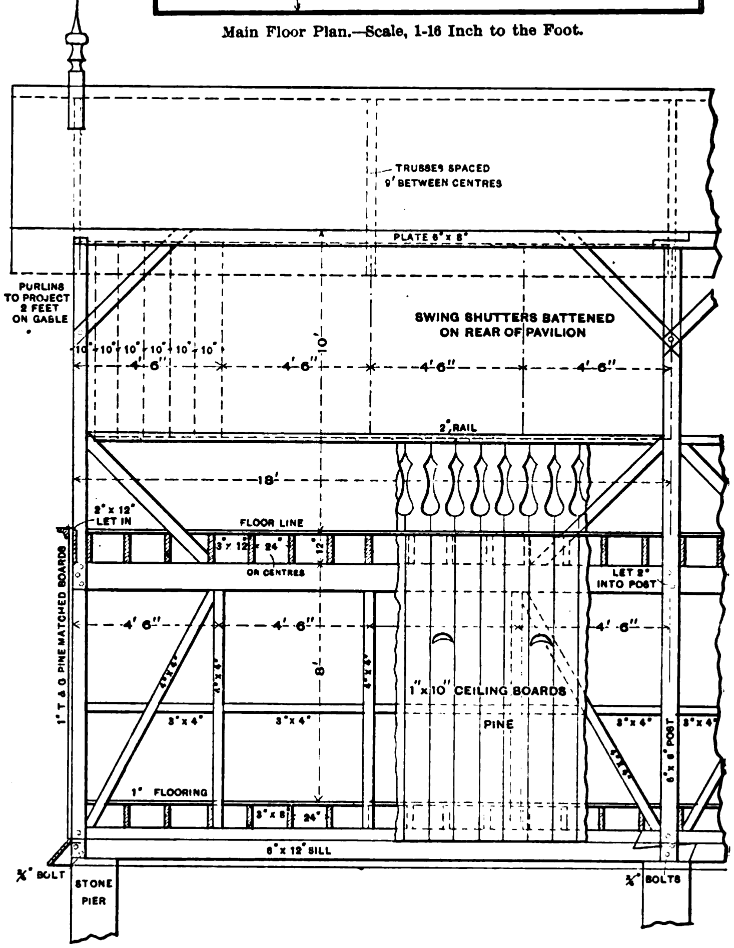
AN interesting exhibition of the work of the pupils at the St. George's Trades School, 520 East Eleventh street, New York City, was given on Monday evening, May 20, when several hundred visitors were in attendance. The students in the various departments devoted themselves during the evening to tracing architectural designs, planing, sawing, mortising, printing, telegraphing and plumbing work.

Combination of Vermont Slate Manufacturers.

The condition of affairs in the Vermont roofing slate trade has been for some time far from satisfactory. Since the dissolution of the old combination of manufacturers prices have become more and more demoralized, until lately quarrying is said to have yielded little or no profit to the operators. To remedy this evil a new combination was effected a few weeks ago which, with one exception, embraces all the Vermont slate concerns, some 25 in number. The association was organized under the name of the Vermont Slate Company, with main office at Granville, N. Y. A secretary and manager was appointed and a board of directors elected. The combination, it is declared, is not formed for the purpose of obtaining high prices, but solely to secure stability and regularity in prices, so that roofers throughout the country may know exactly what they will be required to pay for sea green roofing slate. A new list of prices was drawn up and unanimously agreed to, which, while somewhat higher than the cut rates lately in vogue, is substantially lower than the scale ruling at the close of 1893. According to the agreement, subscribed to by the members, all business must be done through the main office, where all orders received by the several concerns will be periodically filed, and the central office will apportion the production.



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



Framing of Side Walls.—Scale, 3-16 Inch to the Foot.

Design of a Bathing Pavilion.

The outside business is limited to four wholesale dealers, who will represent the combination. They are John Galt & Sons of New York City, David Smith and Gilbert Snyder of Zanesville, Ohio, and J. M. Hochstetter of Sugar Creek, Ohio.

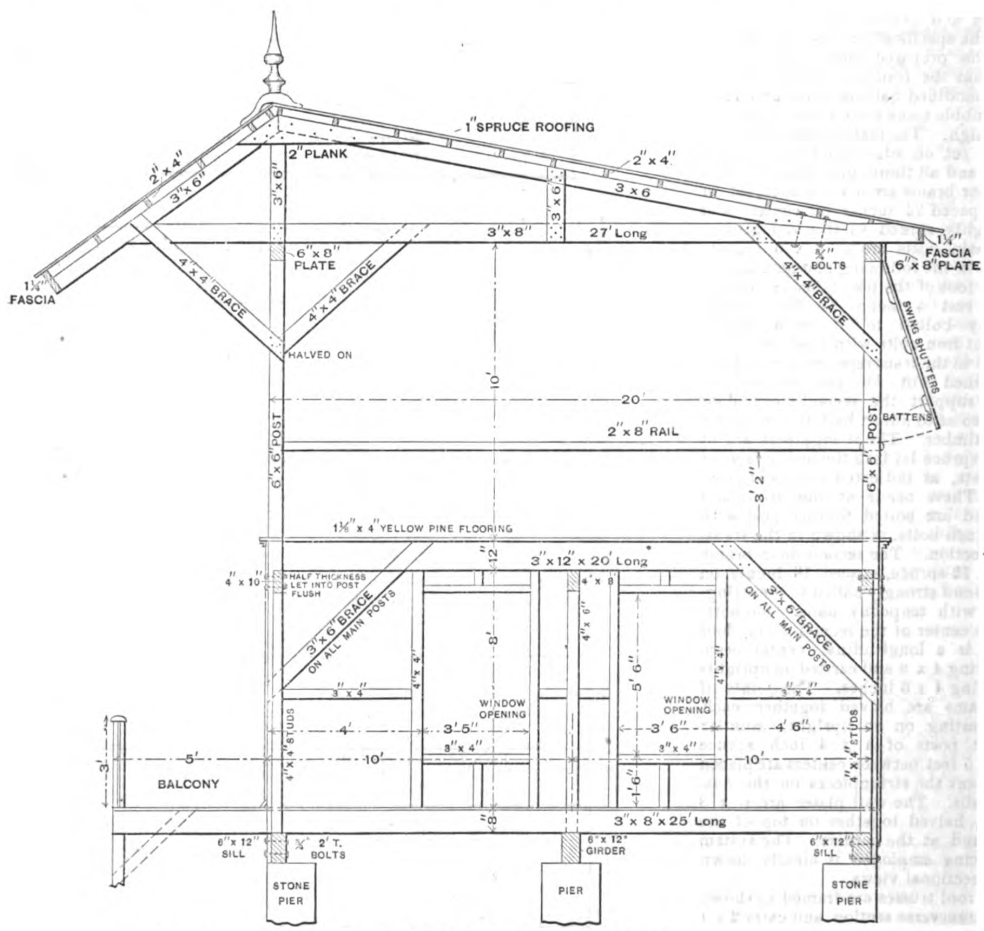
The new arrangement is said to have given great satisfaction to the trade and a good business is looked for in the future. All the Vermont quarries are in full operation, with a growing and improving volume of output. Export business of a very encouraging character is being done with Australia, South Africa and the British West Indies.

American Portable Houses Abroad.

United States Consul Bruhly, at Catania, Italy, has discovered a fine market for ready-built American frame houses of from two to five rooms, well braced and of low price. The recent and frequent earthquakes in Sicily and Catalonia have destroyed or damaged many buildings poorly braced to begin with and, after making inquiries, the Consul is convinced that the people would readily adopt the American structures as better calculated to resist shock. A member of the Royal Earthquake Commission has interested himself in the subject and the Consul is anxious to obtain illustrated catalogues from the American manufacturers to lay before the commission.

Obtaining the Cuts for Hip Roofs.

In a paper read before a late meeting of the London and Provincial Builders' Foremen's Association are to be found some interesting particulars relative to the subject of roof construction and the various cuts pertaining thereto. In touching upon some of the simple cuts necessary for the construction of ordinary hip roofs the author, G. Barclay, says: It has been my lot to have many different designs of roof to manipulate, and the system I adopt for obtaining lengths and bevels of hips is simple and easily caught up. I produce my plan of the building, setting out hips and ridges, also elevation of common rafters; from top of plate I usually produce the line. I also take the line of one side of the hip plan. To obtain the elevation of the hip I usually work down the top line of the rafters and work from that, as the common rafter is used for the purpose of measuring on that line, as the top of the rafter line. To get the right intersection hight at center of ridge I produce the elevation of the common rafter to the center line of ridge also. I take now the vertical hight from top of plate to apex of rafters on center line. I transfer this hight from point on hip plan line at right angles with plan of hip line as base to elevation of hip. Then taking the vertical backing of rafter, on common rafter, from the vertical line set up from on plan, and cutting the top of rafter line, the hip elevation, I transfer the depth shown on common rafter, and by now striking a line across you obtain the correct line of hip corresponding to back of rafters, and the bevels are at once given; then scaling it you get length of hip at once. To obtain the top bevel of hip, set out the side bevel, then set back square from that bevel the thickness of the hip (if for a plan of right angles), and produce same line to top edge, square across top edge, and from the longest point to where the square line cuts the opposite edge gives the top bevel for miter of hip. This also applies to the bevels for hip rafters which are obtained precisely similar, only using for rafters the vertical cut of the common rafter instead of the hip. Valleys are treated precisely similar, and in cases where a pitching board is placed on rafters which run through a roof, and no valley rafter is used, the short bevel of the rafter may be obtained by the application of the principle somewhat varied. As the major part of hip cuts are at angles of 45°, they are found as previously mentioned, but in the case of the foot cut of a valley rafter the pitch of the roof fixes the short cut.



Transverse Section of Pavilion, Showing End Framing.—Scale, 3-16 Inch to the Foot.

Design of a Bathing Pavilion.

The Builders' Exchange

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E. L. Bartlett..........Baltimore.
E. Noyes Whitcomb....Boston.
W. D. Collingwood.....Buffalo.
William Grace.........Chicago.
Geo. F. Nieber........Cincinnati.
Arthur McAllister ....Cleveland.
Alex. Chapoton........Detroit.
Geo. W. Stanley.......Indianapolis.
E. S. Foss.......... ...Lowell.
J. S. Pool.............Lynn.
H. J. Sullivan ... .Milwaukee.
Geo. Cook............Minneapolis.
Stephen M. Wright....New York City.
J. Walter Phelps......Omaha.
Stacy Reeves..........Philadelphia.
Wm. H. Scott.........Portland.
Thomas B. Ross.......Providence.
H. H. Edgerton........Rochester.
Wm. J. Baker.........St. Louis.
Geo. J. Grant.........St. Paul.
Luther H. Merrick....Syracuse.
A. S. Reed............Wilmington.
Chas. A. Vaughn......Worcester.

Unfair Treatment of Bids.

The helplessness of the individual as compared with an organization in ability to secure justice in matters affecting the conduct of his business has been well exemplified in one of the filial bodies of the National Association of Builders during the past month. In one of the principal cities of the East the commission having the sewerage system of the city in charge solicited estimates for certain work at two separate points in no way connected with each other, except by virtue of the fact that both were under the control of the commission, and separate estimates were invited in which no reference was made to any connection between the two jobs. Upon receiving the estimates the commission proceeded to combine bids for job No. 1 with those for job No. 2 in such a manner that a member of the filial body mentioned, whose bid was the lowest on job No. 1, failed to receive the work. There was no indication, at the time the bids were solicited, that such a combination was in prospect, and the action of the commission in giving the entire work to one man, whether or not that man was the lowest bidder upon both jobs, has worked a hardship to the contractor whose bid was lowest for job No. 1.

The proceeding was an entirely arbitrary one on the part of the Commission and one that seems to indicate a lack of appreciation of the moral obligation involved in soliciting an estimate. An invitation to bid presupposes that the person so invited is competent for that particular contract; this being the case, there is no equitable ground upon which the person inviting the bid may stand in declining to award the contract to the lowest bidder. A combination such as has been described in the foregoing amounts in practice to injustice to the lowest bidder on job No. 1.

Whether it is such a combination or anything else that deprives the invited bidder of a contract for which he submits the lowest bid, such action must on the face of it be unjust. The only protection the contractor has in such a case as this is a stipulation, in presenting his estimate, that the contract shall be awarded to the lowest bidder, provided the building is to be erected in accordance with the original specifications and drawings. Any new element that enters into the contract after the bid has been submitted, such as the combination here described, is unjust to the contractor, because it is a condition of which he is ignorant at the time he is requested to submit an estimate for the cost of the work. It is unfair to introduce an entirely unknown quantity after the bid has been submitted, and it is impossible for a contractor to give an intelligent estimate upon specifications that contain only a portion of the requirements. In the case in point it is safe to assume that the estimates of all parties would have been materially different had the Sewerage Commission announced at the time estimates were invited that it was its purpose to combine the figures in such a manner that one man should do both jobs.

Members of the filial bodies are requested to forward to the National Secretary cases of a similar nature to the foregoing, in order that practical examples may be cited to support the effort to correct the injustice.

An Example of Exchange Ownership of Buildings.

The practicability of the recommendation by the National Association of Builders that the exchanges acquire the ownership of a building for their own uses is being continually demonstrated wherever that recommendation has been followed. The recently issued report of the secretary of the Buffalo Builders' Exchange Association shows the feasibility of the plan from a financial standpoint alone, without considering that the exchange has the benefit of a home of its own, constructed to meet its needs and desires.

The receipts the past year were $2300 less than previous year, being caused by having a number of vacant offices the entire year. In no case were rents lowered. Even with this loss in rents out of the receipts for the year, two dividends of 3 per cent. each were declared, and after paying these there is a cash balance on hand of $927.12 and rents due to the amount of $800, or a total surplus of $1727.12.

This statement is one of unusual value as a proof of the benefit of owning a building, for in spite of the adverse conditions existing during the past fiscal year the investment paid a dividend of 6 per cent. and added over $1700 to the surplus. The total receipts for the year ending April 1, 1895, were $18 194 57; the expenses, $15,-017 45, including the 6 per cent. dividend mentioned, leaving a balance of $3177.12

The estimate of resources and expenses to April 1, 1896, is as follows:

Cash on hand........	$3,177.12
Rents due...........	1,457.78
Estimated rents.....	17,500.00
Total......................	$22,134.90
Estimated expense	14,275.10
Estimated surplus.........	$7,859.80

Taking the experience of the Buffalo Exchange in an off year as an example, the question of ownership of a building would seem to hinge upon the willingness of those interested (the members) to invest their money in a building to be owned by the exchange instead of somewhere else. The conditions which prevailed in Buffalo last year were unfavorable enough to demonstrate the security of such investments, and it is safe to assume that a building owned by an exchange in any other city of equal size would be quite as profitable as the one in Buffalo. The experience of the Buffalo Exchange is not unique, and is cited only to show the creditable results that follow the ownership of a building even when producing much less than its full earning capacity. The experience of the exchanges in Boston, Philadelphia, Milwaukee, Baltimore and other cities is like that of Buffalo, with a difference in the proportion of profit only. This is considering the question of exchange ownership from a financial standpoint only, leaving out the self evident benefit to the organization of a home of its own, recognized as such by the community and adding dignity and influence to the institution. Increase of interest on the part of the members in the affairs of the exchange has invariably followed the acquirement of a building.

To Local Secretaries.

Secretaries of the local exchanges are requested to forward to the National Secretary any information that they may have regarding the practical operation of the Uniform Contract, which would be likely to establish the practicability of the provisions of the document. Cases of litigation between builders and owners in cases where the Uniform Contract has been used are especially desired, as up to the present time no tests have been recorded as to the efficiency of the form. Local secretaries are also requested to forward any suggestions resulting from the use of the contract, offering amendments or changes that practice seems to demand in the form.

THE annual statistical report of the building stone industry of the United States, recently submitted to the Geological Survey by Prof. Wm. C. Day, places the total value of the product of all kinds of stone in the year 1894 at $37,315,000, as compared with $33,885,-000 in 1893.

(*Continued from page* 148)

The Builders' Exchange of Dayton, Ohio, is considering the advisability of joining the National Association. The exchange in its present form is comparatively new. The officers are: H. E. Talbott, president; J. Elliott Peirce, first vice-president; C. H. Lyon, second vice-president; Elliott S. Burns, secretary, and C. H. Ware, treasurer.

A National Hardware Association, with headquarters at 505 Commerce street, Philadelphia, has recently been formed, the officers and members of the Executive Committee being: President, William W. Supplee, Market and Fifth streets, Philadelphia; first vice-president, John Alling, Chicago; second vice-president, A. D. Langstaff, Memphis; secretary-treasurer, T. James Fernley, Philadelphia. Executive Committee: Samuel A. Bigelow, Boston; H. H. Bishop, Cleveland; F. C. Pritzlaff, Milwaukee; Frederic Barker, Elmira; W. P. Smith, Knoxville.

An ordinance has been introduced into the City Council of Columbus, Ohio, which is intended to increase the stringency of the building laws of the city. One clause of the bill provides that "Whosoever shall contract to erect any house or other building shall be deemed to be a master or contracting builder, and that any master or contracting builder must obtain a license from the board of public works." Bond of $500 must be given by the party receiving such license, to save the city harmless from all accidents and damages caused by negligence either in the execution or protection of his work.

The contractors of Waterbury, Conn., who have been agitating the question of forming an exchange, are now at work with the definite purpose of establishing an organization. G. S. Chatfield is one of the foremost in the movement.

The new Builders' Exchange of Great Falls, Mont., is considering the question of identifying itself with the National Association of Builders. Correspondence with the secretary has been opened by N. J. Lease.

The annual election of the Builders' Exchange of San Francisco was held at the exchange rooms, at 16 Post street, recently, and much interest was taken in the election, as was shown by the fact that 65 votes were cast. The successful candidates were: T. B. Sibley, Joseph Wilson, A. Kendall, W. B. Anderson, Thomas Elam, O. E. Brady, Oscar Lewis, Thomas Butcher, John T. Hayes and James McInerney. Robert Mitchell, S. H. Kent and W. B. Morris were the judges ofelection.

The newly elected Board of Directors of the Builders' Exchange of Toledo has appointed the following gentlemen to keep the records and handle the cash: Secretary, E. J. Weis; assistant secretary, P. J. Kranz; treasurer, John W. Lee.

The contemplated strikes in the building trades of New Haven, Conn., have been abandoned owing to the lack of activity in the building business.

A fictitious statement that there was a boom in building in Elmira, N. Y., has resulted in a large influx of workmen into that city. The Master Builders' Association has made a public statement to the effect that there are more men than work already in the city.

The carpenters of Watertown, N. Y., are trying to secure a reduction of the working time from 10 to 9 hours per day.

Reports from Saginaw, Mich., indicate that the business depression of the past two or three years is over, and that there is more work on hand than at any time since 1892.

An unsuccessful attempt was made on May 9 by the carpenters of Biddeford, Maine, to secure an increase of wages of 25 cents per day. The wages paid average about $1.50 per day.

The builders of Allentown, Pa., have formed a Builders' Exchange, of which Elmer Butz and John J. Yingling are temporary president and secretary respectively.

At the last regular monthly meeting of the Builders' Exchange of Cincinnati, Ohio, H. E. Holtzinger and G. F. Nieber were chosen to represent the exchange at the Reform Convention held in Cleveland May 29, 30 or 31. The convention was called to discuss financial reform for the government of municipalities. Every city in the United States of over 50,000 inhabitants was to have been represented by one or more delegates in the convention.

The directors of the Builders and Traders' Exchange of Kansas City, Mo., held a meeting recently, and two representatives of the Journeymen Carpenters' Union of the city met them and asked that carpenters be paid 25 cents an hour and employed 9 hours a day. As it now is, carpenters are paid from 20 to 25 cents an hour. Some work 9 and others 10 hours a day. The contracting carpenters of the city have no organization like the boss bricklayers, and as the directors had no direct authority in the matter no decisive answer could be given and settlement was deferred until another time.

The Builders' Exchange of Utica, N. Y., recently held its annual banquet, at which President J. F. Hughes presided. The affair was very pleasant and the speech-making interesting. The exchange has decided to give up its present rooms, but the organization will be preserved.

It is stated that the bricklayers of Anderson, Ind., are strengthening their organization for a crusade against the employment of non-union men.

New Publications.

CHURCHES AND CHAPELS.—By F. E. Kidder, architect. Size, 7¼ x 10¼ inches. 55 pages and 52 illustrations. Bound in cloth, with side title. Published by W. T. Comstock. Price, $1.50.

This work, by a well-known writer on architectural subjects, contains designs and suggestions which will be found of interest and value to church building committees, architects, builders, &c. The subject is one which has not been treated in book form to any great extent in recent years, and the designs presented show that the author has studied the question of church building from a practical point of view. There are 19 designs, illustrated by 46 drawings and half tones, presenting a great variety of arrangement, the larger proportion of the designs having been executed from the author's plans. In addition to the designs there is presented a great deal of practical information relative to the construction and roofing of churches, planning and seating, windows, &c., together with several pages on acoustics, heating and ventilation. The work is attractively issued, being printed upon heavy calendered paper and bound in board covers of neat design.

ELECTRIC LIGHT FOR COUNTRY HOUSES.—By John Henry Knight. Size 4¾ x 7¼ inches; 76 pages; numerous illustrations; bound in board covers. Published by Crosby, Lockwood & Son. Price 40 cents, postpaid.

This volume is a practical handbook on the erection and running of small installations, with particulars of the necessary cost of plant and operation. It is comprised in seven chapters, the first of which is introductory in character, while the following consider the subjects of electricity as applied to lighting, the dynamo, motive power, the fittings, cost and accumulators. In an appendix instructions are given for operating a dynamo and electrical and other terms are explained.

THE ornamental iron work being placed in the Marquette Building, the latest and second in point of size of the Chicago "sky scrapers," will, when completed, be one of the finest examples of American design and workmanship in metal in the country. Incorporated into the design are 24 large panels in cast statuary bronze, portraits of Marquette and his associates and of noted Indians; also scenes in the life of the missionary voyager produced in relief by the American sculptors, Edward Kemeys and Henry McNeil. The work has been executed by the Winslow Bros. Company of Chicago, Ill., who are also doing the ornamental iron work in the Jordan, Marsh & Co. Building, Boston, Mass., and the Guaranty Building and Ellicott Square Building, Buffalo, N. Y.

IN connection with the remodeling of two six story brick and stone factory buildings on Spring street, New York City, a rather unique method of procedure is being followed. Starting from the foundations and working upward entirely new frames of masonry and steel will be constructed, and non-fire proof buildings will be made fire proof. The interior of the structures will be altered also, and new floorings, steam heating apparatus and plumbing will be introduced. The architect in this case is W. B. Tuthill of the city named.

CONTENTS.

RESIDENCE OF MRS. N. J. KEMP, AT SPARTA WIS.

W. W. HUBBARD, Architect.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
96-102 READE STREET, NEW YORK.

JULY, 1895.

Some New Office Buildings.

The visitor to the lower section of the city could not have failed to notice during the past month the many places where workmen were busily engaged in demolishing buildings, some of which, at least, seemed capable of serving a useful purpose for years to come. The demand for additional office room at reasonably low rental, which the modern methods of building construction makes possible, has caused the old structures to be torn down in order to provide space for the erection of more lofty and commodious buildings. Within the last week there was completed the tearing down of the old *Herald* Building, at the corner of Broadway and Ann street, a site notable some 30 years ago as the location of the well-known museum of the late P. T. Barnum. Upon this site, and in accordance with plans prepared by Architect George B. Post, is to be erected a tower shaped structure 25 stories in hight. It will be fire proof throughout and contain the latest modern office building equipments in the way of express elevators, electric lighting and steam heating appliances. Some little distance south of this, in the heart of the banking community, there is under way another structure designed for office purposes, and to make room for which several old buildings have been razed to the ground. This will be 15 stories in hight and rest upon a foundation of piling, with a solid bed of concrete 3 feet thick and 11 feet wide around the sides and under the interior columns as a footing course. On this there is being constructed a series of granite piers, forming a basement, and upon them will be placed a series of cantilever steel girders, carrying the skeleton superstructure of iron and steel, with walls of Indiana limestone, gray brick and terra cotta. The stone will form the façade of the three lower stories, with the brick and terra cotta above. The style of architecture will be an adaptation from the Italian Renaissance, and the cost is placed in the neighborhood of $800,000. Only a short block away, at the corner of Exchange Place and Broad street, another 15 story steel skeleton fire proof building is in course of erection. In its main characteristics it will be similar in style and finish to the building just described, but in the preparation of the foundations a different method was employed. At the corner of Nassau and Liberty streets excavations have been made for still another tall fire proof office building to be erected according to plans drawn by architects Lamb & Ritchie.

An Office Building of Unique Architecture.

Probably the most interesting of the additions to the colony of tall office buildings occupying the lower part of Broadway will be the one designed for erection just this side of the Washington Building and opposite Bowling Green. The plans have just been prepared by the well-known English architects, W. and G. Audsley, with Richard M. Hunt, well known the world over from his connection with the Administration Building at the Chicago Exposition, as consulting architect. The building will contain over 400 offices and will have a court which, it is said, will be the largest of any in the city. The architecture is to be of a style that will prove something of a novelty in this city, as it is an adaptation to modern mercantile necessities of the Egypto-Hellenic. The building will be 16 stories in hight and the upper floors will command a magnificent view of the Hudson River and the harbor. The size of the interior court is of such liberal proportions as to insure good light to the offices, and each floor will have a rentable area of nearly 20,000 feet. Eight electric elevators will furnish accommodations to the tenants of the building. The top floor will be arranged for club purposes, with a restaurant, a reading and smoking rooms, and will probably be occupied by one of the numerous downtown associations of business men. Another interesting feature in connection with the building is that in addition to the ordinary toilet rooms there will be perfectly appointed private bathrooms for the convenience of the tenants. Work will be commenced at once, and it is expected that the principal offices on the Broadway front will be ready for occupancy late next spring. The site upon which the building is to stand has recently been acquired at a cost of nearly $1,500,000, and it is intimated that the building to be erected will cost as much more. Passing now to a point nearly two miles north, on the site of what was formerly the Metropolitan Hotel and Niblo's Theater, are to be found the excavations for two structures, each of which when completed will be 12 stories in hight. The building at the corner of Prince street and Broadway will have a frontage of 75 feet on Broadway, while the building immediately adjoining will have a frontage of 50 feet. The buildings will be fire proof throughout, constructed of steel frame with brick and stone. These are to be used for business purposes, and will have power plants and machinery in the basement, stores on the first floor, while the remaining floors are arranged as lofts, with the exception of the two upper stories, which are designed for office purposes.

A Mammoth Retail Store Building.

A department store building, which will be among the largest of its kind in this country, if not in the world, will soon begin to rise in the center of the retail dry goods district in this city. For some weeks past the stores and private houses fronting on Sixth avenue and extending along Eighteenth and Nineteenth streets have been in process of demolition, and at this writing the work of excavating for the foundations of the new structure is in progress. The building will have a frontage running the entire block on Sixth avenue and extending back 460 feet on the cross streets. It will be six stories in hight, except in the corner sections, which will be seven stories, and at the center of the front on Sixth avenue, where there will be a tower approximating 120 feet in hight. The material of the building will be Indiana limestone and polished granite in the first story, with white brick, white marble and white terra cotta for the upper stories and tower. The aim of the designer has been to make the building as light and cheerful as possible, and it is intimated that in many respects it will bear a certain general resemblance to some of the buildings of the World's Columbian Exposition. The style of architecture will be Italian Renaissance, showing a rich though rather severe style of decoration. A notable feature of the building will be the main entrance on Sixth avenue, which will be through arched openings extending to the hight of two stories, with the ceiling formed of arches in cut stone and the center columns supporting the arches of highly ornamented bronze. There will also be entrances somewhat similar in style on Eighteenth and Nineteenth streets, the halls intersecting at right angles. The point of intersection will be marked on the first floor by a large marble fountain 36 feet in diameter and resting on a marble platform, giving in its formation a series of benches. On the Nineteenth street side of the fountain will be a grand staircase 14 feet wide, finished in marble and ascending in graceful curves to the second story. There will also be five other large staircases distributed through the building, and in addition there will be 20 freight and passenger elevators. The building is estimated to cost in the neighborhood of $1,500,000. Soon after the old buildings were torn down on the Sixth avenue front a tall flagstaff was erected a few feet back from the street, flying a banner inscribed with the name of the builders, "The Siegel-Cooper Company." This will remain until the foundations are so far advanced as to necessitate its removal, but in the mean time it constitutes a conspicuous method of informing the public whose building will occupy the site.

The Apprenticeship Question.

The recently issued report of the Bureau of Labor of the State of Minnesota contains a very interesting and exhaustive presentation of the apprenticeship question from an unbiased and statistical standpoint. L. G. Powers, the Commissioner of Labor, has made a thorough investigation of the subject, drawing his information from all parts of the country and from the standpoints of both employer and employee. Care has been taken to present accurate copies of a great variety of rules for the government of apprentices enacted by labor unions and by organizations of employers separately, and by the two in joint action. The operation of a large number of these systems is shown in a set of valuable tables which contain a large amount of information never before compiled. The whole subject is presented in a most interesting way and with as little of the dry-as dust tendency as possible. The report is a valuable contribution to the literature of the subject and will doubtless prove of great benefit to all who seek the adjustment of the problem of apprenticeship upon equitable and therefore permanent grounds.

Observation.

The habit of observation is one that may well be cultivated by every mechanic. To the practical man knowing but little of books and dependent almost entirely upon experience, there is, in fact, no other way by which he can obtain the information which is of use to him in his work. And yet there is a marked difference in individuals ; some have their eyes so wide open and the faculties so ready to receive new impressions that nothing seems to escape them, while others plod along in the same old rut, looking neither to the right nor to the left, and as a consequence absorb practically nothing from the progressive age in which they live. There is certainly no reasonable excuse for a lack of the faculty of observation. It is something that improves by using, and more completely than anything else takes a man out of himself and makes of him a part of the world in which he moves. The story is familiar of the man of noted ability and extended knowledge who formed in youth the habit of observation by looking into store windows as he passed at his ordinary gait and then enumerating the various articles he had thus noted in his brief glance. To those who are older and have taken up some trade or profession there is necessary only the spirit of perseverance. Make up your mind that each day you will, by observation, learn at least one new thing. Determine that, particularly in matters of importance, you will understand whatever comes in your way—the why and the wherefore. So far as it is proper to be inquisitive, ask questions, seek information far and wide, but do it intelligently or all will go for naught.

Travel.

It is hardly to be expected that the ordinary mechanic will have even the most modest opportunity for travel in the broad sense in which foreign tours are generally denominated. Nevertheless in his smaller sphere he has some chance to go about, to see new faces and new things, and, if he will, he may profit by them proportionately, as the foreign tourist by his extended travels. Certainly nothing broadens a man in a general way as does travel. The lessons of the World's Fair are still fresh in our minds, and to many individuals a week in that wonderland of the age has marked an expansion in judgment and a comprehension of the world and its opportunities such as never came to them before. Many a mechanic who, by the character of the trade he follows, is compelled to go from place to place may well keep his eyes open. If he goes among other workmen in his own line he will find much to be learned that is new to him, even if he be a full fledged journeyman, and if he is the progressive man that he should be he will profit by all that is good and throw aside all that is useless. If it is his duty or privilege to go through other shops or manufactories he will see new methods, new tools, ingenious hints and convenient appliances, a knowledge of which, obtained by careful observation, may some time prove of inestimable value. Then, too, he will meet men whose characteristics he does not know, and his wits will be sharpened to estimate them at once and deal with them understandingly.

Architectural Work at Columbia College.

The exhibition of the Architectural Department of Columbia College, which was held the second week in June, was fully up to those of previous years. The various classes made an excellent showing, a feature of special interest being the measured drawings of the New York City Hall and Trinity Church, which were executed by the third and fourth year classes, the members of which, we understand, spent three weeks at their respective buildings obtaining the necessary measurements. This is the first year this has been done and its benefits to the students cannot be overestimated, for the reason that it brings them in contact with real building materials while affording a practical lesson in measuring a building. The graduating class exhibited various problems executed during the year, all of which were interesting and highly creditable. In the way of historical work the second and third year classes made an excellent showing. In this work Gothic and Renaissance are considered alternate years, and during the past year a thorough study of the Gothic style was made, the ancient historical work being completed in the first year.

Furniture and Its Relation to House Planning.

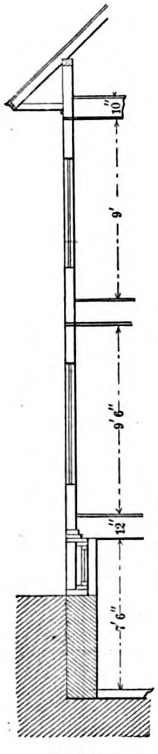
One of the points which, in the planning of houses, seldom receives the consideration that its importance deserves is the space available for the disposition of the furniture in the various apartments. The architect, the builder or the house owner does not always think of this point, but if he did there would be less dwellings erected in which the arrangement of doors, windows, &c., are such as to make it almost impossible to so place the furniture as to be convenient and comfortable. In touching upon this matter Edward H. Brown writes, in one of our exchanges, to the following effect : Our plans have come to us and are ready for inspection. It costs far less to make alterations now than it will in the future when these lines become actual creations of brick, stone and plaster. We must provide ourselves with a sheet of cardboard and a draftsman's scale or 2-foot rule. Let us suppose that the plans are drawn to the usual scale of ¼ inch to the foot. We then lay off on the cardboard, to the same scale, the various articles of furniture we have measured. Each piece should be inscribed with the name of the article of furniture it is supposed to represent. Now let us spread out the plans before us. What is there more simple than to arrange and rearrange these bits of cardboard on the plans until we have discovered whether there is a feasible way of furnishing the room so that the windows and doors are not interfered with and sufficient space is left for us to get about in? Many an architect adopts this method of proving the practicability of his sketches, though far too many of them never think of adopting this simple expedient.

A UNIQUE FEATURE of the new building under way for the Five Points House of Industry in New York City is a children's play ground on the roof. When the structure is completed there will be an iron framework overhead so that in winter the roof may be covered with glass. The new building will cost in the neighborhood of $150,000 and is being constructed of brick, terra cotta and steel. The first two stories will be made into a chapel, the third and fourth floors will be devoted to the trades schools, while the floors above will be used as dormitories. The plans were drawn by James V. Baker, architect, and call for an elaborate system of baths as well as a large laundry, kitchen, electric plant, elevators and other modern conveniences.

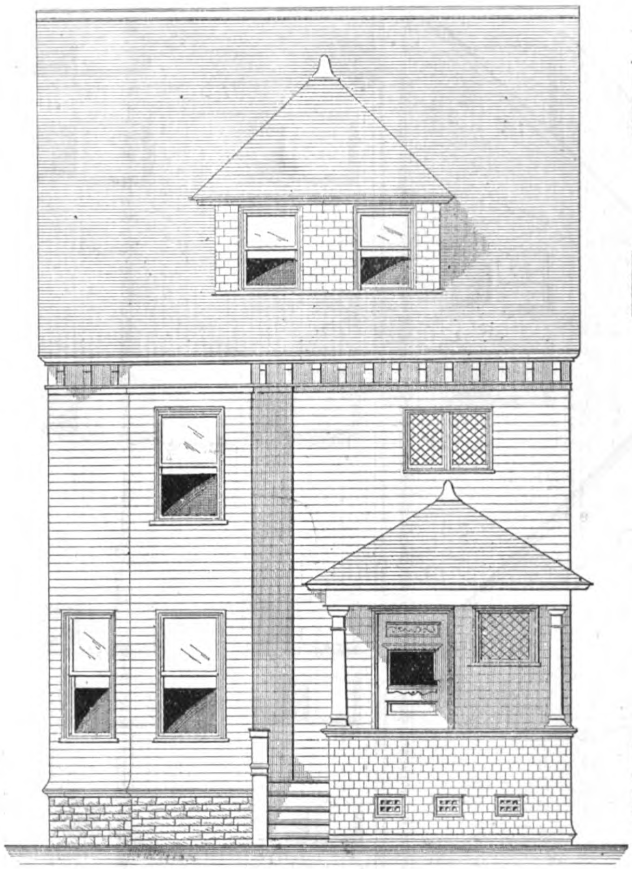
DESIGN FOR A SUBURBAN COTTAGE.

A DESIGN which is well adapted for execution on a suburban lot forms the basis of the illustrations presented upon this and the pages immediately following. The exterior presents a neat effect, while the interior shows an arrangement which will meet the requirements of many. The first floor is so divided as to give four rooms and a hall, the latter being of such size that it can be used as a reception room if required. On the second floor there are four sleeping rooms, the front one having an alcove lighted by stained glass windows. Each chamber is provided with a good sized clothes closet, while the bathroom is so located as to be of convenient access. The drawings of the house were prepared by architect H. L. Campbell, of Leesburg, Fla., who states that the design can be executed at a cost ranging anywhere from $2800 to $4000, according to the location and the style of finish. The cellar is built of rubble stone laid in cement mortar, hammer dressed above ground to form regular courses and pointed and tucked. The cellar floor is cemented throughout and the laundry, located directly beneath the kitchen, is intended to be plastered. The frame of the house is sheeted with matched lumber, which is covered with water-proof building paper and finished with stained shingles, as shown on the elevations. If it is desired to economize, siding may be employed in place of the shingles, although the architect suggests the latter as preferable. The roof is shingled and the gutters are patent galvanized iron suspended in 8 or 10 foot lengths.

The interior finish is in keeping with the general character of the design, all the wood work in the front hall, including floor and stairs, being quartered oak. An economical feature, and one which will be generally commended, is the centralization of the chimney flues in one stack, the arrangement being such that they can be utilized from the sitting room, dining room and kitchen. The rear entrance to the dwelling combines both inside and outside communication with the cellar. The house is heated by furnace, the location of which and the run of the pipes are indicated on the foundation plan. The architect refers to the design as being convenient, compact and economical.



Section.



Front Elevation.—Scale, 1/8 Inch to the Foot.

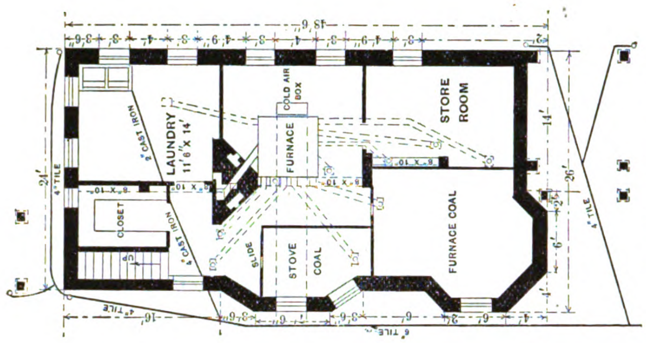
Design for a Suburban Cottage.—H. L. Campbell, Architect, Leesburg, Florida.

Second Floor.

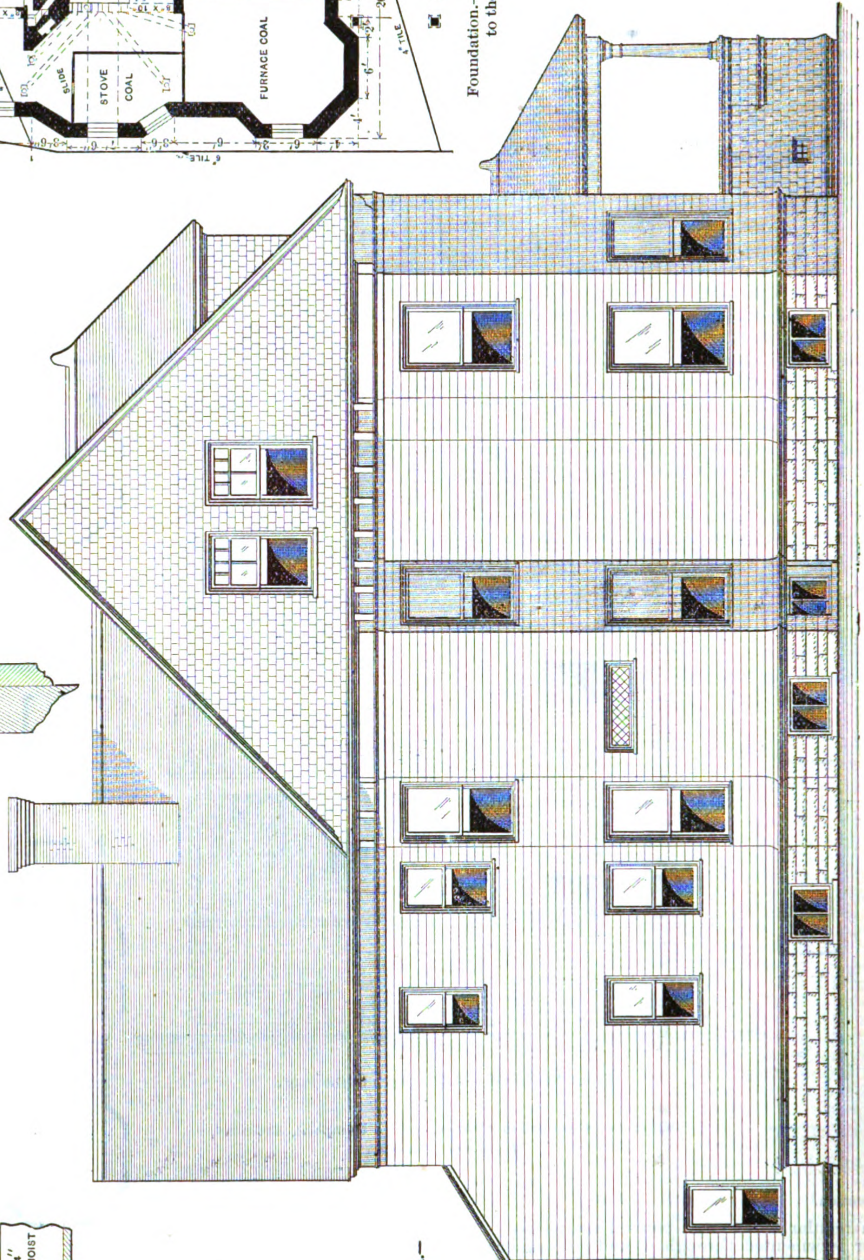
First Floor.—Scale, 1-16 Inch to the Foot.

AT Bangalore, in Southern India, granite slabs as large as 60 x 40 feet and half a foot thick are quarried by means of wood fires, says a writer in an exchange. A narrow line of fire, about 7 feet long, made of dry logs of light wood, is gradually lengthened and moved forward over an even surface of solid rock. It is left in position till strokes with a hammer show that the rock in front of the fire has become detached from the main mass beneath ; the burning wood is then pushed on a few inches. The rock keeps splitting about 5 inches below the surface. It takes about 8 hours and 15 hundredweight of wood to set free a slab measuring 740 square feet. Afterward the plate is easily cut with blunt chisels into strips 2½ feet wide.

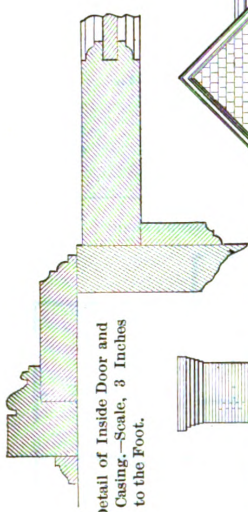
A PHILADELPHIA insurance institution has undertaken a new field in the insurance of buildings against falls or collapses, and issues special policies to cover this hazard. They include the loss or damage occasioned by the fall of buildings from any cause other than fire, explosions of all kinds, bursting or overflow of water pipes, tornadoes,



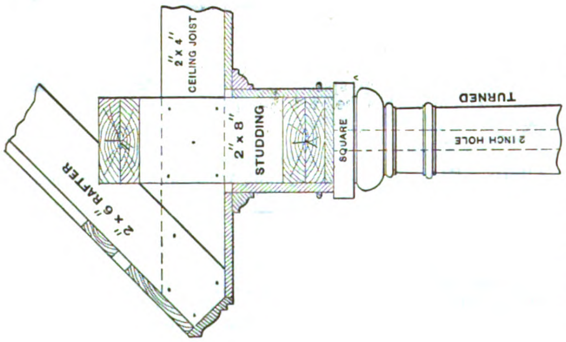
Foundation.—Scale, 1-16 Inch to the Foot.



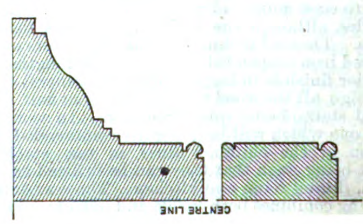
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.



Detail of Inside Door and Casing.—Scale, 3 Inches to the Foot.



Details of Porch Cornice and Column.—Scale, ¾ Inch to the Foot.

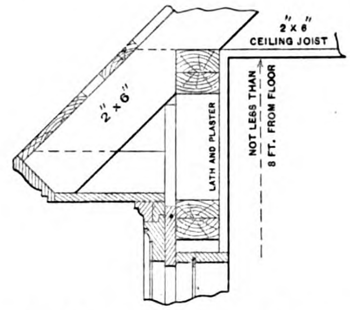


Half Sections of Cornice and Rail at A and B of Grille Work in Front Hall.—Scale, 3 Inches to the Foot.

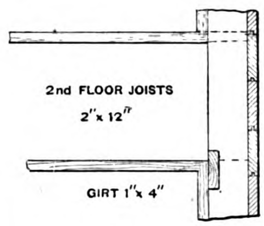
Design for a Suburban Cottage.—Elevation, Details and Foundation Plan.

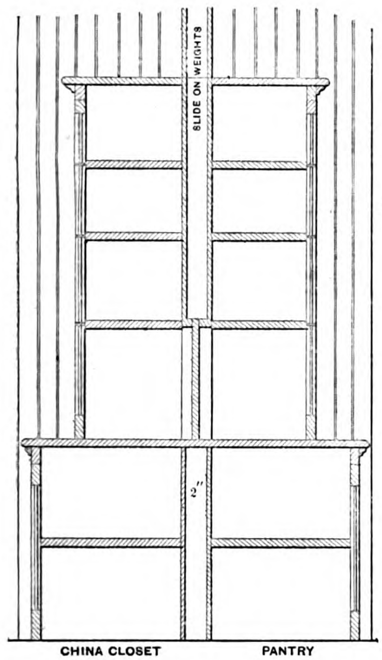
cyclones, or destruction or damage by mobs, strikers or rioters.

THE Olive Street Building Association of St. Louis are about putting up a 16-story office building at the corner of Eighth and Olive streets, the structure being copied to some extent, it is stated, from a building in Chicago. The exterior will be of gray brick and terra cotta and the cost is placed at about $750,000. The lower floors will be used for business purposes, while the upper stories will be divided into offices.

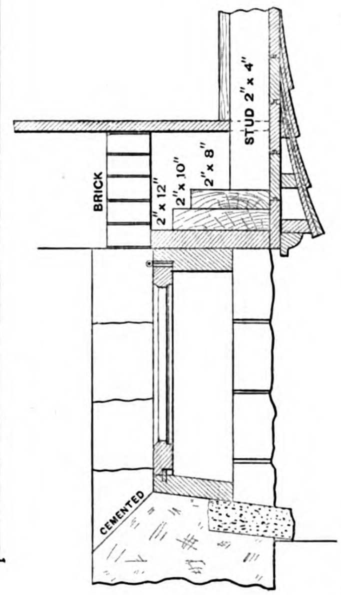


Detail of Front Dormer Cornice.—Scale, ¾ Inch to the Foot.

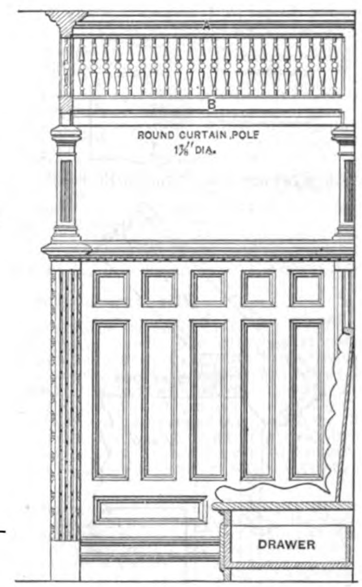




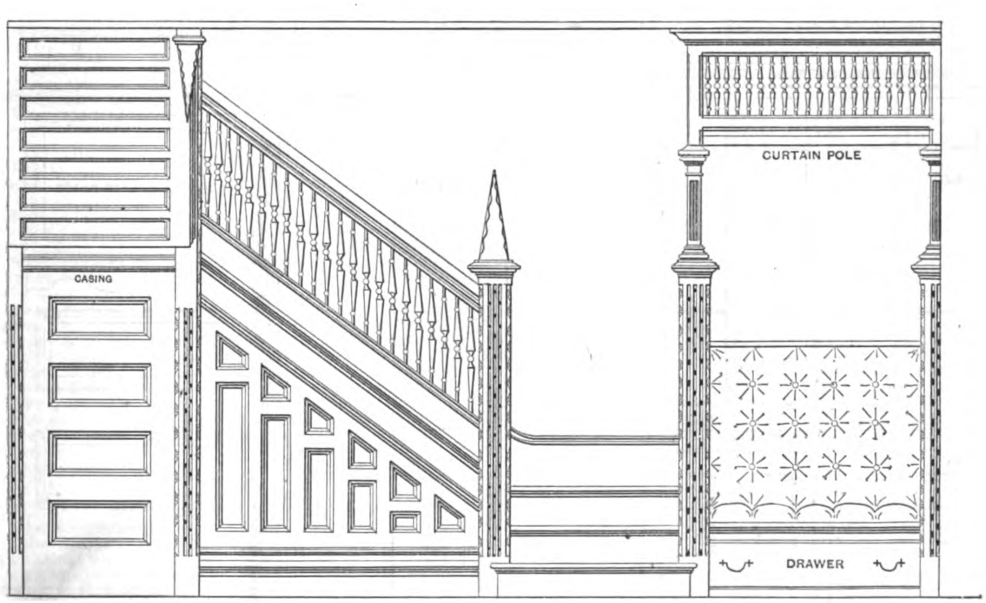
Section through Partition between China Closet and Pantry.—Scale, ½ Inch to the Foot.



Section through Cellar Window, Water Table and Sill.—Scale, ¾ Inch to the Foot.

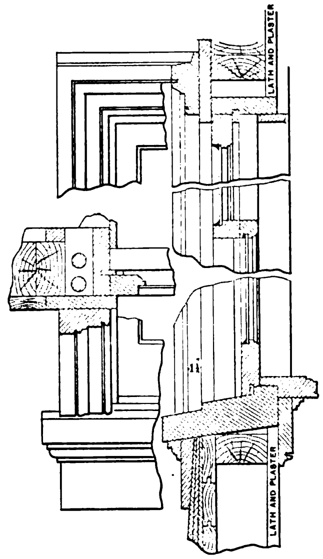


Section through Alcove looking toward the Stairs.—Scale, ⅜ Inch to the Foot.

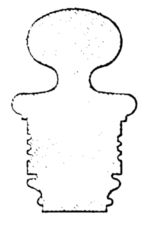


Elevation of Stairway and Alcove as viewed from the Parlor.—Scale, ⅜ Inch to the Foot.

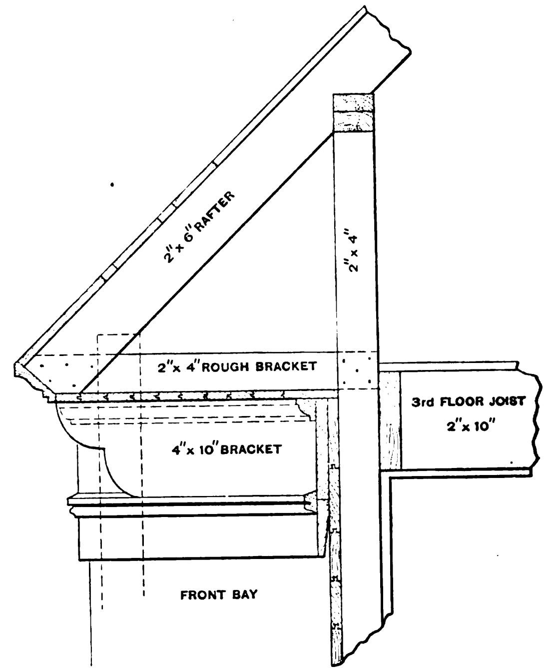
Miscellaneous Details of a Surburban Cottage.



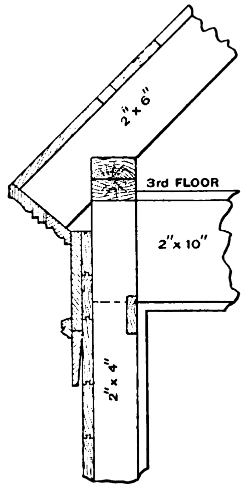
Window Details.—Scale, 1 Inch to the Foot.



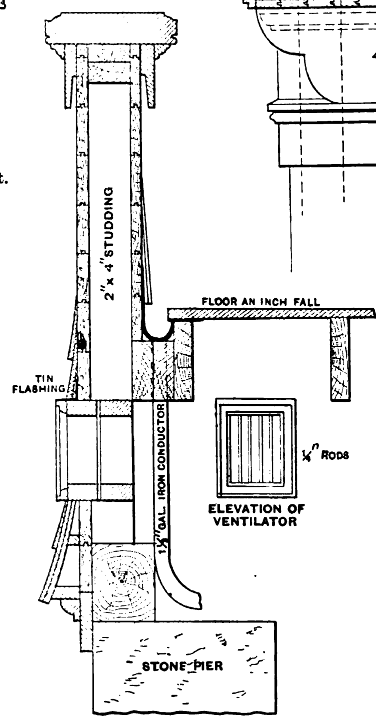
Detail of Hand Rail.—Scale, 3 Inches to the Foot.



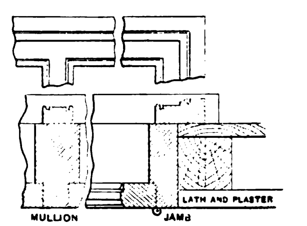
Details of Main Cornice.—Scale, ¾ Inch to the Foot.



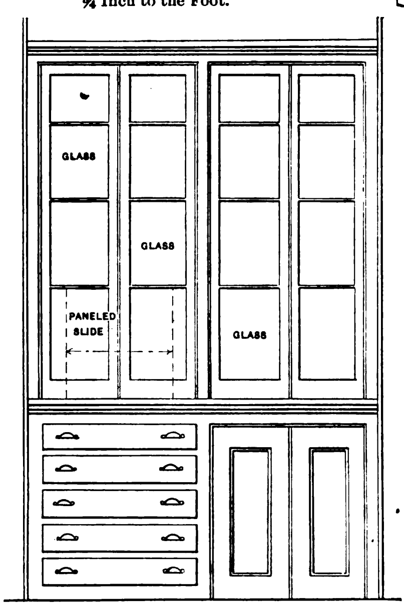
Detail of Cornice at the Side.—Scale, ¾ Inch to the Foot.



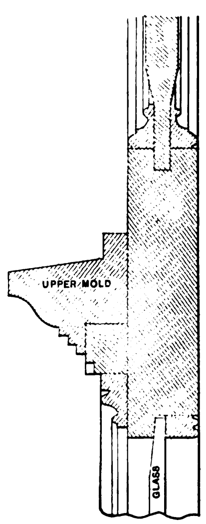
Details of Porch.—Scale, ¾ Inch to the Foot.



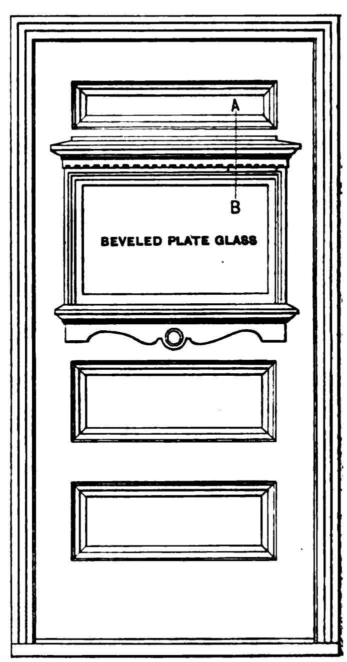
Details of Casement and Stationary Windows.—Scale, 1 Inch to the Foot.



Elevation of China Closet.—Scale, ½ Inch to the Foot.



Section through Front Door on Line A B.—Scale, 3 Inches to the Foot.



Elevation of Front Door.—Scale, ½ Inch to the Foot.

Miscellaneous Details of a Suburban Cottage.

WHAT BUILDERS ARE DOING.

INDICATIONS from all over the country point to a revival of business among builders. In a few localities which have been mentioned from time to time, conditions are such that recovery is slower than it is elsewhere, and in some cities the local situation is such as to operate against investment in buildings at the present time. The anxiety of builders to obtain work after the long depression has resulted in an unnatural keenness in competition, which has had a tendency to cut the margin of profit to a very low figure.

There has been no strike of importance in the building trades since the last report, and aside from mutterings in New York City there is little prospect of anything serious during July.

Baltimore, Md.

The Builders' Exchange of Baltimore, at its annual meeting on June 4, elected the following officers and directors for the ensuing year: President, Samuel B. Sexton, Jr.; first vice-president, Wm. Ferguson; second vice-president, Isaac S. Filbert; third vice-president, P. M. Womble, Jr.; secretary and superintendent, E. D. Miller; treasurer, B. F. Bennett; Directors, Noble H. Creager, Edward L. Bartlett, James A. Smyser, Geo. W. Starr, William V. Wilson, John B. Sisson, H. H. Duker, Henry A. Seim, John Trainor, E. Hall Haswell, Edward D. Preston, Wm. C. Wellener.

The exchange is in excellent condition and preparations for the ninth convention of the National Association of Builders are well under way.

Business among the builders is reported active, and there has been no trouble between employers and workmen during the past month.

Buffalo, N. Y.

The resumption of the activity that existed in the building trades of Buffalo prior to 1893 is proven by the statement made by the State Bureau of Labor for the first quarter of 1895. The Commissioner reports that the number and estimated cost of new buildings and alterations to old buildings, with number of permits issued during the first quarter of 1893, was 521, at a cost of $1,531,301; in 1894, 466, at $1,051,671; in 1895, 326, at a proposed cost of $3,416,821.

The members of the Builders' Association Exchange are busy in nearly every case, and no serious trouble with the workmen is expected.

Boston, Mass.

The condition of the building business in Boston continues to improve, and the present outlook is very satisfactory. It is expected from the volume of work already under way that the total of the season will compare favorably with the years just preceding 1893. No trouble between employers and workmen has occurred during the month, with one or two insignificant exceptions, and there is nothing to indicate any change from the present amicable relations.

Cincinnati, Ohio.

On June 5 the Cincinnati Builders' Exchange approved the resolutions on municipal reform adopted recently by the State Board of Commerce, which ask the repeal of the classification of cities and laws uniform in their operation in regard to government of cities and civil service in municipal offices. President E. E. Locke appointed the following delegates to the Central Board of Business Organizations of Cincinnati: Archibald Colter, three years; S. D. Tippett, two years; Thomas Lee, one year. A communication from the Builders' Exchange of Toledo, suggesting that the various exchanges of the State combine in holding an outing that they might all come together socially, was referred to the Board of Directors.

Chicago, Ill.

During the latter part of May the brick manufacturers of Chicago had a difference with their workmen which was the outgrowth of a concerted effort by all the workmen to compel certain employers to sign the union wage scale. It was stated that the men abandoned yards where the union scale was paid in order to force some concession from the employers who refused to sign the scale, by establishing sympathetic strikes which would stop all work in the city. An effort was made by the workmen to enlist the aid of the bricklayers' unions, but owing to the arbitration agreement between them and the Masons and Builders' Association, the attempt did not succeed. The matter threatened to assume dangerous proportions, but for lack of sufficient support it did not prove serious, although the workmen profess to be still determined to bring matters into shape that shall be satisfactory to the unions.

The building business, as compared with other years, is not up to the mark, although there is a large amount of work being carried on. Aside from the strike mentioned there has been no disturbance between employers and workmen of sufficient importance to interfere with work during the past month.

Detroit, Mich.

The stone masons of Detroit have organized a union with 120 members for the main purpose of securing uniformity in wages. An attempt was made to secure an agreement from all mason contractors to pay the men $3.25 per day. The men were getting from $3 to $3.25 before the union was organized, and while some of the employers have not formally agreed to pay not less than the union scale, there has been no trouble over the matter.

The plasterers at the regular yearly meeting with the employers have fixed the wages for the present season. The amount of building now being carried on promises to make the season a fairly satisfactory one.

Indianapolis, Ind.

At the annual meeting of the Builders' Exchange of Indianapolis, which was held on June 7, the following officers were elected, the president and vice-president serving one year and the directors two years:

President: H. C. Adams.

Vice-President: Conrad Bender.

Directors: J. A. Shoemacher, J. Balke, S. W. Cochrane, E. F. Smithers, J. A. Gardner, E. Boening, J. C. Adams, S. W. Hawkey and Emil Fertig.

The exchange is in good condition and the members report the building business as being in good condition. There has been nothing to seriously disturb the relations between employers and workmen for some time and everything is peaceful at present.

Kansas City, Mo.

By a concerted move, a demand for higher wages was made by all of the plasterers in Kansas City May 27. They asked an increase amounting to 20 cents a day. They were paid 35 cents an hour, or $2.80 a day, for eight hours' work. What they asked was 37½ cents an hour, or $3 a day, for eight hours' work. The demand was a complete surprise to all of the contractors, and rather a disagreeable one, for many of them had based their figures and calculations on the 35-cent scale. The demand rather upset their plans as it was entirely unexpected, because the scale was fixed last April, and ratified by the Operative Plasterers' Union No. 17, to which the plasterers of the city belong.

Some of the contractors acceded to the demand on the spot, principally because they could not afford to risk any chances on their contracts. Others told the plasterers that they would consider the demand, and let them know later. There is more plastering being done now than there has been for some time past, the large amount of remodeling and renovating which is going on in all portions of the city being the cause.

The carpenters are agitating the question of eight hours' work for all branches of the building trades. Several meetings have been held and an attempt will be made to secure the co-operation of the other unions.

Milwaukee, Wis.

The carpenters of Milwaukee are making a strong stand for a minimum wage of 25 cents per hour. There are five carpenters unions in the city and comprise what is known as the Carpenters' Council. In this council delegates from each union are represented, and it controls every union carpenter in the city. It is estimated that there are about 2500 carpenters in the city and that at least 1250 of these are members of the five unions. On May 25 the council determined to send the following notice to the carpenter contractors of the city in the hope of obtaining an answer from each as to whether or not they would concede the wages demanded.

After a thorough discussion of the present condition of the building trade, the carpenters and joiners, organized in the various local unions of the Brotherhood of Carpenters and Joiners of North America, and represented by this council, have arrived at the firm conclusion to make upon every carpenter contractor and builder of this city the demand of paying a minimum rate of wages of 25 cents an hour with a strict observation of the eight-hour day. The organized carpenters of Milwaukee have no intentions whatever to create any trouble in the building trade at this time, still they feel justified and deem it absolutely necessary to bring about more uniform conditions in our trade, to oppose the suicidal competition now prevalent for want of the desired uniformity in wages and hours.

We inform you of the position and the intentions of the organized carpenters in order to enable you to be guided by the same in undertaking new jobs. And considering the already advanced season we respectfully request you to send your answer to the secretary of the Carpenters' council at the latest by Wednesday, May 29.

Henry Ferge, president of the local organization of the carpenter contractors, said at that time that the bosses would probably grant the demands of the men for an increase of pay, as they believed them entitled to it. It is thought the minimum wages will finally be 23½ cents an hour. No definite action was taken by the contractors before the date specified by the workmen, many claiming that they had not received the notice sent out by the unions. None of the contractors of the Builders and Traders' Exchange had on May 29 returned an answer to the notice served upon them by the union, nor was it their intention to do so. The contractors will await developments. Many of them assert that they are now paying the scale demanded by the union. At least they say they pay 25 cents an hour as the maximum rate, with 22½ as the minimum rate per hour, and are willing to make an advance on these figures if the irrepressible contractors can be brought to time. There is very little danger of serious trouble, as the employer and the employee seem to stand pretty close together in this matter.

The complaint of the contractors is that there are plenty of men who will work for low wages, and that the smaller employers are taking advantage of this fact, and coming into competition with the men who pay the full wages, thus making competition very keen. The members of the exchange are reported as being perfectly willing to pay the wages asked by the men, if those wages will be universally adopted.

New York City.

The building trades of New York City are somewhat disturbed by a difference over the interpretation of the agreement between the workmen and the Electrical Workers' Association, which formed the basis of settlement of the recent strike in that trade. It is reported that the Electrical Workers' Union has complained to the Board of Walking Delegates that the employers belonging to the Electrical Workers' Association are using non-union men. The employers are quoted as having said that they made no agreement to employ only union men, and the workmen are endeavoring to enforce their understanding of the agreement. The matter was referred to the Arbitration Committee, but at a meeting held at the Building Trades Club no agreement was reached.

The whole difficulty is connected with the interpretation that is put upon clause 2 of the agreement which terminated the last strike by the Electrical Contractors' Association. This clause reads as follows:

That the Electrical Workers' Union declare their readiness to accept into their union all persons who have satisfactorily passed such examination, irrespective of their action in the present strike, but the men exployed at present by the Electrical Contractors' Association shall, if they wish, join the union without interference from their employers or penalties imposed by the union.

The electrical contractors contend that this does not state that they must not use non-union men, but the Board of Delegates say that, on the other hand, the clause does not protect non-union men, and that, as they do not recognize non-union men under any circumstances, the clause contains nothing to prevent the delegates of the Electrical Workers' Union from acting against these non-union men as they do against others—that is, provided they have not joined the union and passed the examination specified in another part of the agreement.

Failing to come to an agreement, the two sides of the Arbitration Committee put themselves on record as follows: The Contractors' Association "consider that it would be a violation of clause 2 if the delegate should proceed against the non-union men, as they can remain at work indefinitely according to its terms." The delegates' decision was "that clause 2 does not prevent the walking delegate from proceeding as formerly against non-union men, meaning thereby any who are not members of Local No. 3."

The members of the Board of Delegates on the Arbitration Committee declined to have the question at issue put to a vote as they would have had no show whatever, the board being composed of eight electrical contractors, three mason builders and five members of the Board of Delegates.

The Board of Delegates voted unanimously to sustain the decision made by its members on the Arbitration Committee in reference to this case.

The painters and plasterers through the Board of Delegates are seeking to enforce the payment of union wages on all city work.

Several small strikes have occured during the past month, the causes in nearly every case being the employment of non-union men.

The amount of work on hand as indicated by proposals, permits, &c., shows a very satisfactory condition of affairs in the building trades of New York City. The plans and specifications for the erection of buildings in New York in 1895 already indicate a vigorous revival of operations in that line and a vastly increased investment of capital in realty improvements.

Statistics in this connection which have been gathered by Commissioner Dowling of the State Labor Bureau present extraordinary contrasts. Measured by the amount of money which is being put into realty improvements this year, as compared with the total amount so invested in 1893 and 1894, the city of New York should be more than twice as prosperous now as it was then.

The number of plans and specifications filed in the Building Department in the first quarter of 1893 was 655, and in the first quarter of 1894, 538. In the first quarter of 1895 the number filed was 1107, or only 86 less than the total for the same period in the two former years.

The cost of buildings proposed to be erected in the first quarter of 1893 was $14,879,638, and in the first quarter of 1894 it was $9,418,930, making a total of $24,298,568.

The cost of the buildings proposed to be erected in the first quarter of 1895 was $27,462,514, or $3,163,946 more than the total of the first quarters of 1893 and 1894.

Omaha, Neb.

The fraternal feeling that exists between the Builders' Exchanges which comprise the National Association was well demonstrated recently by the Builders and Traders' Exchange of Omaha. During the recent time of hardship among the farmers of Nebraska the Master Builders' Association of Boston donated $100 to help the needy and asked their brother builders of the Omaha Exchange to be the means of its distribution. The task was willingly and gratefully undertaken, and appropriate expressions of appreciation and fraternity returned by the Omaha builders.

Building interests in Omaha are improving steadily, though slowly and it is predicted that by another year the inactivity of the past few years will be superseded by a period of renewed prosperity. No labor disturbances of any moment have occurred for some time past, and everything is quiet between employers and workmen.

Philadelphia, Pa.

The majority of the builders of Philadelphia are busy, and it is expected that the end of the season will show an amount of work done which will compare favorably with past years. There have been no strikes or lockouts of importance during the past month, and there is every indication of continued harmony.

At the last quarterly meeting of the master builders at their exchange, William G. Hartranft of the Commercial Wood & Cement Company read an interesting paper on "Portland Cement."

The speaker compared the American cement with that of foreign manufacture, and argued that the former was of superior quality. He described the composition of both and read a recent letter received by him from a friend in London, England, which stated that the foreign cement now in use was an injury to the builders throughout the country. He added that Portland cement from Europe didn't arrive in America until 1865, at which time it sold as high as $8 per barrel. Since the American cement had been introduced the prices have been brought to a standard basis. The speaker further stated that 13 brands of American cement were exhibited at the Centennial, five of which were pronounced to be of superior quality.

St. Louis, Mo.

The hod carriers' strike at St. Louis, which was reported last month, was finally abandoned for lack of combined action, and because of the large influx of non-union workmen from other cities.

The stonecutters' demands appear to have been generally acceded to by their employers. It is said that no fixed scale has been enforced, and that different yards paid varying prices, ranging from 25 cents to 50 cents an hour. The cutters made a request for a uniform price of 45 cents, and gave 30 days' time in which the employers could decide upon what course they would pursue. Many of the employers are said to have favored the idea of a uniform scale, and it is understood that nearly all have agreed to the stonecutters' demand.

The Builders' Exchange is reported as being in good condition, and the members busy. The present season promises to be one of the most prosperous for builders in the history of the city so far as the amount of work done is concerned, although there is considerable complaint regarding the excessive competition, which has a tendency to materially reduce profits. The present condition of affairs between employers and workmen is such as to warrant the belief that there will be no further disturbance for some time.

Wilmington, Del.

The Wilmington builders are having a fair year thus far, but are looking forward to greater activity before the close of the season. The Builders' Exchange is holding its own.

The master bricklayers of Wilmington met late in May and organized by electing the following officers: G. W. Phillips, chairman; William H. Jones, secretary. The difficulty between the Bricklayers' Union and the Master Bricklayers' Association regarding wages has been satisfactorily adjusted.

Worcester, Mass.

A very enjoyable party was held at the Builders' Exchange rooms recently. The members were accompanied by their wives and daughters and the lady friends contributed largely to the enjoyment of the occasion. Several whist games were started, and there was also dancing. Instrumental music was furnished by the O'Gara brothers, J. H. Deane being accompanist. There was a reading by Miss Florence Norwood and pleasing songs by E. A. Walsh and Mrs. Daniel Downey. Miss Lota Dean gave a reception. Refreshments were served. The hall was decorated with potted plants. The Committee on Arrangements consisted of B. W. Stone, W. E. Coffee and E. A. Walsh.

It is expected that the present will be about an average year for builders. The relations between employers and workmen have been unbroken by disturbances for some time, and there is little likelihood of any change in the near future.

Notes.

The bricklayers and masons of Newark, N. J., have made a demand on the bosses for a new schedule of wages, with reduced hours of work, and the demand has been refused. The men have been working nine hours at 45 cents an hour, and some have received 40 cents an hour. The bosses have adopted a schedule of 40 cents an hour for a day of nine hours, and the men want 42½ cents for a day of eight hours. The laborers get 23 cents an hour and demand 26 cents. The trade is dull and many men are out of employment. The bosses have a strong organization called the Builders' Exchange

A difference between the stonecutters and stone masons in Hartford, Conn., has occasioned considerable annoyance to builders in that city. The two unions are unable to agree on which shall do certain parts of the work. It is feared that the trouble may spread until all the unions in the State are involved.

The painters of St. Joseph, Mo., have begun a campaign for an eight-hour day and an increase in wages from 25 to 27½ cents per hour. The employers were notified before May 1 that on June 1 this demand would be made. The workmen have been successful in many cases, but some of the employers have not yet complied with the demand.

It is reported that the Builders' Exchange of Toronto, Canada, is endeavoring to arrange a social gathering of the builders' exchanges in Ohio in order that the Canadian builders may meet and become acquainted with their fellow builders south of the dividing line.

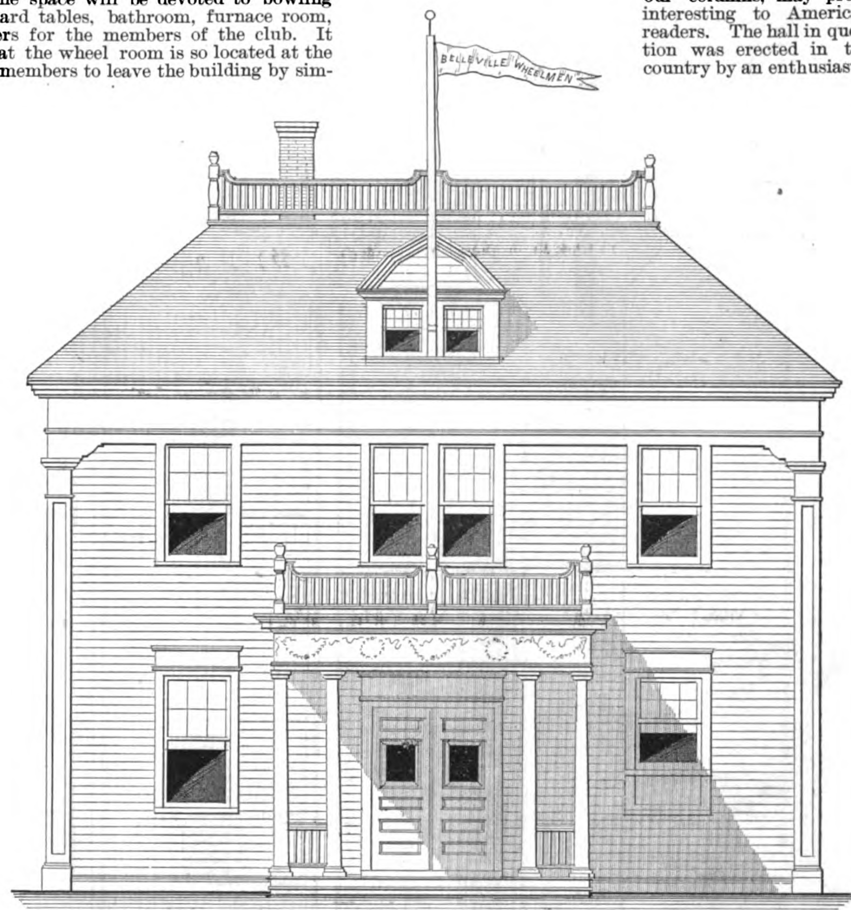
A Piazza is a Building.

A piazza is held by the full bench of the Supreme Court of Massachusetts to be a "building," within the terms of restriction that "no building erected on said premises shall be placed at a less distance than 20 feet from the line of a street." This proposition is finally decided for the first time in the case of John L. Reardon against Minnie J. Murphy, says a recent issue of the Springfield *Republican*. The plaintiff and defendant are owners of adjoining lots of land fronting on Parsons street in Brighton. The defendant has her lot by grant from the plaintiff, her deed containing a restriction like the above. The front line of the main body of the defendant's house is 20 feet from the street, but the front piazza extends out 8 feet nearer to the street. The plaintiff brought this bill in equity to enforce the restrictions in the deed. A single justice held that the piazza was within the restrictions, and ordered it taken down. The defendant appealed, and now the full bench affirms the decree of the single justice.

A COMPLETE Buddhist temple and accessories, weighing 6 tons altogether, were brought to this country by Professor Maxwell Somerville of the University of Pennsylvania, who recently arrived from India. It will be erected in Philadelphia, and will, it is stated, be the only temple of Buddha in the United States.

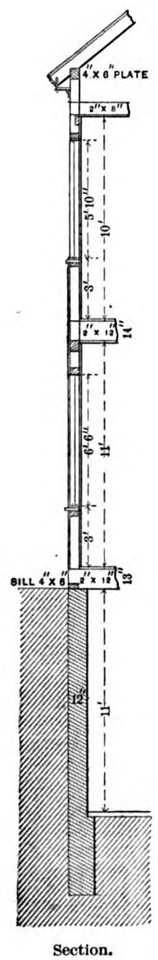
DESIGN OF A BICYCLE CLUB HOUSE.

IN view of the rapidly increasing popularity of the bicycle, which is now employed to such an extent and for such a variety of purposes that in many localities the horse leads a life of comparative inactivity, our readers will be interested in the design herewith presented of a bicycle clubhouse. The structure is colonial in its style of architecture, and is arranged to meet the wants of the Belleville wheelmen of Belleville, N. J. The club house is intended to be erected at the corner of Washington avenue and Academy street of the place named, from drawings prepared by architect H. Galloway Ten Eyck of Newark, N. J. The foundation of the club house is built on sloping ground, which leaves the basement on the side and rear practically on a level with the ground. The ceiling of the basement is intended to be 11 feet high, and the space will be devoted to bowling alleys, pool and billiard tables, bathroom, furnace room, storeroom, and lockers for the members of the club. It will also be seen that the wheel room is so located at the rear as to enable the members to leave the building by simply crossing the rear hall and making their exit through the side door of the basement. The first or main floor, which is level with Washington avenue, will be finished as an audience hall with a stage at the rear, and box office, coat room and ladies' parlor in the front. The second floor, it will be seen from the drawings, is intended for use as club and committee rooms.



Front Elevation.—Scale, 1/8 Inch to the Foot.

Design of a Bicycle Club House.—H. Galloway Ten Eyck, Architect, Newark, N. J.

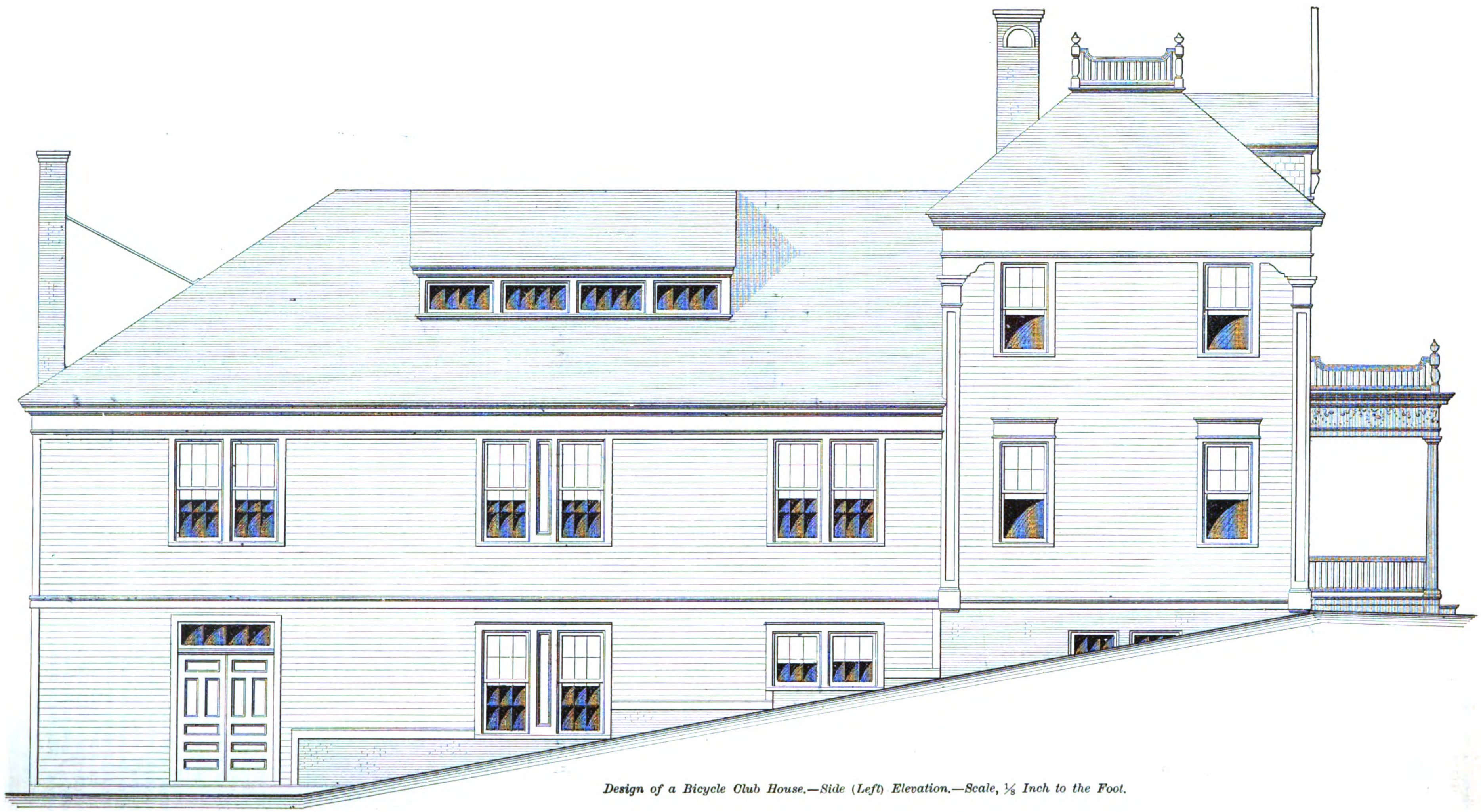


Section.

The foundation of the building is designed to be of brick and the floor beams of spruce. The first and second story joist will be 2 x 12 inches, placed 16 inches between centers, while the third story joist will be 2 x 9 inches, also placed 16 inches between centers. The rafters will be 2 x 8 inches placed 2 feet between centers. The ties, plates and posts will be 4 x 6 inches. The building will be sheeted on the exterior with 1 x 10 inch hemlock boards put on diagonally. These in turn will be covered with white pine clapboards. The floors throughout will be North Carolina pine with North Carolina trimming and doors. The rooms will be plastered with adamant plaster, sand finish, and the walls will be tinted with Church's plaster tint. The architect states that $5000 is the estimated cost of the completed building.

Floors for Ballrooms.

A correspondent of one of the London architectural papers describes a rather novel method of arranging a ballroom floor for dancing purposes which, in view of some of the inquiries presented in our columns, may prove interesting to American readers. The hall in question was erected in the country by an enthusiastic military officer for the use and benefit of his neighbors the villagers, whose houses were near his residence. The principal special points of construction were that the whole floor was supported on lump rubber springs such as were used for tramway cars, and that the flooring surface did not quite extend to the walls, but was allowed a small space around the edges, so that not only was elastic motion in a vertical direction provided for, but a slight horizontal motion, or swing, was permitted. The result was, according to the report of the officer, quite satisfactory. Another floor described by the writer as being much appreciated by dancers had a surface of teak. The bearings were divided into lengths of about 10 feet by walls and rolled iron joists, the floor being then wood-joisted with 8-inch by 2½-inch cut out of balk Dantzic, covered with inch deal laid diagonally, traversed, and finally laid with ¾-inch teak in narrow widths, waxed. The teak was not laid with any view to dancing, but to comply with the wishes of those connected with a vestry in a neighborhood connected with shipping interests ; and all ship men swear by teak for all purposes. It was indeed a fine wood for a floor, as well for use and wear as for



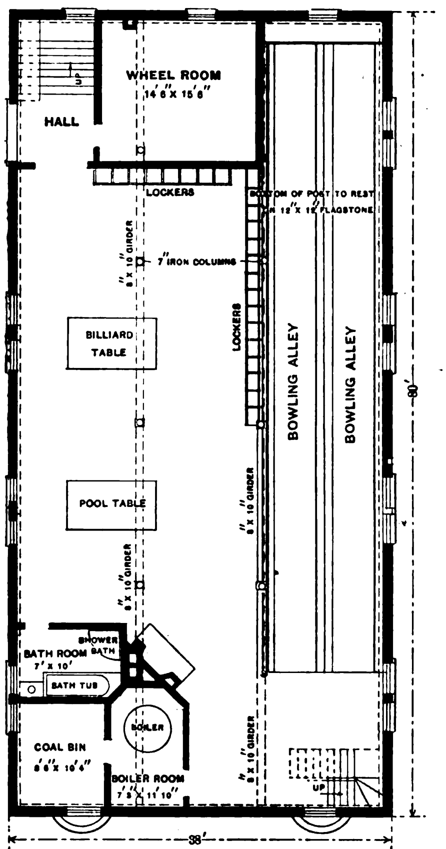
Design of a Bicycle Club House.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

effect of color and tone. Good selected Honduras mahogany, without wax or polish, is said to make a very useful and effective floor surface.

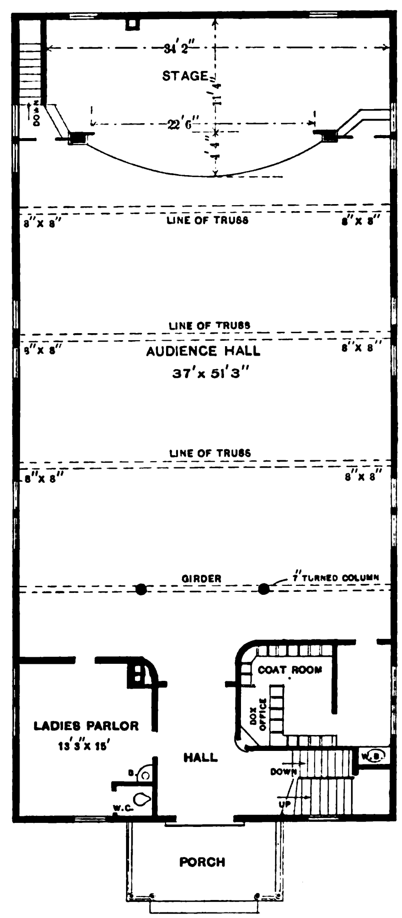
How to Use the Scraper.

Few, if any, tools cause as much disappointment to amateur workers, while appearing so easy to use, as the steel scraper. The instruction often given to correspondents to scrape old work preparatory to repolishing is more difficult to carry out than is generally imagined. When purchasing a scraper, says a writer in a recent issue of the *Illustrated Carpenter and Builder*, it is best to get one about 5 or 6 inches long, and select one of such a thickness that it will not bend or give much in the center when held at each end. To sharpen it, put it in the bench screw or vise, and file the edges gently with a handsaw file, carefully keeping it as square as you possibly can ; now turn and repeat the operation on the other edge. It is necessary to file a trifle more off each end than you do off the center, so as to obtain a slightly rounding edge. Now place it flat on the bench and remove, by one or two strokes with the file flat on the face of the scraper, the burr which the previous filing has raised on the edges. Now give it a few rubs on the oilstone, taking care to keep it as upright as possible. Having prepared the edges, we will now proceed to sharpen it. This is done by placing it flat on the bench, and briskly drawing a bradawl across it from side to side about a dozen times. Now turn it over and repeat the operation with the other side. Then rest it endways on the bench and draw the bradawl across the edge in the same manner, and you will find that you have a scraper with all four edges sharp.

To use it, grasp it firmly at each end with the first three fingers of each hand, and place the thumbs at the back, about 1 inch or so from the center ; incline it toward your work at an angle of about 60 degrees, keeping the edge well down and pressing it firmly forward. You will easily see the direction of the grain of the wood you are working, and use it accordingly ; but in some cases, where you have a very fine figured wood, you will have to vary it, occasionally using it diagonally or crosswise, as the case may require. To resharpen, repeat the operation previously described with a bradawl. After a few times you will find that this causes the edges to become round ; to restore the square edge you require, rub it down on the oilstone and sharpen again as usual. If you add a drop or two of paraffin oil to what you are using for your stone, it will prevent it from thickening and make the stone cut better ; a little powdered emery, too, will greatly facilitate the operation.



Basement.



Main Floor.

Design of a Bicycle Club House.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

New Spire of the Cathedral of Dijon.

The timber spire of the cathedral of Dijon was considered to be the most characteristic part of the building, says a writer in an English contemporary. In 1885, owing to its defective condition, it had to be demolished. It was not, however, the earliest example, for it had two predecessors. The spire, or *flèche*, was about 300 feet high, and from the smallness of the base presented a very acute appearance against the sky. Soon after the demolition M. Suisse, the diocesan architect, prepared designs for a new spire, and after operations which have occupied seven years, and cost nearly 400,000 francs, it has been completed to the satisfaction of the inhabitants. The primary cause of the failure of preceding spires, it was conjectured, arose from a settlement of the piers rather than from a decay of the timber. It was accordingly decided to fill them with *béton*. No less than seven months were devoted to that part of the work, and about 90 tons of *béton* were laid. The spire has been carefully calculated in order that all the timbers will be of adequate strength. They form a series of triangles with horizontal bracing at regular intervals. The timber is covered with slates, with occasional openings for tracery, and near the roof slates are introduced. In its appearance the new spire surpasses its predecessor, and from the care taken with the foundations and carpentry we may assume that it is destined to have a longer duration.

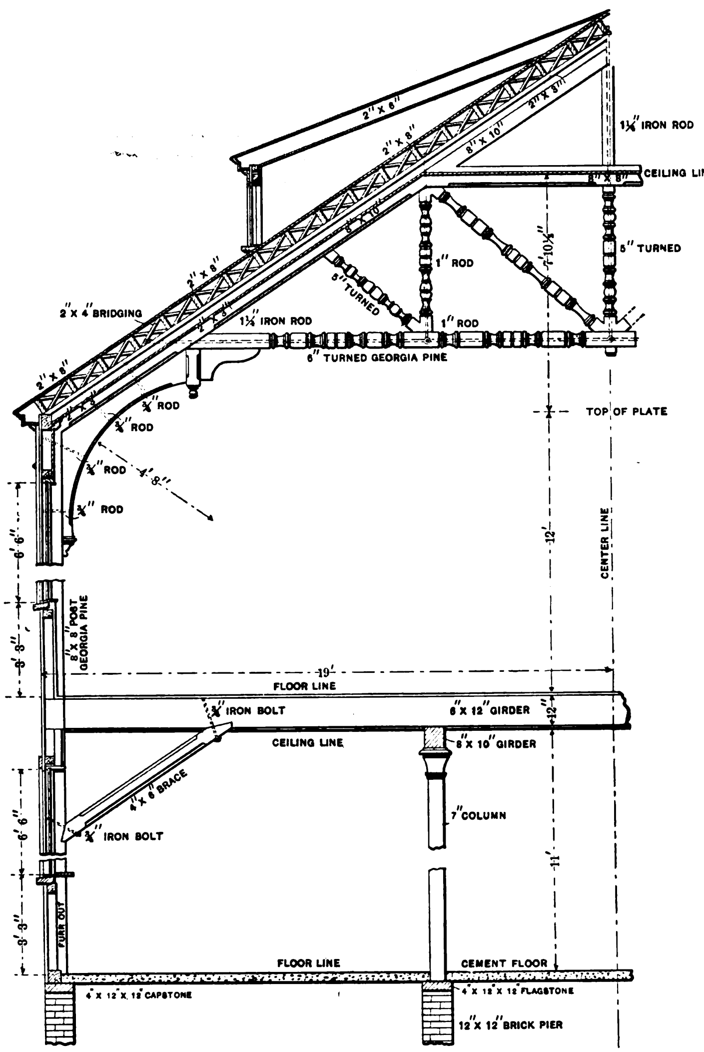
Heating a Country Schoolhouse.

In a recent issue of *Modern Progress* J. E. Patterson, writing on the subject of "Sanitary Heating and Ventilation," describes as follows a method of heating a country schoolhouse:

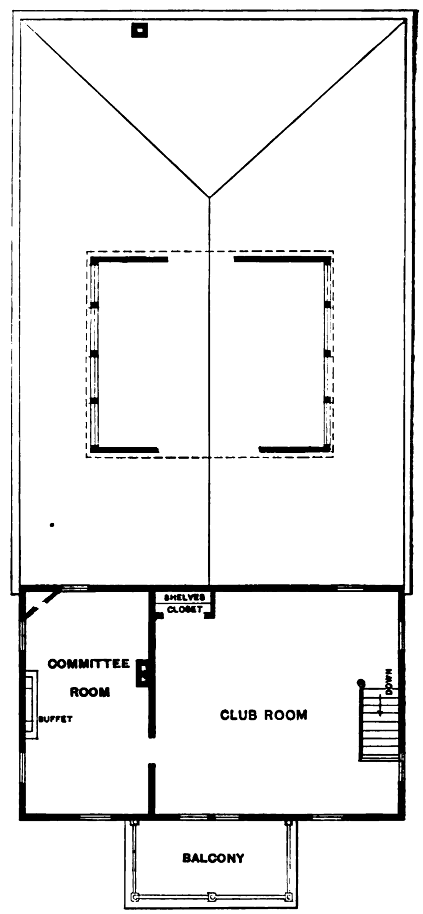
I am of the conviction that every country schoolhouse, no matter of what the superstructure may consist, should rest upon full foundation walls above a thoroughly drained cellar, and the chimney should extend down into this cellar, being provided with either a thoroughly protected fire place at the base or suitable opening for stove pipe. About on a level with the schoolroom floor, and opening into the chimney, a ventilating register should be placed. The heating stove may now be placed in any suitable or convenient place in the schoolroom and the pipe run to the chimney in the ordinary manner. Entering the floor, immediately below the stove, should be an opening connecting by suitable pipe with the outer air. Ignite now and keep alive, in either fire place or stove in the basement, a light, slow burning fire. This will induce chimney draft, tending to produce a vacuum in the chimney, and the cold air from the schoolroom will be drawn into the chimney through the ventilating register, the rapidity of its passage being increased when fire shall have been started and maintained in the schoolroom stove. The result of this will be a constantly changing atmosphere in the schoolroom, a circulation which will cause the intermixture of cold and heated air, producing an equable temperature.

Application of Roman Methods to Modern Work.

A splendid example of the application of Roman methods to modern work is to be found in the construction of the new Congressional Library at Washington, says a recent issue of the *Brickbuilder*. Comparatively little iron enters into the construction of the building, and almost every form of Roman vault is to be found here. When, however, the method of vaulting is examined in detail it is found to follow modern rather than Roman methods. We believe that a still closer following of Roman methods would have been an economy in the work. In the Congressional Library continuous centerings have everywhere been employed, whereas the Roman method employs a skeleton of masonry ribs or arches, which forms, as it were, a permanent centering for the support of the brick and concrete vaulting, thus greatly reducing the amount of wooden centering required. The enormous strength of this method of construction is attested by the numerous Roman ruins, even vaults that have fallen by the destruction of the walls often retaining their shape. By the use of the Roman method iron can be dispensed with altogether when the buildings are not of exaggerated hight, and we believe this omission increases the chance of permanent stability.



Sectional Elevation, Showing Detail of Roof Truss.—Scale, 3-16 Inch to the Foot.



Second Story.—Scale, 1-16 Inch to the Foot.

Design of a Bicycle Club House.

CORRESPONDENCE.

Design of a Capstan.

From Francis, *Cincinnati, Ohio.*—In the December number of *Carpentry and Building* "A. O. C.," Milan, Minn., asks for drawings of a capstan suitable for moving frame buildings. The writer herewith shows detailed sketches of a machine in use in this place for the purpose named. The description will enable any intelligent person, handy with tools, to construct one without much trouble. Referring to the sketches, Fig. 1 represents the front end of the machine, while Fig. 2 shows it ready for use with the exception, of course, of the men, horse and tackle. In Fig. 3 is shown the timbers employed between the rollers, which are of the same diameter for both top and bottom, but framed a little different. The iron piece marked A is lagged on to steady the long roller when set up but not in use, and when removed the rolls can be taken out of the frame in a minute. The hitching stick to guide the horse is not shown, and the lever to which the animal is hitched is generally a straight piece of timber. The machine should be constructed of hardwood, thoroughly seasoned and best adapted to the purposes for which it is used. In operating the machine dig a hole with a post auger little, if any, larger than the hitching post B of Fig. 2 and of sufficient depth. If the earth is not very firm use the piece marked C, of sufficient length to give a good bearing. If the earth should be of a soft nature use an additional hitching chain and what is known in railroad parlance as a "dead man." Attach the machine and let the person who takes the rope off the rollers occupy his seat on the cross rail in the rear, which should be 3 x 10 inches, as the forward block when used is hitched to this piece. Pass the end of the rope in to the right side of the rollers, around the front one and back around the rear one in the lower groove, and so on until the rope is in a sufficient number of grooves to be held easily without its slipping. Let the operator take up all slack, coiling the rope at his side, start the horse and the machine will adjust itself. This device is capable of performing wonders. The writer has known six men with a $10 stable plug to move a large two-story frame house over favorable ground more than a mile in 12 hours, after the building was on the timbers and ready to start.

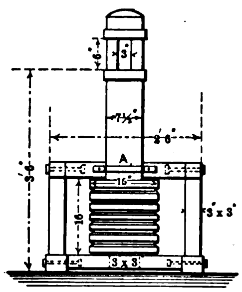


Fig 1.—Front View of the Capstan.

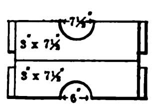


Fig. 3.—Plan View of Timbers Used Between the Two Upright Rollers.

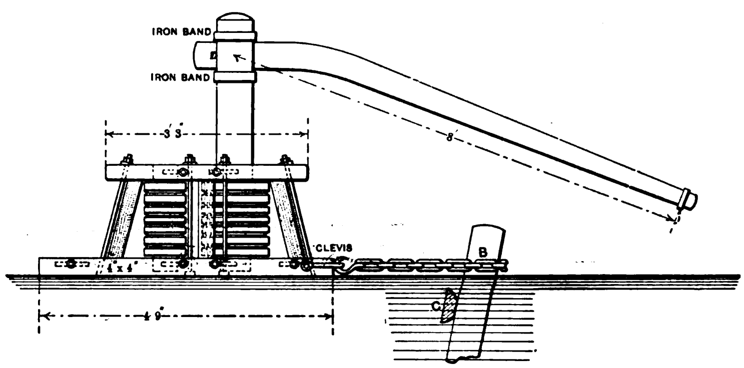


Fig. 2.—Side Elevation of the Capstan Ready for Use.

Design of a Capstan.—Engravings Made from Sketches Submitted by "Francis."

Framing Stamp Batteries and Ore Bins for Gold and Silver Mills.

From W. W., *Chicago, Ill.*—If the subject has not been previously considered, I should be glad to have some of the readers tell how to frame stamp batteries and ore bins for gold and silver mills. I think this would interest a great many others besides myself, and hope that the readers who have had experience in this line will tell how the work is done and accompany their letters with sketches for publication.

The Quality of Tin Roofs.

From Experience, *New York.*—A month or two since there appeared in your journal a letter from a Southern correspondent asking for information as to the lasting qualities of gravel roofs. He also went on to say that "where tin was formerly used in his section gravel roofs are now being specified;" and further makes an assertion that is somewhat remarkable, that "he can put on a good roof at 4 cents per square foot and make money out of it." Your correspondent's statement as to his using a quality of tin costing only 4 cents per square foot unfortunately exposes "the milk in the cocoanut," as any of your readers acquainted with the tin roof business would know (if they were aware of the location from which your correspondent writes) that it is an utter impossibility to buy even cheap prime plates, pay freight to destination and put them on the roof at the figure given by your correspondent. Indeed, to be able to make any profit at all (the quality of goods to which he refers has to be judged, of course, by the price which he states—4 cents per square foot, laid) he has to buy a plate either in Baltimore, New York City or Philadelphia that costs about $6.50 per box. Of course, it is needless to state that a plate at this price is a "waster" of the very poorest quality, and possibly containing holes over which paint itself would have no protective properties. Is it to be wondered at that with the use of such inferior and utterly disreputable material, gravel roofs—or any other kind of covering—would be substituted? Why is it that in the cities of Chicago, St. Louis and others there are hardly any tin roofs? Your correspondent answers this question very satisfactorily himself when he makes a statement involving such a clear insight into just what class of material Southern cities have been afflicted with for such a long time. The citizens of St. Louis and Chicago have come to the same conclusion, and very wisely. It is simply the instinct of self preservation to obtain a covering that will at least shield them from the elements a reasonable length of time.

Being interested in the roofing business ourselves, we know that the use of inferior tin rests wholly with the property owner, the jobber and the consumer. There never has been a time when so many light weight and acid made plates have been used for roofing purposes as in the past four years. Competition has never been so severe and property owners never so reckless of their own interest as at present. The only cause we can assign for this is that they expect $1 worth of work and material for 60 cents. And besides, the price of roofing plates has been so materially reduced during the past few years by the introduction of what is known as the "acid flux process" that this class of material can be bought at a much less rate than any of the plates made by the palm oil process. If property owners could be taught to understand the difference in results between plates made by the acid process and plates made by the palm oil process they would be somewhat startled. Yet we do not think that out of every 100 boxes of tin plate sold to-day there are above three or four made by the palm oil process.

Years ago, competition among tin plate manufacturers centered itself on the quantity of coating that could be successfully placed on one sheet, which, by the way, was then put on by the palm oil process exclusively, acid being comparatively little known. Those who could show the heaviest coating were awarded the laurel. To-day everything is different. It does not so much depend on the amount of coating given a plate to determine its selling properties as on the price at which it can be profitably sold. We cannot blame property owners for using anything in preference to cheap tin—even gravel roofs. It is simply a matter of self defense. We do blame jobbers and roofers, however, for the present condition of affairs, and firmly believe that if the better class of roofers would only take the trouble to educate property owners to understand that but a fraction of a cent per square foot exists between a thoroughly reliable palm oil made plate and a plate made by the acid flux, they would appreciate the hint and act accordingly. It would have the tendency to at least lessen the fierce competition, while property owners would be willing to pay a little more for their tin when the result of its use could be clearly shown.

Of course, the fact that there are a great number of firms doing a large business who are placed in a false light by the present condition of affairs is fully appreciated, and although it may not at present be realized, there will be many of them in a few years like Othello, whose occupation will be gone. Again, do they stop to realize that this incessant warfare of prices simply means carrying on business for the fun of it? Sacrificing quality to price is suicidal, and generally ends in oblivion. We are sure you will bear us out in the assertion that not one firm can be pointed out—whether jobbers or roofers—who ever made a success in dealing exclusively in cheap and disreputable goods. It is in direct opposition to the law of natural worth. Yet we know for a fact that some of the old style plates nowadays which are supposed to be made by the palm oil process are made by acid flux in order to cheapen the cost of production and compete with the more reputable brands of palm oil manufactured plates, regardless of the welfare of the house, the roofer or the property owner.

In conclusion, we can only say that your correspondent has given the key to the whole situation, that until property owners are taught to understand that cheapness is not the first requirement (in roofing plates, at least), nothing but constant expense and new roofs will be the order of the day. And we will venture the prophecy that if acid plates are put on as recklessly in the next four years as they have been in the past, the cheap tin plate will be utterly abolished and a substitute introduced more favorably adapted to atmospheric action and the length of the buyer's purse.

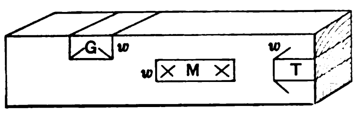


Fig 1.—Showing which of "Tramp's" Methods "A. W." Considers the Best

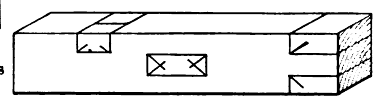


Fig. 4.—One of the Methods Used by "L. L. F."

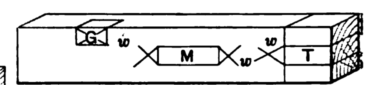


Fig. 6.—Plan Used by "M. D. S."

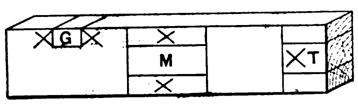


Fig. 2.—A Method "A. W." has often seen Employed Incorrectly.

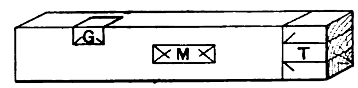


Fig. 7.—Method Used by an Acquaintance of "M. D. S."

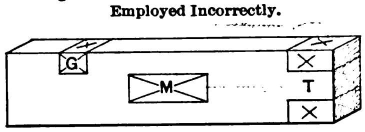


Fig. 3.—Method Referred to by "A. W." as Being Generally Employed in the New England and Middle States.

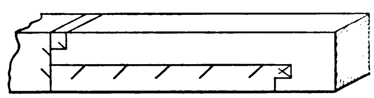


Fig. 5.—"L. L. F.'s" Plan of Indicating a Splice.

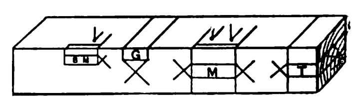


Fig. 8.—Scheme of Witness Marks Used by "A. W. W."

Witness Marks in Timber Framing.—Sketches Submitted by Various Correspondents.

Design for a Modern Greenhouse.

From E. P., *Gloversville, N. Y.*—I shall be glad to have some of the many readers of the paper furnish for publication a good plan of a modern greenhouse. I would like to have the practical readers give this attention at once, as the work is to be done within a very short time.

Sharpening a Cabinet Scraper.

From F. W. F., *Anton, Iowa.*—In reply to "J. C. W.," whose inquiry appears in the April issue of the paper, I would say my method of shapening a cabinet scraper is to use a common flat file, filing lengthwise until there is a sharp edge on either side.

Witness Marks in Timber Framing.

From A. W., *Philadelphia, Pa.*—Referring to the communication of "Tramp," South Denver, Col., which appeared in the February issue of the paper, I would say that none of his sketches are explicit. I send drawings indicating methods which I have seen used and most generally adopted. I think Fig. 1, which is one of "Tramp's" sketches, is the best of the four he furnished. Still, in laying out work five out of ten will cut out a mortise instead of a tenon. Fig. 2 I have seen used, although I have seen many errors in its use. Fig. 3 I have found the most generally employed, both in the New England and the Middle States, and is so clear that no one can fail to see just what is wanted.

Note.—The ambiguity referred to probably arose from the omission in the sketch mentioned of the lines across the top and down the side, indicating where the timber was to be cut. "Tramp" called attention to this in the March issue.

From L. L. F., *Geneva, Neb.*—I have been a reader of *Carpentry and Building* since 1886 and always find much interest in the correspondence, which is always more or less instructive and useful to all who read and think. In answer to "Tramp" of South Denver, Col., whose letter was published on page 44 of the February issue, I inclose sketches, Figs. 4 and 5, showing my way of framing. It will be seen that Fig. 4 is the same as one of "Tramp's," only I show saw cuts at the tenon. In Fig. 5 is represented a splice and shows the method of witness marks which I use in all framing. I think it is the best because it cuts away all witness marks and leaves the timber free from scratch marks, at the same time presenting a more workmanlike appearance. In the second place it is impossible for workmen to make mistakes and it avoids the necessity of explaining to each man working after the framer which is a tenon, mortise, gain or splice. When there are six or more men at work it is only necessary to instruct them to cut away all timber having witness marks, and if you are a competent and careful framer that is all the instruction the men will require. I have had men working for me who wanted to know where each mortise, tenon and splice belonged when in building. When we pay the highest wages we do not always feel inclined to spend much time with workmen. Let them think and study as the work goes along. In the case of an apprentice who is learning the trade and working at low wages it is our duty to give him all the instruction possible. I would like to hear from "Tramp" again.

From M. D. S., *Pittsburgh, Pa.*—Allow me to submit a partial answer to the article in the February issue, contributed by "Tramp" of South Denver, Col. I have changed his sketches to suit my case, using his first as Fig. 6, which shows the method I have always used, witnessing "in" for gains or trusses and "out and across" for mortises and tenons. In Fig. 7 is shown the method always used by Mr. Mc. of my acquaintance, who was perhaps the most successful as well as most fastidious framer I have known. His reason for using this system of framing was "that no marks were left on the timber." As far as I am aware there is no particular reason why either of these methods should be adhered to strictly further than this, that the signs are a sort of language to the mechanic, and a boss after having started with a method should not change, so that the men who follow him will always know "how to cut."

From A. W. W., *Copper Cliff, Ontario.*—In reply to "Tramp's" question in the February number of the paper as to different methods of witness marking in timber framing I send the inclosed sketch illustrating my plan, and also the general scheme employed in this section of the country. As this is the great nickel mining region of the world it is needless to say that there are some immense frame buildings here, and as I have charge of the carpenter work for the largest mining company in the district, there being three mines in active operation during the summer months, I have a great deal of laying out to do in framing timber. Referring to the sketch, Fig. 8, T is a tenon, M a mortise, G a gain, and B M a brace mortise. The other witness marks on the top edge of the timber are for draw bores for pins. The inside lines show the depth of boxing. In a brace mortise I witness mark it only at the toe end of the mortise. I forward my method for what it may be worth, and do not say it is the best one. I hope that readers of *Carpentry and Building* will take up the question and send in their answers. I would like to see more questions asked about timber framing.

Strength of Roof Truss.

From B. R. L., *Naperville, Ill.*—Inclosed I send sketches and computations in reply to the inquiry of "W. H. B.," Baxter, Iowa, whose letter appeared in the issue for February. The data which he gives are too meager for a solution of the problem, hence I have made a few assumptions. I assume that the roof has no ceiling, but is an open timber one; that he will use purlins, and that there will be no truss next to the end walls, the purlins resting directly on the walls at those ends. If there are ten trusses the distance between their center lines will be 6 feet 4½ inches, being 11 spaces. It would be better to take ten spaces 6 feet and one nearly 10 feet, for then 12-foot purlins will cut without waste. I have, however, figured the truss at 6 feet 4½ inches, the slight difference not changing the design of the trusses to any extent. Fig. 1, which I send, plainly shows the joist and purlins which I have assumed and the manner of construction. I have by means of purlins concentrated my loads at the joints, as every truss should be loaded. This saves material and the strains are very easily computed in the different members of the truss. Many builders would put the joist directly on the truss and thus introduce a bending strain in the upper chord. The web members have only their center lines drawn, those that are broken being of absolutely no use in the truss. Our loads are constant and downward, there being no wind load on account of the pitch of the roof, and these counter braces only add weight to the truss itself. In Fig. 2 is represented a skeleton diagram of the truss, including only the members necessary for its safe construction. This seems like a very weak looking truss but it will stand. Fig. 3 is the force or strain diagram.

For convenience in following the diagrams we will call all of the space above the truss X and all below Y. Then the first diagonal to the left will be X 1; the first part of the upper chord X 2; the first upright 1 2; the first part of the lower chord Y 1, and so on.

Referring now to Fig. 2, the area of the roof supported at *a*, *b*, *e* and *f* equals 6 feet 4½ inches, which multiplied by 6 equals 38.16 square feet.

Area of roof at middle section equals 6 feet 8 inches, which multiplied by 6 feet 4½ inches equals 42.35 square feet.

	Pounds.
1 square foot of gravel roof, with sheeting, weighs...	13
1 square foot of snow weighs........................	20
Assumed weight of truss per square foot............	$2\frac{3}{10}$
Total weight..................................	$35\frac{3}{10}$
The total load area at *a*, *b*, *e* and *f* equals 38.16 × 35.3 = ...	1,347
1 purlin, 6 x 6 x 6 feet 4½ inches, weighs............	57
5 pieces, 2 x 6 x 6 for joist, weigh....................	90
	1,494

or 0.75 ton, which is the total load supported at *a*, *b*, *e* and *f*.

	Pounds.
The load area on middle section is 42.35 × 35.3 =..	1,893
For joists over middle section, 5 pieces, 2 x 6 x 7, weigh..	105
	2) 1,998
	999

which equals one-half load area and joist.

1,347
90
2) 1,437
718 equals one-half load area of any of the other sections.

Pounds.
999
718
57 weight of purlin.

1,774, or 0.89 ton, total load at *c* and *d*.

From these loads I get my reactions and lay off the load line for the left half of the truss, the right half truss being, of course, similar to it, and then complete the force diagram. I find all the diagonals and the upper chord in compression, while the verticals and lower chord are in tension. In sketch, Fig. 2, the space X 5 has the greatest compression—namely, about 4½ tons. This will take a 6 x 6, and "W. H. B." can simply spike a 2 x 6 to the bottom of his other 2 x 6's. The greatest tension is in Y 5, amounting to 4½ tons. The 1-inch rod and two pieces of 2 x 8 which he has provided are sufficiently strong for the purpose. Use $\frac{11}{16}$-inch rods for all the verticals and 4 x 6's for all the diagonals, spiking the lower chord securely together, giving plenty of lap at the joints. I suppose "W. H. B." intends to use iron shoes to receive the diagonals. It would be necessary, according to the sketches, to securely fasten them to the chords, because there are no counter braces. I would put the 2 x 8 beams in the top chord and the 2 x 6 in the bottom chord. The center of this truss holds itself on the same principle that a hip roof does when uniformly loaded, but I would, in constructing it, run two diagonals, ⅝-inch rods, so as to be safe, on account of the liability of slightly varying loads, as will be the case in the course of construction. These trusses are very close together, but I think a less number with heavier material would be better. I assume all material to be iron and pine. If I have made any wrong assumptions or errors in the above, corrections will be gladly received.

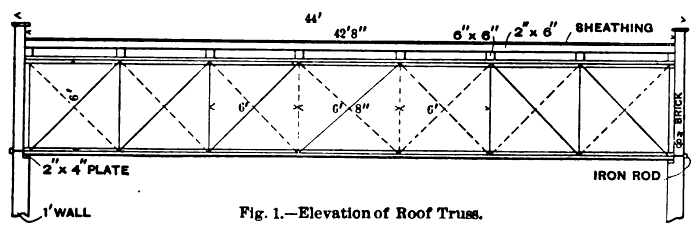


Fig. 1.—Elevation of Roof Truss.

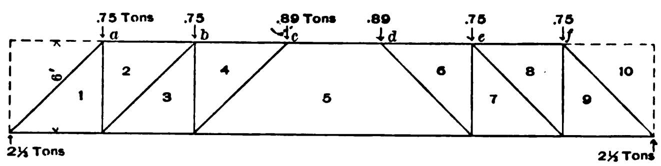


Fig. 2.—Skeleton of Truss.—Scale, 3-32 Inch to the Foot.

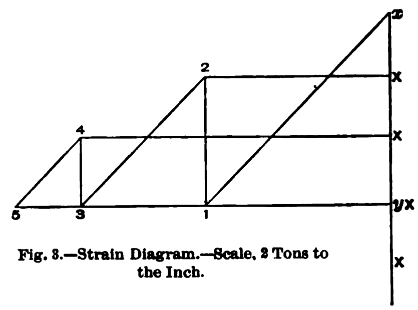


Fig. 3.—Strain Diagram.—Scale, 2 Tons to the Inch.

Strength of Roof Truss —Sketches Accompanying Letter from "B. R. L.," Naperville, Ill.

Design for a Society Building.

From BIRDSEYE, *Reading, Pa.*—Will some kind reader of *Carpentry and Building* furnish for publication in the Correspondence department floor plans for a society hall 60 x 130 feet in size? The first floor is to be devoted to business rooms, the second floor to offices, the third floor to be divided into a reading room, library, banquet hall, kitchen, parlor and rooms for games, together with lavatories, closets, &c.; fourth floor into two or three session halls with ante-rooms, and fifth floor to be devoted to one large hall with ante-rooms, ticket office and at one end a stage. This is a good opportunity for some of the readers to show what they can do in the way of meeting special requirements, and I trust that many of them will endeavor to assist me.

Rules for Kerfing.

From W., *Vancouver, Wash.*—I derive great satisfaction from *Carpentry and Building* and am greatly interested in the Correspondence department, although I have not taken an active part. In the March number I notice a request from " G. N. Y." for a rule for kerfing. I submit some remarks which may be of interest to the correspondent. Referring to the sketches, strike a circle, as indicated in Fig. 1, and take a piece of stuff the same thickness, cutting a single kerf. Place the piece on edge with the kerf at the center of the circle. Depress one end until the kerf is closed, as indicated by the dotted lines. The distance that the piece is moved on the circumference of the circle will be the distance to be used between kerfs. This rule will work on any size circle and any thickness of board. In Fig. 2 of the sketches the piece is kerfed from the back instead of the face. As these kerfs will not close, but open wider, and are not seen, the only rule necessary in spacing is that they be sufficiently near together to allow the board to bend easily. Make a form by tacking blocks on the floor, wetting the piece with warm water, and then as it is bent around the form follow closely with two strips ⅜ x 1½ or 2 inches, nailing them as you go. These strips should be on the edge next the floor, and when well nailed all around turn the circle over and nail strips on the other edge the same way. When finished the circle will retain its shape, the face will show no sign of kerfs and will be stronger than if done the other way. I would suggest to readers of the paper, and especially the correspondent inquiring, that the plan be tried.

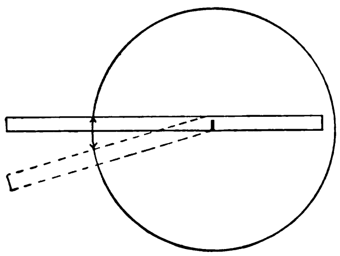


Fig. 1.—Method Suggested by " W."

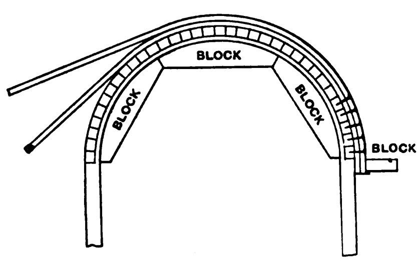


Fig. 2.—Method of Kerfing from the Back Instead of the Face.

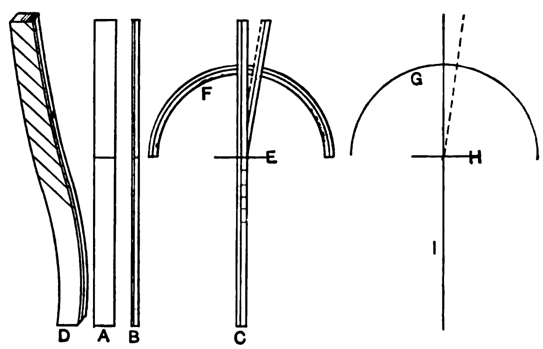


Fig. 3.—Sketches Accompanying Letter of " M. A. M."

Rules for Kerfing.—Sketches Submitted by Different Correspondents.

From M. A. M., *Santa Monica, Cal.*—I inclose sketches and an answer to the inquiry of " G. N. Y." on the subject of kerfing. The material I will use is ⅜ x 8 inches, and is represented at A of Fig. 3 with a kerf about midway of its length. At B is represented an edge of the same piece with a gauge mark 2⅛ inches from its face, this being the depth of the cut. At G is shown the semicircle to be filled with kerfs, H being the center and I a line drawn through the center indefinitely. The piece to be kerfed is shown at C with the cut H transferred to E. Now hold firm the lower part of C and bend the upper end on the circle F until the kerf is closed. The line started at H and cutting the circumference of the circle indicates at the circumference the distance the saw kerfs will be apart. Set the dividers to this space and beginning at the center cut space the piece to be kerfed both ways. Use the same saw in all cuts and let it be clean and keen, with all dust well cleaned out. I always use the Langdon box set to depth, as the beauty of the work depends upon the care and accuracy with which it is done. In kerfing a wreath obtain the cuts in the same manner, but always make them with the pitch of the wreath as shown at D.

Note.—We have answers to the inquiry of " G. N. Y." similar to that illustrated in Fig. 1 of the accompanying engravings from " P. H. L.," Honey Creek, Wis.; " T. S.," Central Square, N. Y.; " J. W. I.," Anaconda, Mont., and " E. B. F.," Rochester, N. Y.

Heating from a Coil.

From C. A. W., *Chicago, Ill.*—I would like to learn how to pipe a room for heating it with hot water to secure the best results. The room is located over a store in which there is a large heating stove. I shall use the room, which is 18 x 22 feet with a 10½-foot ceiling, for a workshop which will have a work bench extending all across the back end, which has a western exposure. The proprietor wants to heat the shop from the coal stove, and thinks that a pipe can be run from a coil in the stove above the smoke pipe; then through the floor and up to the ceiling of the shop, so as to avoid a door which is in the shop. In returning to the stove it will connect with a pipe coil, as he does not wish to use a radiator, but he does not know what size pipe or how much of it to use. I have my doubts about it keeping the room warm, as it is in the west end of the building and the work benches have to be at the west end on an outside wall. The building is of brick and a stove pipe runs up to a chimney which stops at the ceiling of the shop.

Note.—If the stove in question has sufficient heating capacity to heat the store in which it is and the water that would be necessary to heat the shop it seems as if there would be no difficulty in piping the job so as to give good results. Using the cubic rule in determining the amount of heating surface that would be required in the room, we find that about 140 square feet of radiating surface would be required. This is allowing 1 square foot of radiating surface to every 30 cubic feet of space. Owing to the large size of the radiator, it is probable that 1¼-inch would be better in this case than 1-inch pipe, and in order to expose 138 square feet of surface 322 lineal feet of 1¼-inch pipe would be necessary. The placing of this pipe might be either in a return bend coil or in a manifold coil, and in order to get this amount of pipe in a room it is probable that it would be necessary to have the coil extend across one end of the room and a few feet along each side. It is quite a common practice to place the radiating coil under the work bench, and no objection is made to it by the workmen. A heating coil placed in the stove has a superior heating surface and will take care of more square feet of radiation than is generally rated for a regular hot water heating apparatus, provided that the fire chamber is of ample size and a good fire is carried. Calculating on such conditions, 1 square foot of surface would be required in the heating coil in the stove for every 30 feet of radiation in the pipe coil in the shop, or about 5 square feet of surface. This would amount to about 11¼ lineal feet of 1¼-inch pipe in the coil in the stove. This coil is preferably located just above the fire, so that it has the radiant heat of the fire and also the heat of the products of combustion. In piping the job the flow pipe from the coil in the stove should run with a positive ascent, so as to avoid air traps, to a point near the ceiling of the shop. Here should be placed an expansion tank, and when connected with the flow main at the highest point it will also serve as an air vent. The pipe from the flow main to the expansion tank need not be over ½ inch in size. From this point the flow main should drop to the radiating coil. In placing the radiating coil care should be taken to so grade it that any air that may be in it may escape up to the expansion tank. The return from the radiating coil may be run back to the stove and connected to the heating coil in the most convenient manner, but always preserving a fall to the stove. Water in being heated expands one-twenty-third of its bulk, demanding more space, and in order to prevent the expansion tank overflowing it should be of ample size.

COTTAGE AT HELENA, N. Y.

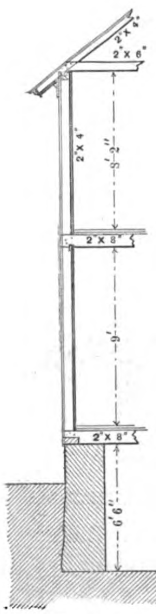
A COTTAGE pleasantly located in the thriving little village of Helena, N. Y., forms the basis of our supplemental plate this month. The engravings presented upon this and the following pages give an idea of the arrangement of the rooms and the method of construction. The drawings were prepared by architect Thomas E. Jennings of Brasher Falls, N. Y., who states that the total cost was about $1400. It will be seen from an inspection of the floor plans that the accommodations consist of four rooms on the first floor and four sleeping rooms and bathroom on the second floor. From the architect's specification we learn that the foundation of the house is of field stone, laid in lime mortar, the portion of the wall above grade being faced with quarried stone. The wall is 2 feet thick, and is carried up to the top of the first floor joist, as may be noted from an inspection of the section showing details of the water table and main cornice. The frame is of balloon construction, the size of the joist, studding, &c., being indicated on the detail mentioned. The outside walls and roof are sheeted with square-edged hemlock boards and the roof is covered with cedar shingles. The cornice, window and door frames and other exterior finish is of pine. The clapboards, which are also of pine, are laid on building paper, and were resawed on a bevel from inch boards.

The walls of the first story are covered on the inside with square edged hemlock boards laid diagonally, as is also the floor lining of the second story. Pieces 2 x 4 inches are nailed diagonally between the studding of the main partitions and in the second-story walls, giving a strong frame to withstand wind pressure. The plastering is two-coat work, sand finish, the plaster in all cases being continued down to the floor lining and extended up to the lining of the second floor, where the ends of the joist join the outside walls. Blocks are cut between the gable studs at the second-story ceiling for the purpose of stopping both fire and vermin. The hall and parlor are finished in ash, with cherry corner blocks and moldings. The rest of the finish, except the dining room and bedroom on the first floor, which are finished in natural wood, is yellow pine, painted. The architect refers to the plan of the roof as being such that with small expense for eave trough and conductor pipe an ample supply of water may be obtained at one side of the house for the cistern, the position of which is clearly indicated on the foundation plan.

Arrangement of Planing Mill Machinery.

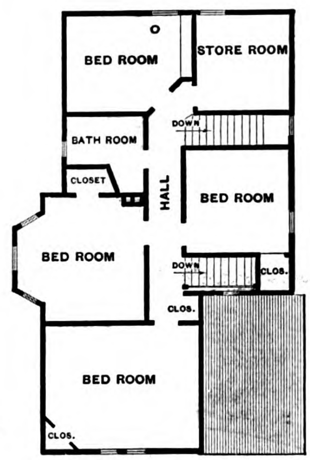
It makes no difference how small a mill is if it is not overcrowded with machines. The great trouble generally is that mill men are too greedy to get a large number of machines when they have not room to put them in, so that they are in each other's way.

This is not the case with wood working mills especially, but as we are in the wood working business we had better not branch out into any other for fear we shall make a mistake somewhere, says a recent issue of *Lumber*. There is some excuse for planing machines being crowded, for we can push their work entirely out of the building, and if there is a convenience for getting the stock up to the machines we can get along very well if they are close together. The chances are, however, that in crowded mills the planers, quite as often as any, come in for their full share of inconvenience from being too close together.

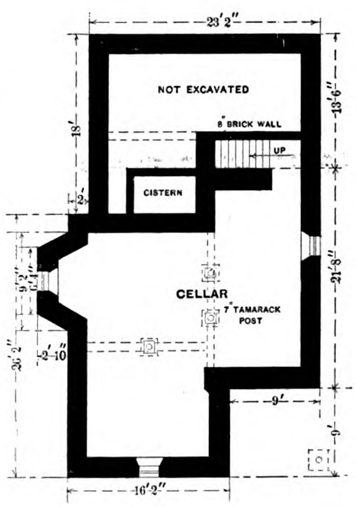


Section.

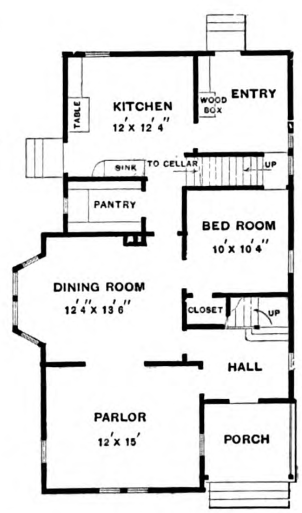
Front Elevation.—Scale, 1/8 Inch to the Foot.



Second Floor.



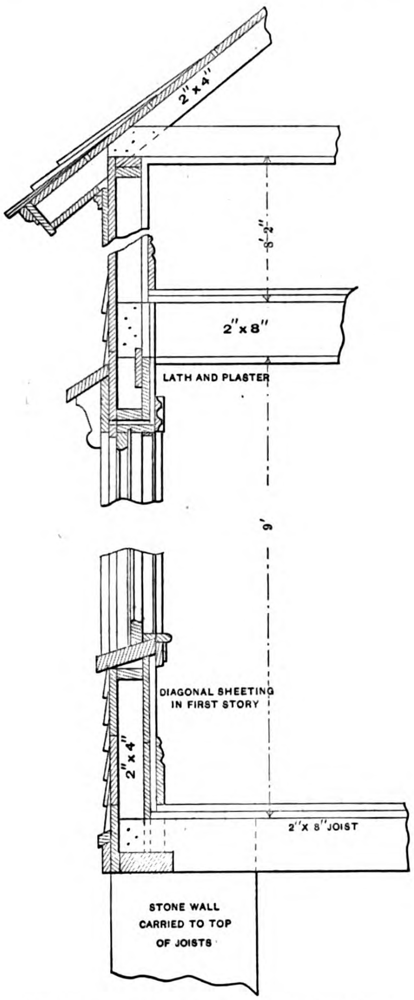
Foundation.



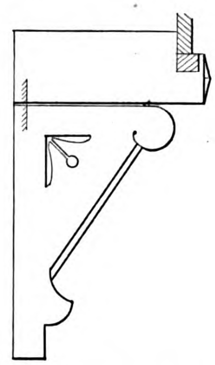
First Floor.

Scale, 1-16 Inch to the Foot.

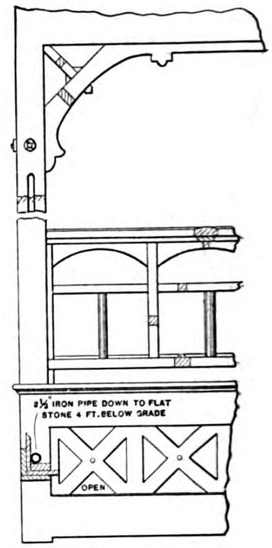
Cottage at Helena, N. Y.—Thomas E. Jennings, Architect, Brasher Falls, N. Y.



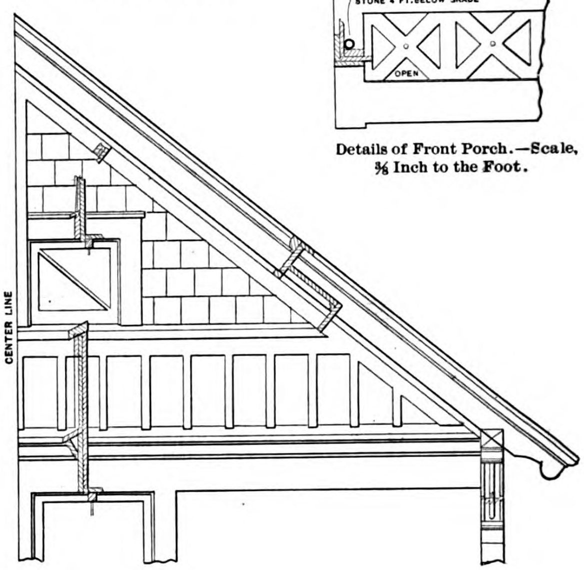
Section Showing Details of Main Cornice, Water Table, &c.—Scale, ½ Inch to the Foot.



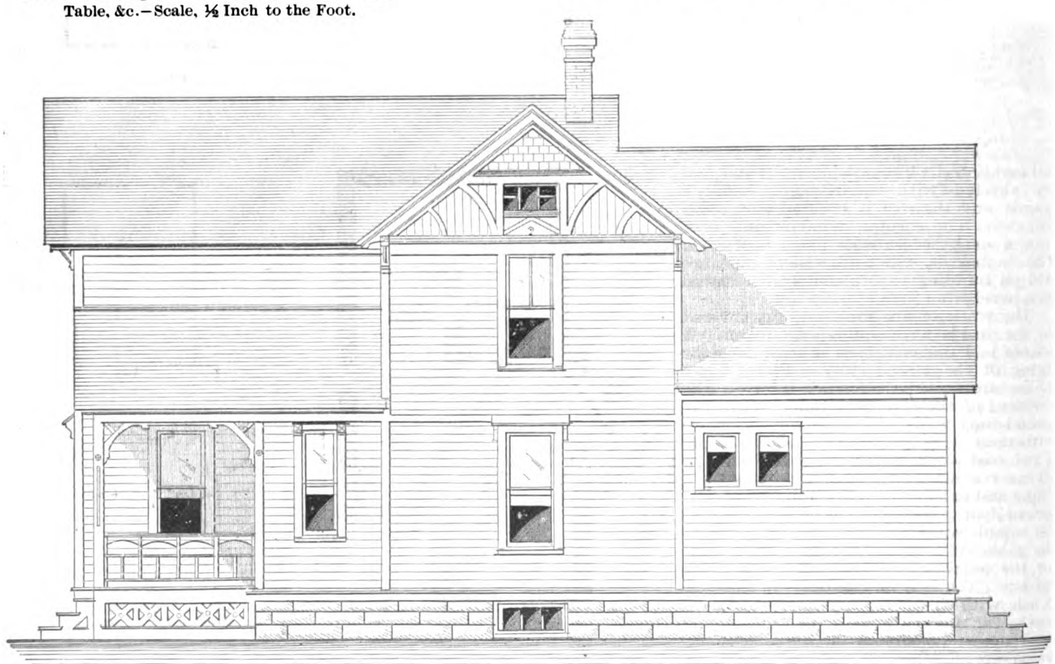
Side View of Porch Bracket —Scale, 1 Inch to the Foot.



Details of Front Porch.—Scale, ⅜ Inch to the Foot.



Details of Front Gable.—Scale, ⅜ Inch to the Foot.



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

Miscellaneous Details and Elevation of Cottage at Helena, N. Y.

In years gone by mill men had to have large floor space to lay down their work for the matcher, but now, when everything is sawed to stock width, we can dispense with some of this room and set machines nearer together without much inconvenience. The common tendency, however, is to crowd machines too close together, and the cost of handling stock is very largely increased in consequence.

AMOUNT *vs.* COST OF WORK.

Men too often think that because they have a lot of machines in their mills they can do a great amount of work, never taking into serious consideration the cost of getting the stock to and from the machines. In the matter of molding machines, it is too often the case that the stock has to be carried to the machine piece by piece and taken away in the same manner.

There might be some excuse for this if we had but little to do, but where machines are doing a large amount of stock work they should be so located that loads of stock, either from teams or floor trucks (which are far the most preferable) can be laid down or left, as in the case of using floor trucks, so the feeder can get them easily. In setting machines too close together we have to resort to the plan of carrying up one or two pieces at a time, and this, with machines that are feeding 75 or more feet per minute, is slow and costly work, and smacks not of the rush style that we must adopt to keep up with the times. "Laying down floors" for the matcher is one of the "way back" systems which have given place to something better and quicker; but that does not warrant crowding in machines so that we shall have to run over one to get at another.

SPACE AND LIGHT.

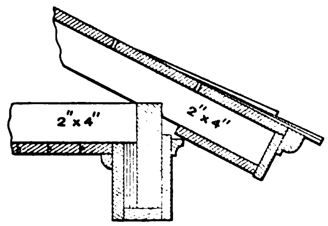
A great many mill men seem to think that they can put a molding machine anywhere, so there is room to set it down on the floor and not have it touch anything. They do not stop to think that all the machines that are run should have free space and good light. No one can see to set a machine up well where there is poor and insufficient light. It should have good light, that the operator may see that the work comes out nice as it runs through, and may not be obliged to carry his work to some near or distant window to look at it. Band saws are frequently put in some out of the way place.

There is but one way to put in and arrange machines, and the plan should be made at the same time the drawings for the mill are made. The man knows what kind and the amount of work he expects to do, and he can sit down and arrange every piece of machinery before the building is erected. In fact, it should be so done. Plan your building to accommodate your machines and not to crowd them into it. Of course, as is many times the case, a company buy a building already erected. Then they must take their chances and do the best they can. As a general thing, it is far better to build your own mill and arrange the machinery so that it shall be situated in the most convenient manner that you can devise. The importance of this method cannot be overestimated. The extra cost each day of handling the stock makes in the aggregate a large expense account, which makes the proprietor wonder why his mill cannot be run as cheaply as his neighbor's. The latter, by conveniently handling his lumber in the mill, makes a percentage of profit where the former loses and eventually goes to the wall. Men manufacturing light work can crowd their machines more closely together if the work is so arranged that it can be passed from one to the other without extra carrying.

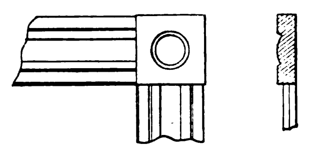
ECONOMY OF OPERATION.

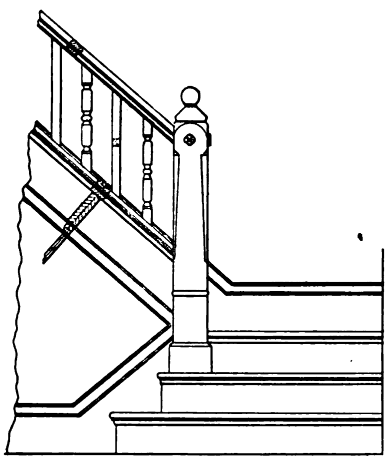
It needs the nicest calculation to arrange the different kinds of machines so that a shop or mill can be run at the least possible expense, and this reduction of expense is made positively necessary from the fact that lumber workers, like men in every kind of business, have cut prices to the lowest notch. If lumber working mills were benevolent institutions, we might not advocate doing the work as cheaply as possible, but "necessity is the mother of invention," and we must devise some means whereby we shall save a margin of profit on the investment. No other plan seems so natural and easy of accomplishment as arranging the machinery in your mill so that the work can be done economically.

No one person can make plans for each mill and shop. Each individual owner must take the subject into serious consideration and make a study of it, as the officers of a railroad do in making out their time tables so that every train shall meet in the right place. Expediting business is one of the great open secrets of success, and this subject of mill arrangement is one of the gravest importance to every man in the wood working business.

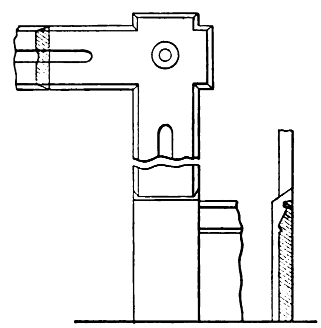


Details of Porch Cornice.—Scale, ¾ Inch to the Foot.

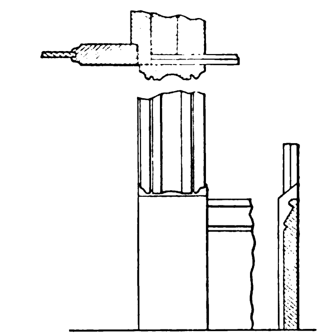




Details of Main Stairs.—Scale, ⅜ Inch to the Foot.



Details of Interior Finish on Second Foor.—Scale, 1 Inch to the Foot.



Details of Interior Finish on First Floor. Scale, 1 Inch to the Foot.

Miscellaneous Details of Cottage at Helena, N. Y

Maltese Buildings.

Instead of stuccoing the walls the Maltese builders cover them with a whitewash as thick as paste, and lay this over the moldings as well as on the plain surface—a plan destructive of all beauty of detail. The village churches in Malta, says an English exchange, are remarkably fine, and one in particular at Zeitun would merit minute examination. We see there, as in some places in Italy, a range of lofty open arches, rising above the external wall of the side aisles to screen the roof. The judgment is not altogether satisfied with this piece of magnificence, because the idea is excited that it is intended in some measure to conceal the construction, and it seems too much for such an object, yet the eye is pleased. There is also a great deal of architecture in the private houses in the villages. A decorated doorway with a window on each side and a bold projecting balcony over it is the usual disposition. Sometimes the house is continued above this, with a large arch opening on to the balcony; sometimes the higher part of the edifice is set back and the balustrade of the balcony is continued in front of a terrace, and in either case the appearance is very handsome and the parts are never crowded together. The fault of these villages is that they have nothing rural about them. The houses are placed close together, or at least with few and small intervals, and one or two palm trees, with a few carobs, figs or cactus peeping above the stone wall, is all that can be seen of vegetation.

BOAT BUILDING FOR AMATEURS.—III.

BY H. L. CAMPBELL.

WE are now ready to take what is called a "spiling" for the next strake. This operation consists of taking a straight piece or batten of material, 4 or 5 inches wide, the same thickness as the planking, and about 20 feet long, and placing it in position with its edge against the edge of the garboard at the midship mold. It must be firmly shored at this point, and clamped or shored at the quarter-molds till it lies flat against each one. It must then be clamped at each stem. Care must be taken not to twist the batten in making it conform to the shape of the molds, but raise up and down on the stem till it lies naturally against the quarter-molds. In its final position it should be the same hight on each stem. We now set our compasses at the widest space between the lower edge of the batten and the gauge line on the garboard. This will be at the stems. Commencing at the stem, place one leg of the compasses on the gauge line of the garboard, and make a prick-mark with the other leg in the batten. Repeat this every 2 or 3 inches from the stems to the midship section, always remembering to keep the compasses in a line at right angles to the keel, supposing the keel to have no camber. We now take the batten off and lay it on the next plank, keeping the lower edge of the batten the distance that the compasses are set away from the edge of the plank. Now, setting one leg of the compasses in the prick-marks on the batten, we make another series of prick-marks in the plank with the other leg, keeping the legs of the compass at right angles to the edge of the plank. We foot or so; then fit the other end and finish nailing. The places where the ribs come must be marked on the inside of the strakes at right angles to the keel and the place where the rib nails come skipped. Where one or both strakes are straight grained the nails must be staggered or put a little way on each side of a straight line, otherwise a crack may start, and, jumping from nail to nail, extend quite a distance. If the grain is not straight the nails may be placed in line. It would be advisable to finish nailing each strake as it is put on. It is easier to do then, and as there are from 2000 to 3000 nails to be driven it is a tedious job if many are left till the strakes are all on.

The same operation is gone through with each successive strake in the same order. If the amateur expects to build a similar boat at any future time he may make a pattern of each strake as he works it out and lay it away for future use. It is advisable to make each strake in a single piece till the outside waste of material becomes too great. When the strakes become so crooked that the whole piece cannot be got out of a plank 12 inches wide, they must be made in two pieces. The first splice should be made near one end, the next one near the other end, while the next may be made in the center. This will keep the splices a good way apart, which makes their appearance less objectionable. The splices must be made by a scarfed joint, not less than 8 inches long, and it need not be more than 12, as shown in Fig. 17. There should be four rows of copper nails in the scarf, the nails being spaced

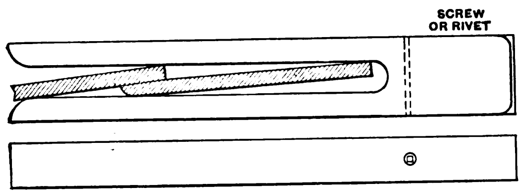
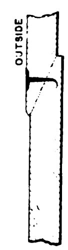


Fig. 15.—Side and Top Views of Clamp for Holding Strakes in Position.—Scale, 3 Inches to the Foot.



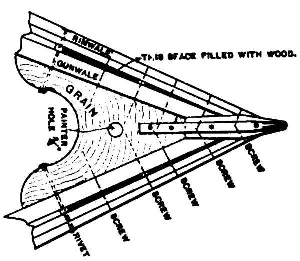


Fig. 17.—Diagram of Splice.—Scale, 3 Inches to the Foot.

Fig. 16.—Hood Boards.—Scale, 6 Inches to the Foot.

Fig. 18.—Details of Breast Hook.—Scale, 1½ Inches to the Foot.

Boat Building for Amateurs.

have now transferred the shape of the garboard gauge line to the plank, and, after tracing a line through the compass marks, we may rip the surplus material off, leaving ¼ inch or so outside the line for subsequent corrections. After taking the width of this plank from the molds and stems they may be laid down at the proper places, and, after allowing for the lap, trace a line through the points, and allowing ½ inch more, as on the lower edge, the surplus material may be ripped off. Now measure up ¾ inch from the compass marks on the lower edge, and transfer this measurement to the inside of the plank. Repeat this at several places along the plank. These marks are where the top edge of the garboard should be when the second strake is in position. We are now ready to make a trial fit.

For the purpose of holding the strakes in position while fitting and fastening them we need four or five clamps, as shown in Fig. 15, made like a large clothes pin and used as shown in the figure. Placing the strake in position, and bringing the marks on the inside even with the top of the garboard, the strake should lie close to each of the molds when clamped in position on the stems; if it does not, it may be moved up or down, not to exceed the margin left at the top and bottom, and, when correct, a pencil line may be run the whole length on the inside along the top of the garboard. Taking the plank off we run another line ¾ inch below this one for the lower edge. After working our material down to this line with draw knife and smooth plane we make the necessary corrections in the top line of the strake, smooth and sandpaper it, and, laying face downward on another plank, mark out the strake for the opposite side. We now run the gauge line along the outside upper edge, and plane off the hood bevels on the outside upper edge, and a corresponding bevel on the inside lower edge, to fit over the bevel already made on the garboard. When in position these bevels should be like Fig. 16, a short distance from the stem. The outside lower edge, must now be rounded its entire length, as shown in Fig. 13, and the strake is now ready to nail in position. One end may be fitted and fastened, and nails driven every from ½ to ¾ inch apart vertically. The strakes should not be planed to less than $\frac{1}{16}$ inch thick at the ends, and the splice must always point aft on the outside. As it requires a great deal of trouble and care to make the planks assume the circular form of the mold on the turn of the bilge it is necessary to trim the bilge to a polygonal shape, as shown in Fig. 13, the shape of the mold before trimming being shown by the inside dotted line. The amount to be taken off the quarter-molds will be very little. It will be noticed in Fig. 13 that in the two laps on the turn of the bilge the wood of the under strake is very much cut away at the midship section and does not leave very much for the nails to clinch in. Although the joint can be satisfactorily made by using light nails at this point, it is better to introduce two oak ribbons about 1 inch wide and $\frac{3}{16}$ inch thick to clinch the nails in. This clamps the thin end of the strake firmly and makes the joint very strong. It also keeps the ribs from being bent into a kink at these points. These ribbons need only run from one quarter-mold to the other, as the joint assumes its normal shape as it approaches either end.

It may be remarked here that the greater the number of strakes in the side of a boat the easier it is to turn the bilge. The strakes on the bottom may be made a great deal wider, and those around the bilge narrower, if it is desired to reduce the number and economize time, but the boat will not have as fine an appearance as one built with the strakes all alike and evenly spaced. If the boat is to be finished in oil and varnish its appearance may be greatly improved by making the top strake of black walnut, cherry, mahogany or any other hard and dark colored wood. The upper edge of the top strake may be left a little full and the hights of the stations on the sheer plan set off on it by measuring up from the floor. The rimwale can now be put on. This should be of oak, about ½ x ⅞ inch, with the under corner slightly rounded. It can be tacked lightly from the inside at the hights set off and fastened with a screw to the stem. Any little hollows or kinks can then be straightened out by looking along from end to end.

and the wale finally fastened by driving nails every 3 inches through the top strake and clinching them on the outside. They should not clinch more than $\frac{1}{8}$ inch, and should be driven against a steel face. The places where the ribs come must also be skipped. The top strake can now be planed down to an even surface with the wale and the operation repeated on the other side.

As the two sides must be made exactly alike the other wale must be adjusted by leveling across from the first one put on, or by measuring up from the floor, always supposing that the floor is level, of which the builder must be sure or some grave mistake may be made. As the strakes are put on the ribs should be marked on each one with a flexible batten, kept at right angles to the line of the keel, in order to show where the rib nails will come. When the rimwales are on, take the smallest bradawl obtainable and bore through the center of each lap on the line of the rib. This will show where to put the nails on the outside. A piece of wood must be held on the outside to prevent the awl from breaking out splinters; the holes must then be enlarged through the first plank from the outside with a large awl, and the nails inserted in all the holes and tapped gently to secure them from falling out. The nails should be the same kind as those used in the laps—long enough to clinch $\frac{3}{16}$ inch or $\frac{1}{4}$ inch. The ribs should be oak or elm, $\frac{3}{8}$ x $\frac{1}{2}$ inch, the largest dimension next the planking; the inside corners may be slightly rounded off. The ribs must be steamed to make them flexible enough to bend in without breaking.

A serviceable steam box for this purpose may be made as follows: Take an ordinary iron pot and fit a wooden cover to it as tight as possible; get a $1\frac{1}{2}$-inch gas pipe nipple, and, cutting a hole in the center of the lid, screw the nipple into it; make a wooden tube about 6 inches square and long enough to take in the ribs; close up one end, leaving the other end open; bore a hole through the center of one side to fit the nipple and screw the box down on the lid; fill the pot nearly full of water; set on the stove, and when it begins to boil put on the lid and box, put in the ribs, and close up the open end with rags, shavings or a lid. It will require two, one on each side of the boat, to nail in the ribs, as they "set" very quickly after being taken from the hot box. Allowance must be made for breakage and more ribs steamed than are actually required.

This part of the work must be done very quickly, as the ribs become brittle if cooked too long. It is perhaps the better way to put in half the number to start with and one can be drawn out and tested from time to time, till they are found flexible enough to bend. They should be first nailed into the center of the keelson with nails about 1 inch long; it was for this purpose that the screws in the keelson were put on the sides. The other nails should then be driven as rapidly as possible. The ribs should be long enough to project above the gunwale about 4 inches, as they have to be bored for the rivets; if they are cut off before being bored they will split. Before putting in the ribs the molds may be taken out, as they are of no further use; the shores between the molds and the braces on the stems must be left in place. The ribs should be put in all in one piece, as long as they will stand the sharp bending required toward the ends. When they begin to break they may be put in in two pieces. After the ribs are all in the gunwales are next in order. These should be of oak, as that is the strongest, but if we wish to be very fancy we can make the gunwales and rimwales of black walnut. The gunwales should be about $\frac{7}{8}$ x $1\frac{1}{4}$ inches, and may be rounded or chamfered on the lower edge; they must be fitted neatly to the stems, and a screw long enough to pass at least $\frac{7}{8}$ inch into the stem should be put through the rimwale from the outside. Holes must be bored for rivets through each rib, boring from the outside through both wales. The rivets generally used are $2\frac{1}{2}$-inch wrought nails, the heads countersunk in the rimwale with a center bit, and the surplus point cut off with a pincers and riveted over a copper burr. The projecting ends of the ribs may now be sawed off and the tops pared off smooth and even with a chisel. After the gunwales are in and riveted the breast hooks may be put in. These are natural crooks, put in between the gunwales at each end, and serve to hold the boat firmly together at these points. It should be about $1\frac{1}{2}$ inches thick, set even with the gunwales at the bottom and planed off evenly with them at the top. It must be planed rounding, leaving it higher at the center than at the sides. A $\frac{3}{4}$-inch hole for the painter may be bored through it. By referring to Fig. 18 it will be seen that the gunwales and rimwales are tapered some and the first rib cut away to allow the gunwales, rimwales and planks to come together on the stem. The spaces between gunwales and planks are then filled with wood and the breast hook screwed and riveted in securely. The thwarts are next put in, spaced as shown in Fig. 19 and secured as shown in Fig. 13, the knees being riveted through both wales and to the thwarts. The knees used are generally hackmatack, but beech, maple, oak or any hard wood will answer the purpose admirably. A half-day's hunt through a piece of woods ought to furnish the amateur with all the knees he will require. The hackmatack knees are formed by the roots and trunk of the tree, of the former of which

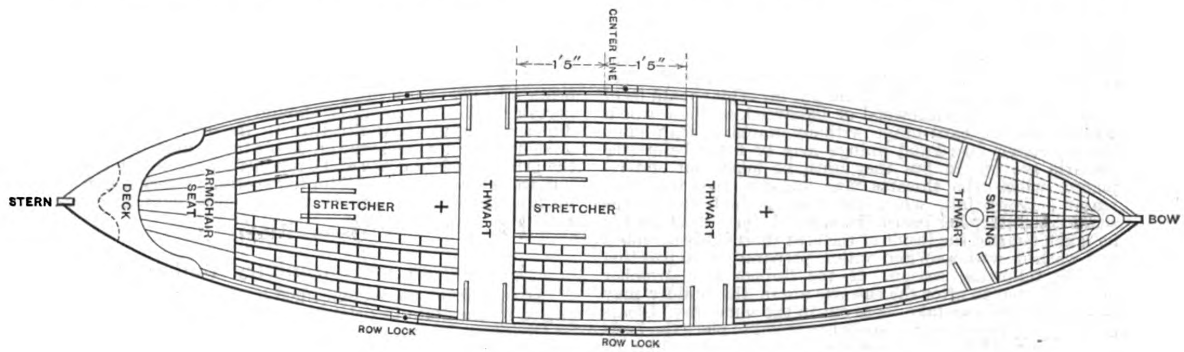


Fig. 19.—Deck Plan.—Scale, ⅜ Inch to the Foot.

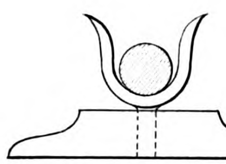


Fig. 20.—Open Rowlock.

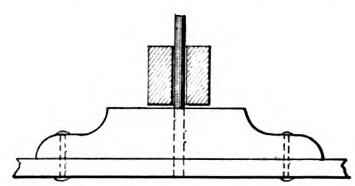


Fig. 21.—Rowlock Used on the Lakes.

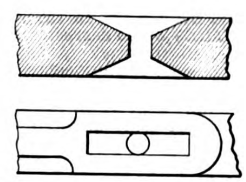


Fig. 23.—Detail of that Part of the Loom of the Oar Working on the Pin.

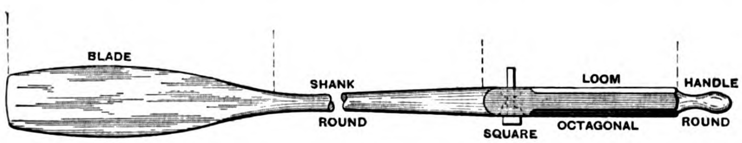


Fig. 22.—Detail of the Oar.

Boat Building for Amateurs.

there are sometimes as many as five growing out at right angles to the latter. The sailing thwart should have a piece screwed or riveted on the under side, with the grain running contrary to the thwart. The hole for the mast should be about 2½ inches in diameter, and that in the step about 1½ inches. The step should be 2 inches thick and securely screwed or riveted to the keel. The better way is to run a tube from the thwart to the step. It may be parallel and the mast slightly tapered to prevent sticking. With a step alone the mast is liable to slip out and split the thwart or damage the side of the boat, but with the tube it cannot ; XX tin will answer for the tube. The stern seat should be made of tapered pieces of ½-inch stuff, secured to two cleats, the cleats resting on long ledges, the same as the thwarts, and notched into them to keep them in place. The seat should be made as large as shown in Fig. 19, to receive an arm chair without legs, making a very comfortable seat for a lady. A small deck is put on over gunwales and breast hook, being flush on the edges with the former. It may be ⅝ inch thick and should have a slight crown. If the boat is to be used for rowing only both ends should be finished in this manner. The seats may be made of alternate narrow strips of walnut and pine, and a bulkhead may be fitted under each seat, joining a small locker. It should be fastened in place with screws so that it can be removed. After the thwarts are in the stretcher or bottom board may be fitted and put in. This should be of ⅝-inch or 1½-inch whitewood or basswood, as these woods will stand more hard usage without cracking than pine. The stretcher board and linings may be fitted before the thwarts are put in, but they must be taken out and replaced when the thwarts are in, for the following reason : Every fall, when the boat is laid up for the winter, the stretcher board, linings and stern sheet should be taken out and the inside of the boat thoroughly scrubbed and washed with soap and water, preparatory to painting for the following season. If the linings and stretcher board are put in after the thwarts are in the builder may be sure that he can take them out in the same way. Cleats should be screwed on the stretcher board to place the heels against in rowing ; the exact place must be determined by experiment, as their distance from the thwart depends on the length of the rower's legs. Adjustable stretchers may be made, as shown in Fig. 19, by screwing parallel pieces to the stretcher board, pointing fore and aft, with a series of notches cut in the upper side, inclining forward at an angle of 45 degrees. A piece of board with a piece screwed to the back to fit in these notches, including all at the same angle, makes a very good stretcher. The linings must be curved to fit the shape of the boat, and must diminish in width toward either end ; they may be made of the same material as the planking and may be wider and fewer in number than those in Fig. 13. They should be painted on both sides before being put in place.

The rowlocks are set 15 inches from the center of the thwart to the center of the rowlock. There are a great many kinds in use. The open rowlock, Fig. 20, requiring a round oar, which may be pulled with a straight stroke or feathered at will, is not so easy for the novice as the one shown in Fig. 21, which is in universal use on the Great Lakes. It consists of an oak block, 1½ inches in hight and wide enough to be flush with the outsides of the wales. It is riveted to both wales at each end, light rivets being used in the rimwale and heavier ones in the gunwale. The top of the block on which the oar plays is about 4 inches long, and should be covered with a thick piece of sole leather. A piece of hardwood is fitted and secured between the gunwale and plank, under the block, and extending between the ribs. A hole is now bored through the block, so that it will come between the gunwale and plank, and a piece of ½-inch round steel is driven tightly in. It should be long enough to project 4 inches above the top of the block when the lower end is even with the bottom of the gunwale. The oar used is shown in Fig. 22, the part of the loom working on the steel pin being square and mortised, as shown in Fig. 23. A hole is bored through slightly larger than the pin, then mortised at top and bottom to give vertical play to the oar This style of oar and rowlock is quite popular, as the rowlocks cannot be lost, and the loom of the oar being quite heavy the oar is nicely balanced. They may also be allowed to trail in the water without danger of dropping off. It would be supposed that the hole through the oar would weaken it at that point, but we have never seen one of these oars broken at the loom ; they generally break at the junction of the shank with the blade, or about the smallest part of the shank. The length of the oar depends almost entirely on the strength of the oarsman. One man can handle a 10-foot oar more easily than another would one of 8 feet. About 9 feet in length is a good average. We wouldn't advise the amateur to make his own oars. Good white ash oars of the above description, but not bored or mortised, can be bought for a few cents per running foot.

If the boat is to be painted inside and out it should receive a coat of paint on the inside before the ribs are put in. Three coats of paint inside and out will be sufficient. The paint should be applied thin in order to get the wood to absorb as much oil as possible. The builder must suit his own taste in regard to colors. A boat painted black outside, with a gold stripe ¼ inch wide, ¼ inch up from the bottom of the top strake, and the interior and the wales finished in their natural color with two coats of boiled linseed oil, one coat of orange shellac and one or two coats of spar varnish, cannot be excelled in appearance. If the outside is finished in oil proceed as just directed for the inside. In painting or oiling the outside the material must be applied plentifully on the laps and the boat allowed to stand bottom upward till dry. The bottom of the stretcher board should be covered with sheet brass where the heels of the oarsman come, to prevent unnecessary wear, and a piece of heavy canvas should be fitted over the whole bottom of the boat up as far as the thwarts ; this will keep the bottom of the boat clean and prevent sand, gravel and dirt from getting under the linings and stretcher board. The stems should be finished at top, as shown in Fig. 11, and faced with half round iron the full width of the face of the stem. The end pieces should be welded to and be continuous with the iron band on the keel, and should be run over the top of the stem and screw to the breast hook. By carefully observing the foregoing directions and exercising a little patience and ingenuity the amateur may be tolerably certain of success, although he may not be familiar with any kind of craft whatever ; but where the opportunity exists a few hours spent in watching a boat builder and in examining boats already built would not come amiss. It is not necessary that the amateur should confine himself to the dimensions of the boat illustrated. He may build longer or shorter, wider or narrower, as his fancy may dictate, as the principles laid down and explained apply to all types; but we would not advise him to experiment very much in his first attempt for fear he may be disappointed in the results.

Legislation on Unsanitary Buildings.

An important clause, embodied in the new law recently passed by the State Legislature of New York and approved by Governor Morton, relates to the condemnation of unsanitary buildings in New York City. The clause, which is based upon English legislation and experience, was suggested by the special Tenement House Committee appointed by the Governor a year ago. It reads as follows : "Whenever in the opinion of the Board of Health of the Health Department of the city of New York any building or part thereof in the city of New York, an order to vacate which has been made by said board, is, by reason of age, defects in drainage, plumbing, infection with contagious disease, or ventilation, or because of the existence of a nuisance on the premises which is likely to cause sickness among its occupants, or among the occupants of other property in the city of New York, or because it stops ventilation in other buildings, or otherwise makes or conduces to make other buildings adjacent to the same unfit for human habitation, or dangerous or injurious to health, or because it prevents proper measures from being carried into effect for remedying any nuisance injurious to health or other sanitary evils in respect of such other buildings, so unfit for human habitation that the evils in or caused by said building cannot be remedied by repairs or in any other way except by the destruction of said building, or of a portion of the same, said Board of Health may condemn the same and order it removed, provided the owner or owners of said building can demand a survey of said building in the manner provided for in case of unsafe buildings, and may institute proceedings in the Supreme Court, in the County of New York, for the condemnation of said building. Said proceedings shall be instituted and carried on in the manner prescribed by the Code of Civil Procedure, except as modified by this act. Upon the institution of said proceedings the owner of said building, or any person interested therein, may in his answer dispute the necessity of the destruction of said building or part thereof, as the case may be. In such case the court shall not appoint commissioners unless proof is made of the necessity of said destruction."

Heating Greenhouses.

In commenting on heating greenhouses, using gas for fuel in a hot water heater, Thomas Fletcher makes the following statement in an English journal : A span roof house, protected from winds, size 20 feet square, 12 feet to ridge, required, in one year, a total gas consumption of 34,000 cubic feet to maintain a minimum of 45 degrees with a hot water system. It is quite out of all question to expect to heat a good sized conservatory with gas for anything approaching three times the cost of coke. Under equally good conditions as regards economy, 1 pound of good dry coke is equal to 19 cubic feet of 18-candle gas, and at the prices paid here—*i. e.*, 4 shillings ($1) per 1000 cubic feet—this quantity of gas would cost 1 penny. At its present price, 13 shillings ($3.25) per ton, coke would cost one-fourteenth part of this, and although in practice the figures would come out much more favorably for gas fuel, the difference would still be prohibitive, except on the smallest scale.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

THE design which is presented for consideration this month is a scroll in the French eighteenth century style, adapted to suit the requirements of this case. The design forms a very graceful and effective piece of work when properly executed, and is neither so complicated nor difficult of execution as to debar any one who can handle tools and has followed the directions previously given from making a success of it. The first thing to be done is to decide upon the size it is intended to cut; then obtain the block, taking care to have it sufficiently thick to allow of cutting the highest member. Proceed as explained with the previous design and saw out very neatly. Next see that the surface of the background and that of the scroll fit exactly. Then tooth them, warm, glue together and allow them to remain until perfectly dry. In proceeding to cut this design take a medium sweep gouge, and, after having thoroughly studied the cross sections, rough out the whole design. Roughing out is taking off most of the surplus material and giving the design somewhat the shape it is intended to be, using the concave and convex sides of the tool as circumstances require.

In commencing to cut for the finish start at the scroll, as represented upon the section at A B of Figs. 75 and 76. It will be noticed that the eye of the scroll is flat, so after shaving that down to the proper hight take a gouge of the proper sweep, and holding the tool perpendicularly execute the perpendicular cuts forming the eye. Round up to them as shown, bearing in mind that the rounding up starts gradually from the flat part of the eye. The next step is to cut the hollow, as shown upon the sections A B and C D. This hollow starts gradually out of the round a short distance from the section A B and runs out at a point near the letter E. Now work the round part to this. Of course either part cannot be worked the first time going over, but each should be worked alternately until nearly the correct shapes are obtained. It will be seen that upon the plan there are two lines a little before the section C D is reached. The line marked 4 is a continuation of 4 shown upon section E F of Fig. 76, but where it crosses the section C D it would be so small as to be hardly perceptible, consequently it is not shown there. After leaving C D it gradually gets tapering until it assumes the shape shown upon section E F of the figure named. After leaving E F it gradually rises, and shortly before reaching section G H rises quicker until it resolves itself into the shape indicated at G H. The hollow is continued through that part of the figure until it runs out at the point of the leaf. Work that portion next, then round up the side toward H upon the section G H. The line upon the plan—the highest point upon section G H—is not straight as you have worked it. If correctly done it should show a profile gradually rounding. To obtain the shape as shown upon the plan work the sharp edge down until the correct outline is obtained, making the cuts parallel with the background. Then work up the rounded side toward the letter H until the upper edge shows sharp throughout, leaving the hollow side an even sweep. Toward the letter F upon the section E F it will be noticed that there is a small hollow shown, which commences a short distance before reaching the line E F upon the plan and gradually enlarges until it assumes the shape as given in section I J. Now, in cutting this great care requires to be exercised, as that portion marked 1 upon the section Fig. 76 is cut somewhat under. Begin cutting at the upper edge of 2 and gradually work down all the time, giving the tool a sliding movement to prevent 2 from breaking out. The sliding movement can be given by raising the handle of the tool and cutting from the letter L toward the F, or the reverse, whichever way suits the run of the grain. After the hollow is nicely shaved out work the rounded part 3 and then trim the edge 2, as explained for similar portions in connection with section G H. There is a hollow commencing a short distance after leaving the line C D of Fig. 75. It runs through the figure by the large hollow upon the section E F, Fig. 76, and the small hollow near the letter I upon the section I J. In working this hollow and also the one last mentioned care must be taken to keep the rounded part in the correct sweep for commencing the rounded stem shown in section K L. Work the stem next; it will be slightly higher at the broader portions than is shown by the section. Continue the general direction of it through and past the point where

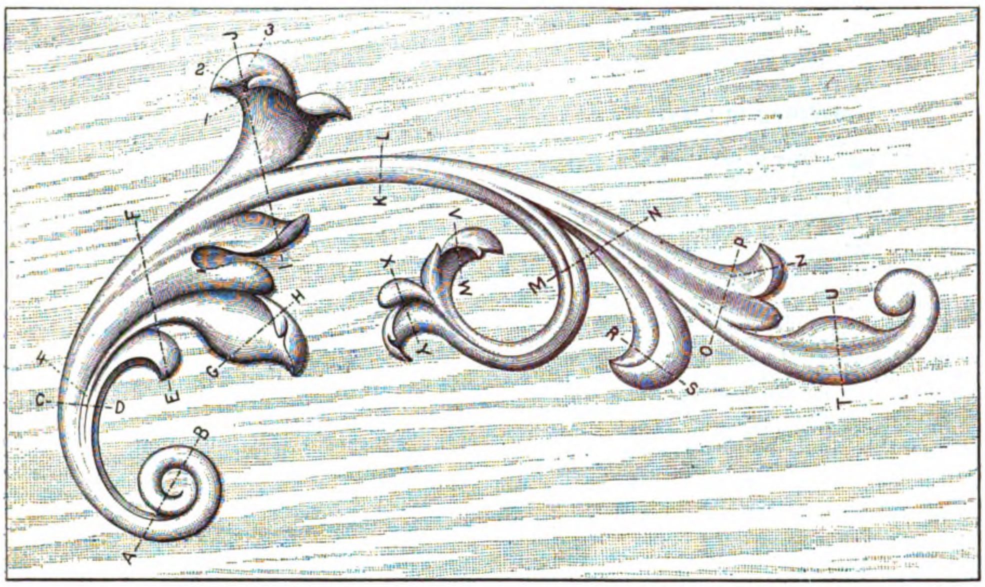


Fig. 75.—French Scroll of the Eighteenth Century Style.

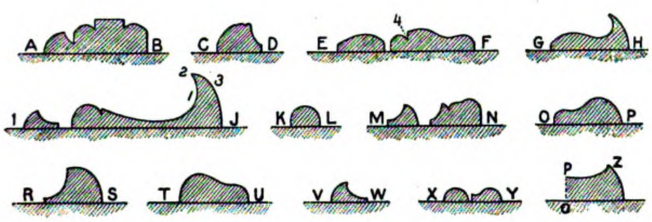


Fig. 76.—Various Cross Sections Taken on the Lines Indicated in the Previous Figure.

Hints on Wood Carving.—By Chas. J. Woodsend.

it branches. Then run up that part toward the letters N P in sections M N and O P. It will be noticed that it gives a turn up so as to form somewhat of a hollow, as shown in section O P Z of Fig. 76. The hollow shown in section O P runs downward toward the background until it leaves the same margin upon the edge of the design as is given for other hollows. The round part toward the letter O in the section O P, soon after leaving there nearly rounds up, then it commences to form a hollow, as shown in the section T U. The rounded part enlarges there, then reduces slightly for a short distance after leaving that point and finishes up in the eye of the scroll. Next take the hollow, as shown in sections M N and R S. Then take the rounded parts shown in the same sections. The next step will be the hollow on the side toward the letters M W and shown in sections M N and V W. Then take the rounded portions, as shown on sections M N and X Y. In working this it is well to keep examining each part as the work progresses so as to keep the general direction of each member. Let all the curves be graceful, taking off a shaving here, filing off a trifle there, and so on until it forms a complete and harmonious whole. After all is satisfactory, sandpaper and finish as before explained. If the directions have been followed and the student is able to properly handle his tools he will have a piece of work of which he may be proud.*

(To be continued.)

Modeling in Clay.

When modeling in clay is practiced as a preparatory course before beginning to carve in wood, the process of building up should be carried on until the outside wall, which represents the surface of the board from which the design is to be carved, is as high as it is designed to make the panel deep. When a leaf or stem is raised to a proper hight smooth it up, giving it vertical sides and flat top, as if it were intended to leave it in this condition. The finish, indeed, should be as carefully imparted as if it were intended to leave it thus. The beginner, says the *Art Amateur*, must go on with his work of blocking out and building up stem, branches and leaves until each portion has reached above the level it is expected to have when finished. This general level of the surrounding border or framing of the pattern, and the design which is inclosed by it, represents the level or surface of the piece of wood from which the carving is to be made. With regard to the square edges which appear in every part of the design when it has been blocked out and built up, if the learner attempts to make them clean and sharp, an annoying difficulty will be met with in the "burr" which arises when the tool is moved along the edge of a stem or leaf. If this is removed by carrying the tool along the side, the burr makes its appearance at the top. This results from making the strokes in a direction parallel to, or outward from, the edge of the clay.

Any attempt to get rid of the burr by bringing the tool over and along the side or top, as the case may be, will not result in the desired end, but only bring about the transference of the burr from the side to top or from top to side, as it may happen. The only way in which a clear, sharp edge can be obtained is to move the tool diagonally along side or top.

The student will find that a leaf built up in the center with low margins has a very heavy, solid look. It catches a great mass of light, and has the effect rather of a solid ball than of a leaf. With the waves going squarely across the long leaf it will be found that the effect is that of a ribbon; and, turning to nature, to see how her leaf surfaces are waved, it will be found that they are rarely or never straight across the leaf, as in the clay. It is necessary to observe that in thus working with the clay to get the best form no finish must be attempted. The most that can be allowed is a line drawn with the blade of a tool to locate the position of the midrib of the leaf.

In nature the stems of leaves and the branches of plants have the greatest variety of section, and by studying them we find very beautiful models. In the larger stem some slight roughness of bark may be given, but on no account should any attempt be made to copy the stem or bark of a shrub closely or exactly. At first the stems may be roughly rounded at the top and left in this condition. For a good effect the stems in blocking out should be made of a hight at least three-fourths their width. A better proportion would be to have the stem as high as it is wide. This, of course, applies to the stems and branches where they are supposed to be flat against the ground. When they are represented as going over or under another stem these proportions may be very much varied.

Nothing has been said about the method of finishing the two half leaves because the student working by himself will, doubtless, find his hands full in modeling the forms of the leaves, and when he comes to finish these he will feel that there is but one way in which they could be put in to look well. This one way, it may be said, is suggested by the shading of the leaves, in which every part of the detail is carefully and sufficiently worked out and thereby rendered amply suggestive to the amateur. And, to refer once more to the character of the material in which he is working: The plastic nature of the clay is such as to enable him to try any method of fashioning the leaves that may occur to him and to alter them again and again until he is satisfied with what he has accomplished. The beginner may be content to go on for some little time without attempting to put on a finish. If his work is rough, no matter. Remember that the chief and great object of all that has already been advanced is to teach form and enable the imagination to comprehend ornamental form in relief. When this has been done the main purpose for which the learner has taken up modeling in clay will be accomplished. There is another reason which should be kept in mind. Without a teacher to explain all the little artifices by which a smooth surface or perfect detail is obtained no little practice is necessary. The variations in the conditions of the clay can be learned from experience, but they are not easily explained on paper. If the beginner will content himself with working for a time in the rough he will soon find himself sufficiently master of the materials to attempt smoothing up and giving sufficient finish to make it worth while to take a cast, and so keep a permanent record of what he has done. In order that he may have as little trouble as possible in carrying out his work he should attend to the following items in regard to the management of his material:

Do not, on any account, hold a piece of clay too long in the hand. It soon becomes warm, and the consequence is that the moisture will rapidly evaporate from it, leaving the clay too dry to be worked properly. This should be noted and the piece in the fingers frequently changed, throwing that which has become too dry, and which has, in consequence, hardened, back into the bowl or box in which the supply is kept.

Clay absorbs water with great rapidity, and in very considerable quantities. During the progress of the work the beginner must be constantly on his guard to have water enough, and, at the same time, not too much. The consistency of soft putty is what should be aimed at, and this will be a good guide for the amateur in keeping his material fit for manipulation and in thorough working order. There is this difference, however: soft putty, when worked about in the hand, in fastening in a pane of glass, gets sticky and clings to the fingers, small portions breaking away from the main mass, but clay will not do this, as it is more cohesive than putty. It will soil the fingers, but when of a suitable consistency for working it will not stick to them.

When beginning any piece of work the clay may be used in a much softer condition than is necessary as the work progresses. After the first stage the clay that is applied to the work should be softer than the work itself. It then stays in place better and does not disturb the mass. When laid on wet the absorption of the water by the drier clay below brings the two portions closely into contact and makes a solid joint.

The clay can best be kept in a wooden pail with a tight cover. When set aside for a time the clay must be sprinkled with water and a wet cloth thrown in on top of it, to prevent the moisture from evaporating. While at work, especially in a warm room, it may need frequent sprinkling in order to keep it in good working condition. As the clay has a constant tendency to grow drier by the evaporation of moisture, it is desirable, after it has been standing for some days, to knead it thoroughly before beginning work so that all portions may be of the same consistency. Other things being equal, a light colored clay is better than one of a darker tint, because it brings out the light and shade of the work better.

When the work has been under way for some time and is considerably hardened, so as to be somewhat firm to the fingers, it can be finished much better than when it is in the soft and plastic condition so desirable, and, indeed, so necessary, at the commencement. Moist clay is not entirely plastic, though it seems so at first touch. In working the clay after the model has been blocked out the amateur must not attempt any alteration of form by pressure. He must not try to make a hollow by pressing the finger into the mass, or to make an elevation by squeezing the materials up. Any attempt to work in this way invariably results in the distortion of the neighboring parts. When hollows are required the clay should be cut out, and when a projection or elevation is wanted it should be obtained by building it up with new material. If the clay that is added is a little softer than that on which it is placed there will be no danger of disturbing the surrounding portions of the work. Careful attention to this rule will save a great deal of annoyance and unnecessary labor after the subject is well advanced.

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

Windmill for Domestic Water Supply.

A cheap windmill that will supply the water for ordinary family requirements or for the stock of small farms is much needed, and as being of interest to our readers we illustrate a windmill that comes within the scope of home made work or within the means of carpenters and mechanics to fit up and set in proper running order. The design, Fig. 1, is for a 6-foot windmill set upon a single post, which, if well set in the ground or attached to a building, will not need guys to steady it, and only in exceptional cases, as for example where the mill is 25 feet or more above the ground, will stays be required. The mill is shown as having eight arms, but can be as readily made with 12 or 16 arms if more power is required.

The blades may be made of ½-inch dressed pine, 2 feet long, 6 inches wide at the narrow end, 12 inches at the wide end; edges to be beveled on the back of the blades to prevent wind resistance, leaving a flat surface to meet the wind. Sheet iron also makes a good blade. Both kinds need a light cross brace near the wide end to stiffen and prevent warping.

The arms should be 2½ feet long, beveled from a point at 1 foot from the center to the end and set at 35 degrees from the plane or face of the mill, this being the most effective angle for the blades. The bevel is made so that the mill will turn as the hands of a watch. The arms are secured to the blades with wood screws. The shaft is of 1-inch pipe, with flanges of 1 x 14 inches and 1 x 6½ inches, tapped out so as to allow of screwing up flush with the thread shoulder on the pipe, as should all the pipe threads. The shaft socket is of 1¼-inch pipe, screwed into the 1¼-inch T, solid, and the other end of the T also filled with pipe cut off flush with its face so as to make the bearing about 7 inches long. Put an oil hole in the T and a plug in the vertical pipe. The connecting rod is 6½ inches center to center. The sliding rod is of 1-inch pipe within a 1¼-inch pipe, which is screwed hard into a 1¼ x 13 inch flange, and revolves in a piece of 2-inch pipe, with the ends closed in to make a fit, and all strapped to a post, as shown in Figs. 2, 3 and 4. The manner of throwing the mill to and from the wind with lanyards and a weight is well shown in the cut, Fig. 2, by simply changing the weight from one lanyard to

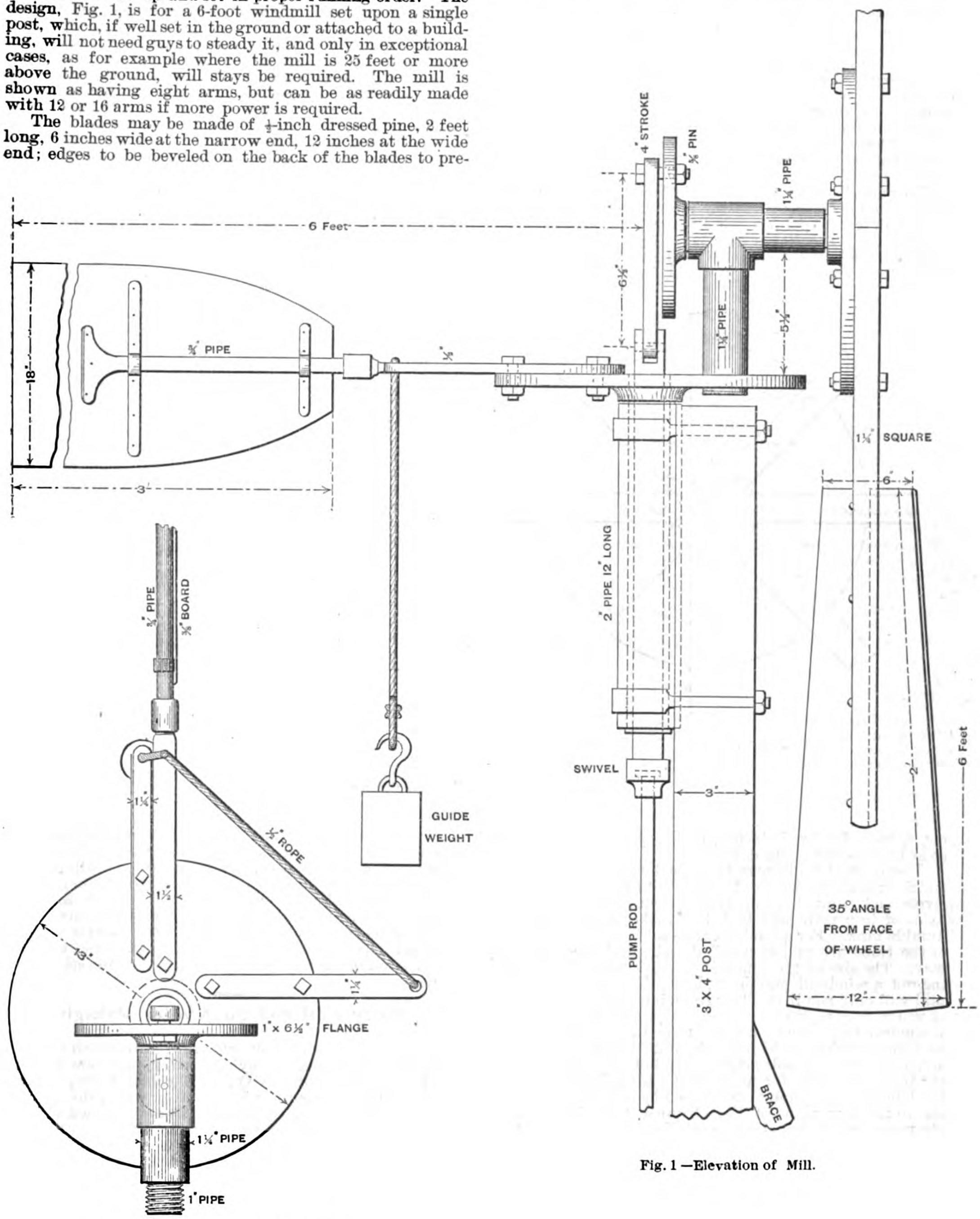


Fig. 1.—Elevation of Mill.

Fig 2.—Plan of Revolving Flange.

Windmill for Domestic Water Supply.

the other. The tail board may extend 6 feet from the center, made of thin lumber or sheet iron and stayed with cross pieces.

The capacity of a 6-foot mill with a full equipment of arms for pumping from a well for a total hight from the water in the well of 50 feet and with a wind blowing 16 miles per hour is 1.8 gallons per minute. The average wind velocity is somewhat greater than 16 miles per hour, and its duration at a velocity for running windmills in the United States is about eight hours per day. The pumping capacity for eight hours per day will therefore be 860 gallons, being from eight to ten times more water than is usually used per day in families and sufficient for ordinary farm supply, so that an eight-arm mill will give sufficient supply for most family wants where water closets are not used. The storage of water is of importance to meet the occasional calms, in which a windmill may not run for a few days.

The staved or barrel tank made from cypress lumber is the best in all respects, and for most purposes need be no more than of 1000 gallons capacity, or 7 feet high by 6 feet in diameter. The staves may be 1½-inch lumber, bottom 1½ inches thick, with all seams plain and well jointed; six hoops of ⅛ x 2 inch iron, lapped and riveted with five rivets, ⅜-inch, flat heads inside; tank tapering from the top, so as to drive the hoops down.

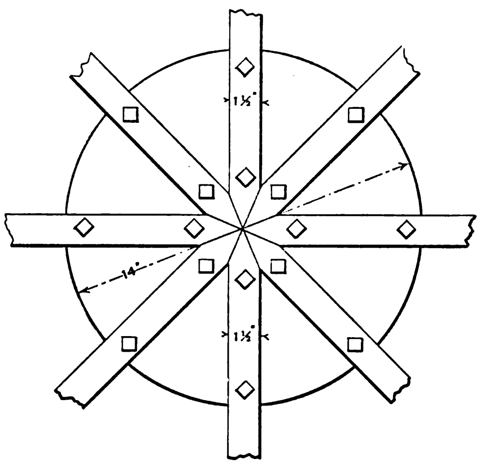


Fig. 3.—Front Elevation of Shaft Flange.

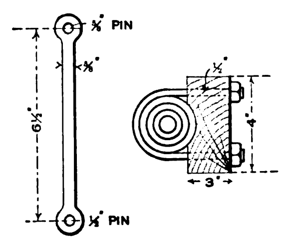


Fig. 4.—Connecting Rod and Flange Bearing.

Windmill for Domestic Water Supply

Iron or steel tanks may be made by sheet iron workers, and for the above size No. 12 gauge iron riveted with ¼-inch rivets and painted inside and out with two coats of red oxide of iron paint and boiled oil makes a substantial and durable tank. For plumbers the cast iron sectional tanks of the trade are easiest handled and satisfactory in every way. The size of the pump is of much importance in laying out a windmill pumping plant. If it is too large the mill will only run in the strongest winds, and its daily yield of water may be little or none. A pump for a 6-foot mill, if single acting, should not be larger than 2-inch diameter by 4-inch stroke for 50-foot lift, and 1½-inch diameter by 4-inch stroke if double acting. As but very few pumps of the trade are made for as short strokes as 4 inches or less, the longer stroke pumps can be used by adjusting the buckets to the lower part of the chamber to avoid too great clearance, which interferes with discharging the air from the suction pipe.

Where it is convenient to place the windmill over a well, a frame should be made to support the post with guy rods or wooden braces, but in all cases the pump should be placed in a pit to protect it from frost. Where it is convenient to place the mill upon a barn and the pump at some distance, a pair of T bell cranks can be used to convey the power a short distance horizontally from the mill to the pump.

Tracing Drawings.

A correspondent writing to an English architectural journal relative to the method of tracing drawings presents the following suggestions: Prepare the tracing cloth or paper by first rubbing on it some finely powdered French chalk and then for doing the tracing use Indian or Chinese ink in which a small quantity of prepared ox-gall has been rubbed up in ink. The tracing may be done by means of a good drawing pen.

Dressing Stone.

The dressing of stone is a most important operation, and generally the larger the blocks the greater care required in leveling the beds or dressing them in the proper angle or in the squaring. If the beds are irregular, or in winding the bearing is unequal, the stone tends to slip and rend at bearing points, which act as fulcrums, and in fact may have to be loaded with an enormous weight. This cannot occur if the beds have been leveled, as the bearing is then equal throughout, says a writer in one of our exchanges. The rent receives rain water and allows it to lodge, and the structure becomes exposed, often in a dangerous manner, to the effects of frost. If the blocks of stone are fairly and fully dressed, the trouble of laying them will be comparatively slight. Care must be taken that in order to hide or disguise a thick, clumsy joint the blocks be not pitched forward on their edges, as they will then be sure to splinter at the edges from the weight bearing on the angle. To disguise the careless dressing of blocks and to work them when laid workmen are apt to underpin large blocks of stone with wedges of wood or splinters of stone, thereby laying the foundation of rents and fissures when the work settles. The setting bed of each course should be brought true and leveled to receive the next course, which must rest solidly and truly upon it. The face of every stone in a wall may be left quarry faced, or as it comes from the quarry, but each stone should be wrought with a setting margin. The dressing of the beds of large blocks of stone may easily be tested by laying the edge of a straight rod or rule (otherwise a straightedge) along the surface of a block, from angle to angle and from side to side, when any winding or irregularities in the setting beds will easily be seen by parts of the edge of the rule lying close to the stone, while cavities admit the light between the bed and the rule. In building with ashlar or other large stone care must be taken that pebbles and small stones be not used in the mortar, as these will act as so many wedges on the beds, but in grouting or filling in the back of masonry there is no objection to splinters being used, and in filling in angles and odd corners in rubble backing they may come in advantageously, not only to save waste of mortar, but because when the mortar sets the work will be better filled. Unfortunately this is where masons will often not take the trouble to use splinters of stone.

Forty Hall and Sir Walter Raleigh.

The sentimental people who are pleased with the story of Sir Walter Raleigh's laying down his new embroidered cloak in a mud puddle for Queen Elizabeth to step on, may be interested to hear that the estate on which this incident took place is for sale. The manor house is known as Forty Hall, probably from the fact that the estate once belonged to the Fortie family. It fell afterward into the hands of Sir Nicholas Raynton, who, in 1629, built the present house, from designs by Inigo Jones. In 1700 the house, which had passed by inheritance from the Rayntons to the Wolstenholmes, was altered and modernized. Two generations later, the sole heiress of the Rayntons and Wolstenholmes married a Breton, whose son divided and sold the estate, and it has since passed through several hands. At the time of the Raleigh story, Queen Elizabeth was visiting at the neighboring manor of Elsynge Hall. In contrast with the vicissitudes which this property has undergone, it appears that an estate in Gloucestershire is also for sale which has remained in the same family, in unbroken succession, for more than seven hundred years. This would make the original possessor a contemporary of Richard Cœur de Lion, at least. How a family must feel in giving up such a property we in this country can hardly imagine, says the *American Architect and Building News*, but one can hardly conceive of anything but harsh necessity which could lead to such a step.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President............Noble H. Creager of Baltimore.
First vice-president..C. A. Rupp of Buffalo.
Second vice-president.James Meathe of Detroit.
Secretary............William H. Sayward of Boston.
Treasurer............George Tapper of Chicago.

LIST OF DIRECTORS.

E. L. Bartlett..........................Baltimore.
E. Noyes Whitcomb..................Boston.
W. D. Collingwood...................Buffalo.
William Grace........................Chicago.
Geo. F. Nieber.......................Cincinnati.
Arthur McAllister...................Cleveland.
Alex. Chapoton.......................Detroit.
Geo. W. Stanley......................Indianapolis.
E. S. Foss............................Lowell.
J. S. Pool..............................Lynn.
H. J. Sullivan.........................Milwaukee.
Geo. Cook..............................Minneapolis.
Stephen M. Wright...................New York City.
J. Walter Phelps......................Omaha.
Stacy Reeves..........................Philadelphia.
Wm. H. Scott..........................Portland.
Thomas B. Ross.......................Providence.
H. H. Edgerton........................Rochester.
Wm. J. Baker..........................St. Louis.
Geo. J. Grant..........................St. Paul.
Luther H. Merrick.....................Syracuse.
A. S. Reed..............................Wilmington.
Chas. A. Vaughn.......................Worcester.

A Short "Missionary Trip."

During the latter part of the month of May the secretary of the National Association of Builders made a "missionary visit" to the exchanges in Detroit, Cleveland, Buffalo, Rochester and New York City. The first visit was made to Detroit, where a large gathering of the members of the Builders and Traders' Exchange, together with a number of invited guests, listened to the secretary's address. After discussing at some length the nature of the National Association, its functions, the nature and functions of the Builders Exchange and their relationship to each other, the secretary took up the local conditions existing among the builders of Detroit, and pointed out ways and means for securing greater efficiency and benefit from the organization. Particular stress was laid upon the fact that the National Association of Builders deals with general principles and methods only, and that the benefit from the national organization to the local body depends entirely upon the local body itself. The National Association supplies the materials out of which better local conditions may be built; materials that are prepared for use, and need only to be shaped to fit local conditions; materials that are made up by selecting the best the whole country has to offer, and yet if the local exchanges fail to build of the materials supplied the fault is not in the National Association. The latter was defined as an organization that does not seek to work by radical measures, nor anticipates instant reforms; it is mainly educational, and as such must expect slow growth of the parts for and by which it lives.

The secretary found the Detroit Exchange centrally located, prosperous in numbers, and possessing within itself material which will doubtless ultimately be the means of increasing its strength and influence as an exchange to a position of still greater benefit to the members and the building interests of the city generally.

From Detroit the secretary went to Cleveland, reaching that city on May 21. The number present at the exchange was the smallest that greeted the secretary on his trip. A strong effort has been made by the present officers to increase the efficiency of the organization, and the visit to Cleveland was in response to an urgent invitation to the national secretary to visit that city.

The meeting in Buffalo on the 22d was one of the most successful of the trip. The members turned out in full, and the secretary's remarks were listened to with the closest attention. After a consideration of the National Association of Builders and the exchange in their relation to each other, some of the customs in vogue among the builders of Buffalo were taken up and discussed from the standpoint of an outsider. The Buffalo Exchange is one of the most practical in the National Association, and is steadily strengthening its position as one of the progressive organizations of the city and enlarging the benefits it has already conferred upon its members. The building owned and occupied by the exchange has demonstrated the wisdom of its ownership from a standpoint of financial investment as well as increasing influence and strength of the organization. The membership is composed of the best builders in the city and the exchange is in excellent condition.

From Buffalo the secretary went to Rochester, where he was met by a delegation from the Builders and Building Supply Dealers' Exchange, and where another very pleasant and satisfactory meeting was held. As in the other cities, the secretary confined his remarks to matters relating to the association, its filial bodies and means for increasing the efficiency of each. The meeting was an enthusiastic one. The Rochester Exchange, though smaller in size than some of the others, is well conducted, and its affairs are administered with care and effect.

The purpose of the Rochester builders has been to make their organization representative of the best interests of the city and to maintain it upon a plane equal to business organizations of any other kind.

The next visit was made to New York City, where the secretary discussed the advantages of ownership of buildings by exchanges. The trip was one that had been in contemplation for some time, and it was hoped that President Creager would be able to participate, but urgent business matters prevented his leaving Baltimore.

The Uniform Contract.

The subjoined form of proposal contains a provision regarding the use of the Uniform Contract, which, if adopted by builders generally, would do much toward the universal use of that document. This is one of the most practical methods of carrying out the recommendations of the National Association of Builders that has yet come to the notice of the secretary, and is one that should be followed by builders everywhere.

The form of proposal with the clause mentioned is as follows:

A. B. C.,
BUILDER AND CONTRACTOR.

It is understood, as a condition to the acceptance of this proposal, that the form of contract used is to be that known as the uniform contract, adopted and recommended for general use by the American Institute of Architects and the National Association of Builders.

........................189

M.......................................

Dear Sir:

I propose to do
....*Work,*
and furnish the materials for the proposed..................
.................................*at*..............................
according to plans and specifications prepared by M............
....*Architect , for the sum of*
....
....*Dollars.*
$........................ *Respectfully,*
....

NOTE:

The National Association of Builders Pro and Con.

The National Association of Builders is not an organization which aims to formulate or enforce methods by any mandatory process.

It is not an organization which attempts to overturn by radical processes the customs which have become imbedded in the body politic of the building fraternity.

It is not a body that anticipates speedy reforms from its efforts.

It is not a body that endeavors to establish restrictive policies or make combinations for the aggrandizement of any special class.

It is not an association that assumes to dictate to or control the bodies of which it is formed.

It is not a body which offers to or can by its own efforts directly produce reformatory results.

It is not a body which has any existence or purpose separate from the bodies that form it or distinct from their welfare.

It is not a body which evolved itself or is without cause or useless.

Conversely: It is an organization which had no existence till the local bodies formed it; an organization which

only lives, moves and has its being by virtue of the fact that there are certain separate and distinct local organizations which have joined in creating a composite delegate body for the purpose of studying unitedly problems which are of common concern, in the belief that in the largest counsels there is the greatest safety, and with the conviction that wise general policies may be most surely discovered, disseminated and become established through the agency of a central body which has no purpose or object other than to act for the best interests. It is an organization so distinctly impersonal that it would vanish from existence should all its constituent parts dissolve or abandon their allegiance to it, but which, once formed, is of such enormous vitality and of such certain persistence that so long as two of its parts maintain allegiance to each other through it its original significance will prevail and its influence abide as the leader in its field of usefulness. It is a body which prepares forms and methods in distinct and practical shape for the constitutional and local bodies to put into operation. While of necessity operating indirectly, it is a body that does the preparatory work which the locals are not so well calculated to perform of themselves separately and apart. It is an organization which best performs its functions when the largest support of properly organized and efficient local bodies contributes to the development and definition of the principles it endeavors to promulgate, and which manifests its value most emphatically when the local bodies follow out most perfectly the policies which they themselves devised and approved under the sheltering wing of its common council chamber.

The New Missouri University Buildings.

The new buildings of the State University were dedicated at Columbia, Mo., on June 4, with appropriate exercises. There are several structures, the most important being the main building, erected to replace the one destroyed by fire in 1892, in which year the work of reconstruction was commenced. The main building, or Academic Hall, is 320 feet long, 132 feet deep and three stories above the basement. In the center is an additional story surmounted by a dome, the highest point of which is 185 feet above the sidewalk. In the east wing of the building is an auditorium 74 x 114 feet, with a seating capacity of 1400. The west wing contains the ladies' departments and a library 35 x 114 feet, with a capacity of 33,000 volumes. There are 37 classrooms, 8 lecture rooms, 4 administration rooms, a ladies' waiting room and a calisthenic hall. The exterior of the structure is of brick, stone, galvanized iron and slate, while in the interior the walls are treated with white plaster finish, the floors being of maple and tile. The contract price of this structure was $236,000. The Law Building is 68 x 114 feet, two stories and basement in hight. It has 12 rooms and offices, 2 large lecture rooms and a capacious library. The Chemical Building has a frontage on the quadrangle of 132 feet, is 92 feet deep and two stories in hight. The Biology and Geology Building, with museum, has a frontage of 140 feet and a depth of 100 feet. In the central portion is the museum, 46 x 100 feet in size, extending through the first and second stories, and has tile floors. The Physics and Engineering Building has a frontage of 145 feet by a depth of 78 feet and is two stories and basement in hight, with a tower at the center 92 feet high. It contains the departments for physics, civil, mechanical and electrical engineering. The Manual Training Building has a frontage of 108 feet by a depth of 117 feet and is two stories and basement in hight. The power house, which furnishes steam and electricity to the buildings, is 72 x 86 feet in size and one story in hight. The new buildings are constructed of brick, stone, galvanized iron and slate and are regarded as fire proof. The total cost was in the neighborhood of $410,000.

National Mexican Exposition.

The exposition which is to be held at the City of Mexico in the year 1896 will occupy the grounds situated at the foot of the Castle of Chapultepec and comprises an area of about 700 acres. The Castle of Chapultepec, a palace built by Viceroy Galvez, was once occupied by Maximilian and has been renovated as the Mexican White House. On the hill stands the Military Academy in the rear of the presidential mansion. It is intended to divide the exposition grounds into three large courts known as the Grand Court, the Mexican National Court and the Foreign Court. To the right of the Grand Court the Foreign Department will erect large buildings in the Renaissance style and connected by a colonnade, under which the exhibits will be installed. The Administration Building will present a beautiful appearance with its many domes and turrets, while the open galleries and porches will add to the general effect. It will be entirely in the Moresque style of architecture. The building will be divided into offices as required by the departments. The center will be an open court with circling galleries at each story. The main entrance will rise to the hight of three stories. The Palace of Mechanical Arts will be in what may be classed as the French style of architecture. The building will be 370 feet long by 225 feet wide, with a tower at each end and the main entrance surmounted by a dome encircled by electric lights. On top of the dome will be a statue of the Genius of Light, the distance from its top to the ground below being 110 feet. On top of the roof, which will be entirely of glass and iron, will be two turrets containing electric search lights. The building will be for the most part of iron and glass, so constructed as to be easily removed in sections, and will, after the close of the exposition, be utilized as a railway station. In addition to the large buildings there will be a number of smaller structures, each devoted to a permanent purpose such as railroad station, model hotels, museums, printing office, glass factory, dairy, &c.

Strikes in England.

Statistics relating to strikes which occurred in England in 1894 have recently been published by the Labor Department of the British Board of Trade. These show that although the total number of disputes was greater than in 1893 the number of persons affected was much smaller. Of the 926 cases of which full particulars were received, it appears that 17.4 ended successfully for the workmen, 14.3 were partly successful, 51.8 ended in failure, and 16.5 had no definite result. Since 1889 the proportion of successful strikes has been growing less, as may be seen by comparing the figures for 1894 with those of 1889, when there were 1211 strikes, of which 43 were successful, 31.8 partly successful, and 17 were failures from the standpoint of the workmen.

CONTENTS.

COTTAGE OF DANIEL P. SHANE, AT HELENA, NEW YORK.

THOMAS E. JENNINGS, ARCHITECT.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
96-102 READE STREET, NEW YORK.

AUGUST, 1895.

Hydraulic Power for Digging Foundations.

The method employed for sinking the foundations of the Johnston office building now in course of erection in this city, at the corner of Broad street and Exchange place, brief reference to which was made in these columns last month, is peculiarly interesting by reason of its novelty and the rapidity with which the work was done. Where the building stands bed rock was found only 42 feet below the sidewalk and it was decided to sink the foundations by a scheme devised by the general manager of the Hydraulic Construction Company, who secured the contract for the work. The operations consisted in sinking a series of 44 steel cylinders, varying from 6 to 18 feet in diameter, according to the load each was to bear. These cylinders were not designed to bear any weight, but to act merely as a shield within which, after they were sunk, men could work and build up the piers to carry the superstructure. In sinking the cylinders each had around the lower inner edge hollow iron castings in the shape of a segment of a circle, and about 2 feet in length. These were sharp on the lower edge, but irregular in outline and pierced with about 100 small holes. To the center of each of these hollow castings was attached a 1½-inch iron pipe running to the top of the cylinder, where it bent over the outside edge and connected with a hose coupling. A cylinder being placed at the point where a pier was to be erected, the water was forced down through the little openings in the iron castings by means of a powerful pump. This loosened the earth at the lower rim of the cylinder so that its weight gradually forced it down; but in order to hasten the sinking through the earth as fast as the water jets softened a place for it, many tons of pig iron were piled on top of the cylinder. While the work of sinking a cylinder was going on a man constantly tested it to see that it went down straight. Two other men were in charge of the lever gates controlling the streams of water which were doing the digging. Whenever one side descended faster than another, some of the streams would be shut off and others opened, the effect of which was to dig a little more in one spot than another under the edge of the cylinder and thus bring it back to the level. Sometimes in the sinking process large rocks were encountered, and in one case an old pile was struck. In the latter instance it was necessary to stop work, dig out the dirt from within the cylinder and cut away the pile. This course, however, was not necessary where rocks were encountered. One of the water-spouting castings was attached to a separate pipe and sunk beside the rock either inside or outside of the cylinder, when the water jets would soften a place for it and the pressure of the cylinder thrust the stone aside into the new place provided for it. After the earth was removed from the cylinders each one was filled with solid concrete and brick work, and over this was laid a double grilling of steel beams, on which were placed the cast iron caps to support the columns of the building. On the south side of the site, where the wall rises next to the adjoining building, the structure will be carried by a series of eight large cantilever girders resting on a double line of cylinders.

Employer and Workman.

The recent experience in the building trades of Kansas City, Mo., which resulted in the adoption of a uniform working time of eight hours per day, is an excellent example of the possibility of adjusting the conditions by which the business is surrounded without friction or disturbance. The establishment of a uniform working time in all branches of the trade was advocated by the workmen early in the season, and the request for a reduction of time in such branches of the trade as were working more than eight hours was made in so fair a spirit that the employing contractors gave the matter immediate consideration. Such of the employers as were represented in the Builders and Traders' Exchange held frequent meetings in the rooms of that organization to consider the matter. The result of these meetings was the establishment of sufficient unity among the employers to warrant the attempt to inaugurate an eight hour day. The utmost good feeling, it is said, prevailed between employers and workmen while the matter was under consideration, and the action of the employers was taken without the pressure of threatened strikes or other labor disturbance of any kind. Voluntary action of this kind must inevitably result in benefit to the fraternity, for a feeling of confidence and harmony is thus created that no amount of concession under force could produce. Organized employers everywhere would do well to consider the demands of their workmen, whatever they may be, and point out wherein they are unreasonable, if they are, and concede them when they are right. As a business policy alone such a course will prove its benefit, without considering the fact that relations based upon principles of justice to each are the only relations that can be either lasting or harmonious.

Pittsburgh's New Office Building.

A short time since the plans were filed in the office of the Building Inspector of Pittsburgh, Pa., for what will probably be the tallest business structure in that city. It will be erected on the site of the old post office, having a frontage of 100 feet on Fifth avenue and 110 feet on Smithfield street, and will cost in the neighborhood of half a million of dollars. The plans, which have been drawn by architect George B. Post of New York City, call for a steel skeleton structure 15 stories high and fire proof throughout. The scheme of construction employed is so designed that the pressure of the huge mass is distributed over the entire area of the ground covered by the building. The foundation footings will consist of a 16-inch bed of concrete, on which will rest a grillage of steel beams with the spaces filled with concrete and cement. The lower stories of the building, which is being erected by D. E. and W. G. Park of Park Brothers & Co., proprietors of the Black Diamond Steel Works, will be of stone and the remainder of the stories brick and terra cotta. The ornamentation of the exterior walls will be rich and effective.

Sanitary Exposition in Paris.

The International Sanitary Exposition which was opened a short time ago in Paris, on the Champs de Mars, will continue until September 15. The exhibition is under the patronage of the French Ministers of Commerce of the Interior and of Public Works, as well as of various learned societies and industrial associations. The exhibition is divided into ten classes, being, respectively, Hygiene of Dwelling Houses, Municipal Hygiene; Prevention of Infection; Demography and Sanitary Statistics; Sanitary Science; Hygiene of Infancy; Industrial and Professional Sanitation; Food Hygiene; Hygienic

Clothing, and Physical Exercises. Class 1—Hygiene of Dwelling Houses—includes instruction in preparation of ground; underground arrangements; light; heat and ventilation; water supply; baths and lavatories; sewage treatment; sinks and water closets; sanitary ware for the household; and special sanitary arrangements for hospitals, barracks, prisons, theaters, public halls, &c. Class 2—Municipal Hygiene—includes water supply; purification; filtration; street cleaning; treatment of sewage and refuse; street lighting; gas; electricity, &c. In conformity with the municipal law recently passed in Paris, the whole of the house drainage in that city will have to be rearranged in the course of the next three years on a plan similar to that in use in England. This will necessitate a revolution in the sanitary arrangements of Paris and will involve a great demand for improved forms of sanitary apparatus. It is in order that these may be brought under the notice of the engineers and architects of Paris that this special sanitary exhibition has been opened.

Union of Employers and Employed.

Our British cousins are indefatigable in their efforts to bring about industrial peace. Their various schemes of arbitration and conciliation, however, have only been partially successful. Notwitsthanding the most earnest labors of really philanthropic manufacturers and publicists, extending over a long series of years, widespread strikes repeatedly occur. Scarcely a trade is exempt from a disturbance of this character for any great length of time, and even now a serious struggle is pending in the tin plate trade. British workmen, despite the most bitter experience in the loss of time and money, will persist in appealing to the arbitrament of force instead of patiently submitting to the dictates of reason, and consequently some of them are every year subjecting themselves and their families to great privations while fighting their employers. The cultivation of industrial peace, therefore, appears to be a very slow and discouraging process. Nevertheless, the supporters of arbitration and conciliation refuse to be disheartened and turn to new methods when the old ones prove futile. The latest effort in this direction is the establishment of an organization, under the name of the Industrial Union of Employers and Employed. The objects of the association, as set forth in resolutions adopted at the inaugural meeting, which was held in London on June 22, are as follows: "To promote harmony between employer and employed by affording opportunities for each side to obtain a better understanding of the other's aims and difficulties; to realize in a larger measure common interests; and to encourage and foster feelings which will tend to remove the grounds for labor disputes." Joining hands on this common ground were representatives of employers' organizations, several chambers of commerce, &c., together with representatives of workingmen's societies and others. The number of workingmen represented is reported to have been over 500,000. So far as numbers interested are concerned this was an auspicious beginning. The proceedings were, however, of the conventional character. Addresses were made and papers were read counseling the settlement of labor disputes by peaceful measures through the adoption of arbitration and conciliation, but no new plans were brought forward by which labor troubles are to be practically checked. It is expected that a monthly journal will be established under the control of the organization for the purpose of educating both employers and employed on the necessity of avoiding labor disputes, and from this much good is expected to flow.

THE General Society of Mechanics and Tradesmen of the city of New York has just issued its annual report for 1894, being the 110th year of its existence. The intimate connection of the society with the New York Trades School is well known, a number of its directors being on committees of that school. It maintains a number of free scholarships in the New York Trades School, sixteen such scholarships having been awarded to pupils last year. Of these, six were for carpentry, four for plumbing, two for bricklaying, and one each for blacksmithing, stone cutting, house painting and fresco painting. The society itself maintains a free library, containing over 100,000 books; and its reading rooms are free to all respectable persons. That this privilege is appreciated is proved by the fact that during 1894 65,278 persons used the reading room. The schools and classes of the society give free instruction in mechanics, stenography and typewriting to men and women. It maintains also a course of lectures on scientific and popular subjects. Moreover, it affords pecuniary aid to, and cares for, widows and orphans of mechanics and tradesmen who are entitled to its assistance.

Building Materials Severely Tested.

In a series of glass cases in the room of the Public Buildings Commission, at the City Hall, Philadelphia, says the Philadelphia *Record*, are preserved a number of specimens of materials used in the construction of the building which have been subjected to a pressure test by the Government machine at Watertown, Mass. A sample brick from those used in the construction of the tower still retains its shape, although compressed into powder by a pressure of 500,000 pounds to the square inch. Its mate, rather dilapidated, did not succumb until 600,000 pounds pressure was reached. Specimens of the white marble which forms the imposing exterior of the hall showed remarkable staying powers. One cube successfully resisted a pressure of 800,000 pounds, and a portion of a similar specimen is preserved which cracked only under the enormous pressure of over 1,000,000 pounds. A report like a cannon shot was heard when it finally gave away, and the commissioners maintain that if a block of marble near the foundation of the City Hall should crack the report could be heard in Kensington.

Moving Brick Houses.

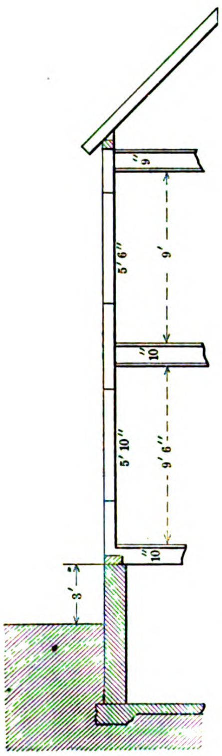
The moving of immense brick structures is no longer an experiment, for this branch of the building trades has taken its place as one of the exact sciences, says a writer in *The Western Builder*. It is no longer necessary to tear down a valuable structure in order that the ground may be used for a more expensive building or to make a thoroughfare. In these modern days a large and heavy brick or stone house can be moved with the ease with which a piece of furniture on rollers is moved. The old method of tearing down and carting the *débris* to a second hand dealer was wasteful of good material, but by the new method a house is removed quickly and without disturbing any of its contents. It is not even necessary to stop business operations in the building while the work is in progress. Large timbers are placed 3 feet apart under the first floor joists and running through the building. Under these are placed a second row of timbers at right angles to the first, and under these last timbers strong lifting jacks are placed about 1 foot apart. The building is then lifted off the foundation to a proper hight to move it. The ground over which the building is to be moved is made perfectly level and covered with boards, on which tracks of heavy timbers are then laid. Maple rollers five feet long are slipped under the timbers in the house and the moving process is ready to begin.

If the house is a small one it is slipped over greased planks and rollers are not needed. In long moves and heavy houses where rollers are used the motive power is furnished by a single horse pulling on heavy chains and pulleys so arranged that the greatest amount of power may be had at the least expenditure of force. The new foundation is built up between the timbers, or needles, as they are sometimes called. After the foundation walls are built and have dried the timbers are drawn out one by one and the holes are filled in.

SUBURBAN RESIDENCE AT ROSEVILLE, N. J.

WE have pleasure in laying before our readers this month illustrations of a suburban residence which combines many features of interest to the architect, contractor and builder. In its arrangement of rooms and general disposition of space it is convenient and compact, while its exterior is attractive in appearance, as may be seen from the supplemental plate, which is made direct from a photograph taken for the purpose. The house contains four rooms of good size on the first floor, with a hall of such proportions as to permit its use as a reception room. In the library is an open grate the ashes from which pass down to the pit below and are taken out in the cellar. The chimney breast for the range in the kitchen is faced with white enameled brick to a distance of six feet above the floor, which enables the brick work to be easily kept clean.

A special feature to be noted in connection with the first floor is that a person can pass from the kitchen to the front door without going through any one of the main rooms, and yet from the front door one cannot see into the kitchen. On the second floor are three sleeping rooms, bathroom and a sewing room, although, if desired, the latter can be utilized as a chamber. In the attic are two more bedrooms. The house was recently completed at Roseville, N. J., for William M. Bailey, the plans being prepared by W. Earle Cass, architect, of 800 Broad street, Newark, N. J. The building is 42 feet deep by 26 feet wide, and has a cellar 7 feet in the clear. The first story is 9 feet 6 inches in the clear, the second story 9 feet, and the finished rooms in the atic 8 feet. The foundation walls, piers, chimneys and inside walls of the cold pantry are built of hard Jersey brick faced on the exterior with North River brick laid in red mortar. All foundation walls in contact with the earth are well plastered with cement and in addition have a coat of coal tar, which gives a thoroughly water tight cellar. All smoke flues are lined with 8-inch fire clay pipe, insuring a much better draft, the architect states, than a square flue, while reducing the risk of fire reaching the wood work, as there is but one joint to each 2 feet in hight of flue. An interesting feature of the cold pantry in the cellar is a bluestone shelf, the position of which is indicated on the plan. The architect states that the cold pantry would have been placed under the butler's pantry and connected by means of a dumb waiter, but as this was the south side of the house it would make it too warm for a provision pantry. The cellar bottom is of concerete, and in the laundry there is a board floor over the concrete.

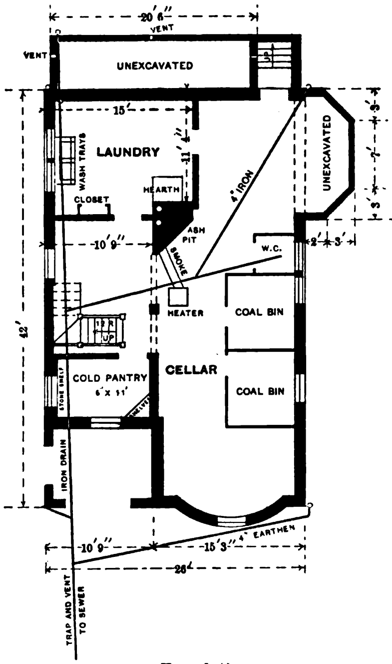


Section.

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

Suburban Residence at Roseville, N. J.—W. Earle Cass, Architect, Newark, N. J.

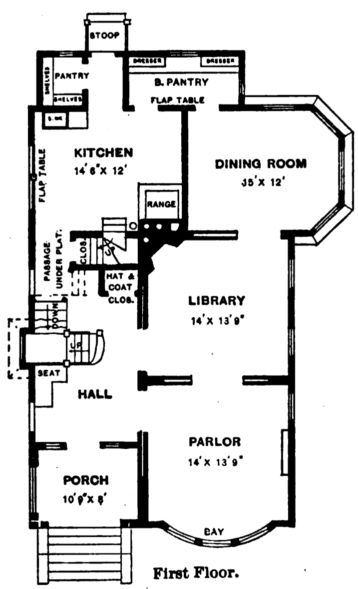
The framing of the house is of hemlock, the girders being 6 x 8 inches, the studding 2 x 4 inches, the rafters 2 x 6 inches and the floor beams 2 x 10 inches. The window and door studs are double, as are also the headers and trimmers. The framing is tenoned, mortised, braced and spiked in a thorough manner. The headers are framed to the trimmers with a single tenon and a 2-inch strip nailed under the tail beams In all cases where the partitions are unsupported the beams under them are doubled. Openings more than 3 feet wide are trussed and partitions having no partition under them are also trussed. The entire frame and roofs are covered with $\frac{7}{8}$-inch hemlock, tongued and grooved, placed diagonally, rendering the



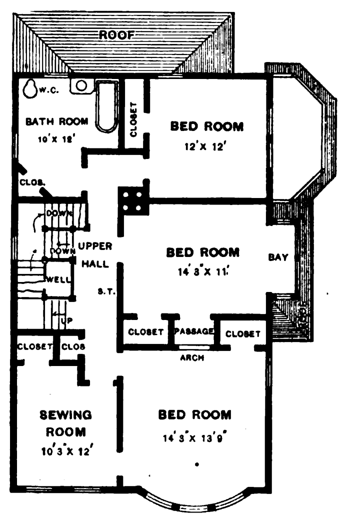
Foundation.

double thick first-quality American glass. The first story has a double floor with felt between. The upper floor of the kitchen and pantry is 2-inch North Carolina pine, the hall and dining room of 2-inch oak, and the balance of the flooring 4$\frac{1}{4}$-inch first quality North Carolina pine, blind nailed. In the bathroom the upper floor is of 1 x 2 inch oak. The floors of the first-story hall, dining room, kitchen and pantry, as well as of the bathroom, have one light coat of oil, finished with Butcher's polish.

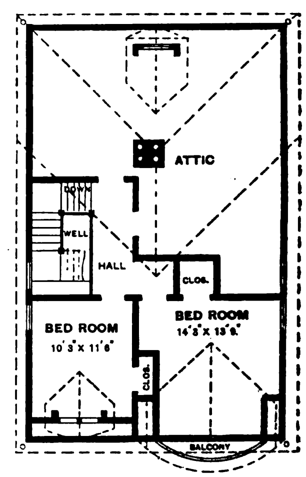
The interior finish is of cypress on the first floor, white wood on the second floor and pine for the remaining portions of the house. The trim is $\frac{7}{8}$ x 4$\frac{1}{4}$, molded and mitered, on the first floor, with base blocks, and $\frac{7}{8}$ x 7 inch base with molding on top, which is continued around all openings, as well as around the windows. In all the principal rooms there are panel backs under the windows. The kitchen and bathroom are wainscoted 3 feet 6 inches high with $\frac{7}{8}$ x 2 inch lumber to match the trim. The principal stairs are of cypress, and the newels are turned. All of the windows on the front are furnished with inside sliding blinds of cypress, while the other windows have the usual outside blinds. The hardware is solid bronze oxidized for the parlor, library, dining room and hall of the first floor. All of the plumbing is open work, trapped and ventilated according to the rules of the Board of Health of the city of Newark, of which Roseville is a suburb. In the bathroom is a 5-foot porcelain lined French tub, Cascade water closet, ivory embossed, and washbowl with Tennessee marble slab and nickeled posts. All faucets and pipes are nickel plated. The exterior of the house is painted three coats lead and oil, and the interior, except the cellar, is filled and rubbed, being finished with two coats of Murphy's varnish. The house is heated by a No. 3 Torrid steam boiler with one indirect radiator for the parlor and seven



First Floor.



Second Floor.



Attic.

Suburban Residence at Roseville, N. J.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

frame strong and firm. Over this is sheeting paper, and this in turn is covered with 6-inch bevel clapboards laid 4$\frac{1}{2}$ inches to the weather, or first quality 18-inch pine shingles, as required by the design. The shingles are laid long and short, with a difference of 1$\frac{1}{2}$ inches.

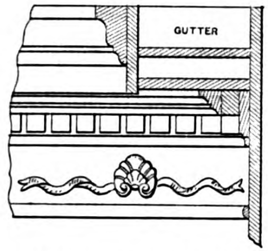
The principal roofs are covered with No. 1 Bangor slate, over felt. The roofs of the side and front bays are covered with Alaska IX tin. All exterior finish is first-class white pine. The floor of the porch is 1$\frac{1}{4}$ x 3 inch North Carolina pine laid in white lead and blind nailed. The turned posts are 8 inches in diameter. The sash in the parlor, sewing room and front bedroom are fitted with first-quality polished French plate glass, all others having

direct radiators for the rest of the house. The cost was in the neighborhood of $5000, but this figure will vary to some extent with the locality and style of finish employed.

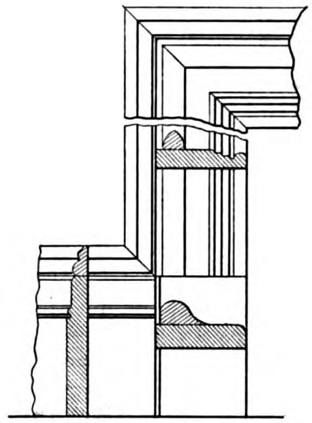
Selecting Brick for Buildings.

The importance of selecting proper brick for constructing buildings is so evident that it needs but the statement of the fact, without argument, to have it generally accepted, says a writer in the *Brickbuilder*. It is plain that in the construction of buildings care ought to be taken to have them of such architectural design as to present an agree able impression to the eye; but as they are intended for the future as well as for the present, they should be of such materials as to withstand the ravages of time.

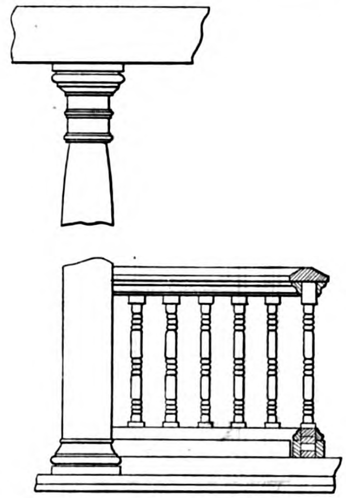
others quickly show signs of decay and rapidly crumble, requiring continuous repairs to keep them in proper condition. In some buildings cracks and fissures appear in them, the material not being in all cases of sufficient strength to resist the pressure. In other buildings a similar variety of brick, though subject to equal or greater pressure, remains unimpaired. The value of building



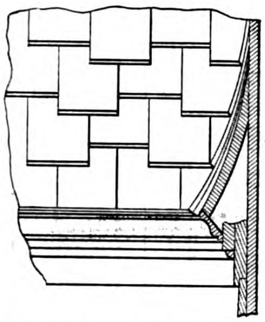
Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



Detail of Base and Trim.—Scale, 1½ Inches to the Foot.



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



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

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

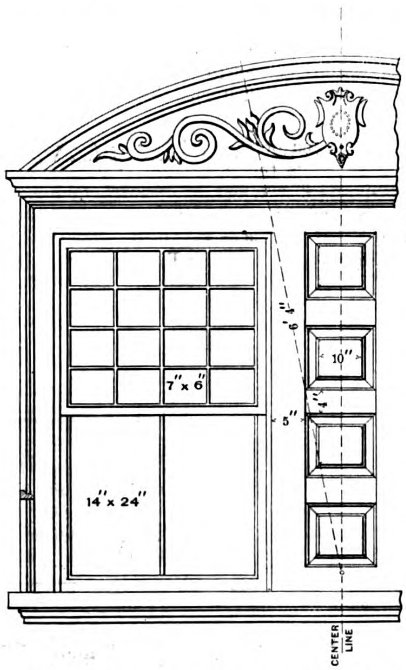
Suburban Residence at Roseville, N. J.—Elevation and Miscellaneous Details.

Even a limited examination of edifices, public and private, discloses the fact that brick of the same general character vary greatly in serving the same purpose. While some preserve their soundness after years of exposure,

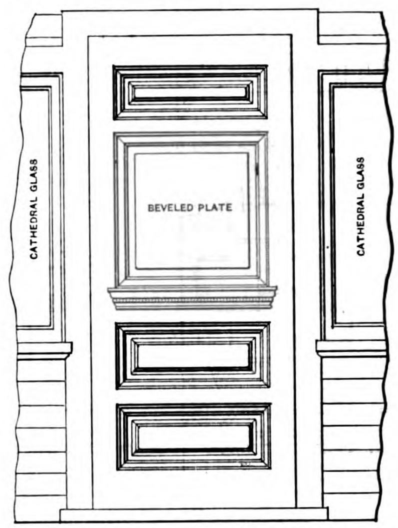
brick, therefore, may be briefly expressed as depending upon two causes: first, physical constitution; second, their chemical composition.

The most important in its results of all experiments regarding brick is the determination of the force required to crush them, and the importance of determining the resistance of building material to pressure cannot well be overestimated. It gives accurate information obtainable in no other way.

The crushing strength of bricks of course varies greatly. A rather soft one will crush under from 450 to 600 pounds per square inch, while a first-rate machine pressed brick will require about 6222 pounds per square inch. This last is about the crushing limits of the best sandstones, two-thirds as much as limestones and marbles, and about one-half as much as granite or roofing slate. But masses of brick work crush under much smaller loads than single bricks. It must be remembered, however, that cracking and splitting usually commence under about one-half their crushing loads. To be safe the load should not exceed one-eighth to one-tenth the crushing limit.



Detail of Windows in Side Gables.—Scale, ¼ Inch to the Foot.



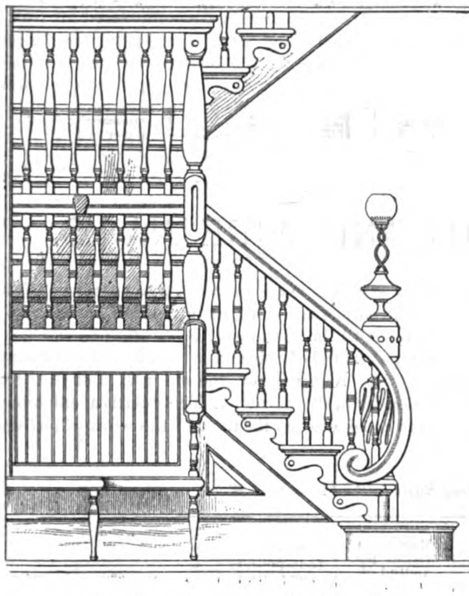
Elevation of Front Door.—Scale, ⅜ Inch to the Foot.

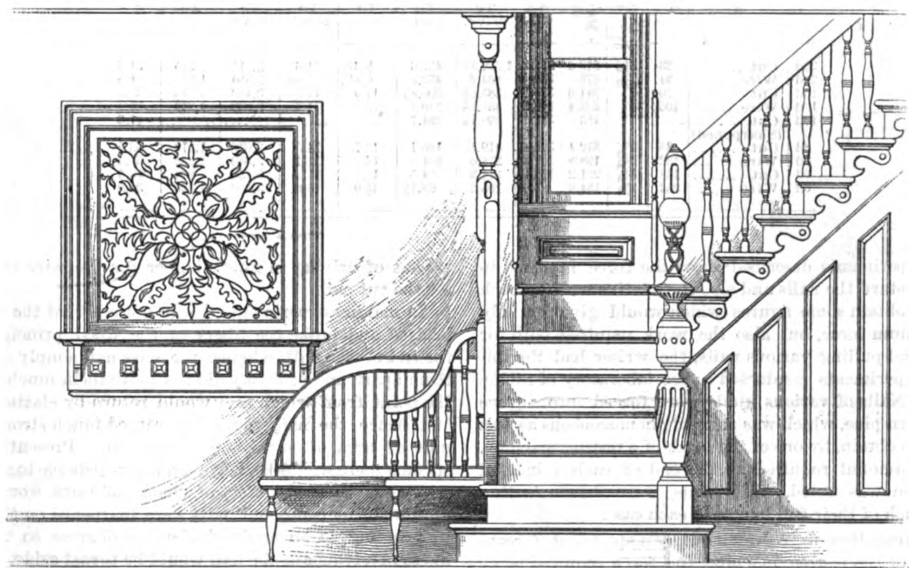
Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

Suburban Residence at Roseville, N. J.—Elevation and Miscellaneous Details.

Wooden Houses for Royalty.

Wooden houses are becoming quite the fashion among the royal personages of Europe and the Prince of Wales, says the *Manufacturers' Gazette*, is taking an active interest in an Anglo-Norwegian company that has been formed to bring into fashion in England wooden houses of the same kind that are so popular in Norway, where there are in existence churches, public buildings and houses made of wood that are in some cases over 500 years of age. The Prince of Wales is having a number of picturesque wooden lodges and houses erected on his estate at Sandringham. The summer residence of King Leopold of Belgium, at Ostend, is constructed entirely of wood, and so, too, are the shooting lodges, or rather *chateâux*, of Emperor William, at Hubertusstock; of Emperor Francis Joseph, at Murzesteg; of Czar Nicholas, at Spala and at Bielovitz, and of Queen Marguerite and King Humbert of Italy, in the Alpine regions of Piedmont, where they are accustomed to pass several weeks every summer. The greater part of Mar Lodge, where the Duke of Fife and his royal wife, the eldest daughter of the Prince of Wales, are accustomed to entertain so largely every autumn during the deer-stalking season, is built entirely of wood; and the kings of Saxony, Wurtemberg, Denmark and of course, of Sweden, have each not one, but a number of roomy and picturesque forest and mountain hunting *chateâux* constructed of undressed wood. The advantage about such houses is that they can be easily transported from one place to another, and can be quickly put together, much in the same way as a Chinese puzzle. Accustomed as one is to find them here in America, they have until now been quite the exception in Europe, save in Scandinavia, and it is only at present that they are coming into fashion, thanks to the example of royalty.


Main Stairs as Viewed from the Front Door.


Elevation of Main Stairs, as Viewed from the Library.

Miscellaneous Details of a Suburban Residence at Roseville, N. J.—Main Stairs.—Scale, ⅜ Inch to the Foot.

Pneumatics and Foundations.

It is said that Papin, the eminent physicist, born at Blois in 1647, conceived the idea of employing a continued supply of compressed air to enable workmen to build under a large diving bell. In 1779 Coulomb presented to the Paris Academy of Science a paper detailing a plan for executing all sorts of operations under water by the use of compressed air. His proposed apparatus was somewhat like that now in general use, says a writer in the *Architect and Contract Reporter*. In 1831 Earl Dundonald, then Lord Cochrane, took out a patent for a device for sinking tubular shafts through earth and water by means of compressed air. His air-lock was much like modern ones, and was to be placed at the top of the main shaft. His invention was made with a view to its use in tunneling under the Thames and in similar enterprises. In 1841 Bush also took out an English patent for a plan of sinking foundations by the aid of compressed air. A German, by name G. Pfaun Muller, made a somewhat similar design for a bridge at Mayence in 1850; but as his plan was not executed, it was, like the patents of Cochrane and Bush, little known till legal controversies in regard to patent rights dragged them from obscurity. The first practical application of the plenum process was made in France in 1841 by M. Triger. In order to reach a vein of coal on a sandy island in the Loire, opposite to Chalons, he sunk an iron tube about 40 inches in diameter some 60 feet by the blows of heavy weights. The fine sand was removed from the interior by means of a scoop bucket. On reaching a layer of coarse gravel he could not force the tube through. He therefore capped his tube with an air-lock, and by compressed air forced out the water which had all the while filled the tube, and sent workmen to the bottom. The pressure he used was never greater than two atmospheres. The water was discharged through a small tube, into which, several feet from the bottom, a jet of air was allowed to enter, thus diminishing the specific gravity of the column till it was rapidly blown out. In 1845 Triger read a paper on the sinking of a tube about 6 feet in diameter to a depth of 82 feet by the same method, and suggested the use of it for the construction of deep foundations for bridges. Dr. Potts generally has the credit of inventing the vacuum process, for which he took out a patent in 1848. Many times in sinking foundations by this method the compressed air process was resorted to so that men could enter the pile to remove obstructions, and finally its many advantages caused it to entirely supersede the vacuum process. At present the term "pneumatic process" is practically synonymous with compressed air process. The first foundations sunk entirely by the latter were the pneumatic piles for the bridge over the Medway at Rochester, put down in 1851. The depth reached was 61 feet. The first pneumatic caisson was employed at Kehl, near the eastern border of France, for the foundation of a railway bridge across the Rhine.

DRIVING AND PULLING CUT AND WIRE NAILS.

IN view of the discussion which has been in progress for some months past in the Correspondence department of the paper relative to the merits of cut and wire nails, the following extracts from a paper by Prof. R. C. Carpenter, read at the Detroit meeting of the American Society of Mechanical Engineers, cannot fail to prove highly interesting and instructive :

The experiments described show the force required to drive and start the nails and also the relative work in each case. To obtain some figures which would give not only the maximum force, but also the work required both for driving and pulling various nails, the writer had the following experiments conducted in the laboratory of Sibley College. Nails of various kinds were forced into a piece of Southern pine, which was as nearly homogeneous as was possible to obtain, by one of the heads of a testing machine, and the amount required at the end of each ¼ inch of penetration was noted. The nails were driven within about ¼ inch of their full length in each case.

In pulling, they were drawn out by a species of forceps attached to the testing machine, the force required being noted at each ¼ inch. Diagrams were then drawn corresponding to the force exerted and the depth of penetration, the integration of these diagrams giving the total work either for driving or for drawing. Experiments were made on ten nails of each kind, and the averages taken to represent the work of any particular class.

The general summary of the experiments is given in the accompanying table, from which it will be noted: 1. That very much more force is required to drive a cut nail a given distance than a wire nail. 2. That more force is required to start a cut nail generally than to drive it, and that it invariably starts much harder than a wire nail. 3. The work in inch-pounds per nail required in driving cut nails is much more than that in driving wire nails. 4. The work in inch-pounds in pulling cut nails is about equal, sometimes less and sometimes greater, per nail, than that for pulling wire nails. 5. The maximum force per pound in driving or starting wire nails is more nearly equal to that of the cut nails than when estimated on the basis of that of a single nail, but it is still less. 6. The work, in foot-pounds, per pound of wire nails, required for driving is less than that required for the cut nail, and that for pulling is considerably more. 7. The relative efficiency which is here considered as the ratio of the work of pulling to that of driving is much higher for the wire nail than for the cut nail.

Summary of Experiments in Driving and Pulling Nails in Southern Pine Wood.

No. of Nail.	Kind of Nail.	Number to 1 pound.	Depth of penetration, inches.	Maximum load to drive, pounds.	Max. load to start in pulling, pounds.	Work in inch-pounds.		Maximum weight per pound of nails, in tons.		Work in foot-pounds per pound of nails.		Relative efficiency.
						To drive.	To pull.	To drive.	To start.	To drive.	To pull.	
20d	Cut.........	23	3½	819.6	920.8	1,522.85	477.6	9.37	11.6	2,915	'915	31.6
20d	Wire..	34	3½	376	318	864.6	472.8	6.41	5.43	2,450	1,335	54.5
10d	Cut	70	3	341.6	356.8	585.25	200.85	11.9	12.5	3,410	1,215	35.5
10d	Wire.........	105	3	282.4	218.6	435.65	220.2	12.2	11.4	3,550	1,940	50.7
10d	Cut..... .. (Sharpened)	....		453	518	699.75	284.7	....	.... ..	....	.. ....	41.0
8d	Cut.........	88	2¼	312.4	328.4	419.1	140.1	13.7	14.5	3,086	1,019	33.5
8d	Wire... ...	132	2¼	198.8	167.2	278.6	104.6	13.2	11.1	3,240	1,255	37.5
6d	Cut	168	1¾	221.2	155.6	274.3	64.5	13.7	13.3	3,530	904.5	23.5
6d	Wire	252	1¾	184.6	87.6	165 2	62.75	13.9	15.0	3,480	1,320	38.0

In making experiments it was noticed that the cut nail bruised and broke the fibers of the wood, principally at the end of the nail, whereas the wire nail simply crowded them apart, and probably did not move them much beyond the point from which they would return by elastic force, and hence the nail would be grasped much stronger per unit of area of surface by the wood. Presenting less surface there would be, however, less resistance to starting.

To see what the effect of change of form would be, a number of tenpenny cut nails were sharpened on the point by grinding to an angle of about 30 degrees, so that the fibers in advance of the nail would be thrust aside, and not bruised and broken. This served to increase the holding power over the cut nail of ordinary shape about 50 per cent. in starting force and about 30 per cent. in work of resistance to pulling.

The good result produced in sharpening the end is shown by some experiments made some years ago in the Sibley laboratories on the holding power of ordinary railroad spikes, as compared with a Walcott spike, which differed from the ordinary railroad spike in having a sharp end and also in having two longitudinal grooves stamped into one side.

Tables were presented showing the resistance to pulling when driven 5 inches; the weight required to drive twenty-penny cut nails for each ¼ inch of length; weight required to pull twenty-penny cut nails each ¼ inch in depth; the same in regard to wire nails; and also table showing driving and pulling force for cut and wire nails of ten, eight and sixpenny size.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

THE subject for consideration in the present article is a somewhat difficult design for a carved stool, and should preferably be made of oak. The style is Elizabethan, and if carefully worked out makes a rather unique and handsome piece of furniture suitable for a hall or library. One-half of the design is presented in elevation in Fig. 77 of the illustrations. The legs are intended to be worked out of the solid, with the exception of the small round rosette, which may be turned and planted on. The grain of the wood should be so placed as to show the silver streaks upon the two outside faces, which can easily be done by selecting the stock with a little care. The rails are to be mortised into the legs and the top so worked as to show the end grain upon three sides. The fret work that goes between the legs and below the top rail is cut through the board, and may be worked out with a jig saw and neatly cleaned afterward. The scroll upon the top rail projects somewhat, the dotted line shown upon the section of the leg, Fig. 79, giving the position for the face of it. All the framing should be done and everything should be ready to put together before the carving is commenced. It would be advisable in this case to use a stencil, as each design is repeated several times. Prepare a stencil for the straight part of the legs, cutting out the portions that are intended to be taken out in the work. Lay upon the work and with a fine pointed and moderately hard pencil mark the outline. If so desired, the operator may rub a little precipitated chalk upon the work to enable the pencil marks to show more plainly, but the less foreign substances there are upon the work the better will the operator be able to keep his tools in proper order. After one portion of the leg has been made ready for cutting, take the mallet and chisel and cut perpendicularly down to a depth of about 1-16 inch parallel with the pencil mark and a few shavings distance from it. Care must be taken to have all the marks connected so that the surface will not chip up during the succeeding operations. Now take the chisel and cut across the grain as if one were mortising. Cut small chips, not too deep, and work close

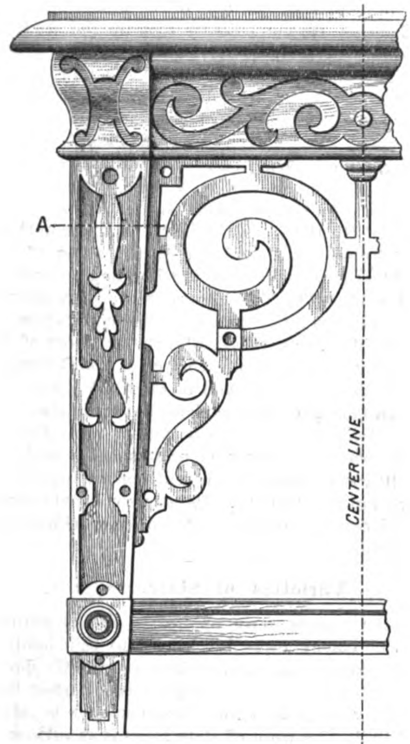


Fig. 77.—Partial Elevation of Carved Stool.—Scale, 3 Inches to the Foot.

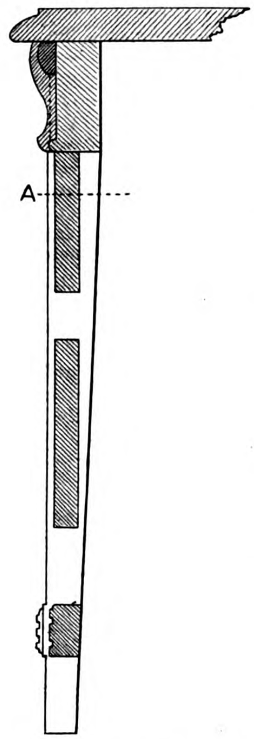


Fig. 79.—Detail of One of the Legs.—Scale, 3 Inches to the Foot.

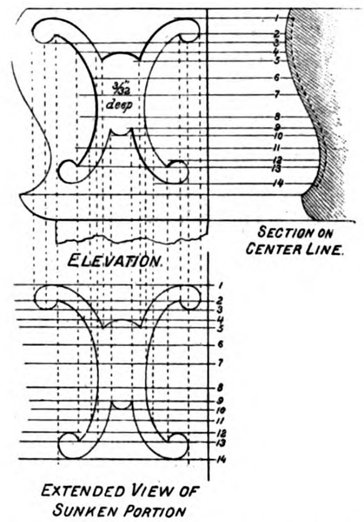


Fig. 80.—Details of Sunken Portion of Upper Part of Leg.—Scale, 6 Inches to the Foot.

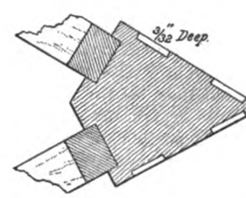


Fig. 81.—Section of Leg on Line A.—Scale, 6 Inches to the Foot.

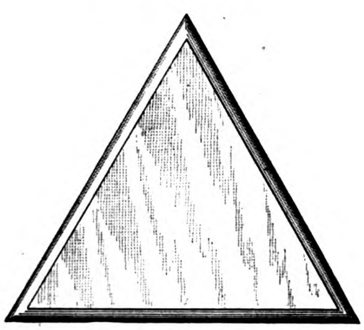


Fig. 78.—Plan of Top of Stool.—Scale, 1½ Inches to the Foot.

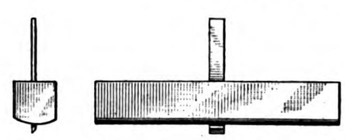


Fig. 82.—Front and Side Elevations of Router.—Scale, 6 Inches to the Foot.

Hints on Wood Carving.—Design for a Carved Stool.

* Copyrighted, 1894, by David Williams.

to the cuts previously made. Next take out these chips and smooth the bottom neatly with a chisel. Now take the router and work it smooth and of even depth. An experienced carver would work it right out at one operation, but I would advise the student to repeat it several times if necessary as there is no loss by so doing, but rather a gain in the end. After the bottom or back grain is worked as smooth as can be with chisels and router pare the sides neatly up to the pencil marks, taking care not to slip and cut too deep; then finish with scrapers and sandpaper.

Now work the upper or curved part of the leg. I desire to call particular attention to this part, as it presents a few of the difficulties that are frequently met with in carving. It will be noticed by examining the details that the surface of this portion is straight horizontally, but curved vertically. It is desired to carve a figure on that surface which shall have the same appearance as one drawn upon a perfectly flat surface of the same sight dimensions, and not look distorted upon completion. Upon a piece of paper make the drawing full size as it is to appear when finished. This is shown in Fig. 80, which is presented to a scale of 6 inches to the foot. Now draw the profile and then draw any number of lines through the design, extending them to cut the profile, giving each line a number. Next draw other lines through the design and at right angles to those already drawn. Now take the cardboard or whatever it is intended to employ in making the stencil, for it must be flexible in any case, and transfer the lines running vertically through the design on to it. Then transfer the lines running horizontally, taking the distance each time along the curvature of the profile. Trace the design through the points thus obtained. I need scarcely remind the student that all the measurements require to be taken with great care and accuracy. Cut out the part it is intended to cut upon the work, and by comparing the stencil with the first sketch considerable difference will be perceived between the two. It is advisable for the student to study the principle of the foregoing, as this method requires to be frequently used, and I shall have occasion to refer to it again only in a more complicated form. Place the stencil upon the work, keeping it well to the surface, and mark out as before mentioned. Now proceed according to the directions given for the straight parts, with this difference, that in the present case the finished lines must be cut square with the profile, no matter what position it assumes. The dotted lines shown upon the profile in Fig. 80 will, I think, fully explain my meaning.

For this portion of the work it will be necessary to make a style of router differing from the one already given. In Fig. 82 are shown side and end views half-full size of the router that is required. Take a piece of wood, say $\frac{1}{2}$ x $\frac{1}{2}$ x 3 inches, and round one side, as indicated in the engraving, so as to fit into the hollow of the profile of the leg. Then take a small piece of saw blade and make it $\frac{1}{8}$ inch or $\frac{5}{32}$ inch wide. Sharpen one end the same as a chisel with a small bevel or basil. Next bore a hole through the wood about 1-16 inch smaller than the steel is wide and drive the steel through the block, allowing the sharpened end to project to the proper depth, and the router is complete. No wedge is required, and the steel can easily be withdrawn upon the completion of the work. It may at first be rather awkward to use, but a little practice will overcome the difficulty.*

(To be Continued.)

A CELLULOSE paint adapted for the protection of iron and metal surfaces, which is described by the *Practical Engineer* of London, consists of a 10 per cent. solution of ordinary wood pulp, to which may be added any coloring matter desired. At the moment of using the paint there is to be added to it some sort of siccative, such as an acid salt of lead or manganese. The paint finally becomes insoluble, affords a good protecting covering and does not scale off like other paints and varnishes. It may become immediately insoluble and resistant by a second coat of one of the siccatives named above.

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

James Renwick.

Members of the architectural profession will learn with regret of the death, on June 23, of James Renwick, well known as a member of the firm of Aspinwall & Renwick of New York City. Mr. Renwick was born in this city in November, 1818, and at the age of 17 graduated from Columbia College. He immediately took up the study of architecture and engineering, first serving as an engineer on the Lake Erie Railroad, and afterward became an assistant engineer on the Croton Aqueduct, in which position he superintended the construction of the reservoir at Forty-second street and Fifth avenue. Mr. Renwick's reputation, however, is more closely associated with the churches erected under his direction in New York. Probably his greatest work was in 1853, when he began the preparation of the plans of St. Patrick's Cathedral on Fifth avenue. His plans were accepted, and the corner stone of the cathedral laid on August 15, 1858, the building being dedicated on May 25, 1879. The towers, however, were not built until some time later, the work being commenced on them in 1887. Mr. Renwick was also the architect of St. Bartholomew's Church and the Church of the Covenant, both in New York City, as well as St. Ann's Church in Brooklyn. In 1869 he made the plans of the building for the Young Men's Christian Association and Booth's Theater. He was also connected professionally with the New York Stock Exchange, the Smithsonian Institution and the Corcoran Art Gallery. He was employed toward the close of his career in restoring the old Spanish Cathedral in St. Augustine.

Varieties of Slate.

Slate is the generic term applied to all fine grained argillaceous or clayey rocks breaking into thin laminæ. When the laminated character is but imperfectly developed the term " shale " is used; when it is so perfect that the rock readily splits into thin, even plates it is called " roofing-slate." The color of slate rocks is as various as the degree of lamination; the chief colors are, however, gray, greenish gray, green, purplish and dark blue. Roofing slate is almost always of the latter color. Slate rocks insensibly pass into grits according as the argillaceous constituent diminishes and that of sand increases, the property of laminability diminishing in the same degree. The finer and more argillaceous the slate, therefore, the better adapted it is for yielding roofing slate. When slate rocks are in contact with large masses of igneous rocks, especially with granite, they undergo a remarkable change, being, as it were, baked into what is called mica slate, which sometimes passes almost completely into mica, one of the constituents of granite. Where the rock thus altered had been originally a fine-grained slate, and the baking not proceeded very far, it may still be used for roofing slate, being more durable than the unaltered rock, although the slates are not so even. Good roofing slate should be of a uniform, fine grain, should split easily into even plates, which may be easily pierced with holes by a sudden blow of a sharp-pointed instrument without being fractured; its color should not be very dark, as that indicates a large quantity of carbonaceous matter, the presence of which assists in the decomposition of the slate; it should also be free from pyrites, and, finally, it should not absorb much water either by its surface or edges, a point which is readily ascertained by weighing a piece of the dry slate, plunging it in water and then weighing it again after the surface has partially dried. Although the less perfectly laminated slate rocks are sometimes used as a building material they are not well adapted for that purpose. The finer kinds of roofing slate, when large sized slabs can be obtained, are adapted for many useful purposes besides the roofing of buildings, such as the construction of cisterns, acid condensers, billiard tables, benches for laboratories, baths, &c.

CORRESPONDENCE.

Strains in King and Queen Post Trusses.

From C. A. P., *Philadelphia, Pa.*—I should like to see published the breaking weight or strains of the king and queen post trusses which are illustrated in the sketches sent herewith. The wood is cherry. I should also be glad to have a formula or rule for calculating the strains by an arithmetical and also by an algebraic method. What is we must make some assumptions. The section of the tie beam according to Fig. 1 is $1\frac{1}{8} \times \frac{5}{8}$ inch, or equal to $\frac{45}{64}$ inch ; now at a strain of 8000 lbs. per square inch as an ultimate load the tie beam would break under a strain of $\frac{45}{64} \times 8000$ lbs. = 5625 lbs. If our calculations show a stress of that amount on the tie beam, then the breaking load of the truss has been obtained.

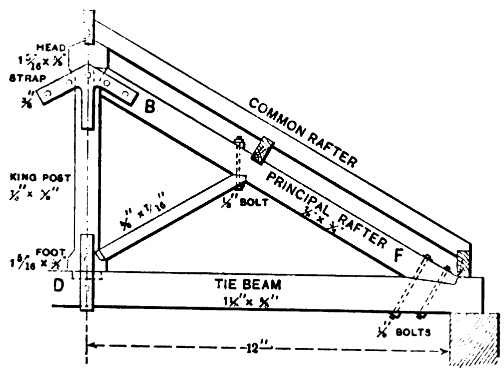


Fig. 1.—King Post Truss.—Scale, 3-16 Inch to the Inch.

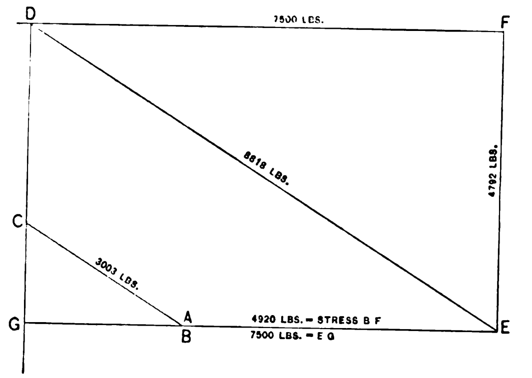


Fig. 6.—Stress Diagram of Queen Post Truss.

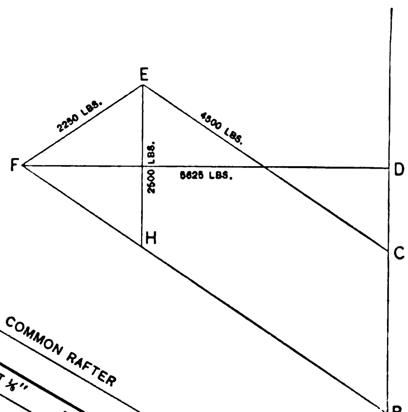


Fig. 4.—Stress Diagram of King Post Truss.

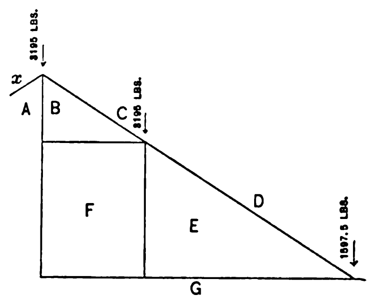


Fig. 5.—Skeleton of Queen Post Truss.—Scale, 3-32 Inch to the Inch.

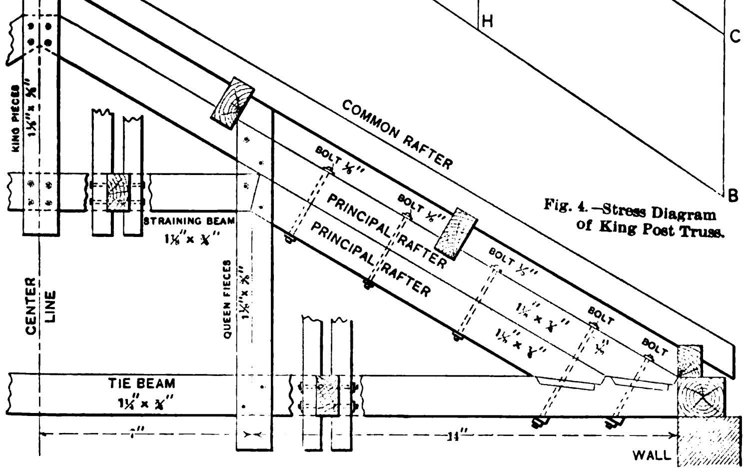


Fig. 2.—Queen Post Truss.—Scale, 3-16 Inch to the Inch.

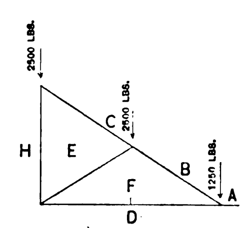


Fig. 3.—Skeleton of King Post Truss.—Scale, 3-32 Inch to the Inch.

Strains in King and Queen Post Trusses.

the name of a good book which will give the calculations according to these methods?

Answer.—From the sketches submitted by our correspondent we have prepared Figs. 1 and 2, presented herewith. The first is a so-called king post truss, although the duty of the post is more that of a tie than of a strut. Cherry is a wood of which we have no data as to its tensile strength, but its compressive strength is given as 8000 lbs. per square inch, and a conservative estimate of its tensile strength may be taken at 8000 lbs. per square inch. These figures are for the ultimate loads. As our correspondent has not given the distributed load the trusses are to sustain, and as he seems to desire to arrive at their limitations,

Drawing the diagram of the truss, Fig. 3, and lettering so that like parts on the skeleton of the truss signify like parts on the stress diagram, Fig. 4, we make the following assumptions: Suppose that we have a distributed load of 1000 lbs. to sustain. This would make an apex load at each joint of the truss 2500 lbs., or one-quarter of the load; at the points of support the load would be one-eighth of the whole load, but at these points the load, such as it is, is borne directly by the bearing walls and does not strain the truss, so that the amount, 1250 lbs., as shown, is not taken into account in the stress diagram. The load at joint B C is 2500 lbs. On the stress diagram, Fig. 4, beginning at B, draw a vertical line, and on that line, with a scale of

1250 lbs. per ½ inch, lay off a load of 2500 lbs.; next, lay off C D equal to one-half that load, for that distance would be the central apex of the truss and would be the half way point of the full panel load. Draw the line B F parallel to the rafter B F of Fig. 1; draw the line D F parallel to the tie D F and prolong these two lines until they intersect at the point F; then, by the same scale as the loads have been laid out on the vertical B C D, may the stresses in these two members be read off. We find D F by scale to be 2¼ inches, and B F to be 2¾, and by the scale of 1250 lbs. per ½ inch would make the loads respectively 5625 lbs. and 6750 lbs.

The stress by scale on the strut E F is 2250 lbs., and its area is $\frac{35}{128}$ square inch; at 8000 lbs. per square inch its breaking load would be 2187 lbs. The stress in C E by scale is 4500 lbs., and its area is $\frac{35}{64}$ square inch, and its breaking load is 4375 lbs. The figures in two instances show that the truss would fail in the tie beam, and also in the first part of the rafter, before the natural breaking load of the timber is reached, which indicates that the truss is not properly proportioned.

We next draw a skeleton of the second or queen post truss, Fig. 5, and then draw the stress diagram, Fig. 6. In this truss we have a very imperfectly designed queen post truss. As drawn, it consists of a combination queen and king post truss. As the desire in this case, as in the other, is to find at what point the truss will fail, we have to make certain assumptions. The method can best be shown, however, in the following manner: Draw D C G indefinitely, and from D lay off the supposed load D C. In this case we have drawn D C equal to 5 inches on a ¼-inch scale. Lay off C G, equal to 2¼ inches; from D draw D E parallel to rafter D E, and draw G E parallel to G E, and prolong them until they intersect at some point, as E; then by this same scale will the stresses in D E and G E be measured; now G E, the stress in the tie beam, measures $11\frac{75}{100}$ quarter inches, and at a scale of nearly 639 lbs. per ¼ inch the stress in G E is 7500 lbs. Now the area of the tie beam is 1¼ x ¾, which is equal to $\frac{15}{16}$ square inch, and at 8000 lbs. per square inch the ultimate or breaking load is 7500 lbs. So at this strain the truss would fail at the tie beam. Continuing the stress diagram, draw C B parallel to D E and intersecting G E at B. The stress in C B is measured by the same scale. To find the stress in A B we must look at the truss carefully. B F and A F are both horizontal, and must therefore be in the same straight line from the center point of intersection, but B C and A x are equal in length; start at equal distances from the central point of intersection (not lettered in the diagram) and make equal angles with C x. Then the stress in A B, being represented by the distance from A to B, will be zero. The stress in B F will be represented by B E. The stresses in B C and B F do not reach the breaking load; the stress in D E by scale is 13,855 lbs., and by calculation of the sectional area is 8818 lbs.

For the stress in F E, combine the reaction F E with the known stress in D E, and we get the stress F D = E G.

The calculated strains show that the second truss is safer than the first, so far as it is proportioned, but this result has been obtained at the expense of unnecessary timber improperly placed as to truss design. It would have been better to have inserted a strut in the lower triangle, and then it would have been unnecessary to double up the lower part of the truss rafter.

As to books containing formulæ for truss construction and designing, there are few, if any, that cover the whole ground. Among the best are Hatfield's "Transverse Strains," Greene's "Elements of Graphic Statics," Kidder's "Architects and Builders' Pocket Book" and Trautwine's "Handbook." The two last named are excellent in discussing the theory of truss design and particular effort has been made by both writers to explain the principles and laws of mechanics involved, and from which all the deductions are logically made.

The Howe Truss.

From C. B., *Norfolk, Va.*—I notice in the February issue that "W. H. B." of Baxter, Iowa, asks a good question which ought to start a discussion on the Howe truss. As I am interested I beg to ask for some information regarding the framing and repairing of Howe truss railroad bridges. I want to know, among other things, how to space angle blocks with regard to different camber. What is the best camber and rule for same?

Where should the best pieces of timber in the chord be placed, at the center or on the ends?

What is the best practice in packing the chord and locking joints?

A serious point in packing joints in the bottom chord is that there is difficulty in putting in sufficiently heavy packing. Now what is to be done with a 150 foot span when the butt joints in the lower chord have opened sufficiently to admit of shoving in the hand? As this chord lengthens the bridge, of course, sags. How would rods full length of the chord work?

Which is the stronger, a through or an overhead Howe truss—that is, for floor beams on the upper chord?

What is the best practice in framing flooring and overhead braces? Is it to halve them at their intersection, as shown in Fig. 1 of the sketches, or cut one and dowel to the other, as shown in Fig. 2?

What are safe lengths of span for 45-ton engines without overhead bracing?

When straining brace connects direct with chord, which of the lines A, B or C of Fig. 3 should be the line of toe cut?

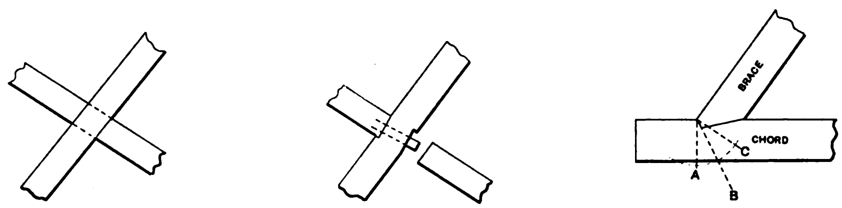


Fig. 1.—One Method of Framing Braces. Fig. 2.—Another Method of Framing Braces. Fig. 3.—Line of Toe Cut.

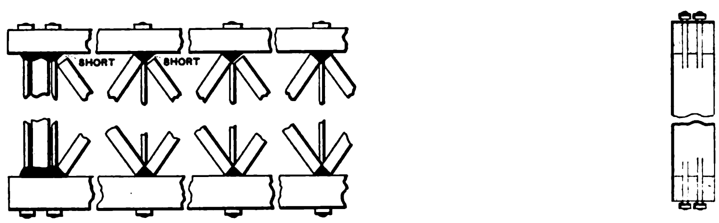


Fig. 4.—Section of Truss, Showing Slack to be Taken up. Fig. 5.—Section Through Chords.

The Howe Truss.—Sketches Accompanying Letter of "C. B."

What is the best usage in taking up slack?

Suppose a span of 90 feet has sufficient slack to allow of the first panel of counters being 2 inches short, as indicated, for example, in Fig. 4, is it safe to wedge these braces, or should the slack be taken up? In taking up slack, is there any particular point from which to start, and instead of trying to get all at one round, is it not better to go several rounds of the wrench?

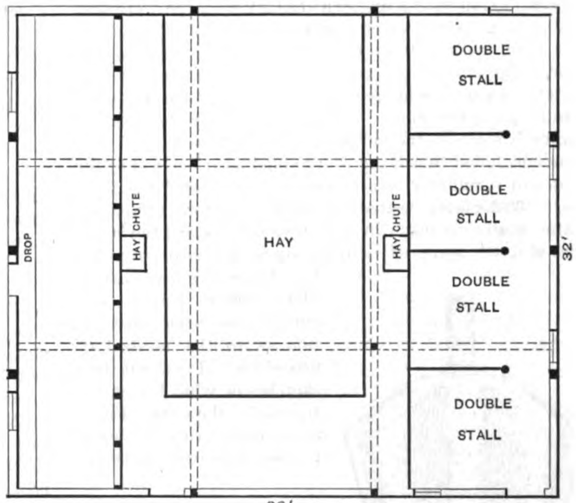
What is the best form of washer to use in connection with such work as that indicated in Fig. 5?

Recipe for Cement Pavements.

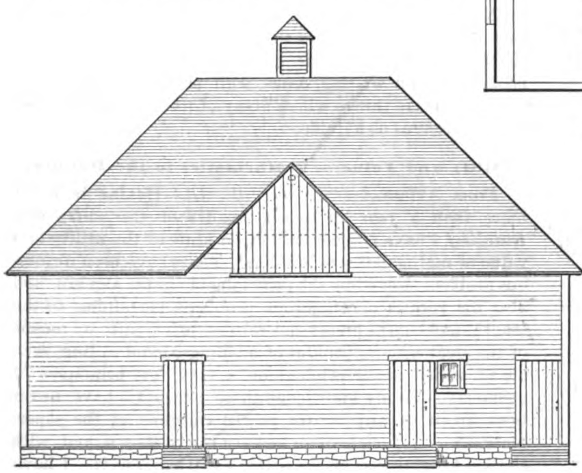
From E. H., *Detroit*, Mich.—I shall be glad to see published the best recipe giving the proportions of sand and cement for cement pavements for a climate like that of Albany or Boston.

Design for a Farm Barn.

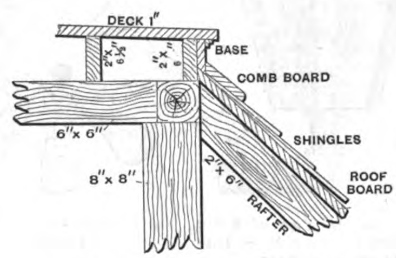
From H. C. R., *Hawkeye, Iowa*.—In regard to the request of "O. G. P." of Elmdale, Kan., allow me to say that barns of the description given are similar to some built in this vicinity and which I like very much. I send herewith a draft of one of these barns, which may prove of interest to the correspondent making the inquiry. It will be seen from the sketches that there is a perspective indicating the framing employed, a front elevation, a plan view and a detail showing the construction of the roof at the deck. The foundations of the building are of stone, on which rest 8 x 8 sills, 32 and 36 feet in length, framed with mortise and tenon 2½ x 6. There are four cross sills, two running each way 13 feet inside, measuring from out to out. The joist in the horse stable are 6 x 6, placed 3 feet apart and run the length of the stable. They are framed in such a way as to be flush with the sills. The flooring is of 2 x 12 inch boards, laid about ¼ of an inch apart. The joist in the cow stable are 4 x 6 inches, placed 3 feet apart, and there is a "drop" 14 inches wide. The first two rows of joist lay above the sill 4 inches, the "drop" being alongside of the second row, so that the floor projects 2 inches. There is a trough 4 inches deep running the length of the stable, made by spiking 2 x 4 pieces on to the joist. The posts are all 8 x 8 inches, and the girts 4 x 4 inches. I first lay a 4 x 4 lengthways, even with the outside edge of the sill, then the 6 x 6 placed 2 feet inside, or from the edge of the "drop" to the outside sill lengthwise. I then cut some pieces 2 x 4 to go inside the 4 x 4 and 6 x 6, and toe nail them 4 feet apart, lay on the plank lengthwise and then place the other 6 x 6 on the side of the "drop" and spike it fast. Now place the other rows of 6 x 6 between these and the center sill, using a 4 x 4 on top of that; then lay the floor crossways. Allow 5 feet for the cows to stand on and place the stencils, made of 2 x 4 stuff, 3 feet apart from center to center. I suggest 6 x 6 plates and 6 x 8 storm braces, because a barn is rendered more solid, and there are no barns built here without them. The hip rafters, jacks and others are 2 x 6, and the purlin plate 4 x 6 inches. If a horse fork with track is used it will be necessary to raise the gable about even with the deck, and it should be covered vertically with 12-inch stock boards and battened.



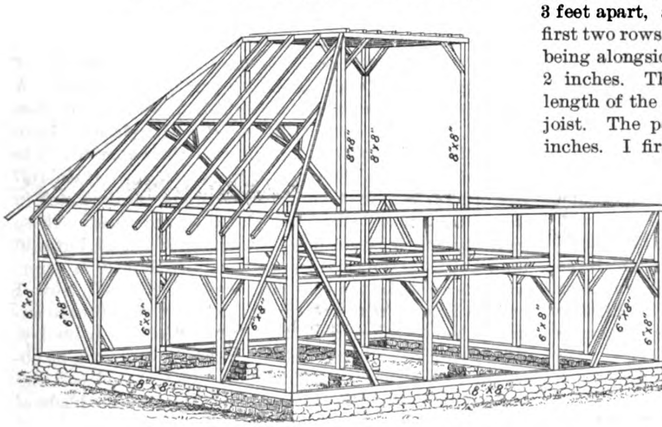
Main Floor Plan.—Scale, 3-32 Inch to the Foot



Front Elevation.—Scale, 3-32 Inch to the Foot.



Detail of Deck Construction.—Scale, ⅛ Inch to the Foot.



Perspective View, Showing Framing.

Design for a Farm Barn.—Illustrations Prepared From Sketches Submitted by "H. C. R."

Design for Hardwood Mantel.

From J. P. Y., *Graysville, Ind.*—Can any of the readers of *Carpentry and Building* furnish a design with details of a hardwood mantel with overmantel and mirror?

Instruction in Pattern Making.

From P. J. C., *Grand Rapids, Mich.*—I am serving my apprenticeship with a man who has a very large workshop heated by a 16-inch sheet iron stove which stands about 5 feet high, with a space of 2 feet or more above the feed door. This stove, when run at full blast, makes it uncomfortably warm in some parts of the shop, but does not sufficiently heat the ends. I have seen hot water heating plants in some of the buildings where I have worked, and have concluded that if our stove stood near one end of the shop and a radiator was placed at the other it would be more comfortably heated. I desire, therefore, to make a water heater to place in the stove for heating the water that will be conveyed to the radiator by means of pipes. I wish to make a pattern of this water heater and would like some instruction as to the method of procedure. I submit two sketches of what I have designed for the work. Fig. 1 is a general view, designed to have a 1½-inch outlet at the top and an inlet of the same size at the bottom, to which I intend to connect the iron pipe. At the widest point my intention is to have the heater 12 inches in diameter, as shown in the plan, Fig. 2. The extreme dimensions from top to bottom I intend shall be 15 inches and that the inlet shall be 12 inches below and the outlet 3 inches above a line drawn at the largest diameter, from which the receptacle will taper both ways. I do not desire to have the casting when complete over ¼ inch thick, and wish to know how to proceed to make the core box as well as the pattern. I talked with a friend who has had some experience in foundry work, and he says there will be no difficulty in making such a casting if the proper pattern and core box are furnished to the foundryman. Will some of the pattern makers enlighten me by sending drawings for publication?

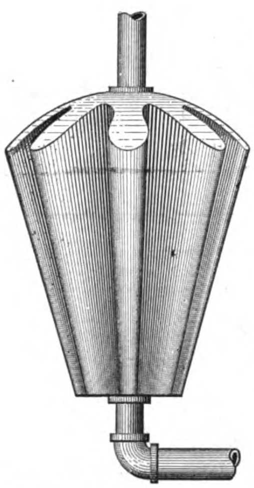


Fig. 1.—General View of Water Heater for which Wood Patterns are to be Made.

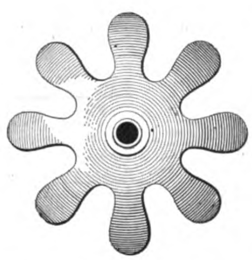


Fig. 2.—Plan View of Water Heater.

Instruction in Pattern Making.—Views of a Water Heater Submitted by "P. J. C."

Suggestive Designs in Solid Carving.

From D. F., *Philadelphia, Pa.*—I would like the author of the series of articles on wood carving now running in *Carpentry and Building* to give us, before he finishes consideration of the subject, some designs in solid carving such as crockets in Gothic and the acanthus leaf in classical work. The author deserves great credit for his articles, as they are very instructive, not only to wood carvers, but to others as well.

Note.—We have no doubt that the author of the articles on wood carving will be glad to have other readers offer suggestions in the direction indicated above. It will afford the opportunity of showing in what particular line the readers are interested and enable him to consider subjects of special value to the greatest number of our patrons.

Plans for a Wood Turning Shop.

From J. F. W., *Danville, Pa.*—Will some of the many readers of the paper kindly give me designs of a wood turning shop about 16 x 30 feet in plan? I want something cheap and yet of economical and compact arrangement. I would also like to have designs of a wood lathe for turning all kinds of handles and reeded work.

Note.—This subject is one which should attract the attention of a large class among our readers, as it offers opportunity for an interesting and valuable discussion. We trust that there will be a liberal response to the inquiry of this correspondent, to the end that a variety of designs may be presented. Our correspondent will probably obtain satisfactory designs of wood turning lathes from catalogues of manufacturers of these goods.

A Reader's Opinions and Wants.

From JACK, *Ontario, Ohio.*—I wish to express my opinion of *Carpentry and Building* by stating that I am greatly pleased with the new departments which have lately been added to it. The department on wood carving is of interest to many of us chips who have many leisure hours, especially in the winter, for practice. Along this line I would like very much to have some of the brothers that are handy with the drafting pen give us more designs for combination bookcases and writing desks, wall pockets, paper racks, &c. These are things which many of us would make if we had the designs as a guide.

Utility and Value of Mathematics to the Builder.

From APPRENTICE, *Naperville, Ill.*—Having been for more than a year an earnest reader of *Carpentry and Building*, I have frequently noticed hints of the utility and value of mathematics to builders. There have been numerous problems solved by the principles of simple algebra, and also the results of numerous problems pertaining to the lengths and cuts of braces and rafters, principally by means of the steel square, profiles of moldings, hand railing, &c., all of which are dependent on a very few principles of geometry. To my knowledge these principles have never been given by any writer in the columns of the paper. Now, these principles can be very easily shown, and with the kind permission of the editor I will attempt it. I have frequently told old carpenters that all lengths of rafters, braces, &c., could easily be obtained by means of a pencil and a smooth, small block of wood to write upon, far more rapidly than by a steel square or drawing board.

For the sake of illustration take Fig. 1, on page 108 of the May issue for 1894, showing a part of a barn bent. A great many framers put in a vertical purlin post and then cut a notch in the rafter to fit on the purlin plate. I have seen old experienced builders instruct their apprentices to clean the big shop floor and then lay out upon it the full size of roof, in order to ascertain where to cut the notch in the rafter and get the length of the purlin post. These men claimed to know how to use a steel square, but said the results thus obtained were generally slightly in error, which is apt to be the case with the best of care. Now, I believe that no man ever understood the steel square unless he had at least a good knowledge of simple geometry. By geometry the length of any rafter or brace can be obtained to any degree of accuracy. If I should ask any builder how far it is from the 4-inch mark on the blade of the square to the 3-inch mark on the tongue, he would, of course, say immediately 5 inches. Let the accompanying figure illustrate. The principle is this: Take any two straight lines and make a corner; measure 3 and 4 inches from the corner on each line, as shown, and draw the slanting line, which will be 5 inches long. Now construct a square on each of the lines, as shown. The area of the first two squares will be 16 square inches and 9 square inches respectively, their sum being 25 square inches, which is also the area of the square on the slant. The sum of the first two squares will always be equal to the square on the slant, no matter what may be the distance taken from the corner. Take the figures 8, 6 and 10 used in squaring a building, these being very handy when you use a 10-foot pole. The square on 8 is equal to 64, and the square on 6 is equal to 36, making a total of 100. The square on 10 equals 10), the same equality as above. By this principle all brace lengths given on the tongue of any steel

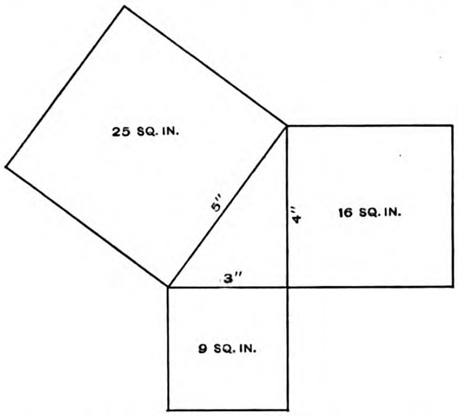
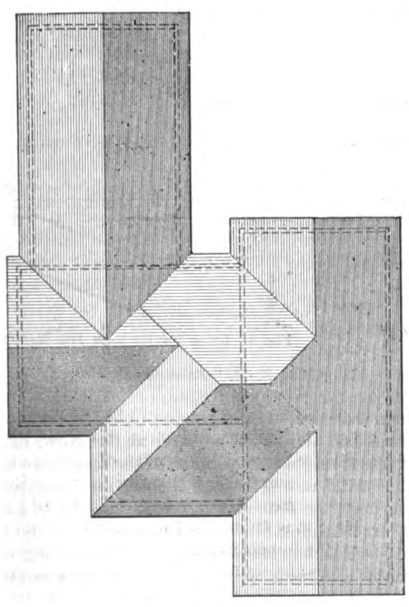


Diagram Accompanying Letter of "Apprentice."

square are obtained, and not by experience, as many otherwise good mechanics have told me.

Take again a brace having a 36-inch run. The sum of the squares on the 36-inch sides equals 2592 square inches; now multiply the length of the brace 50.92 inches by itself and we have 2592. Take again a small roof of one-third pitch and 18 foot span. The rise will be 6 feet and half the span 9 feet. The span line and vertical through the apex of the roof make a square corner. The length of the slant line will be the length of the rafter: Thus, the square on 9 is 81, and the square on 6 is 36, making a total of 117 which must be the area of the square on the rafter, the length of which must be 10 feet 9¾ inches. The best and quickest way to find such number as when multiplied by itself will equal 117 is to have a table of numbers running



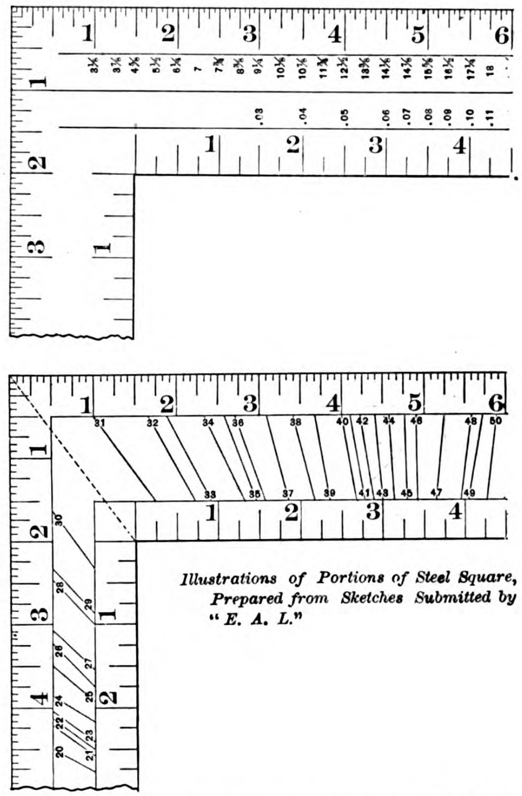
Roof Plan of a $750 Cottage.

up to, say, 10,000. Paste this in your sash and molding book or memorandum book, where it will be handy, and from it you can pick out the numbers.

The above simple principle which I have endeavored to illustrate, and one other which I may at some future time illustrate, will solve any problem that can be solved by the steel square. In fact, in steel and iron construction these principles are used entirely. The other principle to which I refer in the foregoing is similar and proportional triangles.

Roof Plan of $750 Cottage.

From J. S. ZIMMERMAN, *Morgantown, N. C.*—I inclose a blue print of the drawing of the roof for the $750 house published in a late issue, and about which "M. Q. D.," New Iberia, La., makes inquiry in the February number. The correspondent says he cannot see how the building can be roofed to conform to the elevation. I hope the matter will be made clear when he examines the roof plan submitted. He will notice that the front porch roof is not shown, as this is a subordinate matter and does not affect the real question at issue. The pantry off the kitchen is intended to be covered by the roof of the rear porch. The



Illustrations of Portions of Steel Square, Prepared from Sketches Submitted by "E. A. L."

correspondent will also see that one of the main hips depends for support on the valley rafter on the left side of the L, and that in turn obtains its support from being fastened to the main ridge, as indicated on the plan. He will see, however, that all valleys are 2 x 8 inches and the main hips of the same size. The common rafters are 2 x 6 inches and all others 2 x 4 inches, placed 2 feet on centers. The dotted lines indicate the roofing plates.

Figures on the Steel Square.

From E. A. L., *Moberley, Mo.*—I have been a reader of the paper for some time and I would like my brother chips to explain the figures on the portions of the steel square, of which I send sketches herewith.

Shingling Hips.

From CARPENTER, *Germantown, N. Y.*—I would like to know how to start the first course of shingles on a hip when it is desired to lay a double course up the hip?

Note.—The subject of shingling hips has been discussed at considerable length in past issues of the paper, and if our correspondent will refer to the issues for April, May and July, 1892, he may find that which will prove of interest and value in the connection named. The subject, however, is one of recurring interest, and we trust those who can find time will write us describing their methods.

ART OF ROOF FRAMING.

By J. E. M.

THE art of roof framing is considered by the majority of mechanics as the most interesting work in the craft. In presenting this treatise on the subject to my fellow workmen I lay no claim to originality, but if what I write shall benefit the young mechanic who chances to read it I shall feel repaid for the effort. Having had nearly 20 years' experience I realize the fact that a great many mechanics are unable to frame a roof unassisted, and venture to give a few practical ideas through the columns of the paper. What I shall have to say consists essentially in showing an on a building 30 feet wide and of one-third pitch. Now, one-third of 30 is 10 and one-half of 30 is 15. We have therefore a triangle, the sides of which are 10 feet and 15 feet respectively, from which to obtain the side corresponding to the rafter. Referring to Fig. 1 of the sketches, A B is the rise and A C the run. Take a good standard steel square and lay it flat on a surfaced board with the tongue to the left. With a sharp knife scribe close to the edge of the square at the figures 10 on the tongue and 15 on the blade. Make a mark at right angles to the scribe marks at

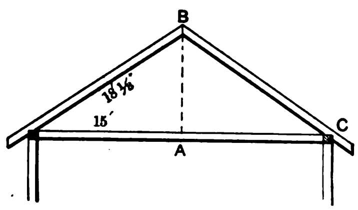


Fig. 1.—Elevation of Roof, Showing Rise and Run of Rafter.

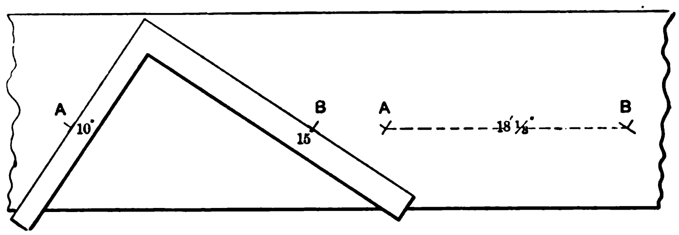


Fig. 2.—Illustrating Method of Using the Steel Square in Obtaining the Length of a Rafter.

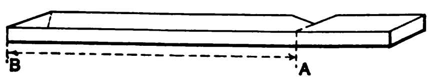


Fig. 3.—Points of Measurement of Common Rafter.

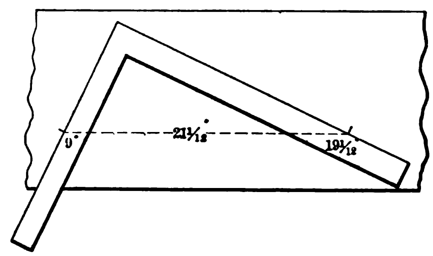


Fig. 6.—Method of Obtaining Length of Hip Rafter.

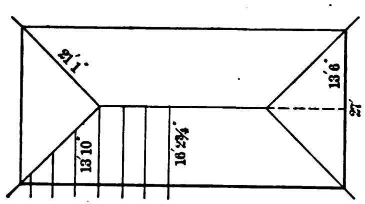


Fig. 4.—Roof Plan Showing Common, Hip and Jack Rafters.

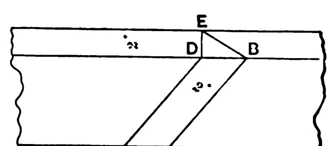


Fig. 7.—Lines for Obtaining the Back Bevel.

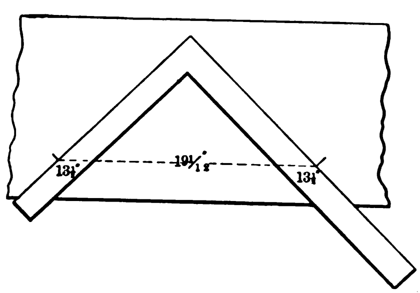


Fig. 5.—Obtaining Base Line of Hip Rafter.

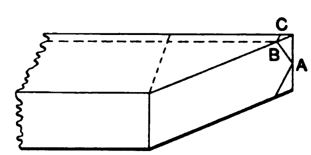


Fig. 8.—Lines for Backing Hip Rafter.

The Art of Roof Framing.—Illustrations Accompanying the Article of " J. E. M.," Sacramento, Cal.

application of the steel square, whereby the lengths and bevels are quickly and accurately obtained. What is wanted by the average mechanic is a practical method, easily understood and applied, and my letter therefore will apply only to plain roof framing. This subject thoroughly understood little difficulty will be experienced in connection with complicated work, as the principles are the same in every case.

I will first give attention to gable roofs. A rafter is the long side of a right angle triangle, called in geometry the hypotenuse. We have the base and altitude given to find the hypotenuse. To obtain the length of a rafter it is first necessary to find the rise or pitch of the roof and next to find half the width of the building from out to out of the plates. We then have the altitude, which is the rise and half the width of the building, the base, to obtain the length of the rafter. For example, we find the length of the rafter the figures as indicated in Fig. 2, the 10 on the tongue being shown at A and the 15 on the blade at B. Now, by measuring across from point to point with the square we have as a result a trifle more than 18 inches, and counting the inches as feet we find the rafter to be 18 feet ⅛ inch in length. In obtaining plumb and level cuts use the figures 10 and 15 or 8 and 12 on the square, both working on one-third pitch. In roofs of odd or uneven pitch use the rise and run.

After having found the length of the rafter on a scantling, first lay out its foot. In measuring the length, work from the line of the plumb cut, as indicated in Fig. 3; that is, from A, the plumb line, to B, the top of the rafter. Cut the scantling so laid out for a pattern. It is always best to shorten the bevel at the top a trifle so that the bottom of the top cut will hardly press the opposite rafter, giving the rafters the full strength at the cut. The length of any common rafter can be found in this manner through the medium of the steel square. After the beginner has thoroughly mastered the first step in gable roof framing the way is opened to more difficult work.

The next step brings us to hip roof framing, of which we will present two methods, both being practical and easily understood. Take, for example, a building 27 feet wide, over which we wish to construct a square roof of one-third pitch. First obtain the length of the common rafter as in Figs. 1 and 2. Mark the length of the same on the roof plan previously arranged, as indicated in Fig. 4. Now apply the square to a board, as in Fig. 2, taking $13\frac{6}{12}$, this being one-half the width of the building, on both tongue and blade, as indicated in Fig. 5. Measure across from mark to mark and the result is found to be $19\ 1\frac{1}{12}$ inches. Counting inches as feet, the result is 19 feet 1 inch, the length or base line of the hip. Again, take on the blade the length or base line first sought, which is $19\frac{1}{12}$, and, measuring from scribe and witness mark of tongue to that of blade, we have as a result $21\frac{1}{12}$ inches, as shown in Fig. 6. Again, counting inches as feet we have as a result 21 feet 1 inch, which is the length sought. For the top and level cuts of rafter use 8 and 17 on the square, the short bevel being the top cut and the long one the bottom cut. In roofs of uneven pitch use the base line and hight, in this case 9 and $19\frac{1}{12}$ being the figures.

To obtain the lengths of jack rafters proceed as follows: From the width of the building deduct twice the distance the rafters are between centers. Again, take the half and divide by the pitch and we obtain the rise and run of the longest jack. Make each set of jack rafters as much shorter as the long jack is shorter than the common rafter. In Fig. 4 of the sketches the rafters are supposed to be 2 feet on centers. We should then deduct 4 feet from 27, which is 23; one-half of 23 is 11 feet 6 inches, and one-third of 23 is 7 feet 8 inches. We then have $7\frac{8}{12}$ on the tongue and $11\frac{6}{12}$ on the blade, obtaining a length of 13 feet 10 inches for the longest jack. The difference in length between this and the common rafter is 2 feet $4\frac{3}{4}$ inches; that is, each jack rafter will be that much shorter than the one before it in working down the hip. The same plumb and level cut of the common rafter is used for the jacks.

In order to obtain the back bevel proceed as follows: On a scantling used as a rafter lay off the plumb cut A B, as indicated in Fig. 7. Now parallel with A B lay off C D at a distance from it equal to the thickness of the rafter D E, which in this case is 2 inches. Connect E with B and we have the bevel required. The bevel of the hip rafter is obtained in the same manner. In order to obtain the lines for backing the hip, lay off on a rafter scantling the level cut and saw it, as shown in Fig. 8. From the center of the point apply the miter square and draw A B. Set the thumb gauge from C to B, gauge both sides of the rafter and remove the corners from gauge line to center. When hip rafters are not backed care must be taken to reduce the foot so that the jacks will wind with the body of the roof. In Fig. 9 is shown the foot of the common rafter, the distance from A to B being 3 inches. In Fig. 10 is represented the foot of the hip rafter, *c* D being equal to A B. The backing line is represented by *e e*. When not backed raise the level cut *c c* as much as may be required to back the hip, the distance being represented by *e g*.

In measuring the length of hip rafters, work from the plumb line of the foot on the top edge to the center of the bevel at the top, as A B of Fig. 11.

The second method for framing the hip rafters may be described as follows: First obtain the length of the common rafter and on a board draw a right angle. On one arm set the length of the common rafter and on the other set off half the width of the building. Connect the two points and the result is the length of the hip. Now use the same figures as in the first illustration and the length of the common rafter is found to be 16 feet $2\frac{3}{4}$ inches. Referring to Fig. 12, we have A C a common rafter, A B half the width of the building and C B the hip rafter. From A to C is 16 feet $2\frac{3}{4}$ inches; from A to B is 13 feet 6 inches, and from C to B is 21 feet 1 inch. Now upon A B space the jacks the required distance apart and draw *d e* parallel to A C. This represents the length of the long jack, and the others are obtained in the manner described.

The lengths of valley rafters are found in the same manner as the hips. It is advisable when no roof plan is furnished for the workman to draw one to the scale of $\frac{1}{2}$ inch to the foot. After each rafter is laid down in its proper position proceed to obtain the lengths as previously described, after which the roof can be speedily framed. When framing hip roofs always use a ridge board, and when doing so the rafter must be shortened half the thickness of the board. When the young mechanic has learned to frame hip and gable roofs, it reasonably follows he can frame a roof combining gables, hips and valleys, as the principle is the same in all cases.

Now, in regard to octagon roofs. Many times the me-

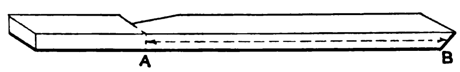


Fig. 11.—Points of Measurement of Hip Rafter.

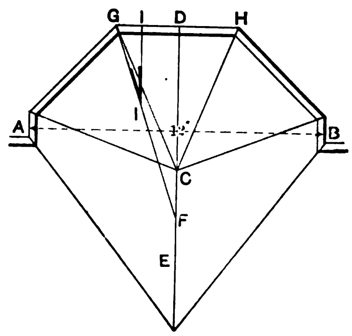


Fig. 13.—Lines for an Octagon Bay Window.

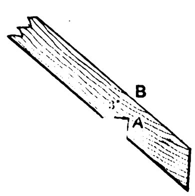


Fig. 9.—Foot of Common Rafter.

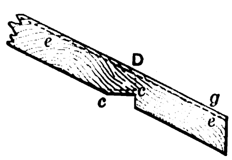


Fig. 10.—Foot of Hip Rafter.

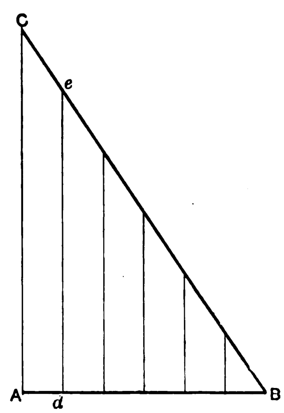


Fig. 12.—Second Method of Obtaining Hip, Valley and Jack Rafters.

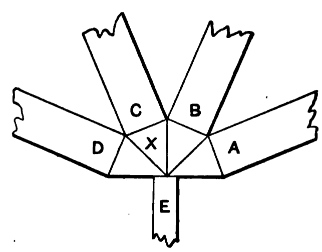


Fig. 14.—Tops of Rafters and Post at the Ridge Line.

The Art of Roof Framing.—Illustrations Accompanying the Article of "J. E. M.," Sacramento, Cal.

chanic is called upon to erect a roof over a bay window having octagon sides. To do the work, first lay out on a board the roof lines, as indicated in Fig. 13. Let A B represent the width, which we will call 12 feet; then half the width is 6 feet; one-third of 12 is four, so we take 4 and 6 on the square and obtain as a result 7 feet 3 inches as the length of the common rafter. Now on D E, the ridge line, set off D F, the length of the common rafter. Connect F with G, which gives the length of the hip rafter. Now upon G H set off the jack rafter I I. Set a bevel at the point of intersection and this will give the back bevel of the jack rafter. The plumb and level cut is the same as that of the common rafter. For the top and bottom or plumb and level cuts of the hip, measure from G to C, and this with the rise will give the cuts required. From G to C is 6½ feet; then 4 and 6½ are the figures used on the square, the tongue giving the plumb and the blade the level cuts. Instead of beveling the top of the hip rafters get out a half octagon post the sides of which are the same width as the rafters, all as indicated in Fig. 14. In this case X represents the post, the top of which need only be worked down far enough to receive the rafters. A B C D are the rafters abutting the post and E represents the ridge. Instead of using a valley rafter let the main roof go through, board it and valley on to the boards. This plan is the quicker and gives a stronger job.

WHAT BUILDERS ARE DOING.

AN estimated statement of the condition of affairs in the building trades throughout the country at midsummer, as compared with the condition at the same period of 1894, shows a decided improvement in 1895. It was evident in many localities at the beginning of the year that the effects of the depression of 1893 and 1894 had not been entirely overcome and capital was timid. Comparatively little building that was not absolutely necessary was undertaken and anything of a speculative nature, outside of the large cities, was postponed, awaiting an improvement in general business conditions. As a result of this state of affairs the prospect at the opening of the season was uncertain, but as general business improved confidence became restored and building, which is among the last of the industries to feel the effect of either depression or prosperity, became more active. In nearly all localities where the building business has improved, as compared with the outlook at the beginning of the season, it has continued to advance steadily to greater proportions with each succeeding month. The East has been especially favored and in most of the important cities the total of the year, unless some unexpected setback occurs, will reach the "high water" mark of the years immediately preceding the late panic. The middle West seems to be gradually recovering itself, although building has not yet resumed anything like the activity of the boom period. Business is reported as being quiet on the Pacific Coast, though all are hoping for an improvement in 1896. The relations between employers and workmen in the various branches of the trade have been unusually free from disturbances thus far this year and there is little indication of any unfavorable change. While wages in some of the localities are low, they are, in the majority of cases, fixed by the unions, and these scales generally prevail. Disturbances which have been serious enough to interfere with the general progress of building have been almost unknown, such strikes or lockouts as have occurred having been confined to single trades. The hod carriers' strike in St. Louis was about the only one that promised to be serious, but that failed of its purpose because of the presence of workmen from the duller portions of the West. The outlook for the balance of the season may be considered as favorable, both for the remainder of the year and for the opening of 1896.

Baltimore, Md.

The amount of business being done by the builders of Baltimore, compared with general business conditions, is satisfactory and it is thought slightly exceeds the amount under way at this season in 1894. There has been no trouble of any moment between employers and workmen since the season opened, and at present everything is serene in that direction. The Builders' Exchange is in excellent condition and busily engaged with the details of the plans for entertaining the delegates and others expected to attend the convention of the National Association of Builders. The place of meeting has been selected and the various committees are all working to perfect the arrangements for the comfort of the visitors.

Boston, Mass.

There has been no change in the building business from the favorable condition reported last month, other than an assurance that the prediction of steady improvement was well founded. The amount of work in the market has steadily increased since the season opened and builders generally are busy, with the prospect of continuing to be throughout the year. The number of labor troubles has been very small and nothing has transpired to create any serious disturbance. The Master Builders' Association is in excellent condition, with the usual list of applicants for membership awaiting action. The form of estimate prepared for the use of its members has been amended to provide against the possibility of the introduction of new conditions into the contract which differ from those indicated in the specifications. The new form appears in the Builders' Exchange department of this issue.

Buffalo, N. Y.

The volume of building at present being carried on in Buffalo exceeds by a considerable amount that existing at this time of the year in 1894. The prices at which work was taken in the early season were very low and contracts made at that time will, it is feared, show but small margin of profit when completed. Of late prices have been better and the present outlook is encouraging. The prospect for the rest of the season is very good, both in work and prices, and it is expected that the fall business will greatly exceed that of 1894.

The condition of affairs between employers and workmen is undisturbed in all branches of the trade, except the plumbing, gas fitting and steam heating branches. The journeymen in these branches have been out on a strike for nearly two months and at this writing the prospect of settlement is uncertain. The men demand an increase of 50 cents per day and a reduction of working time from nine to eight hours. A few of the leading contractors have conceded these demands upon the condition that all employers make the concesion. The majority of the employers are standing together and are hiring journeymen from other cities, and have recently filled the places of the strikers with new men. The employers are of the opinion that the difficulty will soon be settled, while the workmen, it is said, are considering the advisability of calling a general strike of all branches of the trade. The latter condition seems unlikely to occur, as the activity of building has brought more workmen to Buffalo than can be supplied with work, and, as a result, there are many idle men in the city. A small strike of plasterers occurred about July 1, the men demanding an increase in pay from \$2.70 to \$3 per day. This being the wages generally paid, the employers conceded the demand and the men returned to work.

Bridgeport, Conn

A largely attended meeting of the Master Builders' Association of Bridgeport was held about July 1, at their rooms in the Arcade. It was unanimously voted that the exchange should be organized as a corporate association under the laws governing such associations in the State. When the incorporation is accomplished the exchange will be in a position to sue and to be sued; its arbitration will be almost as binding as in a court of justice, and the action of the majority may be enforced as the rule of conduct for each and every member. The initiation fee will remain at \$10 until October 1, after which time it will be \$25. It was originally intended that the lesser fee should prevail only until July 1, but in view of the fact that it was desired to let everybody in on an equal basis the extension of time was granted. The exchange already has 75 members, who represent the best of the building trades of the city, and has several applications for memberships on hand. It is expected that the exchange will reach, ultimately, the degree of dignity attained by the builders' exchanges in other cities, where the best of all the contracts of the city come to members of the exchange. The reason alleged for this is that the exchange operations are a guarantee and a protection to the customer. Business is reported as being in good condition and everything quiet between employers and workmen.

Detroit, Mich.

The builders of Detroit are having a quiet season, the showing of work on hand made by the department of buildings being little better than that of last year. The number of permits issued up to the present time argues that the balance of the season will not be greatly improved. The relations between employers and workmen have been undisturbed for some time past and there are no indications of any unfavorable change in the near future. The Builders and Traders' Exchange is in good condition and is holding its own as one of the business institutions of the city.

Kansas City, Mo.

The general contractors who are members of the Kansas City Builders and Traders' Exchange have for some time been considering the advisability of reducing the working time to a uniform day of eight hours. The matter was the subject of several meetings in June and the following from the *Journal* shows the result:

> Eight hours of labor for all workmen engaged in the building trades is assured. The general contractors decided to accede to the wishes of the journeymen mechanics at a meeting held at the Builders and Traders' Exchange. A paper fixing eight hours as the working day and naming July 1 as the date upon which the agreement is to go into force was signed by the general contractors who attended the meeting, and has since been circulated for further signatures. Although several of the trades already work under an eight-hour agreement the action of the contractors is the first formal action of the kind in Kansas City, and it will affect all of the local building trades. As no reference was made to wages it is assumed that the scale now in operation will remain unchanged. The agreement will not raise existing wages at all, but it will have the effect of affording work to more men.
>
> The craft which will be most benefited will be the carpenters, for the reason that many of them have been working ten hours and comparatively few have been able to find employment this year.
>
> The meeting of the contractors was the outcome of a mass meeting of journeymen and contractors held at the exchange last Saturday night. At that time a resolution favoring eight hours' labor and a time and one-half time wages for all extra work was adopted without a dissenting vote. As the general contractors were the parties most vitally interested it was decided by them that the matter be considered at a special meeting of their number. The adoption of the eight-hour system was agitated by Carpenters' Union No. 160 early in the spring, so the agreement reached yester-

day may be looked upon, perhaps, as the result of that body's efforts. The union was strongly backed up by the bricklayers. The whole movement has proceeded without friction, as almost all, if not all, of the contractors have been heartily in favor of eight hours' labor.

As compared with former years building interests in Kansas City are still quiet and the present state of affairs seems to indicate that the total of work done at the end of the season will not greatly exceed that of last year.

Lowell, Mass.

The Lowell builders are handling more work than they were last year at this time, although the total is still below the mark of previous years. The increase of work over the amount done in 1894 makes the present season a satisfactory one by comparison, although the builders are looking forward to still further improvement in the future. The relations between employers and workmen are harmonious, there having been no disturbance of any kind between the two since the season opened. There is every prospect of continued harmony during the remainder of the season. The Master Builders' Exchange is in good condition and the members are looking forward to an increase in business during the balance of the year and a further improvement in 1896.

Lynn, Mass.

Building interests in Lynn are in a very much better condition than they were a year ago at this time, and indications point to continued activity during the balance of the season. A considerable amount of new work on hand is in the residence portion of the city ; the number of dwelling houses being erected is unusually large. The employers and workmen have had no serious differences this year and none are in prospect. There are very few idle workmen in the city and bricklayers especially are busy. The report of the inspector of buildings shows that if the present projected improvements are carried out the total building for the year will greatly exceed that of 1894.

Milwaukee, Wis.

The Builders and Traders' Exchange Association have, at the request of architects, manufacturers, contractors and others interested, decided to open a permanent exhibit of builders' supplies and material, and for that purpose have set apart the second floor in their fire proof structure, which is located in the business center of the city. All exhibits will be in charge of a manager, under the direction of the Board of Directors, and the business standing of the members of the Builders and Traders' Exchange is such as to guarantee that all who place exhibits will receive fair treatment. The exchange has recently issued a handbook compiled by W. H. McElroy, manager of the exchange, which contains the articles of incorporation of the Builders and Traders' Exchange, their constitution, by-laws, rules of the exchange and exhibition department, form of proposal, lien law, list of officers, Milwaukee architects holding admission tickets to the exchange, a list of the deceased members, a list of architectural, building and trade journals which are constantly kept on file in the exchange for the use of the members, an alphabetical and classified list of the members of the exchange, together with the number of their letter boxes and a copy of the Uniform Contract.

New York City.

The figures of the Department of Building of New York City, covering the first six months of the present year, show to what an appreciable extent contemplated building operations have exceeded those of the same period of last year. The total number of buildings projected was 2562, estimated to cost $59,201,-804, against 1297 buildings, estimated to cost $27,779,160 for the first six months of 1894. Some of this heavy increase is probably due to the filing of a large number of plans before the new building law went into effect on May 29, as all plans filed previous to that date were exempt from the more onerous exactions prescribed in the new law in the way of fire proofing, air spaces, &c. No doubt many of the plans were filed merely to forestall the law and without any intention of building at once. An idea of the rush at that time may be gathered from the statement that during the two weeks ending June 1 plans for 457 buildings, estimated to cost practically $10,000,000, were submitted to the department. Of the 2562 buildings projected during the first six months of the present year 1519 were for flats and tenements, estimated to cost $33,708,200, while 683 were for private dwellings, estimated to cost $6,836,000. The number of office buildings, hotels, stores, churches, &c., projected was 126, estimated to cost $17,442,200, while in the way of miscellaneous buildings covering stables, shops and the like there were 234, estimated to cost $1,215,404. The largest increase as compared with the first six months of 1894 is found in connection with flats and tenements, the number projected during that period being only 393, estimated to cost $7,794,550. Comparing these figures with the first six months of 1893 shows that the present season is also far ahead of that of two years ago.

There have been only minor labor disturbances during the past month, one being that of the granite cutters on the new Columbia College Building, who went on strike the latter part of June because granite from quarries where non-union men were employed was being used. The granite came from the Red Hill quarries in Connecticut, where it is alleged lower than the union scale of wages was paid. The outlook is favorable for a fair amount of business for the rest of the season, but there is no "boom" in sight nor is one generally expected.

Providence, R. I.

Providence builders are well satisfied with the condition of the building interests of their city. The amount of work now under construction greatly exceeds the amount in hand at this season of 1894, and the new work contemplated promises to swell the total of the year to record breaking size. The report of the building inspector shows that the amount of projected work has steadily increased since the season opened and promises to continue to do so for some time yet. The record of permits and intentions to build is greater at present than it has been at the same period in any year since the present inspector went into office. The contractors of the city are all busy and a number from other cities have obtained jobs in Providence and are contributing to the general prosperity of the season. The condition of the relations between employers and workmen is highly satisfactory, there having been neither strike nor lockout since the season opened, and there is no evidence of dissatisfaction manifested at present. The wages paid this year are the same as prevailed in 1894 and all trades are working nine hours per day. The market prices of building materials are about the same as those quoted last year and at the beginning of the season, and although competition is keen the majority of contracts are taken at a living price, with good outlook for a profitable year. The Builders and Traders' Exchange continues to be one of the influential organizations of the city and is steadily increasing its sphere of usefulness and its list of members.

Rochester, N. Y.

It is estimated that the amount of the contracts now being carried on in Rochester is about 25 per cent. less than existed at this period last year. Competition has been so keen that in spite of a stiffening in prices of building materials, work has been undertaken at lower prices than prevailed in 1894. Wages remain the same as they were last year—40 cents per hour for masons, an average of 25 cents for carpenters and 15 cents for common labor. No strikes or lockouts have occurred up to the present time and there is no indication of unfavorable change. The arbitration agreement between the masons and their employers prevents any disturbance in this branch of the trade, all questions of wages, hours, working rules, &c., being fixed at the beginning of the year. The effect of this agreement is beneficial to all the other branches of the trade, and has a tendency to reduce the number of strikes, the influence of the masons being for peace. The prospect for the balance of the season is not particularly encouraging, judging from the amount of work now in the hands of architects.

The Builders' Exchange is in a healthy condition and practically demonstrates the benefits of organization. It is increasing in members and influence and is in good financial condition.

St. Louis, Mo.

St. Louis builders are pleased with the present state of business, it being stated that the amount of work now on hand is very much larger than the amount on hand at a similar period in last season. Contractors are looking forward to a profitable year and if the present indications are correct the total of work done at the close of the season will compare favorably with the best years in the city's history. There are no strikes or lockouts now in operation, and the effects of the hod carriers' strike reported recently have almost entirely disappeared. No further disturbance between employers and workmen is expected, everything being harmonious at present. The men returned to work at the employers' terms, as did also the brickyard workmen, who struck in sympathy with them. There is plenty of work at present and the balance of the season promises to continue busy. The Builders' Exchange is pushing its influence and is steadily gaining ground as a conservative and intelligent business organization.

St. Paul, Minn.

Up to the present time the amount of building done in St. Paul is greater by 100 per cent. than the amount done at this period of 1894. Notwithstanding this increase the total of the season will probably be considerably below the total of more prosperous years. In spite of the improvement over last year many journeymen are seeking employment and it is reported that many are leaving for the harvest fields of the further Northwest. The bricklayers are about the only men who have enough to keep them busy, and in this branch of the trade there are applications for work from outsiders and from Minneapolis masons. No strikes or lockouts have occurred during the year, and the excess of idle workmen is cited as a sufficient reason for believing that no disturbance between employers and workmen is likely to occur for some time to come. Competition has been very close and work has been taken at prices which must leave little margin for profit. The Builders' Exchange remains in about the same condition that has been reported from time to time. A majority of the members are busy.

San Francisco, Cal.

The Builders' Exchange of San Francisco is having a building erected for its own use. An arrangement has been made with the Sharon estate, whereby the latter is to erect the building according to the plans accepted by the Building Committee, the exchange securing a lease on the property for five years. Either party, however, at the end of three and a half years has a right to cancel the contract, providing a three months' notice is given. At the end of five years the lease may be renewed, subject only to a question of rent. Should there be any dispute the matter will be submitted to arbitration. Another feature is that all contracts for building and furnishing must be let to members of the exchange. The new Builders' Exchange will be erected on the northwest corner of New Montgomery and Mission streets, with the main entrance on the first named thoroughfare. The structure will be of brick, two stories high, with a frontage of 80 feet on New Montgomery street and running back 50¾ feet on Mission. The outside of the building will be handsomely cemented, which will add materially to its attractiveness. The exchange complete will cost about $10,000, the building alone calling for $6800.

The ground floor will be occupied as a main exchange room, Secretary James A. Wilson states, though there will be a general assembly room, three telephone rooms, a large lobby, clerks' room and members' lockers and boxes. Each member will have his own box, including a separate mail box. From the lower end of the lobby the broad stairs lead to the gallery on second floor. Here there will be nine large rooms for estimating purposes, a directors' room and an assembly chamber. These last two are so constructed that they can be made into one should the occasion demand it. In the center of the roof will be built a large dome skylight, while the balance of the upper story will be lighted with windows, these being extra large. The ground floor will be lighted in the same manner. The interior finishings will be in grained pine, and the outside upper wall will be covered with old

Spanish tiling. The exchange will, of course, be furnished with the most approved lavatories and such other conveniences as are found in modern structures. The contract calls for the completion of the new exchange by September 1, when the members of the exchange will take possession. The Building Committee consists of W. B. Anderson, Thomas Elam and James A. Wilson.

The building trades of San Francisco are somewhat disturbed over a difference between the mason and carpenter contractors, involving the question as to the rights of the latter to be considered the general or principal contractors. Until recently custom has given the whole contract to the carpenter, making the mason a sub-contractor, and the masons object to the continuance of the custom, alleging that the practice is injurious to them. The masons demand equal right with the carpenter to assume the whole contract, or that they shall be direct contractors with the owner, irrespective of the general contractor, in all jobs costing over $500. The effort of the masons has created a considerable disturbance, which manifests itself in a feeling of uneasiness among the various branches of the trade. The amount of work now on hand compares favorably with that under way at this period of 1894, and relations between employers and workmen are undisturbed by strikes or lockouts.

Worcester, Mass.

The amount of work being done by the builders of Worcester is about the same in volume as that under way at this time of last season. Present prospects do not indicate any radical improvement over the total of 1894. If the average of the first half of the year is maintained the total will fall considerably below the standard of prosperous years in the past. The character of work now on hand is largely confined to dwellings of good quality, and the apartment and tenement houses that absorbed the majority of the work last year form a much smaller proportion of the new work. There are a number of large business buildings in course of construction and a considerable amount of repair work being done. Affairs between employers and workmen are in a quiet and peaceful condition, no strikes or lockouts having occurred this year and none are in prospect. Wages remain the same, with few exceptions, as those paid in 1894.

The Builders' Exchange is making preparations for its annual outing, which is one of its entertainment features for the summer season. The organization is in good condition as to members and finances.

The Builders' Exchange has issued a large poster bound at the top and bottom with metal strips and arranged with loops or the purpose of hanging it upon the wall. It carries at the top the address of the exchange, a list of officers and trustees and names the 'change hour. Below is a list of active members by trades for 1895; a list of associate members, as well as of those having exchange boxes; a statement showing when the meetings of the exchange are held, and in large letters across the bottom of the posters are the names of the Room Committee.

Notes.

The bricklayers of Los Angeles, Cal., struck recently for an increase in wages from $4 to $5 per day. The most of the men returned to work on a compromise. The carpenters are considering a strike to secure an advance of 50 cents per day.

The contractors of Altoona, Pa., are at work organizing a builders' exchange and have applied to the secretary of the National Association of Builders for information as to how to proceed. Frank Brandt of 1722 Margaret avenue is one of the most prominent in the movement.

The Mason Builders' Association of Wilmington, Del., has elected G. W. Phillips, president; A. W. Ruth, vice-president; William H. Jones, secretary; C. G. Anderson, treasurer; C. Sharp, executor.

The semi-annual meeting of the Brotherhood of Painters and Decorators of America was held in Lafayette, Ind., early in July. The following officers were present: President, John M. Watter of Baltimore; William Devaux of St. Louis, first vice-president; Elias Briedenbaugh of Dayton, Ohio, second vice-president; C. W. Pritchard of Lafayette, third vice-president and W. E. Ward of Jersey City. These gentlemen comprise the Executive Board. The membership is reported at 12,000 and the organization is in good condition.

It is reported that the Builders' Exchange of Cincinnati, Ohio, is seeking a new method of keeping its accounts, the method heretofore in use having been demonstrated defective and confusing.

The new Builders and Traders' Exchange of Bloomington, Ill., is reported as being in good condition and considering the question of joining the National Association of Builders. The officers are as follows: F. Dunlap, president; C. L. Hutchison, first vice-president; J. H. Jeffries, second vice-president; R. F. Berry, secretary; Jas. H. McGregor, treasurer. Directors: J. B. Holmes, Geo. McIntosh, Geo. W. Bowman, F. J. Collins, J. F. Evans, F. C. Muhl, Luke Watson, N. Dietrich.

WIND BRACING IN HIGH BUILDINGS.

THE rapid increase in the number of tall buildings in course of erection in the leading cities of the country renders more than ordinarily interesting the opinions of architectural engineers regarding the methods employed for bracing to resist wind pressure. At one of the meetings of the American Society of Civil Engineers Guy B. Waite presented a paper on the subject above indicated, and from it we make the following extracts, with accompanying illustrations:

After taking into account the nature and the value of the various live forces, which act vertically, horizontally or otherwise, the question naturally presents itself, whether modern buildings are being constructed with the same amount of safety against all of the various forces mentioned.

Most designers of high buildings are convinced of the safety of their structures against the ordinary forces which will be brought to bear upon them, but they do not always base their conviction upon scientific reasoning, and therefore it is natural to find a diversity of design proportional to individual opinions. All engineering designs for high structures, such as towers and chimneys, are made to conform to mechanical principles for the resistance of lateral forces of wind at a pressure of from 25 to 50 pounds per square foot of exposed windward surface.

While the sizes of building lots in the large cities are not materially changing, the hights of the buildings placed on them are rapidly increasing; so that now numerous buildings extend 250 feet above curb level, and there are many instances of buildings varying from 23 to 25 feet in width and from 120 to 175 feet in hight, with the uppermost 100 feet exposed to wind. Now, from a scientific or engineering standpoint, structures with sections corresponding to the last mentioned should at least have positive resistance, and if the construction is of a character to permit doubts as to its ability to perform a particular function, such doubts should be on the side of safety.

Observers will have noticed examples of buildings having cross sections corresponding to the latter dimensions given—from 80 to 100 feet deep and almost identical in character and general planning—where one structure is made to depend upon cross partitions, end walls and the ordinary girder connections, with columns for transferring horizontal forces to foundations, while the other has a distinct system of structural bracing capable of caring for similar forces. It would seem that either one owner was put to unnecessary expense, or that the other has not proper insurance on his structure. In doing justice to the subject, however, it may be said that partitions, walls, &c., as ordinarily constructed, cannot be relied upon to act in conjunction with steel structural work in resisting lateral forces, and, therefore, if the former means can be relied upon in a certain case, there will be a limit beyond which the steel frame must take up such forces, and then we could have examples similar to the one above described, where one building is within the limits for resistance by partitions, walls, &c., and the other one just beyond that limit. Such a classification can, however, be made properly only after the qualifications of the materials for resisting such forces have been definitely determined, in order to place them on a footing with steel structural work.

After consulting standard authors, reliable data, and prominent engineers, the writer is unable to find any engineer who is willing to assume the responsibility of allowing an average of less than 30 pounds per square foot horizontal pressure on the exposed windward portion of high buildings. Since buildings of this class are not ordinarily subjected to horizontal forces other than wind, aggregating an approach to this limit, subsequent discussion will be confined to wind pressures only. An argument often presented by those who are sanguine about the efficiency of ordinary materials of construction (such as walls, partitions, and general filling in material) is, that the maximum pressures are simply local gusts of such short duration that their impulses are absorbed in overcoming the inertia of the mass. If this be true in very high buildings, where thickness of wall is inconsiderable compared with the exposed hight, the material of the structure must act as an elastic body, and the wind impulses must be of such short duration that, before the reaction of the elastic mass has taken place, the force of wind has subsided, and the impulse has been exhausted in internal work. Now, if there should be a succession of such impulses and one should come not in harmony with the vibration created in the material, the heavier the mass the more detrimental would its weight become when its oscillation and the wind impulse act together. Furthermore, if the wind impulses are thus dissipated, the prevalent practice of calculating for vertical reactions due to them is erroneous; for no horizontal force on one side of the structure can cause a vertical reaction on the opposite side without being transformed by intervening construction.

The Venetian Building in Chicago, which is 50 x 108 feet and 135 feet above curb, was designed for a total wind pressure of 40 pounds per square foot. The steel construction was designed to take 70 per cent. of the total pressure, and the general mass of the structure was relied upon to take care of the remaining 30 per cent. It may not be unreasonable to assume that a building can be built so that the natural bracing of its general construction and the special bracing of the steel structure may accommodate each other enough to act in conjunction, in which case why cannot 40 or 50 per cent. of the entire pressure be

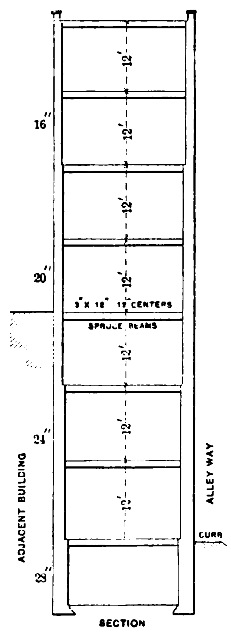


Fig. 1.—Section of Seven-Story Warehouse Building.

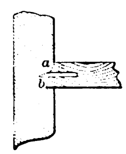


Fig. 2.—Wooden Floor Beam Anchored in Wall.

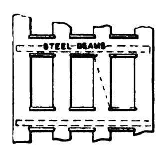


Fig. 3.—Three-window Front, Showing Steel Beams Above and Below Windows.

Wind Bracing in High Buildings.

taken by the general construction in more favorable cases? To formulate definitely for the various existing conditions, more complete data seem necessary, such as:

1. The maximum amount of wind pressure on good sized areas at various altitudes, and under all ordinary circumstances, in the especial locality under consideration; also, the length of time during which such maximum pressures act.

2. Experiments on the strength of partitions, walls, &c., for resisting vibrations and thrusts under similar conditions to those existing in buildings.

3. Experiments to determine to what extent the mass of the structure directly absorbs the impulses of wind pressures.

Under present circumstances, there seems to be no reasonable course of procedure left for the discussion of existing conditions other than to accept authentic data and the judgment of the most experienced authors. Under this conviction the writer will discuss some structures, the general dimensions of which are in accordance with plans coming under his observation. For the first example let us examine the construction of an ordinary non-fire proof building not classed with high structures. Take a warehouse building, Fig. 1, 28 feet front and rear, 96 feet deep and 85 feet high, located with an alleyway on one side and a three-story building on the other. Assume that the adjacent building is capable of resisting the effects of wind when blowing toward it, and, for brevity, only discuss the effects which wind blowing on the exposed portion above the adjoining building will have on the structure.

The walls are of brick, 28 inches thick in cellar, 24 inches in first and second stories, 20 inches in third, fourth and fifth stories, and 16 inches in sixth and seventh stories. First determine what wind pressure the dead weight of walls and floors will safely take care of. When the material in walls is not first class, the center of resistance at each joint is taken within the middle third (to avoid tension on the windward side): the dead weight above each floor level will resist the following wind pressures on the exposed surfaces above the floors:

Seventh floor, 5	pounds for each wall = 10	pounds.	
Sixth floor, 3	pounds for each wall = 6	pounds.	
Fifth floor, 2.7	pounds for each wall = 5.4	pounds	Approximately.
Fourth floor, 2.15	pounds for each wall = 4.3	pounds.	
Third floor, 2.2	pounds for each wall = 4.5	pounds	

As wind ceases at the fourth floor level and the dead weight increases faster than the other functions as we proceed downward, 4.3 pounds, depending on the joint at the fourth-floor level, will be the limiting wind pressure which can be cared for by walls and dead loads taken independently. Now, if the walls are of excellent material and well built, the center of resistance may be taken at one-quarter way from the inner side, which will make a maximum compression on the inside of about 100 pounds per square inch, and a maximum tension on the outside of 33 pounds per square inch at fourth story floor level; then the total limiting wind pressure which can be cared for by dead weight is 6.5 pounds per square foot on the entire exposed surface above the adjacent building. This pressure corresponds to a wind velocity of 40 miles per hour. Now, for a pressure exceeding 6.5 pounds per square foot, the surplus must be carried through the structure to the foundations, and we must look for means in the construction to provide for it.

The maximum shear from wind will occur where the aggregate effect comes on the fourth and lower floors. Then the next problem is to determine what wind pressure the fourth and lower floor systems are capable of transmitting from the horizontal to the vertical.

A wooden floor beam as usually laid in a wall, with beveled edge and not anchored, can exert no resisting moment at its seat; but if its back edge is built up solidly against, and it has a solid seat, and is well anchored in the wall, as indicated in Fig. 2, it can be relied upon to resist something.

In the present case the 3 x 12 inch spruce floor beams, spaced 12 inches on centers, have every sixth beam anchored. Now, supposing that such beams have been built into the wall with a view of exerting a resisting moment at their ends, and that they are anchored with straps with net sections of 1⅛ x ⅜ inches, and fastened on center line of beams with two ⅜-inch spikes, we can allow for such resisting moment 6000 inch pounds. Such moment will resist a wind force on a wall 50 feet high by 6 feet wide (when considering the wall rigidly held at each floor level) of about ⅜ pound per square foot at each end of the beam, or a total of ¾ pound per square foot. Had all beams been thoroughly anchored they would have sustained a wind pressure of 4½ pounds per square foot. If each beam had been anchored by wall plates at both top and bottom they would have resisted a total of 9 pounds per square foot wind pressure on exposed wall. Thus far we have found a total resistance for structure as follows: Walls, 6.5 pounds; floor beams, 0.75 pounds = 7.25 pounds. This is equivalent to a velocity of 42.5 miles per hour.

This velocity will cover that of ordinary winds, but in a violent storm the velocity will reach 70 miles per hour on a building of this hight located in New York City, with surroundings as described. That is equivalent to a total wind pressure of 20 pounds per square foot, which should be provided for in a structure of this kind. This leaves 20 pounds — 7.25 = 12.75 pounds to be provided for in some part of the construction not yet considered. If floors are well constructed throughout, they, with the walls, will form a truss sufficient to transmit such a horizontal pressure to the ends of the building, where, if sufficient provision has been made in the fronts, it can be conducted safely to the foundations. We will assume in this case that fronts have three windows in each story, with piers 30 inches wide between them; in the panels above and below the windows are two steel beams sufficient for all emergencies anchored into the wall at each end, all as indicated in Fig. 3. Now, the girders over and under each set of windows, with the filled in brick work between them form a truss which must transmit the total shear at the fourth floor level of 30,600 pounds. The girders by confining the brick work act in the capacity of ties, and the piers as diagonals in transforming horizontal pressures into vertical ones. We can assume that the stress is equally divided between the four piers, then we will have a resultant diagonal strain on each of 25,000 pounds. The pier being 20 inches thick, and allowing 100 pounds per square inch pressure, an active diagonal section of brick of 20 x 12½ inches will be required. Such piers should properly be made of good hard brick laid in cement, to insure an efficient diagonal. The actual bearing area on the diagonal edges of piers may be quite small if of good material.

A practical illustration of the partial transmission of horizontal pressures to end walls by the floor system, and the resistance of such end walls to horizontal forces, can be seen in the buildings located at Nos. 250 and 251 South street, New York City. The buildings are each about 24 feet 6 inches front and about 150 feet deep, extending through from South to Water street. There is a small break in the party wall at about 90 feet from South street of 1 foot, which slightly stiffens it. No. 250 South street is six stories high, or 65 feet above curb. No. 251 South street is five stories, or about 50 feet high. Floor beams are 4 x 12 inches, spaced 16 inches on centers, and each building has a row of columns and 10 x 12 inch girders. Columns are 8 inches diameter, cast iron, for three lower tiers, and 8 x 8 inch yellow pine above, spaced 10 feet on centers. The walls are 24-inch stone foundation and 16-inch brick upper walls. No. 251 South street has only a one-story blacksmith shop on the east side, and is therefore exposed to northeasterly winds on the four upper stories. No. 250 South street has only the upper, or sixth, story exposed on the easterly side.

No. 251 South street is leaning westerly 5 inches at the front and increasing in extent to about 30 inches at central part. The foundation walls are in perfect condition, and no settlement of either has taken place. The easterly exposed wall has an appearance of being "scooped out," owing to the bottom part remaining nearly in line, while the upper part has yielded most at the center, gradually diminishing at the ends where it receives its support. No. 250 South street has yielded and leans similarly to No. 251, as also the three or four adjoining westerly buildings, but to a lesser extent, and it seems to be mainly due to the westerly buildings that the ones described are held in place.

The fatal wrecking of the warehouse building while in course of construction at No. 74 Madison street added another to the list of buildings collapsing by wind pressure. The building was 29 feet front, 92 feet deep, and seven stories, or 75 feet, high above curb level. The bearing walls were 24-inch brick foundation, 20 inches through first and second stories, and 16 inches thick above. The floor beams were spruce, 3 x 12 inches, spaced 16 inches on centers. During the storm which wrecked the building, the maximum velocity recorded at the United States Weather Bureau on the Equitable Building for one hour was 48 miles, which would mean an average pressure of about 10 pounds per square foot. The wind evidently caught the unfinished building nearly broadside, but at a sufficient angle to throw a considerable pressure against the leeward wall through the unfinished open front. The front portion of the building was completely thrown over down to the foundation, crushing the adjoining two-story frame structure, while the rear portion of the building was held up and stood after the wreck by means of the completed rear wall. Not being able to determine the exact conditions at the time of the accident, the wind pressure which was required to collapse the structure cannot be determined.

(To be continued)

THE ROOF OF A TALL BUILDING.

THE roof on a building 24 stories high cuts a small figure in the work of its erection. The roofer is insured a lively breeze when at work, even though the sun may be hot. Such a building and such conditions are found in the new structure of the American Tract Society, Nassau and Spruce streets, New York. The roof proper more closely resembles a pavement that is used on a sidewalk than it does the roof found on the majority of buildings, as it is composed of glazed earthern slabs, which are hollow, and about 12 x 18 inches in size and 2½ inches thick. In each of the edges there is a groove ½ inch wide and ½ inch deep running lengthwise. There are two hollow chambers running through the slab the long way that are about 4 inches wide and ¾ inch deep, presumably for a circulation of air. These slabs on a flat roof are laid on T-iron resting on the rafters and are securely bedded in a good rich mortar in which some cement is mixed.

The superstructure of the roof is graded so that at two points there are depressions in the roof from which a conductor pipe is taken to carry off the water. A box made of 20-ounce copper about 12 x 18 inches in size is placed in this depression to receive the water. From the bottom of the box a 4-inch conductor pipe made of copper leads to the main conductor pipe, which is made of extra heavy wrought iron pipe. The connection is made by means of a brass threaded nipple secured into the socket on the iron pipe and which is soldered securely to the copper conductor. All around this roof, the battlement walls are flashed with sheets of 20-ounce copper which are bedded in the wall, and above this flashing another narrow flashing extends down from the joint to insure the flashing being water tight. This is the construction on one of the wings of the building. The other wing has an upper section to the building which is smaller in size than the building proper and the space between the two is roofed with slabs and flashed with copper as described. The battlement wall which rises outside of the upper section of the building is built with a sharp slant at the top and this battlement is covered with 20-ounce copper, the sheets used being 3 x 8 feet in size. The roof of the upper section rises sharply to a peak and is covered with earthern slabs as previously described, over the surface of which a bed of mortar is placed, into which is securely bedded Spanish tiles and laid with copper hooks to the T-irons at frequent intervals to aid in repairing the roof should any of the tiles become broken.

In this peak roof are a number of circular top windows which are covered with copper of the same weight, which is neatly worked into the curved shape of the Spanish tile and a secure connection made. On the top floor, the windows are large round bull's-eyes set in a copper frame and aranged to open and shut. Two of the down spouts from the building are made of 20-ounce copper 4 inches in diameter and are supported by means of iron clamps bedded in the masonry of the building. Copper supports are riveted to the pipe where the clamps secure it, to hold it properly in place. These leader pipes are nearly 300 feet long, which will give some idea of how high the roofer is above the street level. The roofers at work state that when there appears to be but an ordinary breeze in City Hall Park there is almost a gale on the roof, and that some of the days in June it was uncomfortably cool where they were working on account of the stiff breeze.

WOOD PATTERN AND MODEL MAKING.

FEW CALLINGS that men have chosen to follow as a means of livelihood are more exact in the nature of the work than that of wood pattern and model making. In its very nature and possibilities of results it attracts hundreds of young men, but of the many who start out there are comparatively few possessing the patience to continue through the tedious years required to perfect oneself for the business. Worse still, many of those who serve the allotted time of apprenticeship find when they are through that they are a long way from being pattern makers and hence give up in despair, if not in disgust. It is because of this latter fact that men are often found employed at other trades in the wood working line, and are experts at their business, who when asked to do a piece of pattern making say they know how it ought to be done but they cannot do it. Precision is the cardinal point in making a pattern, says a writer in a recent issue of one of the Western papers. It very often happens that a piece of work, and especially if it be a large job, is distributed among half a dozen pattern making establishments. In this case, of course, working drawings are furnished and the workman is required to turn out his part of the pattern—very often without having any idea of what the entire piece of machinery looks like or what it is intended for—and it must fit precisely the parts that have been made by other men. The distribution of drawings is very often resorted to by inventors who have no patents and who fear to risk their inventions in the hands of a mechanic who might turn out a model and himself claim a patent on it. There are, however, very few instances where tricks of this kind have been resorted to. On the other hand, the pattern maker, if he is taken into the confidence of the inventor, is a great deal more likely to give the latter suggestions that can be put to good use than he is to take any advantage of the customer.

The Expert Pattern Maker.

The expert pattern maker, besides knowing his business, must be an encyclopœdia of information, especially if he is in a position where transient work is done. Inventors, as a rule, who are in need of patterns or models have little idea of how the work is to be done. Few are capable of making drawings, and not one in a hundred, if he could make drawings and work in wood, could make a pattern that the most accomplished molder could put into the sand and get out again. So the pattern maker must understand molding and drawing, and he must be quick to grasp the ideas possessed by the inventor or the latter is very likely to think that he is not enthusiastic enough and to take his work elsewhere.

Everything that is cast in iron, brass or other metal must first be made in wood. In this way the base burner that gives forth a cheerful glow in the winter time was first made complete in frail white pine. Later the pattern maker stained it black and the novice who then viewed it could not have told, except by its weight, that it was other than a genuine base burner all ready for action.

Making Stove Patterns.

Stove pattern making is considered the most intricate work that the pattern maker is called upon to perform. Months are consumed in the making of an ordinary base burner and the cost of the patterns runs up to from $500 to $1500. Even then the owner has very little to work on, for the reason that his wood patterns would go all to pieces after three or four castings had been made from them. The next move is to take the wood patterns to a foundry and have iron patterns made from them. It is from the latter that the stoves are made, and generally the owner has three or four sets of patterns on hand in case of accident to any particular part and also for the purpose of furnishing repairs.

After the patterns are made they must all be "follow boarded." By this is meant that they must be backed up by pieces of solid wood that will exactly fit into their crooks and turns and afford the molder a solid foundation on which to work. Indeed, a good deal of the work is originally built up on "follow boards," for the material of which stove patterns are made is very thin, and in making bases, drums, fire pots and the like it is necessary to use little strips of wood which are glued together and framed on the solid piece. The stove pattern maker must have the patience of the little boy who builds mud palaces only to tear them down and build them up again. It is said that there never was a man with an idea for a new stove who knew what he wanted when he stepped into a pattern shop. He has a general idea and the pattern maker begins his work. He has not gone far when the stove man comes around and makes a change, and he continues to make changes until the last piece is finished and the molder's boy has carried the patterns out of the shop and started with them to the foundry.

The building of stoves, however, is but a small part of the work the pattern maker is called on to perform. He must build houses, machines, engines, pumps, wheels, columns, stairways. Above all, he must look pleasant when a new customer announces that he has discovered something that will revolutionize the world and all that he wants is a pattern.

Thousands of dollars are annually thrown away by men with ideas who will not be convinced of the impracticability of those ideas until they have had patterns or models made and are enabled to see for themselves. The expert pattern maker can tell before he has touched a tool to a stick of wood whether the pattern he is working on has merit, but he does not generally do so for the reason that it would only have the effect of sending away a customer.

Patterns for Architectural Work.

Architectural work is among the daintiest that is done in pattern shops. In this the pattern maker must use discretion, for it very often happens that an architect with an eye for the beautiful turns out a drawing which, while it might easily be made in wood, could never be cast in a foundry. This is particularly the case with scrolls for ventilators, doors, stair railings and the like. Columns for buildings are generally considered stock work, inasmuch as the original column owned by the foundry or architectural iron working firm is made to do duty in hundreds of cases by simply changing the length, panel, lugs, collars and bases. Holes that have been made by nails or screws are plugged up with a wax made especially for this purpose, rough edges are taken off with a little sand paper, and when the casting is turned out no one knows but that days were spent in making the pattern, whereas but a few hours may have been consumed.

Almost the first question the pattern maker asks his customer is the material he wants the casting to be made in—whether it is to be iron, brass or steel. To the reader this information might seem trivial, but to the mechanic it is of the utmost importance, for he must allow for the shrinkage which takes place in all metals. To do this he works by a separate rule for each metal, with the result that when the casting comes out, although it may have been considerably larger in the wood, it is exactly the right size in the iron, brass or steel.

In this connection an old time pattern maker tells a story of how an employer who wanted to save the wages of an expert pattern maker engaged a cabinet maker to do some work for him and paid a double price for it. The cabinet maker was given a number of measurements on a piece of work and the employer went to attend to some outside matters. When he returned his new man appeared to be doing all right and he paid no more attention to the subject. The work was completed and sent to the foundry. Later it was delivered on a building for which it was intended and was promptly returned to the foundry with the information that it was nearly ¼ inch too small all over. The foundryman sent the patterns back to their maker, and he promptly took his cabinet maker to task about the work. The man insisted that the work was according to measurements and to prove his statement pulled out an ordinary 2-foot rule and began to go over the different parts. The cause of the trouble then dawned on the employer. The cabinet maker had made no allowance for shrinkage and the work had to be done all over again. Besides, the pattern maker had to pay for the castings which were made from the first patterns.

Tools Required.

All wood workers are compelled to carry about large chests of tools, but perhaps no other man is required to have as many and as varied a lot as the pattern maker. Smoothing planes so small that they would ordinarily be taken for playthings for a boy are a part of his stock in trade. He must have chisels and gouges with points so small that the surface can scarcely be distinguished. Gauges with which he can run around corners and get into cavities are indispensable, and yet he must be possessed of the heavier and more substantial tools of the carpenter and joiner in order that he may perform the rougher class of work which comes to him.

When castings are to be hollow it is necessary to make a core box. This is just as much smaller than the pattern proper as the thickness of the casting. Then on the end of the pattern a piece is left that will fit into the core box, and this end is stained yellow if the casting is to be in iron, while the pattern is stained black. The yellow denotes to the molder that the piece is not a part of the pattern and is not to be cast. The impression it leaves in the sand serves as a rest for the core, which is afterward punched out of the casting. Patterns intended for brass work are stained yellow and the core ends, if such there are, are stained black, the reverse of the order for iron work.

In small work, as in novelties, the wood patterns are used for the casting of brass patterns. The good patterns, of course, would last but a short time. A number of the brass patterns are made and "gated" together; that is, they are laid side by side and connected in such a manner that when they are lifted out of the sand there is a connecting space between them through which the metal runs from one to another, thus enabling the molder to cast six or eight of the articles at a time. All the big foundries and stove works have pattern makers regularly employed, but the light work and that which comes through the inventor is done in what are known as jobbing shops.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

WHAT has already appeared under the above title has attracted so much attention on the part of members of the building trades, and so many letters have been received expressing a desire that the subject of "Architectural Drawing for Mechanics" be still further considered, that we have concluded to add to the work another series of lessons designed for home study and practice. It is not the intention to go over the ground in exactly the same manner as heretofore, as all the minor details have been covered and the student is supposed to be sufficiently far advanced to now take up the subject and proceed with it in a way calculated to extend his study and practice and fit him for more complicated forms of work.

It is the intention to extend the lessons in a way that will bring out new phases of the art, and more especially the points that have not been covered in previous articles. With this object in view the plan has been chosen of a large two-story stone and frame residence, with tower, octagon and round corners, as well as many other features, to produce a wide range of work and give the student the largest amount of study and practice possible to obtain from a single example. The basement and outside stone walls of the building are to be 18 inches thick up to the second floor, except the partitions of the basement, which may be 8-inch brick walls. All outside and partition walls of the frame part are to be of the common 4-inch studding, which, with the lath and plastering, makes about a 6-inch wall. The difference in the thickness of the stone walls and the frame partition walls causes a little study in the laying out of the rooms, in order to prevent the offsets in the walls making undesirable corners in the rooms. In preparing the floor plans shown in Figs. 33 and 34, the draftsman will see how easy it would be for this feature to show itself, and yet by a little study in the way of planning it will be noted how easily it has been avoided. The study of planning and designing goes hand in hand with the drawing, and if one is to draw practical plans, every detail of the work must be thoroughly studied.

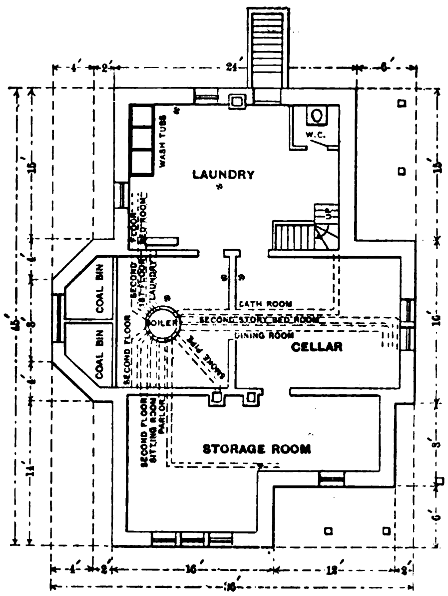
The first consideration in starting the work is the number of rooms to be provided, and the size or an approximation thereto, as it is not always possible to determine just how a plan will work out on the start. Draw the outlines in pencil so as to take in the desired number of rooms; then study how to divide them in the best possible manner for light, heat, size and general convenience. It will frequently happen that the general outline will need to be extended at some points and contracted or drawn in at other places; hence the outlines and general arrangement are the first points to consider. After these have been pencil-sketched and the plan has assumed a tangible form, it can then be permanently drawn. The first floor plan is usually the first consideration, and from it the other plans are correspondingly arranged and drawn.

The first floor plan, represented in Fig. 33, shows a few points not covered in previous work. For example, the burners for lighting are represented by a small circle and cross, indicating that the building is to be lighted by gas or electricity. The circles and crosses in the middle of the rooms are center lights from the ceilings, and those in the bedrooms are side lights from the partition, these being usually arranged about 5 feet apart to accommodate a dressing case, thus giving a light on either side. The boiler in the kitchen for supplying the house with hot water is shown near the chimney. In this connection attention is directed to the location of the bathroom on the second floor. It will be found directly over the kitchen, making the connections short and direct—a special feature of the plumbing that should always be considered. It lessens the labor and expense, while giving better service generally, to locate bathrooms as near as practicable to the water supply.

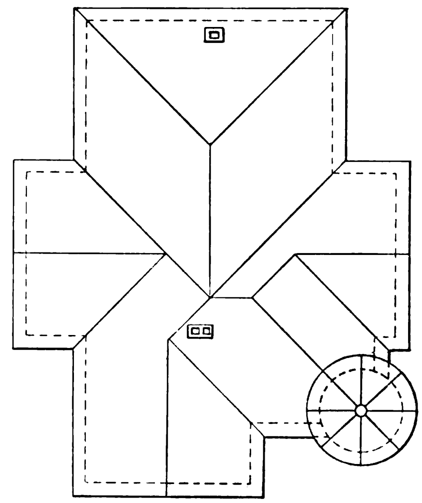
The house is arranged for steam or hot water heating and the little rectangular spaces in the different rooms represent the location of the radiators. By comparing the first and second floor plans with the basement plan the general arrangement of the pipes will be seen. A special feature of this plan is in locating the radiators so that as many lines of pipe as possible may be carried parallel with each other to the different rooms. This results in a considerable saving of time and money, as well as obviates the necessity of a great deal of joist cutting, which is often the case where the pipes are widely scattered.

In the parlor, on the first floor plan is shown the method of representing a fire place and mantle. The small circles at the outside of plan represent the down spouts or conductors for carrying the water from the gutters on the roof. The basement plan, Fig. 35, shows the general arrangement of the laundry, boiler room, coal bins, &c. The dotted lines outside of the plan show the outside dimensions of the foundation wall. The outside lines to the left and front show the size of the wall over all, which is 36 x 45 feet. The next set of lines shows the different divisions or the lengths of the wall from angle to angle. The total of the different divisions must equal the extreme length of wall on each side respectively. The drawing sets this forth so plainly that further description is unnecessary. It is obvious that by this method of drawing a plan a mistake in measurement is almost impossible.

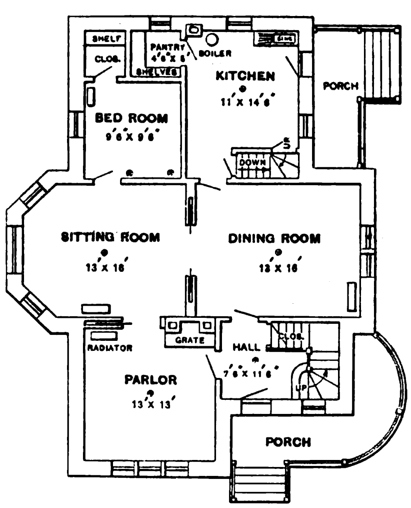
The roof plan is shown in Fig. 36, the dotted lines indicating the wall plate and the outside lines the projection of the cornice. The other lines represent the hips, valleys and ridges, and are easily understood from the drawings. It will be observed that the octagon end of the left gable is finished square from the roof plates, having large brackets to support the projecting corners, thus giving a wider range and diversity of work, so that the draftsman may



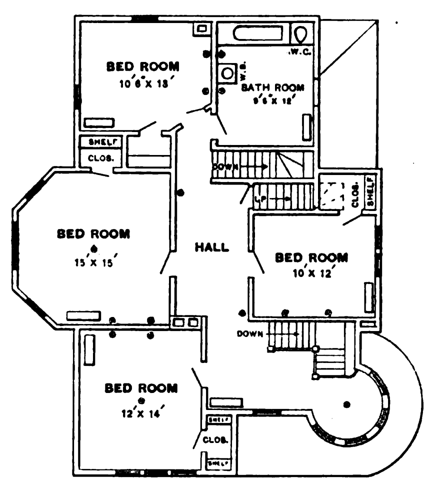
Foundation.



Roof Plan.



First Floor.



Second Floor.

Architectural Drawing for Mechanics.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

have a better chance to exercise his skill and talent in the art of drawing.

(To be continued.)

Gothic Moldings.

Gothic architecture reveled in the use of moldings, not alone what are usually called ornamental moldings, such as the dog tooth, the ball flower, &c., but also the plain continuous lines of light and shadow, though they are in effect identical, since the former are nothing but serrated ridges, more or less rounded and modified from the first process. Every door, window, monial; every edge, vertical or horizontal; every band, string, groin rib, roof label, arch and jamb, whether of wood or stone, internal or external, was generally molded. Of course, the effect produced by so free and extended a use of them was magnificent. Construction gained there by a rich perspective, a depth of shade, an attempering of bare prominent outlines, a fine tone, which arrested the eye and made it dwell on certain parts of higher pretension and more exquisite elaboration than others. And yet moldings are merely the ornamental adjuncts, not the essentials, of architecture, says a writer in the *Architect and Contract Reporter*. Some buildings of the best periods were quite devoid of moldings, whence it is evident that they are not necessary even to a perfect design. Boldness and simplicity produce effects, different indeed in their kind, yet not less solemn and striking than richness of detail. But the power of moldings was appreciated to the full by the ancient architects, and it is quite evident that they delighted in their extensive use. It was their ambition to work them wherever they could possibly find means and opportunity. Hence it is that such a vast quantity everywhere remains that no ordinary pains are requisite in examining any considerable moiety of them for the purpose of investigating their principles. If the uniformity in their use had not been tolerably strict it had indeed been a hopeless task ever to master the subject; indeed, if there had not been a system of molding there would have been nothing to investigate. But so little did the mediæval masons depart from the conventional forms that a capital, a base or an arch mold is often found of perfectly the same profile in an abbey or a cathedral and in a village church at the other end of the kingdom, so that one might almost suspect that the very same working drawing had been used for both, and this, when it is considered, must appear a very wonderful feat.

Proficiency of Journeymen Bricklayers.

In looking over the present condition of the mason builders' business throughout this country, says a writer in a recent issue of the *Brickbuilder*, we cannot but notice, however hard we may try not to do so, the general incapacity of the journeyman bricklayer. Nearly every large contractor of brick work has in his employ some men who are worth all or more than they are paid, some who earn possibly the equivalent of their wages and some who, no matter how rough the work may be, never earn for their employer as much as their wages, and it is of this latter class that we complain.

They are always behind time, always in the way of better men, never do anything right, cannot carry a corner and keep it plumb, cannot even lay brick on the line without "crowding" it; their window and door jambs resemble stairs, on account of their roughness; they "whitewash" the work, to use a truthful phrase, both outside and in; they strike about half their joints and these are generally only partially filled with mortar; they never have the inside and outside of the wall on the same level, always roll their brick the wrong way so as to leave a "lip" on the under side, put the poorest side of a brick out, cannot turn the simplest arch and have it true; in short, cannot do any piece of work even after it has been laid out for them and do it in a first-class manner. Strange, isn't it, that men who claim to have served a three or four years' apprenticeship, have been journeymen for years, and are worthy (?) members of the "union" should be so absolutely lacking and have the face to expect as much pay as the most skilled mechanics. Right here I want to emphasize what I believe to be one of the greatest drawbacks of unionism as at present conducted. It undoubtedly tends to pull the good men down and bolster the poor ones up, thus putting all on the same level, consequently discouraging a higher standard of labor. Did you ever look at it in that light, brother builders? A man may be worth much more than "union" wages to his employer, but still he must not receive a cent more than the fellow who isn't worth his salt. Why do not the unions adopt a graded system of excellence and have a man paid according to his worth?

There are many good bricklayers who know what a brick is, and how to lay it, but that is about the limit of their knowledge. They understand a plan about as well as the Hebrew language; couldn't lay out a piece of work if their life depended on it. Many mechanics who pretend to be good bricklayers have never served a regular apprenticeship, but have picked up what little they know—and it's often hard to tell what that little is—from observation, and blunder along, trying to palm themselves off as journeymen. Surely, some of them would never stop their journey as far as bricklaying is concerned if contractors would do their duty.

It is a fact to be deplored that so few American boys learn the mason's trade; but it must be conceded that American boys, as a rule, prefer to stand behind a counter at $6 a week, where they can keep their hands soft and clean, than to learn a trade, especially that oldest and noblest of all trades, masonry. What a great mistake they make. In three or four years they could place themselves in a position to earn two or three times as much as can be secured in the same length of time behind desk or counter.

But, alas! "what fools these mortals be."

Strength of an Old Warehouse.

In demolishing a part of the Albert Warehouses in Liverpool, England, belonging to the Mersey Docks and Harbor Board, it occurred to the assistant engineer in charge of the work to make some investigations into the strength of the old brick work. The wall was built about 50 years ago of hand-made bricks, laid in ground mortar made with Flintshire lime. This lime is in a high degree hydraulic and has a reputation for making mortar of exceptionally good quality. The *Journal* of the Royal Institute of British Architects, which describes the investigation, states that the engineer conceived the happy thought of leaving a piece of it in the form of a horizontal beam, having a 12-foot span and measuring about 2 feet square in section, seven courses in the hight of a 2-foot wall. The ends of the beam were not cut free from the rest of the work. This beam was then loaded with all the weight that could be conveniently piled upon it, without appreciable deflection or other sign of weakness resulting. Two courses were then cut off, and the whole weight again put on, but without other result. The beam was further reduced by a course, leaving it four courses, or 14 inches deep, and the ends were also cut free from the other work —the mortar beds of the 12-inch bearings being left untouched. A centrally placed load of 5 tons 15 hundred weight was then gradually piled upon it, and was borne for several days without apparent effect upon the brickwork. Finally the weight was increased to 6 tons 9 hundredweight 23 pounds, which was sustained for 30 hours, when the beam collapsed during the night and came down in pieces, more like broken timber than anything else. Other tests were made with similarly astonishing results, but the above are sufficient to show what really first-rate brick work in hydraulic lime will stand.

Wages in France.

A recent report by the United States agent at Roubaix, France, on the hours of labor, wages, working days per year, classification of workers, and other questions immediately relating thereto as they exist in Paris and the Department of the Seine, contains much information of interest and value. These industries give employment to skilled and unskilled workers in about equal proportions, except in the construction of earth works, where the majority of the workmen are laborers. Work rarely ceases on Sunday except in the masonry trade. The average duration of a working day is from 9 to 10½ hours according to the season. During the summer painters work 10 hours, masons 11 hours, paviors 12 and 13 hours, and in winter the hours are sometimes reduced to seven for these trades. The report contains a table giving the wages per hour accorded to first-class workmen in the building industries by the Board of the Department of the Seine, in comparison with the official tariffs of wages of the city of Paris and the Society of Architects.

THE use of terra cotta is becoming so widespread that the question of how to treat the surface of this material so as to render it less liable to injury and decay, without impairing its appearance, is one of considerable interest. European journals announce that an effective method of treating terra cotta has been recently introduced by E. Fortora of Naples, Italy, a place where this material is largely used for decorative purposes. Mr. Fortora recommends that the terra cotta be immersed in a bath of paraffine wax at a temperature above the boiling point of water, but below that of wax. All moisture and air are said to be expelled by this treatment from the pores of the material and an absorption of the molten wax takes place. It is claimed that all porous material of the character of terra cotta is vastly improved when subjected to this treatment, and is, moreover, rendered quite impervious to water.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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First vice-president	C. A. Rupp of Buffalo.
Second vice-president	James Meathe of Detroit.
Secretary	William H. Sayward of Boston.
Treasurer	George Tapper of Chicago.

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To Local Secretaries.

Local secretaries are reminded of the importance of reports from filial bodies to be presented to the coming convention. Care should be taken to have these reports as comprehensive and thorough as possible, covering all matters of interest to the fraternity regarding methods of administering the affairs of the exchange, regulations adopted or deemed advisable for the government of the business of building; experience and suggestions as to the best means of establishing and maintaining harmonious relations with organizations of workmen; plans for the adjustment of the apprenticeship question, and all other information that will tend to extend the knowledge of the members of the association on lines of progress.

The reports should be prepared early and sent to the National Association at least one week before the opening of the convention.

Blank Form of Estimate.

The form of estimate approved by the Master Builders' Association has been amended, recently, in order that it may offer greater protection to the bidder against the introduction into the contract by the owner or architect of conditions not contemplated or prescribed in the specifications. An estimate submitted under this form is simply an estimate of the cost of certain work described by certain specifications and drawings, with a specific proposition to undertake the work provided the terms of the contract are agreeable. Under the usual method of bidding for work the contractor states to the owner that he will do certain work for a certain price, which statement is in itself a contract on the part of the builder if the owner chooses to so consider it. The subjoined form is prepared for the especial purpose of putting an estimate upon a proper basis and giving it proper standing, while its use reduces the submission of a bid to a specific and business like transaction. The local exchanges in the National Association of Builders are urged to adopt something of a similar character for the protection of their members and the general improvement of the manner of transacting the building business. The experience of such cities as have adopted such a form has been very satisfactory. The form adopted in Milwaukee was the first established in use in the National Association, and has been employed for nearly two years with good results.

FORM OF ESTIMATE

Approved by

THE MASTER BUILDERS' ASSOCIATION

of the City of Boston.

For the use of sub-contractors, or for use when divided estimates are submitted to owners or architects.

BOSTON, ...

....

........estimate for the ....work for the building proposed to be erected on ....street,

for ....owners, is ($..................) ....

This estimate covers such work (in the line above referred to) as is mentioned in certain specifications for said building prepared by.......... architects, pages numbered ....*and such work only*, and comprehends that the dimensions of the said specified work, and the method of its construction or application, are to be in accordance with certain illustrative drawings also prepared by said architects, and submitted by them in conjunction with the said specification, which drawings are hereby defined and referred to as Sheets Nos.............................

..............will agree to execute a contract for the said work at the price above stated, provided the terms and the conditions of said contract are satisfactory to ....

Respectfully submitted,

....

The Function of Organization.

One of the most important characteristics of organization is its agency for promoting comparison of views and the exchange of ideas. Through this agency the exchange of ideas brings about mutual confidence and sympathy, which in turn give encouragement to projects for mutual benefit. Out of mutual confidence grows a strength which is impossible where disorganization exists. Organization thus becomes an instrument by and through which conclusions may be reached and put in operation, and the ideas of the individual become the property of the whole. Organization may be created for some particular purpose, but unless that purpose be a wise one, founded on principles of justice, its accomplishment cannot be permanently estalished. If the purpose is to benefit the members of the organization at the expense of those outside, failure must be the inevitable result, notwithstanding the appearance of temporary success. The inherent functions of organization prevent permanent success if the purpose is unjust, for two reasons at least. First, it is unwarrantable to assume that a number of men will intentionally pursue a course that they know to be unjust, and organization, by its nature, provides the means for determining the justice or injustice of a cause. A purpose which may have seemed just in the beginning may, through the functions of organization, be proven unjust, in which case efforts to establish an unjust result are abandoned, and the success of an unjust purpose proved impossible. Second, if the members of an organization persist in their effort to establish an unjust purpose, failure is sooner or later inevitable, for the injustice having become concentrated, assumes such proportions that those injured by its operation are enabled to deal with it in a manner that would be impossible were the unjust practice limited to isolated individuals. An organization whose purposes are unjust, whether avowedly so or not, is, in spite of its appearance to the contrary, a distinct benefit to the community, as it offers an example of the injustice of certain practices which frequently escape observation when confined to an individual. By such an example, which attracts attention because of its size, the injustice of certain conditions which have been long endured, because they were the custom, become recognized, and once recognized, their overthrow is but a question of time. Custom is the apparent reason for the toleration of many conditions and practices which are unjust, but in reality the reason is the let-alone policy of the many who are content to take things as they find them, and who accept conditions that exist without even stopping to consider whether they are right or wrong. The function of organization strikes at the root of the trouble, no matter how slow its operation may be, for out of the exchange of ideas comes an unconscious education as to the injustice of the conditions which the organization is formed to correct. With the operation of organization comes a new motive for thought in the minds of those against whom it operates, and thus both sides are stimulated into an action that otherwise would have been still further delayed. The beneficial results of organization are often obscure, and advantages secured often appear to be gained through some one's loss, but when it is considered that the purposes of organization, taking those in the building trades as an example, are good, as announced, it is impossible that some benefit should fail to result. Through concerted action the theories of individuals are put into operation on a scale sufficiently large to be considered a fair test, and by the test only can theory become practice. Organization offers the means for sifting out of the ideas of the many the good in them all, and the machinery for its application, with the strength needed to assure success.

Law in the Building Trades.

UNGUARDED EXCAVATION IN SIDEWALK.

The Supreme Court of California holds that a contractor who has completed an excavation in a sidewalk, as required by his contract, is not liable for injuries to persons falling into it, due to the absence of proper guards, if he did not contract to guard the excavation after it was completed.—Cotter *vs.* Lindgren, 39 Pacific Reporter, 950.

PENALTY OR LIQUIDATED DAMAGES.

A party advertised for bids for a court house, the notice requiring each bid to be accompanied by a check for $500, "as guarantee of good faith that the bidder, in case his bid is accepted, will enter into a contract," &c. One whose bid was accepted failed to enter into a contract within a reasonable time, whereupon the check was appropriated. The Court of Civil Appeals of Texas held that the money deposited was not liquidated damages, but a penalty, and only so much of it could be retained as would cover the actual damages.—Lindsey *vs.* Rockwall County, 30 S. W. Reporter, 380.

RIGHT OF ADJOINING OWNER IN OVERHANGING WALL.

The Supreme Court of New York, First Department, holds that where the owner of a lot erects a wall the foundation of which is wholly on his lot, but a part of which overhangs an adjoining lot, the adjoining owner will not be enjoined from removing so much of the wall as overhangs his property.—Lyle *vs.* Little, 33 N. Y. S. Reporter, 8.

MECHANICS' LIENS.

Where it appeared in an action to foreclose a lien on property owned by husband and wife that the title was in the name of the husband only, and that knowledge of the fact that he had a wife was not brought home to the lienholder, it was not error to render judgment for the latter, although the notice omitted the name of the wife.—Wash. Rock-Plaster Company *vs.* Johnson, Supreme Court Washington, 39 Pacific Reporter, 115.

FRAUD MAY PREVENT A LIEN FOR BALANCE OF CONTRACT PRICE.

Where a company agreed to build a factory for a certain sum, and a number of parties severally agreed to pay the amounts they individually subscribed, and some of them did so, but it appeared that those who had not paid their supposed subscriptions either never signed the contract at all or signed a piece of blank paper under fraudulent representations, so that they never became parties to it, the Supreme Court of Wisconsin held that the construction company were not entitled to a lien for the unpaid balance of the contract price.—D. & R. Bldg. & Mfg. Co. *vs.* Cupp, 62 N. W. Reporter, 520.

New Publications.

DOMESTIC ELECTRICAL WORK. By William A. Wittbecker. Size 5¼ x 8 inches; 55 pages; illustrated with 23 diagrams. Published by David Williams, 96-102 Reade street, New York City. Price, in paper, 25 cents; cloth, 50 cents, postpaid.

This little work, as the title indicates, is intended to assist those without a previous knowledge of electricity in the installation of simple electrical apparatus in offices, dwellings and workshops. It is not altogether intended for the amateur who seeks for nothing more than experimental work; neither is it expected to prove of great value to the expert electrician. It is designed more especially for the person who is seeking for information that will assist him in increasing his daily earnings. The author states that the information given is such that with a close observation of the directions laid down any one without the slightest knowledge of electricity should be able to do the work described. The subject is discussed in nine chapters, several of which appeared as a series of articles in various issues of *Carpentry and Building* for last year. The first chapter is devoted to a simple bell circuit; the second to a multiple bell circuit, while the third gives attention to various circuits. The chapters which follow take up fire alarms, annunciators and alarms, burglar alarms, automatic fire alarms, electric gas lighting, and running wires in finished buildings. The information presented is thoroughly practical and the little work should prove a valuable addition to the library of the carpenter and builder who wishes to inform himself upon a branch of the building business which is coming prominently to the front.

CONTENTS.

RESIDENCE OF WILLIAM M. BAILEY, AT ROSEVILLE, N. J.

W. EARLE CASS, ARCHITECT.

NEWARK, N. J.

SUPPLEMENT CARPENTRY AND BUILDING, AUGUST, 1895.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.

96-102 READE STREET, NEW YORK

SEPTEMBER, 1895

National Association of Builders.

There appears in another part of the current issue a copy of certain proposed amendments to the constitution of the National Association of Builders, to be acted upon at the October convention in Baltimore, Md., which amounts to a virtual reorganization of the association. The purpose of the proposed changes is to still further extend the influence of the association and to secure more direct and thorough application of its principles and recommendations through the medium of State organizations which shall be subsidiary to the national body. By this means it is hoped to localize the work within State lines and to secure greater effectiveness in applying the principles advocated to the needs of the builders operating under the varying laws of the several States. The proposed reorganization, if adopted, will more clearly define the true character of the National Association of Builders, which is that of a formulator of general principles of equity and progress, and provide the means for centralizing the interests of builders into State associations which shall be the means for fitting the general principles to the conditions existing in the several States. The State associations will provide greatly increased facilities for direct application of methods recommended for general adoption. The work of the National Association of Builders has been of the highest order ever since its inception and has attracted the favorable attention of the English speaking world. Any effort therefore to extend its influence and field of operation should receive the earnest co-operation of builders throughout the country.

Shop Floors.

A shop floor where heavy machinery is to be located can hardly be too well planned and constructed. That good floors and foundations are necessary to good work is in evidence in every shop where unstable or vibrating floors and foundations cause planer tools to dig into work and lathes to surface out of true. For frequently the jar of one machine is transmitted to another with disastrous results, and in all such cases quality of work can only be secured by a reduction in quantity—that is, by reduced speed and feed. For the heaviest tools nothing short of a floor or individual foundation going down to hardpan can ever be expected to give satisfactory results. In many English shops this requirement is amply met, but the remainder of the floor between machines is such as to discourage the average American workman. For it is, in fact, nothing short of a cobble stone pavement, with large stones at that. A concreted floor would be a vast improvement, but it possesses the disadvantage of preventing the ready change of position of machines and their attachment to the floor in their new locations. A shop floor that has given most excellent results with moderately heavy machinery is constructed by first laying and working down solid an even bed of coarse gravel, upon which are leveled up parallel lengths of 2 x 4 inch spruce stock 16 to 20 inches on centers. The gravel is thoroughly tamped underneath these sticks, so that the entire foundation is solid, and then the spaces between and up to a level with the top of the timbers are grouted in with cement concrete. A perfectly level surface can be best secured by light rolling. When the concrete is fully set, a course of 2-inch spruce flooring is securely nailed to the foundation timbers, above which, in turn, is laid a top flooring of ⅞-inch tongued and grooved birch, blind nailed. This combination forms a floor possessing at all places a thickness of 3 inches, and over the foundation stringers of 5 inches for lag screws, by which the machines may be secured. The birch is far better than hard pine, as it does not split and strip up, but is dense and even grained. The durability of such a floor must depend largely upon local conditions, but where the soil is moist enough to prevent dry rot there appears to be no deterioration after several years of use.

Another Towering Office Building.

The colony of office buildings rapidly multiplying in the lower portion of the city will soon receive an addition in the shape of a sky scraper which will, when completed, have an altitude of twenty-one stories above the sidewalk. It is not probable that the structure will be commenced before next spring, as the buildings now occupying the site will not be vacated much before May 1, and it will doubtless be another year before the building is ready for its tenants. It will be erected on a plot fronting 45 feet on Broad street and 55 feet on New street, the average depth being about 154½ feet. The building will be in the Renaissance style of architecture, with the lower stories faced with marble and the remaining portions in gray brick with marble trimmings. The street fronts will be distinguished by white columns extending to the fourth story. The plans of the architects, Messrs. Harding & Gooch, provide for a main structure eighteen stories in hight, which is to be surmounted by a three-story dome in the form of a half sphere, with Europe and America connected by a cable in relief. The site involves the investment of more than $1,200,000 and the building which it is proposed to erect will probably cost at least a million more. The projectors of this enterprise promise that the building will surpass in its appointments and general finish any of the structures recently put up in the city. The proposed edifice will be erected by The Commercial Cable Building Company, recently incorporated for that special purpose under the laws of the State of New York with a capital of $1,000,000, and it is probable that the Commercial Cable Company will occupy the first floor.

Strikes in France.

The strike statistics contained in the report for 1894, recently made by the French Bureau of Labor, present an interesting study. During the period covered by this report there were 391 strikes, in which 54,576 workmen took active part, resulting in the loss of 1,062,480 days of work, the question of wages being responsible for 55 per cent. of the strikes which occurred. The workmen were successful in 21 per cent. of the strikes which concerned 25 per cent. of all the men out, while strikes involving 45½ per cent. of the workmen failed and 33 per cent. of the strikes were partly successful. The appeals to the new law of arbitration numbered 101, of which 8 were made before work was actually stopped and 93 after strikes had been declared. The number of appeals to the law of arbitration by the workmen was 51, while employers made four appeals and employers and employed together made two. The employers refused arbitration in 24 cases and the workmen in 16 cases After arbitration had been refused the workingmen in two cases gave up their demands without having quitted work; a strike was declared once, while 21 strikes were continued and five were ended by the workmen, who abandoned their demands. Of the

22 strikes commenced or continued after arbitration was refused six were successful, seven were compromised and nine were defeated. It is interesting in this connection to compare the number of strikes for the period named with those of previous years, in 1893 there being 634 strikes, in 1892 there were 261 and in 1891 there were 267 strikes.

Massive Business Structures.

If present plans are carried to a successful issue there will soon be in process of erection at the corner of Fourth avenue and Nineteenth street, New York City, an unusually massive structure, 12 stories in hight, which will be devoted to industrial purposes. The site has a frontage on the avenue of 131 feet and on the street of 200 feet. The building will rise nearly 170 feet from the sidewalk, and it is expected to be finished and ready for occupancy early in the fall of next year. Richard Berger is the designing and constructing architect, and has the assistance in consultation of E. D. Lindsay, who represents the American Lithographic Company, to whom the contemplated structure has been leased for a long term of years. It is intimated that the building will be of more massive and stronger construction than any of its size heretofore erected, as it will be called upon to sustain the weight of heavy lithographic presses in operation. The frame work will be of steel and iron, with heavy girders and strong piers and pillars. The front will be of granite, iron, buff brick and terra cotta, and the roof of asphalt. There will be a grand portal in the middle of the Nineteenth street *façade*, and an open court along the south side, giving light and air on three sides. Storage vaults for lithographic stones will be constructed under the sidewalks and in the basements. The top floor will be arranged for the artists and engravers of the company named. Eight steam elevators will be provided, as well as a steam plant for heating and power. The lighting will be by electricity. The structure is estimated to cost $800,000 and the site on which it stands is figured at $600,000 more.

Richard M. Hunt.

In the death of Richard M. Hunt, which occurred at his cottage in Newport, R. I., on July 31, the architectural profession has lost a most honored member. The work which he did and the influence which he exerted will prove a lasting monument to his memory and serve as an educator far into the distant future. Mr. Hunt was born in Brattleboro, Vt., October 31, 1828. His early education was acquired at various schools in New England, but at the age of 15 he accompanied his mother to Europe and entered the school at Geneva, where he commenced the study of architecture. Subsequently he went to Paris and became a student at the Ecole des Beaux-Arts, upon leaving which he traveled through Europe, Asia Minor and Egypt. Returning to Paris in 1854 he received from the French Government an appointment as Inspecteur des Travaux in connection with the new buildings uniting the Tuilleries to the Louvre. Mr. Hunt was placed by the supervising architect in charge of the Pavilion de la Bibliothèque, opposite the Palais Royal. In this position he made, under Lefuel, all the studies and drawings for the Pavilion. In the year 1855 Mr. Hunt returned to the United States and was immediately engaged to assist the late Thomas U. Walter in preparing the plans for the completion of the Capitol at Washington. After six months of hard work he came to New York City and began the career which has made his name famous the world over. He was a leading spirit in the founding of the American Institute of Architects and in establishing a studio for pupils similar to those which flourished in Paris. In this studio many of the leading architects of the country received instructions, among the number being Prof. William B. Ware of Columbia College, George B. Post, Charles Gambrill, Frank Furniss, Henry Van Brunt and others. The structures designed by Mr. Hunt are found in the principal cities of the country, some of the more prominent being the Lenox Library, the first buildings of the Presbyterian Hospital, William K. Vanderbilt's residence, the Tribune Building, the Theological Library and Marquand Chapel at Princeton, the pedestal of the Statue of Liberty on Bedloe's Island, the Vanderbilt Mausoleum on Staten Island, the Divinity Buildings and the Scroll and Key Society Building, Yale College, the monument commemorating the triumphant close of the Revolutionary War at Yorktown, Va., the Brimmer houses in Boston, a number of the finest villas at Newport, R. I., and the country palace of George Vanderbilt at Biltmore, near Asheville, N. C.

Mr. Hunt's abilities were recognized abroad and he was appointed a member of the Jury of Fine Arts at the International Exhibition at Paris in 1867. He was made a Knight of the Legion of Honor in 1882 and was elected a member of the Institute of France. He was also a member of the Central Society of French Architects, of the Society of Arts and Engineers of Vienna and of the Academy at St. Luc in Rome. He was a corresponding member of the Royal Institute of British Architects and in 1893 received from it the gold medal presented annually by Queen Victoria to the architect or archæologist adjudged to have done most for the history or advancement of science. In December of the same year he was elected an associate member of the French Academy of Fine Arts, an honor said to have never before been conferred on an American. He was also highly honored in his own country and was, it is said, the first artist to ever receive from Harvard University the degree of LL. D. At the Centennial Exposition Mr. Hunt served as a member of the Fine Arts Jury and at the World's Columbian Exhibition at Chicago in 1893 he held a similar position and was president of the Board of Directors.

Theater Fires.

A writer in a recent issue of the *Builder* states that "Glasgow is noted for its theater fires, there having been nine since the year 1829, in addition to three circus fires. The conflagration at the Theater Royal on March 1 was one of the most instructive, as it clearly showed how dangerous some concrete floors can be, and to what extent cast iron columns, if properly set up, will resist high temperatures without being affected. The fire also showed to what a degree wood work can become inflammable tinder in buildings of this kind. As to the concrete corridor floors, pugged wood would certainly have been safer. They could not be used for localizing the fire in the auditorium, as they were too unreliable for the firemen to work on or under. The difference of temperature and the falling of small weights easily wrecked them, though they were 7½ inches thick to an average span of about 6 feet 6 inches. As to the cast iron supports, in several instances as many as three columns, bolted one over another and fixed to a good base, remained in position while everything around them was totally destroyed. The wood work, of which there was too much in the building, burned furiously and rapidly, the auditorium and stage being gutted in a marvelously short time. The wood work was reduced to ashes in a way seldom seen at ordinary fires. The walls, which were of masonry, withstood the flames well and will probably be re-used." The writer concludes his remarks by intimating that from an examination of the plans of the structure it was fortunate the fire did not occur during a performance at the theater.

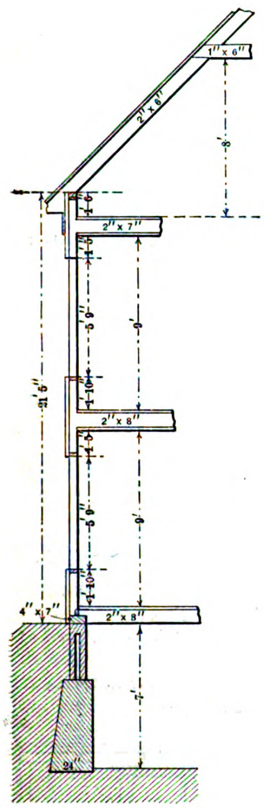
THE last annual report of the Street Department of Boston, Mass., contains a description of some artificial stone work, which is the first example of the use of this material on any considerable scale that the city has yet made. It was put down for a footpath serving to connect two parallel streets about 240 feet apart, but with a difference of level of about 45 feet at the point where it was used. The path is about 138 feet long and 11½ feet wide. It consists of seven flights of artificial stone steps connected by platforms of the same material, and there is an additional flight of 13 steps at one end.

DESIGN OF A TWO-FAMILY HOUSE.

ONE of the things which the observing visitor cannot fail to notice in many cities and towns scattered through the New England and other Eastern States is the relatively large number of dwellings designed for the use of two families. It is not a feature which can be said to be peculiar to this section alone, as houses planned to meet the requirements of two families are found all over the country; but in the extreme Eastern States buildings of this character are so common as to be the rule rather than the exception. There are in dwellings of this kind, as might naturally be supposed, a wide variety of arrangement and design. In some cases the house is so planned that one family occupies the lower floor and the other the second story, both making use of the same front and rear entrances, while the rooms in the attic are divided between the two families, as circumstances may require. In other cases the same general arrangement exists, but with the difference that each family has its own entrance. In still other cases the building is divided in the center, each family having a private entrance and occupying rooms on the various floors from the ground up. A rather interesting design showing an arrangement of rooms similar to that first described is presented in this issue of the paper. It represents a dwelling erected last summer from drawings prepared by George and J. P. Kingston, architects, of 518 Main street, Worcester, Mass. The floor plans show the arrangement of rooms, the details indicate some of the more interesting features of construction, while the half tone supplemental plate, made from a photograph taken for the purpose, gives a good idea of the appearance of the completed structure.

An inspection of the plan shows that each family has five rooms on a floor, these consisting of parlor, sitting room, kitchen and two sleeping rooms, besides bathroom, pantry and ample closets. In the attic are finished two sleeping rooms, giving one to each family, with space to finish two or three more rooms should circumstances require it. Should it prove undesirable to divide the space in the attic between the families occupying the first and second floors, the owner might finish off four or five rooms, add a dormer window, and extend the rear stairs so as to give a suite of apartments for a third family.

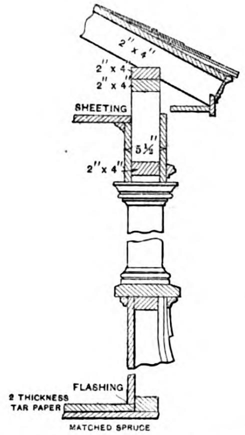
From the architect's specifications we learn that the foundations are of stone below grade and brick above, the underpinning having a 2-inch air space, as shown in the detail presented on a following page. The cellar walls are pointed with mortar and all brick and stone work whitewashed. The cellar is partitioned off so that each family has a room of its own. The inside studding employed are 2 x 4 inches for the main partitions, and 2 x 3 inches for the cross partitions placed 16 inches on centers. The sizes of other timbers employed in the construction are shown on the details. The exterior frame of the building is sheeted with ⅞-inch planed and matched spruce boards covered with sheeting paper, and this in turn with 6-inch spruce clapboards. The gables are covered with cut pine shingles, as shown. The roofs are sheeted with ⅞-inch hemlock boards, laid about 2½ inches apart and covered with 16-inch cedar shingles. The outside finish is pine, worked out according to the details. All finished parts of the building have two floors, the lining floor being ⅞-inch planed and matched spruce, while the top floor in each kitchen, pantry, bathroom and hall is birch or maple, not more than 3 inches wide, blind nailed and neatly



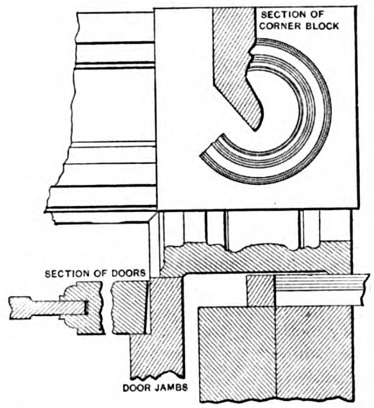
Section.

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

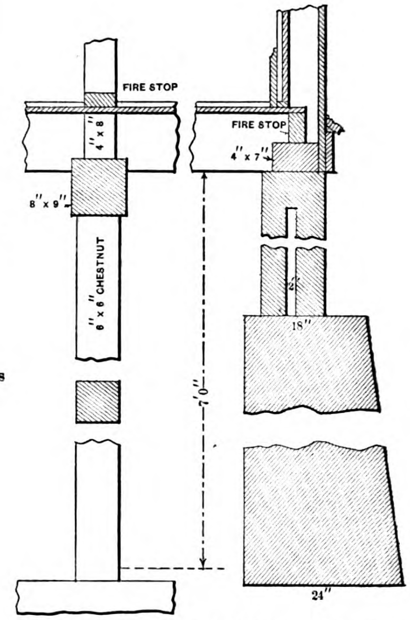
Design of a Two-Family House.—George and J. P. Kingston, Architects, Worcester, Mass



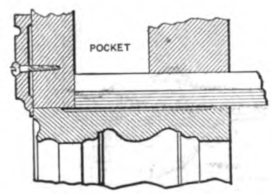
Detail of Balcony Cornice, Column, &c.—Scale, ⅛ Inch to the Foot.



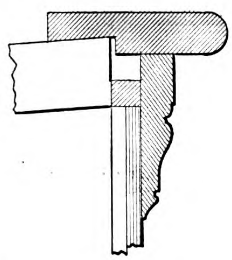
Detail of Finish in Halls, Parlors, Sitting Rooms and Bedrooms.—Scale, 3 Inches to the Foot.



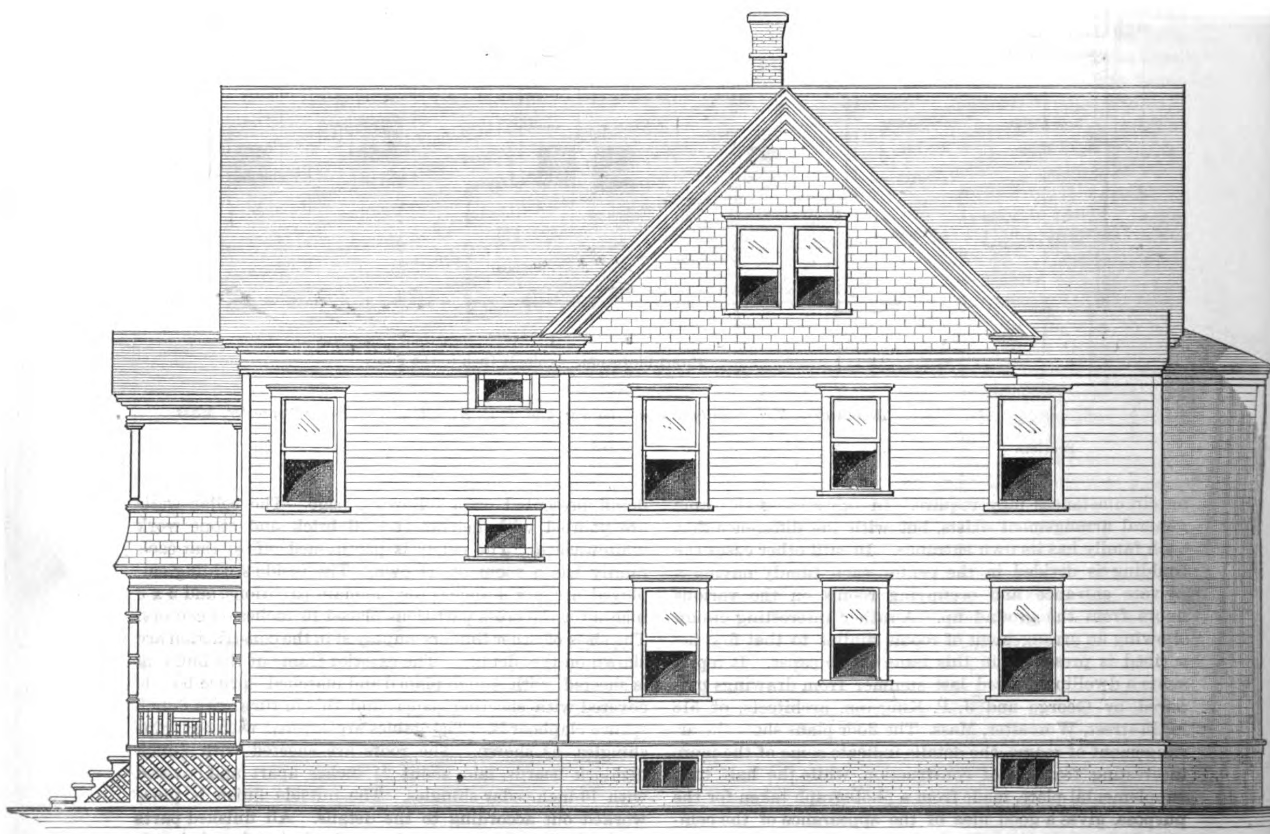
Detail of Foundations.—Scale, ⅛ Inch to the Foot.



Detail of Windows.—Scale, 3 Inches to the Foot.



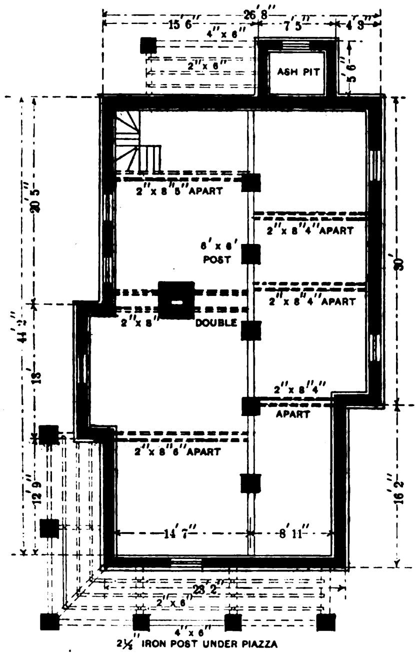
Detail of Window Stool and Apron. —Scale, 3 Inches to the Foot.



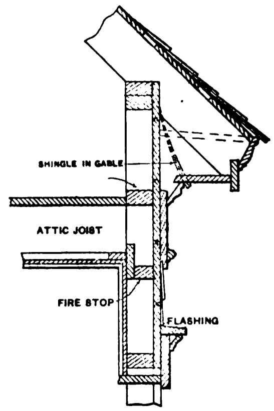
Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Design of a Two-Family House.—Elevation and Miscellaneous Details

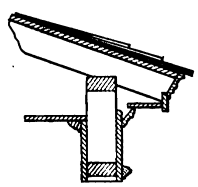
smoothed. All other top floors are ⅞-inch square edge pine. The top or finished floors were not laid until the base and wainscoting were in place. The interior finish of the parlors and sitting rooms is red birch, the bedrooms and front halls white wood, and the kitchens, pantries, bathrooms and rear halls North Carolina hard pine. The kitchens and rear halls are wainscoted three feet high and the bathrooms four feet high with narrow beaded sheeting. The pantries, it will be observed, are extra large and contain a flour barrel closet and a case of drawers, as well as



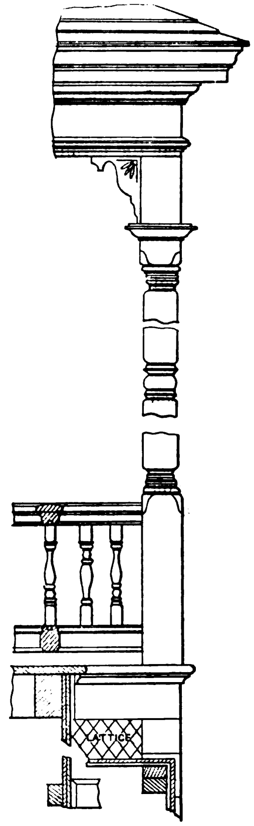
Foundation.



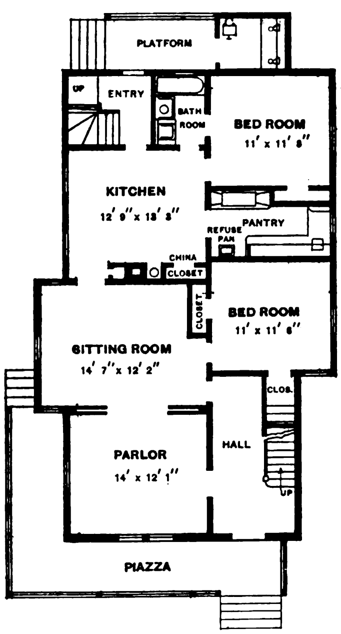
Detail of Main Cornice.



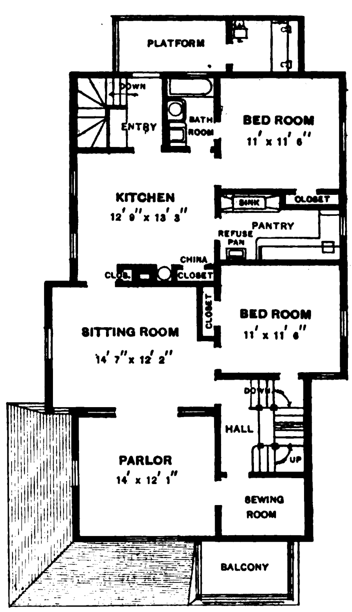
Detail of Porch Cornice.



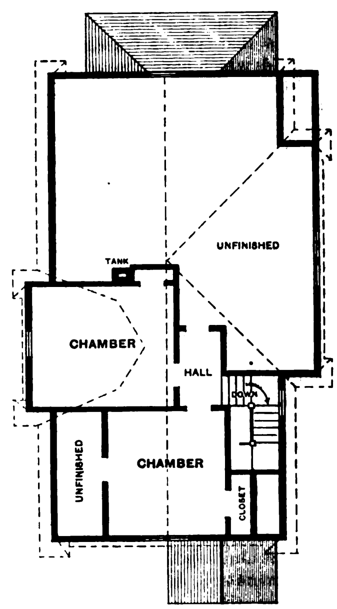
Detail of Front Porch.



First Floor.



Second Floor.



Attic.

Design of a Two-Family House.—Floor Plans.—Scale, 1-16 *Inch to the Foot.—Miscellaneous Details.—Scale,* ¼ *Inch to the Foot.*

a sink and a place for refrigerator, the pan being made in the floor and drips to the outside of the building. The interior finish throughout is in the natural wood, with liquid filler, shellac and varnish. All plastering is carried down to the floors on the outside walls. The plastered walls in each kitchen, pantry, bathroom and rear hall is treated with oil paint, which can be readily washed at any time. All other walls are papered, which, however, was not covered in the contract. The plastering is one-coat work smoothed up, while the ceilings are two-coat work, the second being a finishing coat. The plumbing is executed in the best manner, provision being made for hot and cold water, with a copper boiler for each floor. There is also on each floor at the rear a wood and coal room, with an ash sifter which empties into a pit in the cellar. A portion of the rear platform containing these rooms may also be used for drying clothes. The building is piped for gas and has outside blinds on all windows. There has been a second house erected from plans slightly modified from those shown in this connection, the principal difference being that the arrangement of rooms was reversed and the house was 1 foot longer. The contract price of the building which we illustrate was $3350, but in other localities, where lumber and materials are cheaper than in the neighborhood of Worcester, the architects state that the building could probably be put up for $3000 or less. The second house was put up by the day and we are not informed as to the total cost.

"Rough Cast" in Plaster or Cement.

In discussing the difficulty of securing durable outside plaster or cement "rough cast," either in plain surfaces or with half timber work, a correspondent of the *Brickbuilder* writes to that journal an interesting letter in which, among other things, he says :

"There seems to be many different opinions as to the best method to follow for combined durability and effect; some, including one of our most eminent practical architects, advocating pure lime mortar with long hair or fiber, and others claiming that only pure cement mortar on metal lath, or expanded metal, can be relied upon. On a half timbered country house, built a year ago, I used lime, sand and hair mortar on metal lath for the first coat, and cement and sand (one to one) for the second coat after the first had hardened for some time, the mortar and hair taking a strong "clinch" in the metal lath, and the cement forming a thin, extremely hard protecting "skin" over the first coat. I should say that the work would be much better if the first coat were left uncovered for four or five weeks at least, in order to harden under atmospheric action, but so far this piece of work seems successful."

We have no doubt many of our readers are interested in this subject and that an expression of opinion on the part of those experienced in this particular line would prove both valuable and instructive.

A Fire Curtain of Water for Buildings.

A trial was recently made at the Fire Department headquarters in Boston, Mass., of a device for protecting buildings from fires in adjacent structures. The fire headquarters are located in a dangerous lumber district, and in order to protect the new fire alarm apparatus it was suggested that perforated pipes be placed along the front and sides of the structure near the top. The apparatus as constructed consists of a 5-inch stand pipe extending above the upper story. From it runs another pipe around the side and front from 4 to 2½ inches in diameter. On the front are three revolving sprinklers and one on the side at the center, the arms being of bronze metal slightly curved. Each end of these arms has a ball nozzle such as is used by the fire department on regular hose lines. At the base of the stand pipe is a Siamese connection for four lines of 3-inch hose. At the test a Fire Department steamer furnished the power, and for about 15 minutes poured through the sprinklers water at the rate of 1000 gallons a minute, completely drenching the walls and making a continuous sheet of water from top to bottom.

THE HOWE TRUSS DISCUSSED.

BY HENRY DAUBE.

Up to the present time a great deal has doubtless been said and written about the Howe truss; and presumably much more will remain to be written as long as that type of truss is used. In response to several inquiries which have appeared in *Carpentry and Building*, I will endeavor to present a little information in regard to this truss. It is not my object to enter into an exhaustive analysis of the properties of the truss, but merely to present in as simple a manner as possible several well established facts, together with information derived from the experience of the writer. The Howe truss is classed among that style of trusses commonly known as quadrangular or quadrilateral trusses, its name being derived from the engineer who first applied the principle on which it was built. It can be distinguished from other trusses in the same class by the fact that all of its vertical web members (in the Howe truss these are rods) are subjected to tensile strains only while the inclined members or braces are in compression. Its use is almost universal, ranging from the light roof truss to the heaviest bridge. In railroad work it can be used for spans as great as 200 feet, while in buildings it is made to perform all kinds of service.

This truss can be constructed wholly of iron or of a combination of iron and wood, in which form it is most frequently used, and finds much favor among engineers and architects; the wood being best adapted to compression. The size and depth of the truss, as well as the dimensions of its members, depend entirely on existing conditions—the span, the use to which it will be put and the load, whether dead or live, to be sustained. Therefore no general rules can be given, each case depending for its solution on the governing conditions.

In important cases it is always advisable to calculate the strains on its members, so as to insure a feeling of safety as regards its strength. As before stated, it was not the intention to take up this phase of the subject as the reader would have to possess a thorough knowledge of the principles of mechanics to fully comprehend it, but in the course of the article I may refer to the character of these strains to bring out some important point. To enable the reader to more fully understand what will follow, a drawing is necessary. Fig. 1 illustrates a Howe truss of 25 feet span and 6 feet in hight. It is intended to represent one of the trusses of a railroad bridge, but the same kind of a structure could be used inside a foundry or machine shop for supporting a traveling crane or other hoisting apparatus, only it would be made proportionately lighter. The upper and lower chords are built of two or three timbers placed parallel to each other, but of a sufficient distance apart to allow the suspension rods to pass through. These rods are generally spaced at equal distances, as will be seen from the engraving. Where these rods intersect the chords triangular prisms are placed to sustain the thrust of the diagonal braces. These prisms are commonly called angle blocks and run across the full thickness of the chords; being made either of hard wood or cast iron. In trusses of large span and built for heavy work angle blocks of iron should have the preference over wooden ones. While there no doubt exists a difference of opinion as to which are to be preferred, it would be well to remember that certain kinds of wood when brought in close contact with other woods have a tendency to cause rapid decay. It is said that the oaks especially, when used in conjunction with the pine species, cause the latter to decay, and it is probably for this reason that iron angle blocks are given the preference on important work. From authentic sources it is learned that some very important bridges in England and Switzerland have been built in which the angle blocks were made of wood.

The inclination of the abutting faces of the angle block should always be such as to bring it at right angles to the axis of the braces. The suspension rods run through the whole hight of the truss and are provided with nuts and washers. The strains on the rods are always greater on those nearest the end, and this should always be kept in mind when designing important work. In small work the rods are all made to one size, taking that of the one strained the most. To show the readers how it is that the end rods are strained most a small diagram will be necessary. Suppose Fig. 2 to represent a skeleton diagram of a Howe truss and suppose the truss is uniformly loaded at each of the panel points, as shown in the engraving. Beginning at the center it is manifest that the weight is transferred from the rod to the point 1; then at that point it is transferred to the diagonals, one-half of the stress going to the right, the other half to the left. The strain traveling along the diagonal reaches the point 2, where its vertical component joins the weight 2 to travel again up to point 3 and down again to point 4, where it is again augmented by weight 4. In this manner the strains become greater as they approach the ends of the truss, in consequence of which the rods must be made stronger. The same can be said about the braces, but with the chords the effect is just the reverse, and in these the strains are greatest at the middle of the span.

As the details are brought out so fully in Fig. 1 further description is unnecessary, and I will now take up the subject of camber. In building trusses that have to sustain very heavy loads it is the customary practice to give them a camber, which consists of curving the horizontal timbers slightly upward in the center. Various rules exist in regard to determining the proper amount of camber for certain spans. The object of cambering a truss is to allow for any settlement which may occur after completion, and also to prevent the truss from deflecting below a horizontal line when taxed to its maximum capacity. Some engineers allow 1-inch camber for a span of 50 feet; 2-inches for 100 feet, &c., while some, depending on the accuracy of their work, allow only one-half this amount. By cambering the horizontal timbers it is manifest that they must be made longer than the straight line which joins their ends. The increase in length of the lower chords due to cambering would be so trifling that in ordinary practice it could be entirely disregarded. Not so, however, with the upper chord; the increase in length of this member would be quite an appreciable quantity, because the top chord is cambered to a curve which is concentric to the curve of the lower one.

Trautwine gives a rule for determining this increase when the depth, the camber and the span are given, providing, however, that the camber does not exceed one-fiftieth of the span,

$$\text{Increase} = \frac{\text{depth} \times \text{camber} \times 8}{\text{span}}$$

using either feet or inches in the calculations. By cambering the truss the distance between the suspension rods on the upper chords will necessarily be greater than the distance between the rods on the lower chords. The panels are not strictly parallelograms, the rods converging somewhat. By dividing the total increase in length of the upper chord by the number of panels in the truss we obtain the increase per panel. This, of course, will affect the length of the braces, and great care should be taken to cut these to the proper length. Trautwine also gives a method for finding the length of the braces in cambered trusses, but while the method shown is practically correct, in so far as lines are concerned, yet I think that it could not be applied very well in a timber truss. Since I have taken the liberty of differing with a certain method, it is necessary to show a reason for so doing. The reader must remember that in calculating strains in trusses skeleton diagrams are used, and the lines composing these diagrams are generally taken or drawn through the axes of the various members. These lines usually meet at a common point of intersection, as will be seen from the dotted lines in Fig. 3. But in practice these lines do not always thus meet, and hence my reason for differing. The method shown by Trautwine is that of finding the length of the hypothenuse A C of the right angled triangle A B C; and even were these axial lines to meet at a common point of intersection the rule would not apply on account of the angle blocks taking up part of the distance. The best way to get the length would be to lay out one panel full size.

Having covered various points that may interest the readers, and having already extended this article further than was originally intended, I can say nothing more than that the young mechanic can find no better way of increasing his knowledge of the principles of mechanics and construction than by taking hold of such a subject as is offered by the Howe truss.

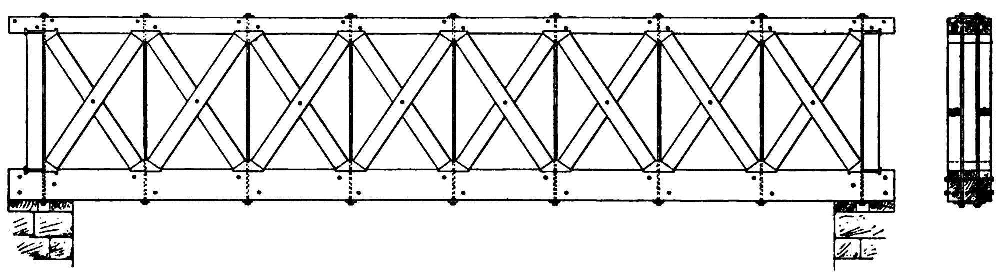


Fig. 1.—Elevation and Cross Section of Truss of 25 Feet Span.—Scale, 3-16 Inch to the Foot.

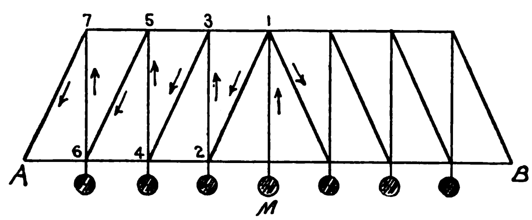


Fig. 2.—Skeleton View of a Howe Truss Uniformly Loaded at Each of its Panel Points.

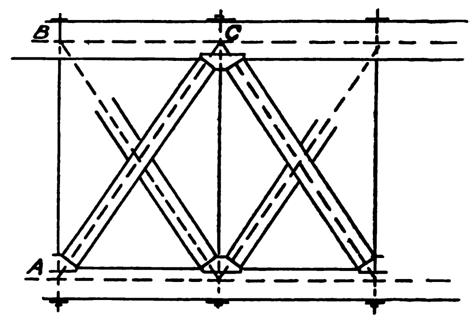


Fig. 3.—Method of Finding Lengths of Braces in Cambered Trusses.

The Howe Truss Discussed.

WHAT BUILDERS ARE DOING.

THE month of August has been uneventful in the building trades of the country, little having occurred to alter the conditions as outlined in our last issue. The conditions between employers and workmen are practically unchanged, the only prospective difference of any magnitude being the threatened strike at Buffalo, which is not sufficiently advanced at this time to warrant conclusions as to its extent. Preparations for display by the various labor unions on Labor Day are being made in nearly all localities where organization has any foothold, and the building trades are making provisions for being well represented.

Baltimore, Md.

Building in Baltimore continues with unabated vigor and there is no prospect of any disturbance by strikes or lockouts. The Builders' Exchange is bringing to perfection its plans for entertaining the delegates to the ninth convention of the National Association of Builders and an exceedingly entertaining programme has been laid out, so that the stay of the visitors will doubtless be most enjoyable.

Boston, Mass.

There is no indication of any decrease in activity in the building business in Boston until the end of the season, the outlook reported in August having been apparently well founded. It is expected that the carpenters will make a stand on September 1 for eight hours, with an increase in wages to 35 cents per hour. At present the men are working 9 hours in most cases and wages range from 27 to 33 cents per hour. The workmen claim to be in good condition to press their claim, and the support of the United Brotherhood of Carpenters and Joiners is expected should outside aid prove necessary. It is estimated that there are over 4000 carpenters in the city a majority of which are members of the unions. For several months the carpenters have been considering the advisability of taking advantage of the revival of business to secure a reduction in their hours of labor. Since 1887 the carpenters have been working nine hours a day. In 1886 and 1890 the carpenters struck for an eight-hour day, but failed. It is now believed by them that the master builders will accede to the demand, in view of the fact that the eight-hour rule now governs in so many towns and cities. Whether or not the decision of the carpenters will involve the entire building trades of Boston in a strike is as yet problematical. The carpenters are of the opinion that it will not, as they have been led to believe that the larger master builders are ready to grant the eight hours as soon as a request is submitted to them. Should the request be refused and a strike be ordered, it is believed that the entire building business in the city will be paralyzed, and that about 16,000 men will be thrown out of work until the contention shall have been settled. At the present time union carpenters are working but eight hours in 58 cities, with wages at 35 cents per hour.

The lathers have been trying for some time to secure an advance in wages from \$3 to \$3.50 per day. Late in July a strike was decided upon and the men quit work. After remaining out for about a week the employers generally granted the increase and the men returned to work. The various trade unions of the city have made considerable preparations for Labor Day and an elaborate display is expected.

Buffalo, N. Y.

At the time of this writing the building trades of Buffalo are threatened with a general strike, which, if inaugurated, will effect all branches of the business. The cause of the disturbance is the employment of non-union steam fitters on one of the prominent jobs now in course of completion. The union plumbers objected to the employment of non-union steam fitters and gave the contractor 24 hours' notice to discharge the objectionable men. At the end of the time given the non-union men were still at work, and after a hasty consultation by the advisory committee of the Plumbers' Union a strike was declared, and the plasterers, bricklayers, carpenters, masons, stone cutters and electricians quit work. It is stated that the Plumbers' Union intends to call out all the building trades in the effort to prevent the employment of non-union men.

The condition of the building business is about the same as that reported last month, and unless the threatened strike develops into something serious the next three months will be busy ones.

The annual outing of the Builders' Association Exchange will occur on September 2, and preparations have been made for a most enjoyable day. The steamer "Pilgrim" has been chartered and the party, which will consist of members and their representatives only, will leave the city at 9.30 o'clock a.m., and spend the larger portion of the day on the water. If the weather permits, a run will be taken out into the lake, after which the steamer will visit the various resorts on the river, including a trip around Grand Island. The park grounds at Edgewater have been thrown open to the builders by the proprietor, and at this point only will a lengthened stay be made. The committee in charge has provided ample refreshments, including a morning lunch, dinner and supper, all to be served with sundry liquids and cigars on board the "Pilgrim." A large attendance is expected and all will doubtless have a thoroughly good time. The committee in charge of the affairs consists of Messrs. Geo. W. Carter, Jacob L. Mensch, Harry C. Parsons and J. C. Almendinger.

Chicago, Ill.

The condition of affairs in Chicago as regards the amount of building going on has not materially changed during the past month. It is expected that the total of the year's work will exceed that of 1894, but as compared with 1892 and 1893 the amount will probably be considerably smaller. There is a movement on foot among the labor unions to bring about some arrangement whereby factional differences can be avoided. As the unions are constituted at present, there is continual strife between organizations, which operates to the injury of the workmen and employers alike, and which destroys the opportunity for benefit that exists in harmonious action by people with a common cause. About the average number of petty disturbances have existed during August, but no strike or lockout of a general character has occurred. The workmen are making extensive preparations for a Labor Day parade.

The members of the Builders and Traders' Exchange held a most enjoyable outing on August 3, in conjunction with the members of the Milwaukee association. An excursion was planned whereby the Chicago builders were taken to Milwaukee by special train to Schlitz Park by special electric cars and treated to an excellent dinner, in which latter they were joined by their Milwaukee brethren. Each member of the Chicago Exchange who attended the excursion was provided with tickets for each of the features of the day, and everything passed off without the least confusion or delay. The Chicago party left their city at 8.30 o'clock a.m., and arrived in Milwaukee at 11 o'clock, when they were welcomed by a committee of their brother builders of Milwaukee. All proceeded at once to Schlitz Park, where a reception was extended to the visitors by the Milwaukee Builders and Traders' Exchange. Considerable speech making followed the reception and the whole assembly proceeded to dinner. The afternoon was spent in the park to the accompaniment of good music and other entertainment provided for the occasion. The Chicago contingent returned to their homes at 7.15 p.m., everybody having passed a most enjoyable day. The party numbered 460. Much credit is due the Committtee of Arrangements for the excellent manner in which the details were carried out. The committee consisted of Geo. H. Fox, chairman; James Bloomfield, James Hogan, E. B. Myers, J. G. McCarthy and secretary Frank Conrick.

Detroit, Mich.

The building business in Detroit still continues quiet, with little prospect of picking up before next season.

The carpenters' unions are seeking to bring about an amalgamation for the purpose of securing greater unity of action on matters of common interest. One of the first moves contemplated is to urge a demand already made for an increase of 10 per cent. in wages to restore a cut that was made during the hard times of 1893. The carpenters state that they desire higher wages than those represented by a 10 per cent. increase, but do not think it wise to ask for more than the present state of business seems to warrant. They hope to secure the advance without disturbing the present relations with the employers. The men are asking for \$2 per day, the wages paid in few cases being over \$1.75.

Milwaukee, Wis.

Business among the Milwaukee builders is gradually growing better, although the amount of work done this season will probably fall below the total of prosperous years in the past. There has been no disturbance of the relations between employers and workmen for some time past and there seems to be no evidence of an unfavorable change in the near future.

The members of the Builders and Traders' Exchange helped to entertain the members of the Chicago Exchange at Schlitz Park on August 3. The following gentlemen comprised the reception committee appointed to look after the welfare of the visitors: L. A. Clas, John Langenberger, P. L. Peterson, W. H. McElroy, C. A. Sercomb, R. G. Harper, P. T. Collingbourne, James Toombs, William Petermann, E. T. Doyn, S. V. Hanley, C. G. Foster, G. T. Huewe, J. H. Sullivan, W. P. Beckworth, E. W. Bond, J. H. Lenicheck, Henry Kimple, D. W. Cutler, Philip Gross, Henry Ferge, Thomas Bentley, Ernst Silgen, C. F. Kindt, James Graham, Edward Roberts, C. J. Fox, William Wollaeger, E. T. Washburn, Charles Dingwall and G. B. Posson. The visitors were met by Bach's orchestra and after the usual greeting were escorted to the electric cars. *En route* the home of the local exchange was passed and the cars slowed up that the party might see the building. The visitors were welcomed to the city by President C. A. Sercomb, who also introduced the other Milwaukee speakers. Garret Dunck, F. C. Eschweiler and City-Attorney C. H. Hamilton were among the number who welcomed the Chicagoans. It was after 1 o'clock when the addresses were concluded and the visitors were then treated to a luncheon. Then the party was entertained with music in the park and during the afternoon an entertainment was given in the park pavilion. The visitors departed for their homes at 7.15. Through the efforts of the 'Builders and Traders' Exchange the new building ordinance which was compiled with great labor by the Common Council is to be revised and put in such shape that it will be of some service. As soon as the new law went into effect it was found that its terms were contradictory and many of its provisions were impracticable. Considerable trouble has already resulted and there is likely to be more if the ordinance remains as it is. Arbitration has had to be resorted to in two or three cases and members of the Builders and Traders' Exchange were the arbitrators. They saw the need of a revision of the great ordinance and recommended that the exchange act in the matter.

Some time ago the exchange appointed a committee and invited the Merchants and Manufacturers' Association and the Board of Underwriters to appoint committees to act together in making a revision of the ordinance. The committee of the exchange is composed of President C. A. Sercomb, Henry Ferge and G. B. Passon. The Merchants and Manufacturers' Association has appointed John C. Spencer, Ferdinand Kieckhefer and Manager Wilkins as its committee and the underwriters' committee is composed of L. A. Wheeler, J. O. Noyes and C. F. Hubbard. These nine gentlemen will give the ordinance a complete overhauling.

New York City.

The overshadowing feature of the month in the building trades was the collapse, on the morning of August 8, of the intertior portion of the eight-story building in course of erection at the corner of West Broadway and Third street, whereby 15 workmen lost their lives and many others were severely injured. Since the collapse an investigation has been in progress looking to the cause of the accident and the placing of the responsibility therefor. The building, of which only the walls remain standing, covers an area of 50 x 85 feet, and was finished inside with the exception of the plastering and the floors, which were heavily loaded with plaster, &c., when the collapse occurred. The testimony brought out in the investigation seems to go far toward proving that the cause of the accident was inadequate foundations. In clearing away the *débris*, it was found that the concrete foundation, about 10 feet square by 12 inches thick, which supported the central pier and the weight above it, had been laid upon the edge of an old well about 8 feet in diameter. The thin wall of this well had been partially cut away to receive a corner of the concrete foundation, which extended toward the center of the well about 4 feet. According to the building laws there should have been at least 18 inches of concrete under the supporting columns instead of the 12 inches which were employed. The investigation brought out a number of rather startling features in connection with this building operation, and just as we go to press the jury announce their verdict fixing the cause of the disaster as faulty foundations and holding responsible for the collapse the architect, an ex-inspector of the Department of Buildings, the contractor, the mason foreman in the employ of the contractor, superintendent for the contractor, and the superintendent for the architect.

The New York Stone Trade Association has recently been organized under the laws of the State of New York, with John B. Smith, president; William McLatchie, vice-president; B. A. Williams, treasurer and Edwin Shuttleworth, secretary. We understand that the object of the organziation is to harmonize the differences which have existed among the several interests in the stone trade, and to show individual members that in uniting for the protection of the whole they will at the same time be serving themselves. Its functions are limited to providing a place of meeting and adopting such rules for government as are usual in commercial exchanges. The place of meeting is the Bloomingdale Lodge Room, 166-170 East Sixtieth street. When the exchange was opened, on August 15, a fine lunch was served and a number of appropriate speeches made. The exchange, the president states, will be open between 12 and 2 o'clock of each business day for the transaction of business between quarrymen and stone cutters, but the room will remain open until 5 p.m. for appointments with business friends.

The Employers and Builders' League had an outing on August 14, when they went to Rye Beach, N. Y., and enjoyed a clam bake. About 300 took passage on the steamer "Chancellor," arriving at the beach about noon, and passed the remainder of the day in feasting and sports. The competition for prizes given for bicycle, foot and potato races was confined to club members, the contests being sharp and vigorous. This outing, we understand, is the inaugural of what is hoped to be a series of clam bakes.

Omaha, Neb.

The building business in Omaha still continues very quiet, with little prospect for improvement before the end of the season. Local contractors have much to compete with; bidders from out side the city are seemingly able to underestimate them and are doing work at a price that would leave no profit for the local men. Many of the smaller contractors take work at prices that leave them barely day wages, and members of the bricklayers' unions have been taking work as contractors and have been permitted to pay less than the union wages. When these latter complete their jobs they are received back into the union again, and the contractors have thus far been unable to prevent unfair discrimination by the unions, which force them to pay the union scale of wages in all cases while permitting the conditions cited above. The amount of new work being carried on is very small, and there is a feeling among the builders that the situation will remain practically unchanged until the effects of the sale of the good crops, which generally prevail, are felt. The condition of the Builders and Traders' Exchange, in spite of the hard times, remains about the same.

Philadelphia, Pa.

At a special meeting of the Philadelphia Master Builders' Exchange, held August 8, the following were elected to represent the exchange at the ninth annual convention of the National Association of Builders, to be held in Baltimore October 15-18.

Delegates—President Charles Gillingham, Secretary William Harkness, George Watson, John S. Stevens, Franklin M. Harris.

Alternates—W. S. P. Shields, William Conway, Francis F. Black, A. G. Buvinger, James Hastings.

The Delegate at Large is Stacy Reeves.

The exchange continues in its usual prosperous condition, and is steadily extending its influence as one of the solid business organizations of the city. The Trade School under its patronage and supervision is in excellent shape and will be materially assisted by the contribution of $7500 to its funds from the State. The bill praying for the appropriation was passed and signed by the Governor early in July, and the members of the exchange congratulated themselves on obtaining the full amount asked for, as the amounts asked for for educational purposes by some of the other institutions of the State were materially reduced.

Building continues at about a normal point of activity, and no labor disturbances have occurred for some time past.

It is said that arrangements have been made for a representative exhibit at the Atlanta Exposition by the Builders' Exchange. The exhibit will include specimens of the handiwork of the students of the Master Builders' Mechanical Trade Schools attached to that institution.

Providence, R. I.

The building operations in the city of Providence this year will exceed in point of number of buildings erected any previous year in the history of the city, and the expenditures will show a corresponding increase over that of any preceding year. According to the records of the inspector of the Building Department, there have aready been issued up to date 756 permits to build, which is nearly as many as were issued during the whole of last year. Several old structures in and near the center of the city, which for a long time have been an eyesore, are being removed, to be replaced by modern buildings.

The Builders and Traders' Exchange is in excellent condition and is steadily increasing its membership and importance as a benefit to the building interests of the city.

Worcester, Mass.

The members of the Builders' Exchange of Worcester took their annual jollification in the form of an excursion to New York City, up the Hudson to Poughkeepsie, back to New York and Coney Island and home. The details of the trip were planned so that everything was provided for beforehand, and every one of the members who attended reported having had a most enjoyable time.

Business remains about the same as reported last month, and nothing has developed to disturb the relations between employers and workmen.

San Francisco, Cal.

The Builders' Exchange of San Francisco met recently and passed resolutions of respect to the memory of Charles D. Terrill, founder of the exchange, who died in Alameda on July 14. It was decided as a mark of respect to suspend all building operations in the city on the day of the funeral.

Mr. Terrill was an Odd Fellow and a member of the Civic Federation, and these bodies were represented among the pall bearers. He was also a trustee of the Free Public Library. He came to California in 1850 and was Tax Collector of Stockton from 1852 to 1856. He has for many years been a contractor in this city and was widely known. He leaves a widow and several children.

Notes.

At the meeting of the Builders' Exchange of Bridgeport, Conn., August 5, six new members were admitted, as follows: W. A. Disbrow & Co., carpenters; Dowling & Porter, carpenters and masons; Jerry Reilly, Jr., plumber; A. Wellington, plumber; L. M. Johnson & Co., painters; Fenn & Morehouse, sash, blinds, doors and mantels.

The Duluth and Superior (Wis.) associations of the American Federated Trades are seeking to establish unions in the saw mill towns in that vicinity to prevent the further continuance of the system of payment in time checks which are only available to the workmen at certain stores. An attempt to secure a regular pay day and cash payments throughout the district will be made.

The union bricklayers of Toronto, Ont., are trying to secure an advance in wages to 36 cents per hour and a nine hour day. Considerable correspondence has passed between the workmen and the Builders' Exchange, and at one period a general strike was threatened, but nothing of a serious nature has developed up to the present time.

On August 8 an excursion of members of builder's organizations in Cincinnati, Dayton, Cleveland and Toledo, together with friends was made to Cedar Point, a summer resort on Lake Erie near Toledo. It is reported that there were over 500 present and that a most enjoyable time was had. The Builders' Exchange of Toledo was one of the most active of the organizations interested in the affair.

The building business in St. Joseph, Mo., is reported as being active, with the majority of the contractors busy.

The Builders' Exchange of Cincinnati is considering the advisability of amending its constitution so as to abolish fines for non-payment of dues, and to substitute therefor a provision which shall prohibit delinquent members from all privileges of the Exchange until arrears are paid.

Master Builders of Great Britain.

The thirty-fifth semi-annual meeting of the Association of Master Builders was held in Leeds, England, on July 23, representatives from a large number of places being present. The president, John Bowen of Birmingham, explained to the meeting the course which had been adopted in reference to the Plumbers' Registration bill introduced into Parliament last season, and impressed upon the members the desirability of opposing the bill again when it should be introduced. It was decided that the association should render all possible support to the Master Plasterers' Association of London in their controversy with the National Association of Operative Plasterers, which it was stated had for some considerable time past made systematic endeavors to have boycotted certain master plasterers in London. Various other matters of interest to the building trade were discussed, among which reference was made to the apprentice indenture form, some being drawn up in such a way as to render the plumber liable to maintain the apprentice when unable through illness to work. In the evening the members were entertained by the Leeds Master Builders' Association, a banquet being given in the Queen's Hotel.

The Commissioners of the Atlanta Exposition are desirous of showing a workingman's model home not to exceed in cost at Atlanta, Ga., $700. They have offered a prize of $100 for the best design of a building of this character.

PLANNING SMALL HOUSES.

IN planning a small house it should be an especial study to avoid waste of space and yet insure general utility. There must be no long passages; hight must be kept down, and roofing as simple as possible. Breadth of effect must be studied rather than prettiness and ornament, as in this class of work there is no money to spare for either; all must be simple. One can hardly do better than conceive one's design on the lines of the old cottages in the immediate neighborhood, as they will invariably suggest much in the way of simple planning, detail and construction. It cannot in this connection be too clearly laid down that passage must be reduced to a minimum. This class of house cannot afford that 10 per cent. of its cost should be spent in passage, says T. W. F. Newton, in one of our foreign exchanges. In large houses it is generally unavoidable, but in small houses it can be so curtailed as to be practically *nil*.

The ground plan is the key to all the rest. If that be bad, as a rule all is bad; but it must be worked out by a careful consideration of the needs of the first floor. The front entrance should be fairly imposing, the door of ample width, with an inviting air about it. If it be a little lower than the usually given proportions, so much the better, as it will apparently increase the width. It is well either to have a porch or pent, or to recess the door, to afford shelter for any one waiting to be admitted. Care should be taken that the front door be not too much raked by the principal windows. The door should open into a small lobby or outer porch, which in its turn should have a small cloak room or recess for coats and hats. Three feet by three feet will hold a considerable quantity of these, and the general tidiness of the hall is thus preserved. Following this lobby an arched opening should give access into a small hall of about 9 x 12 feet. This hall—sitting room, if carefully planned so that it may be shut off from the stairs and kitchens—will give quite a useful apartment. To secure this object it is advisable to have all doors on one side, that the remainder may be free from traffic. An ingle nook, if it can be arranged, or a corner fire place will add to the picturesqueness of this cozy room. The ingle should always be low, never more than 6 feet 6 inches or 7 feet, and a deep beam with a wide shelf over. An internal treatment of bricks gives a solid air of comfort, and wide benches at the sides add to this. The usual long passage hall is so much waste space and quite useless as a room of any sort; neither can it be warmed. With this and the well of the stairs a current of cold air is generated which is drawn into the rooms every time the door is opened. If the stairs be shut off by a swing door or a curtained arch, and a good fire place given to the hall, an air of warmth and comfort is secured and greater privacy gained to the house, as the inmates may pass up and down unobserved from the hall.

The dining room, if possible, should have an eastern aspect, and if it can also have a south light so much the better. The morning sun is always valuable in the dining room in a house of this type, as it serves also as the breakfast room, and the dinner is usually in the evening, when the lamps are lighted. The chief points to be considered in this room are width, which should not be less than 13 feet, and ease of service to the kitchen and pantries; a small serving hatch from the latter saves a good deal of needless traffic. The fire place is best at one end and the door at the other, at right angles to the fire. A long, low window, with a seat recessed, and a simple beamed ceiling should make a comfortable and useful room.

The drawing room, being more for afternoon and evening use, should face south to west. Here I think a square room is to be preferred—say 14 feet by 14 feet—with bays and ingle, and a plain ribbed plaster ceiling. There is a tendency to make ingle nooks long, narrow and high—this is out of character with the old traditions, as all old ones are just the reverse in every particular.

The kitchen should be of fair size, and the light preferably on the north or east side, so that the midday sun may not add to the heat. The windows should be at right angles to the fire, so that the light on the range may be unobstructed. The larder should have a similar aspect, and may open out of the scullery. The pantry is the most useful near the dining room for easy service. The scullery should have sink and copper on the same side, under the window, and out of the draft of the door if possible. There should be two rows of 6-inch white tiles round the sink. The trades entrance and yards should be well away from the front door, and the space for coal and wood should be under cover and inclosed from the back porch. Water closet and ash pit are best distinct from the porch, and the former should not, as is too often the case, lead out of the scullery. A small toolhouse is useful for tools, stores of potatoes, &c. A good hight for downstair rooms is 9 feet.

The first floor is gained by a light, easy and wide staircase, alike convenient for all parts of the house, and the space underneath may be utilized for pantry or way to small cellar. The staircase both up and down should be well lighted, and the landing so planned as to give easy access to four or five bedrooms, bathroom, storeroom and water closet. Of the bedrooms, two should be of good size and two or three smaller. A large bathroom with hot closet for airing linen is a great convenience; the shelves should be of open battens so that the heat may ascend. It is best to arrange the bathroom and water closet over the scullery and outbuildings; by this means the circulation from the kitchen boiler is kept short, and breakages, should they unfortunately occur, do not cause so much damage. The bedrooms must be arranged with an idea as to the position of the bed, so that it may be shielded from the draft and give a view of the fire to any one in bed. Strong light opposite the bed is to be avoided. The roof can be started at 7 feet and go off to 9 feet in the center.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

THE scroll which forms the subject of the present article is different in several essential particulars from those previously given. It is desirable that the student should begin to learn to cut by the eye unaided by molds and this figure is designed to meet this requirement, but at the same time, in order to supply the wishes of those who do not feel competent to cut by the eye unaided, it is so given that molds may be applied and thus do away with the distrust of ability frequently apparent in beginners. The design presented in Fig. 83 is a radical departure in the method of working from any of its predecessors. In finishing the design it is not permissible to use scrapers and sandpaper, as the whole is to be finished with the gouge. In the case of designs similar to those previously given, it is perfectly correct to use scraper and sandpaper in finishing, but the present example involves a rather conventional treatment of nature. On that account it must be finished direct with the gouge. Understand, it is not to be left rough, but to be worked as smooth as it is possible to do it with the tool. The student may not at the first attempt be able to make a crowning success of it, but practice and a close application to the hints already given will enable him to succeed. In the finishing it is desirable to take off as long shavings as possible, and at the same time they must be very thin, so as to leave as few marks as possible from the tools. It is a great test of the mechanical skill of a carver to finish his work so smooth without the aid of scrapers, &c., as to deceive any but an expert. The design is rather simple and easy to cut, as there is no veining to the leaves.

Commence the work by sketching the outline of the

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design upon heavy paper, and in the leaf parts do not make each half exactly similar. A certain latitude in this respect renders the work not only more attractive in appearance, but it is in reality more artistic, approaching nearer to nature; yet it is only nature treated conventionally—a suggestion without its truth. It is intended that this work should be used upon a perfectly flat background, although if preferred it may be sawn to the outline and employed as a frontispiece. No matter how or where it is to be used, it is intended that the back should be perfectly flat, so as to enable the student to have something for a guide to which to work until he has had more experience in handling irregular surfaces. After the design is sketched the size it is intended to be cut, secure a block sufficiently thick to take in the highest members. Let the material be of some free wasting—that is, cutting, wood. Hard wood is to be preferred to pine of any kind. Make the background perfectly smooth and true; then take the block roughly cut to the required length and width and fit to the background in the position required. Now take the sketch and mark upon the bottom of the block. By "bottom" is understood to be the side that rests upon the background. Saw neatly to the mark; tooth, glue, clamp and allow it to remain until the glue is perfectly dry, after which take a pair of dividers and with the different hights obtained from the sections shown in Fig. 84 scribe the block in the positions from which they are taken. Then with a broad flat gouge rough cut the work, making a small allowance for finishing.

The next step is to finish the eye of the scrolls upon the two extreme ends of the design, the eyes being cut square down until they meet the hollow toward D upon the section C D. Work the hollow, quickening it a little as it approaches the leaf. By quickening is understood to mean making it more convex or concave, as the case may be. In this case it is more concave. Quickening is intended to emphasize a curve in order to prevent the flat appearance it otherwise would have, and so make it more pleasing to the eye. Do not forget in working hollows to use the gouges so as to make a drawing cut, and thus prevent the center line from chipping out. After the hollow is neatly worked treat the rounded sides, using the concave side of the gouge for the purpose. These parts may be completely finished if so desired before the other portions are worked.

We will now proceed with the center portions, which in reality are the most difficult of the lot to cut. Examine sections K L, M N and O P for the purpose of getting the general run of the lines well fixed in the mind. It will be noticed that this part has the appearance of being rolled under, and is produced by cutting from the outer part of the eye parallel with that portion toward the letters L and P on sections K L and O P, a small part of which is indicated upon section M N, and is there shown parallel with the face of the background. The bevels for the eyes of the side scrolls may be obtained with the dividers, taking the different distances from the sections and transferring them to similar positions upon the work in hand, then gradually easing the parts between the marks until the curves are continuous and regular. The line marked Y on the design and its position upon the sections shows a sharp edge, as may be seen by referring to sections K L and M N. It is continued sharp, though gradually losing its pronounced sharpness as far as the line extends, where it gradually rounds up until it assumes the shape shown toward the letter J upon the section I J. From there it reverses the process until it assumes the shape shown on the extended view of the section G H³. Another thing to which I desire to call the attention of the student is the portion of the leaf turned over and shown upon the section G H and G H¹. This part is not under cut, but if attention is paid to the manner in which the sections are unfolded the result will be equally satisfactory. It will be noticed that the edges of the leaves are shown cut upon a bevel, as by so doing the edges are less liable to chip in working. It also gives the student a chance to rectify any little defects that may occur, especially in the first attempts. Do not make the bevels of the edges of the leaves all alike, as a little diversity adds to the appearance. A flat gouge is employed to work the leaves, there being no part of them whatever that is flat. All are hollow, and the sections given will apply in a very slightly modified form to the whole. There are four holes, marked 4, 5, 6 and 7 on the design, and one shown upon section R S, marked 4. It will require a little practice to cut them oval, but it can be done by throwing the handle of the gouge more in the direction of the longest diameter of the hole than in the shortest. The tools required for executing this design are five gouges and no chisels.*

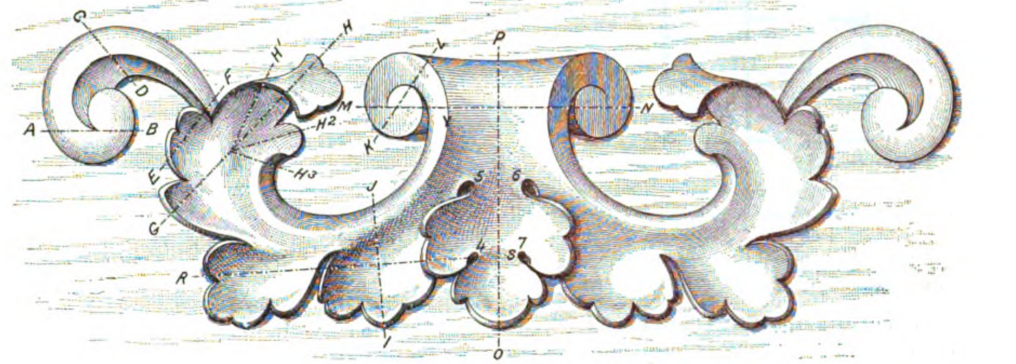


Fig. 83.—Scroll Design.

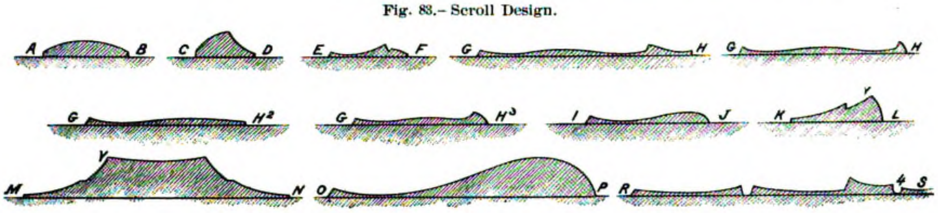


Fig. 84.—Sections Taken on the Various Lines Indicated in the Previous Figure.

Hints on Wood Carving.—Scroll Design with Sectional Views.

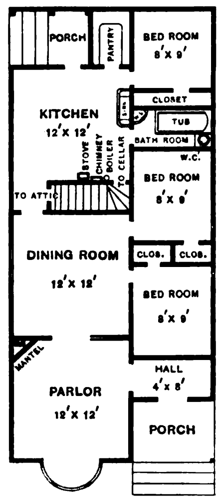
* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

(To be Continued.)

CORRESPONDENCE.

Plan for a Workingman's Home.

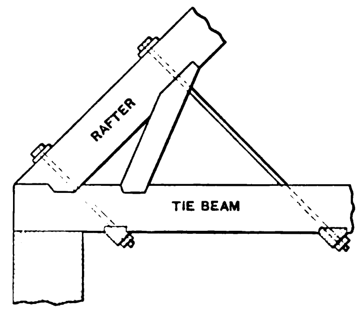
From APPRENTICE, *Buffalo, N. Y.*—I inclose a rough sketch showing the floor plan of a workingman's home intended for erection on a 25-foot lot. I would like very much to have some of the readers of the paper furnish elevations for the house. The size of the building is to be 20 x 44 feet, including porches, and one story in hight.



Floor Plan of Workingman's House.—Scale, 1-16 Inch to the Foot

Riddell's System of Handrailing.

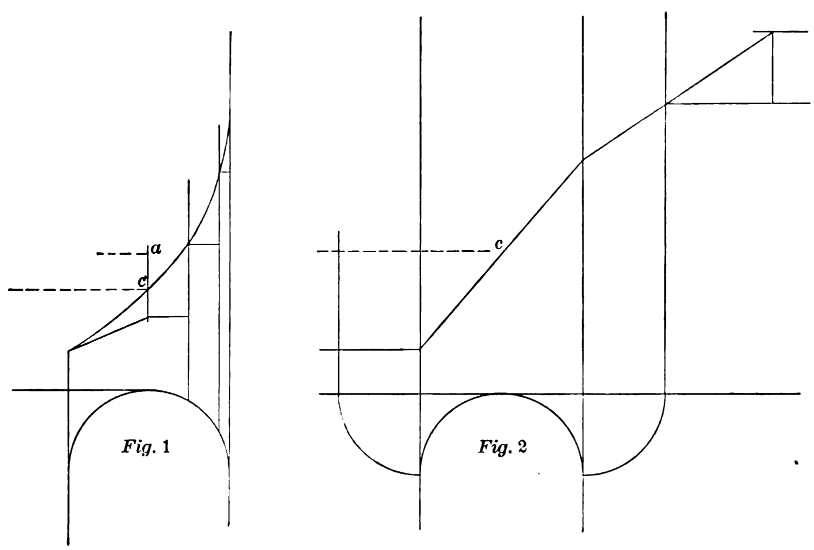
From C. W., *Toronto, Canada.*—I thank the editor and likewise Mr. Secor for the solution of the somewhat difficult problem in handrailing which I presented some months ago. It is, I think, the best way out of the difficulty. I will now to the best of my ability answer "Jere" of Davenport, Iowa. The fault of the Riddell system I have endeavored to show by means of the two diagrams which I send. Fig. 1 shows the best possible falling central line of rail, viewed from the back of well, while Fig. 2 shows the development of tangents according to Riddell's system. It will be seen that it throws the rail at the center joint *c* just three inches too high. Its proper place is shown in diagram Fig. 1 by *c*, while *a* indicates the point it would be if worked by Riddell's tangents. The falling line would then pass through the point *a* and consequently make a botch of the job. Now, I have no difficulty in drawing what I consider the best falling line for any rail that comes to hand, but I admit I cannot locate the tangents to throw the rail where I want it and have the joints come square to the face of the plank and square to the tangents. If "Jere" can do so, I have no doubt a great number of the readers of *Carpentry and Building* would only be too glad to see it illustrated.



Method of Connecting Tie Beam and Rafter in Roof Truss Construction Suggested by "D. J." of Vancouver, B. C.

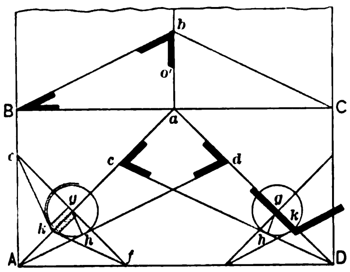
Criticism of Self Supporting Roof.

From D. J., *Vancouver, B. C.*—My idea of a self supporting roof is one having the rafter so curved as to carry the weight to the wall without the help of any web system, but not necessarily without a tie beam. To do this it is necessary that the loads at several points along the rafter be calculated in such a way that the proper curve to hold them in equilibrium may be obtained. With a uniform weight of roof this curve is a parabola, but it can easily be obtained for any system of truss, a simple method being given in Greene's Graphic Analysis No. 1. However, in order to provide for wind pressure and unequal loading it is generally cheaper and easier where head room for such is not a consideration to use such a truss as shown by I. P. H. in the January number. The strut and rod



Riddell's System of Handrailing.—Diagrams Submitted by "C. W." of Toronto, Canada.

nearest the wall in Fig. 1 of his sketches should be interchanged and the strut fastened so as to be able to take any tension due to the wind blowing on the opposite side of the roof and causing an outward pressure at this point by increasing the compression in the rafter, while on the opposite side, these points being considered in equilibrium under the weight of the roof itself, the rods would not in their present position be able to resist the wind pressure and would cause great stresses owing to the obtuse angles

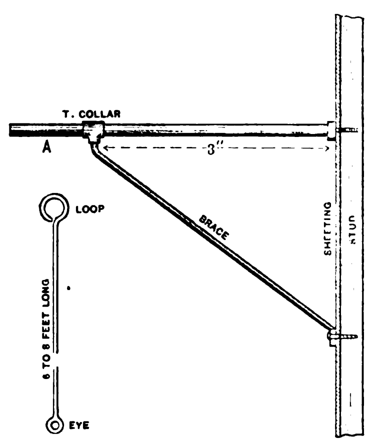


Method of Backing Hips Suggested by "J. J D."

at these points. Fig. 2 of his sketches is quite rigid and can well resist wind stress, but economy in the use of iron would require all the rods to be made vertical, the intermediate ones being sustained from the tops of the long struts. The greatest trouble in wood trusses generally is to get proper connections between the tie beam and the rafter. This curved form of roof truss meets this objection to some extent by increasing the angle between these members, and thereby making the horizontal compact of the struts in the rafter less at this point. Such a connection as shown in these figures will develop but a small part of the strength of the beam, and I suggest as an improvement the connection shown in the accompanying sketch.

Backing Hip Rafters of Any Pitch.

From J. J. D., *Cornwall, Cal.*—As being of possible interest to readers of the paper I send my method for finding the backing of hip rafters in any pitch of roof when the plan is right angled. Referring to the sketch which I send proceed as follows: Let B *b* and C *b* represent the common rafters, A D the width of the roof and A B equal half the width. Bisect B C in the point *a* and join A *a* and D



Staging Bracket Described by "J. C. F."

a. From *a* set off *a c* and *a d* equal to the hight of the roof *a b*. Join A *d* and D *c*, then A *d* and D *c* are the hip rafters. To find the backing, proceed as follows: From any point, as *h* in A *d*, draw the perpendicular *h g*, cutting A *a* in the point *g*, and through *g* draw a perpendicular to A *a*, the line *e f* cutting A B and A D in the points *e* and *f*. Make *g k* equal to *g h* and join *k e* and *k f*. The angle *e k f* is the angle of the backing of the hip rafter A *a*.

Cheap and Durable Staging Bracket.

From J. C. F., *Richland Center*, Wis.—As the question of staging often arises I send a sketch of a cheap and durable staging bracket that may be useful to many of my brother chips. It is entirely practical and safe and is constructed in the following manner: I take for the arm A a piece of common gas pipe 1¼ inches in diameter. I take for the purpose that which is cast away as worthless, as it answers every requirement and costs nothing. I take one piece 8 feet long with a ⅜-inch lag bolt welded to the end next to the building or wall line. At the other end I use a T collar with a reduced opening on the lower side to admit of ¾-inch gas pipe for the brace. The lower end of the brace is simply flattened and a hole made large enough for a nail or screw bolt passing through. Another piece is fitted in the outer end to make the bracket wider and

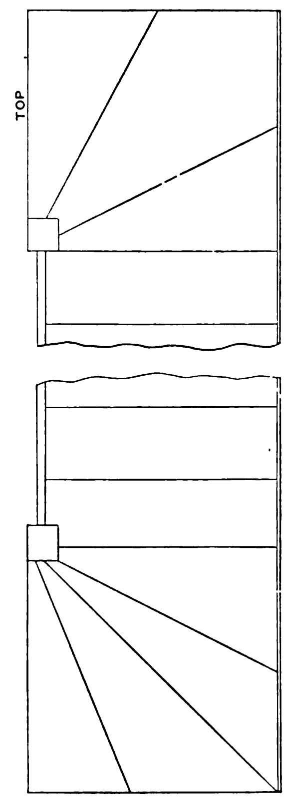


Diagram of Stairs Contributed by "Young Chip."

for other purposes. In order to prevent lateral swaying I take a ¼-inch fencing board and bore holes in it to correspond to the distance between brackets and slip it over the outer end of the bracket. To still further strengthen and prevent side swaying I make a brace of a ⅝-inch rod of iron with a loop on each end, one large enough to slip easily over the outer end of the bracket. The other end has a hole simply large enough for a nail by which I put the rods on at the outer end of the staging, so that the rods will pull against each other. In order to put up the bracket it is simply necessary to bore a hole in the wall where it is desired to have the bracket and twist the screw end into it, which can be done easily from a ladder or staging. This will be found to be very rigid and perfectly safe, and is the least in the way of work of anything I ever saw. Each bracket carries only its own staging boards and consequently adds no weight to any other staging. The entire expense did not exceed 75 cents a bracket and they will last indefinitely.

Problem in Handrailing.

From YOUNG CHIP, *Montreal, Canada.*—Will some of the many readers of *Carpentry and Building* tell me how to get out the handrail for the stairs shown in the accompanying sketch? All the stairs around here are generally let out to the stair builder and a young fellow like myself never gets a chance to learn anything. It is the same thing with doors, windows, &c.—everything is made in the mill—a bright look out for the coming generation of carpenters.

Making a Floor Water Tight.

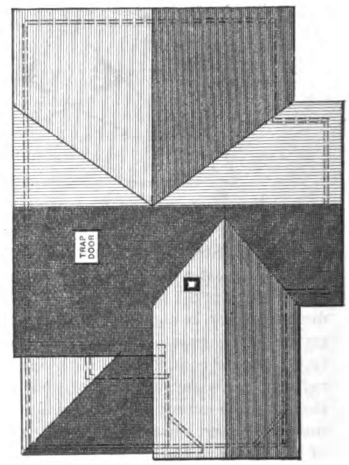
From J. W. B., *Central Valley.*—Will some of the practical readers of the paper tell me the best method of laying a floor so as to make it water tight?

Design for Workingman's Cottage.

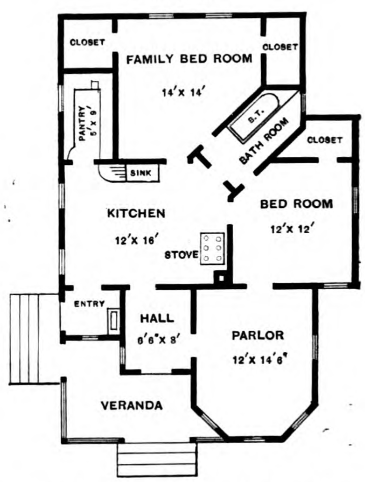
From R. B., *Meriden, Conn.*—In the January issue of *Carpentry and Building* I notice a floor plan for a workingman's cottage from "J. P. K." of Worcester, Mass. I think the plan suggested by this correspondent a decided improvement on the two previous ones published in the January and September issues of the volume for 1893, but I suppose there is nothing so perfect that it could not be improved upon. I therefore submit the accompanying plan and elevations for the consideration of the readers of the paper. I always make it an object in planning a house to have the bedrooms connect independently with the bathroom, if such a thing is possible. In this case I found it very difficult to plan so as to accommodate both bedrooms and the bathroom with one stove and at the same time have them connect properly. As other correspondents who have submitted plans on this subject offered criticism I suppose I have the same privilege. There are a few objections to the plan of "J. P. K." about which I wish to speak. One is that the bathroom, although opening directly out of the kitchen, is too far from the stove, the distance being about 12 feet, whereas in the plan which I submit the distance is only 5 feet. "J. P. K.'s" is also inconvenient for both bedrooms. The closets, however, are convenient and abundant, but rather small I think, as their combined areas are less than 30 square feet, while the closets shown on my plan have about 70 square feet. Large, handy closets in a house constitute, in my estimation, one of its prettiest inside features. I have never had occasion to plan anything in this line before, and would say that the bathroom feature here shown is original. I realize that my plan is imperfect and that there is a chance for some of my brother readers to improve upon it. I hope "J. P. K." will take no offense at the faults I have found in his plan and shall be glad to have him criticise mine, as that will only bring it nearer perfection, which is the great mark we are all trying to reach. Allow me to congratulate "J. P. K." on his floor plan submitted in the competition. It was difficult for me to discriminate between Nos. 2 and 78, for there were features in the former which I liked better than in the latter, and *vice versa.*

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

Design for a Workingman's Cottage Submitted by "R. B.," Meriden, Conn.



Roof Plan.



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

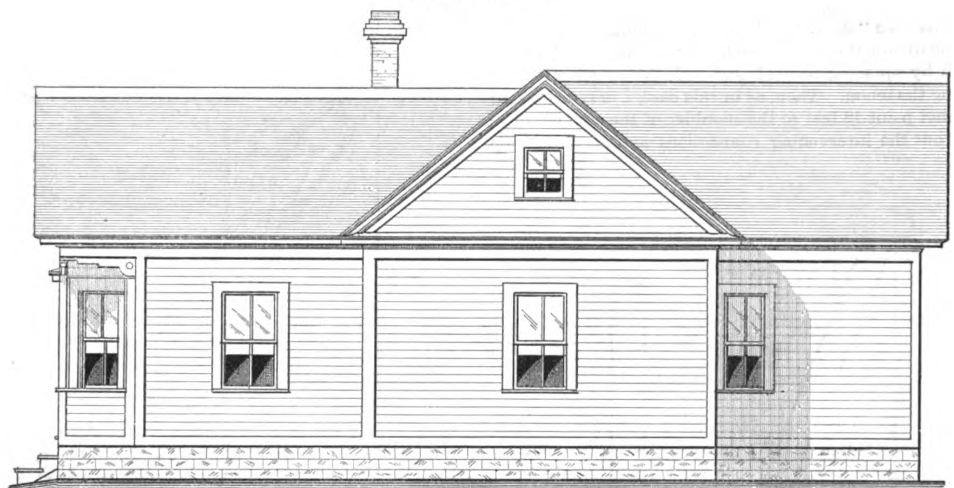
Are Gravel Roofs Durable?

From G. F. WHEELOCK, *Birmingham, Ala.*—The correspondence started by "G. D. B." of Greenville, S. C., in the April issue, relative to tin and gravel roofing has opened up a very interesting question, and to me personally it resulted in a very pleasant correspondence with the writer mentioned. I have had a couple of communications from him, and from his statements of conditions and results I give him credit for being perfectly honest in his assertion that he can put on a good tin roof for $4 per square and make money. But while those conditions exist there I have never met them in any other part of the country during my travels, which cover the Eastern and Western States and this portion of the South. In regard to the relative cost of tin and gravel roofing, I would base the price of a good tin roof laid on sheeting paper and finished with two coats of good paint at $7.50 per square, with a resultant profit to the roofer of $1 per square. Admitting that this roof with slight repairs and a coat of paint every two years, at a cost of 75 cents per square, will last 20 years, we have a total cost during its life of $15 per square. Now, we must bear in mind that to attain this result the roof must be looked after every couple of years. If this is neglected and the roof is allowed to rust, it will, of course, proportionally shorten its life.

Now, as to the gravel roof, I will base my price at $4 per square for a four-ply coal tar pitch composition roof; this will give the roofer $1 per square profit. This roof will last for at least ten years, when it can be replaced at the same original cost, making the total cost for 20 years $8 per square and requiring no attention during the life of the roof. To attain this result the material and work must be of the best; and in this connection I wish to say that there has been a great improvement in the manner of doing gravel roofing in the past few years, especially the substitution of metal for the old style felt flashings and metal eave strips for the wood strip. Right here, in my mind, is the vital point, in connection with composition saturated with asphalt instead of coal tar, I will place the life of the roof at 25 years, and I believe this a safe limit.

I apply a roof of this kind here, for which I charge $7.50 per square, same as first cost of a good tin roof, painted, and as between the two there is no comparison. To show the value placed upon this roof by one of my customers, who has used the same roof on his buildings in St. Paul, Minn., he says he would rather have it at same cost than sheet gold. While I hardly agree with him on this point, I do believe that asphalt, when properly prepared and applied, is the best roofing material for flat roofs in the market, copper not excepted. Coal tar pitch in time

Side (Left) Elevation.



Side (Right) Elevation.

Design for a Workingman's Cottage —Elevations.—Scale, ⅛ Inch to the Foot.

roofing. Any portion of the roof where it is not possible, on account of the position or shape, to protect the felt with gravel should be covered with metal, for as long as the felt is perfectly protected the roof will last.

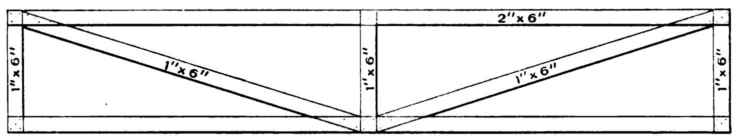
In the laying of a good composition roof a good grade of tarred felt, weighing not less than 2¼ ounces to the foot, should be used. Care should be taken that there is not less than four thicknesses at any part of the roof, well stuck together with hot pitch. In finishing the top surface with gravel, which should not be larger that ½ inch and free from sand, the pitch should be poured and not applied with a mop. To put on a roof in this manner will require about 100 pounds of pitch to the square. While I base the probable life of this roof at ten years, if asphalt properly prepared is substituted for pitch and the felts are by exposure loses its oils, becomes brittle, the gravel is loosened, the felt is exposed and rots. Asphalt is not affected by exposure to the atmosphere, does not become brittle, and consequently holds the gravel securely in place. I notice that some roofers are in the habit of using pine tar pitch. This becomes very soft in summer and very brittle in cold weather, and I do not believe it possible to do good work with it.

Details of Tool Cabinet.

From J. E. L., *Ida, Ark.*—I would be pleased to have "J. F. P." of Portland, Maine, send for publication in the columns of the paper the details and dimensions of the tool cabinet illustrated in the May number for last year. I would like especially the details of the roll front.

Method of Roof Bracing.

From C. S., *Wayland, Iowa.*—I submit herewith a drawing indicating a method of roof bracing which I recently noticed in a brick building erected in our town. The braces are spiked on the outside, the 1 x 6 vertical pieces being spiked over the top of the braces, while the roof joists are held by the 1 x 6 inch diagonals, as shown. The building is 24 x 60 feet in size with 14-foot story. I would like to have the opinion of the readers of the paper on this form of construction and have them give their views as to the proper way of bracing the roof.

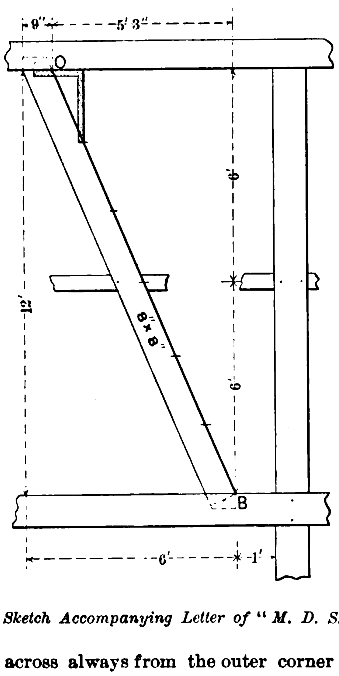


Method of Roof Bracing.—Sketch Submitted by "C. S."

Laying Out a Leaning Brace with the Steel Square.

From M. D. S., *Pittsburgh, Pa.*—In the February number of *Carpentry and Building*, "A. J. B" of Lima, N. Y., submits an article criticising "H. V. S.'s" method, which appeared in the issue for August, 1894, and gives an illustration showing his own method of "framing a brace between two parallel beams 12 feet apart, and with a run of 6 feet from toe to toe." I would refer both "A. J. B." and "H. V. S.," as well as "C. E. C." and "J. E. R." in the preceding article on the same page of the February number, to my communication which appears in the issue for May, 1894, which covers both problems; also to the article of "F. J. C." of Allentown, Pa., in the October number, 1894. I wish to say also that I think "A. J. B." has taken the wrong view of the problem.

Let us take "A. J. B.'s" sketch, changing the post connections to suit the case. Now, when I "lay out" a post, I begin by squaring around one end, the lower end, and marking the tenon. Then, as in this case, I measure along from that point 12 feet to the shoulder of the next bearing; laying out the intervening connections as I go along, and squaring across always from the outer corner or angle if it is a "sawed," or from the "line" if it is a "hewn" timber. Now, a leaning brace of the kind in point is nothing more than a leaning post, and in this case leans 5 feet 3 inches from the perpendicular. So in the same way I would go about to lay out, not from "toe to toe," but from "toe to heel," or on the line B O. In practice, I always lay out the mortises for the leaning braces in the parallel timbers, with the "run" from "center to center," which is the same as from "toe to heel."

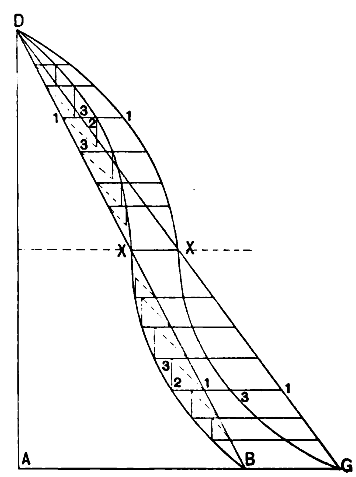


Sketch Accompanying Letter of "M. D. S."

According to the foregoing argument, then: The "run" is not 6 feet, but 5 feet 3 inches. And we proceed to lay off the brace, using 24 inches on the long and 10½ inches on the short blade of the square, and applying to the corner of the timber, or to the "line" parallel with it, as the case may be. Either B or O may be used as a starting point; the result will be the same. "A. J. B.'s" method is impracticable, first, because he must first find the exact length of his brace before he can use the straight-edge to make the line shown in his sketch; and, second, because unless there be several braces of the same run, he must do twice the work necessary to accomplish the result aimed at. By the method we have given, the "leaner" might be "laid out" and framed by the time "A. J. B." would have his pattern made; and time, in this swift going, close competing part of the nineteenth century, is more than money, as every contractor knows.

Developing an Ogee Hip Rafter.

From "JERE.," *Davenport, Iowa.*—Thinking that it would be of interest to readers of *Carpentry and Building* to have submitted for their consideration a new method of developing the curved line for the hip rafter of an ogee or curved roof of any kind I send the following remarks: The method of applying the principle is, so far as I am aware, original, as I have never seen it applied in the manner shown—that is, the points through which to trace the curve of the hip developed from the pitch of the rafter and curved line, the said points being the diagonal distance of a square the sides of which are equal to the distance from the pitch of the rafter to the curved line, as at 1 2 of the diagram inclosed. These points being applied to the pitch of the hip on the same line, as shown, give the points through which to trace the curve of the hip, as at 1 3. The principle underlying the use of this diagonal line is the same as that in straight roofs to find the limit or length of hip rafter. If, therefore, from the diagonal of the square of the base the extreme points can be obtained, the diagonals of intermediate squares will give the intermediate points on the curved line of hip if applied as shown. To develop the curved hip let A D of the sketch represent



"Jere's" Method of Developing an Ogee Hip Rafter.

the hight of the common rafter and A B the base; A G the base of the hip; B D the pitch of the common rafter and G D the pitch of the hip. Draw the center line X X square with A D, allowing it to cut both pitches and extending it both ways. Draw the curved line B D from centers on the line. Dot the line B D any number of times on each side of X X. From the dots square over from A D, cutting both pitches. Take the distance 1 2 and set it up square with A B. Draw the dotted diagonal 1 3 and set 1 3 at 1 3, as shown. Repeat the operation on all lines as indicated and trace the curve.

F. A. B.'s Tool Chest.

From F. A. B., *North Bolton, N. Y.*—Referring to the letter from "F. A. B.," presented in the March number of *Carpentry and Building,* the Editor wishes me to state more specifically my wants as to a tool chest. He also desires drawings of the chest which I now have. I therefore comply with his request by sending drawings showing the interior of the chest, the dimensions of which are 2 feet by 2 feet by 3 feet inside. In Fig. 1 of the sketches is represented an interior view with the front side and one end removed so as to clearly indicate the construction. In the illustration A A A are drawers which slide toward the front of the chest, B is the till for rabbet planes, bead planes, &c., C the plow till, D the chest bottom for planes, &c., E the hack saw till, F the saw rack, G G G G drawer slides, and H H H H are drawers which run the length of the front side of the chest but are not shown in the sketch. These drawers slide toward the rear of the chest. The numbers in Fig. 1 refer to corresponding drawers in Fig. 2 where they are shown in outline indicating the partitions. Referring to Fig. 2, the drawer No. 2 shows a till for bit braces, No. 3 a till for draw knife, No. 6 for augers, bits, gimlets, &c., while No. 7 shows a long till in the front side for level and two tills for chisels. The rest of the compartments in the several drawers are to be used as one may desire. The ends and backs of the drawers are made of $\frac{1}{2}$ inch cherry, and the front is of $\frac{5}{8}$ inch sumac. The bottoms of the drawers and tills throughout the chest are of $\frac{3}{8}$ inch and $\frac{1}{2}$ inch pine. The body of the chest is of $\frac{5}{8}$ inch black oak. There is a one-panel cover made of black cherry. I consider this a very good chest, but too large to move from place to place, as I am obliged to do. Now, what I want is a chest about 34 inches long, 24 inches wide and 18 inches high, these being inside measurements. As will be seen by referring to Nos. 6 and 7 of Fig. 2 the augers are all together in one till, and it is the same with the bits and chisels. Now, I want the inside of the chest so constructed as to be convenient, and to hold such tools as are needed generally in house building. I want the drawers so partitioned that each edged tool will have a place by itself, and I want to economize in room as much as possible. In Fig. 3 of the sketches is shown an idea I have for partitioning the drawer for chisels. I have no such drawer in my chest, but send the sketch for the inspection and criticism of the readers of the paper. I trust that I may hear from many on the points raised.

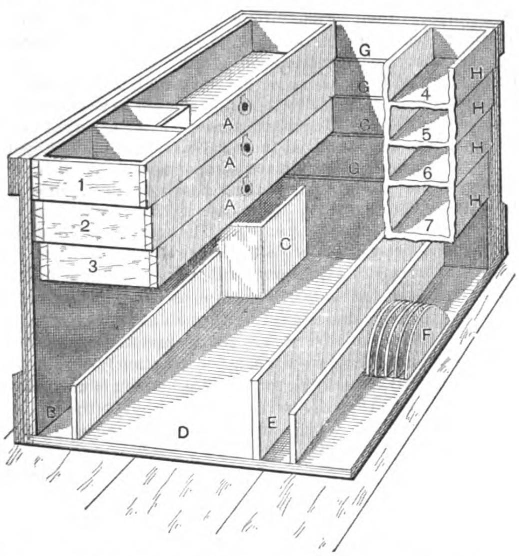


Fig. 1.—View of Interior of Chest, the Front and One End Being Removed to Show the Arrangement.

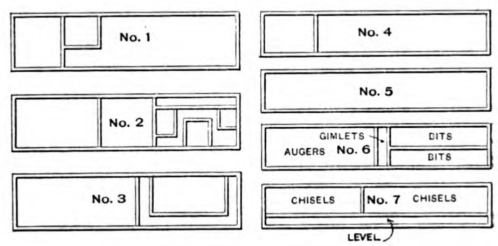


Fig. 2.—Outlines of the Various Compartments.

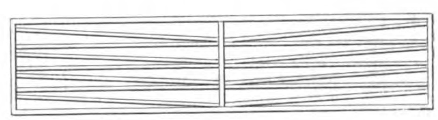


Fig. 3.—"F. A. B.'s" Method of Partitioning the Chisel Drawer.

"F. A. B.'s" Tool Chest.—Illustrations Showing the Arrangement of Compartments.

Design for a Bowling Alley, Pigeon House, &c.

From J. W. B., *Central Valley.*—I have been a subscriber of *Carpentry and Building* for a number of years and now come to it for information. I would like very much to have some of the readers present a plan and description of a bowling alley; also a plan showing a neat pigeon house such as would be practical where the pigeons are raised for the squabs.

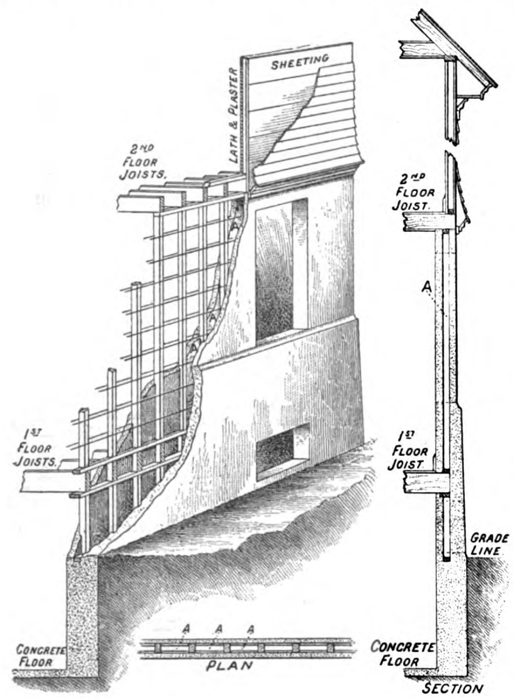
Windmill For Domestic Use.

From M. W., *Dayton, Ky.*—In the July number of the paper, on page 183, are illustrations of a windmill for domestic use. I wish to make one having from one to two horse-power, and desire to know if the castings and pipe mentioned are heavy enough to hold a wheel to give that power. I would use steel for the shaft and socket in the T and Babbitt metal for boxing.

Note.—The 6-foot windmill referred to by our correspondent is rated as equal to $\frac{1}{15}$ horse-power in a 16-mile wind, and in a 20-mile wind it will give a useful $\frac{1}{10}$ horse-power. It will require at least a 16-foot mill for a useful horse-power in a 16-mile wind and $1\frac{1}{2}$ horse-power in a 20-mile wind. Such a mill will require much larger and stronger fittings than those mentioned in the article presented in the July issue, and should be mounted upon a braced post 6 inches square at the top. For the shaft sleeve it is recommended that a 3 inch pipe 2 feet long be employed, while for the vertical shaft a $2\frac{1}{2}$ inch extra strong pipe may be used and for the slide a $1\frac{1}{2}$-inch pipe. The stud on the flange should be $2\frac{1}{2}$ inches, the shaft sleeve 2 inches and the shaft $1\frac{1}{2}$ inches, all extra strong. The crank flange should be $1\frac{1}{2}$ x 10 inches. The flange for the vertical shaft and also the spider for the arms of the wheel should be made of special castings, with deep bosses on which the threads should be tapped clear through and the pipe threads cut large and long enough to screw through the flanges. The T piece should be of malleable iron, unless an extra heavy cast iron T can be obtained. Its threads should be tapped out large and the shaft sleeve, pipe and bushing screwed well toward the center, to give a full bearing. All parts of the mill should have a proportion for strength due to its size. If a steel shaft and babbitted boxes are used a special casting must be made for this purpose, on which the pipe stud may screw, the same as in the T piece. The crank flange and the spider can be screwed on to the steel shaft with right hand pipe threads, and the mill made to run right handed, in which case the pressure will keep the screw joints tight.

Cement in Building Construction.

From W. C. W., *Buffalo, N. Y.*—I have been a reader of *Carpentry and Building* for several years and consider it the best and most practical paper I have ever had. I submit a sketch and desire to ask the practical readers to give their opinions of the construction shown. I think it will prove of great interest and value to a host of readers who are always on the alert to catch on to a new idea to discuss the question of cement construction. If those who are acquainted with this method of building will tell



Cement in Building Construc ion.—Illustrations Accompanying Letter of "W. C. W."

through the columns of the paper the cost of such a structure—that is, the grade of cement employed, the proportions of sand or gravel to cement, and also whether any lime is used—I think great good will result. The cost of a balloon frame building 10 feet high and 10 feet long will be about 95 cents per lineal foot, exclusive of lumber. I allow the price of 2 x 4 studding as $1 ; matched sheeting, $1.75 ; lap siding, $2.75 ; one square painting, two coats, $1.50, and lath and plastering $2.50, making a total of $9.50. In the sketch which I send it will be seen that plaster is not needed, thereby effecting a great saving. In executing this form of construction the frame and studding are raised as in an ordinary frame house, but the sheeting, siding and inside lath are omitted. Instead of the lath I fasten in place iron bands as close together as may be deemed necessary. The next step is to form molds—that is, boards placed horizontally as far apart as the wall is to be thick when finished. Between the studding there is a space of 4 x 14 inches, provided the studding are placed 16 inches on centers. In this space of 4 x 14 inches is placed a piece of stuff in thickness equal to the hollow space it is desired to have in the wall. This would make the piece about 2 x 14 inches and 5 feet in length, or half the hight of the ceiling. This piece is put in vertically and then the cement is poured in from the top. When set the piece of 2 x 14 is withdrawn, leaving a hollow wall. In the sketch which I send the hollow spaces in the wall are represented by A A A, while the light cross lines in the broken view represent band iron fastened to the studding in order to hold the concrete. I think if metallic lath were used it would make a much more solid job and, besides, the cement walls could be reduced in thickness—that is, in case of smaller houses. I trust that the practical readers will take up this question and discuss it freely for the benefit of all.

Sharpening a Cabinet Scraper.

From A. N. S., *Gloversville, N. Y.*—I have been an attentive and interested reader of *Carpentry and Building*, especially of the correspondence in the same, for the past four years. I have followed quite closely the different methods of sharpening a cabinet scraper, and in my opinion the letter which appeared in the July number comes nearest the mark ; but it lacks in some of the details. My plan is to begin by procuring a piece of spring steel 5 or 6 inches long, somewhat thicker than a hand saw blade. If the temper is too high, which it is quite likely to be, have it retempered several degrees lower than any saw in common use. Next, instead of a bradawl, I procure a currier's steel, which is of about the same shape, and employed by leather dressers, it being used for that express purpose, but on a different tool. Then follow the directions for filing a square edge, which should be rubbed to a perfectly square, smooth corner on an oil stone. Its accuracy can be ascertained by drawing across the thumb nail to see if any small notches made by the filing remain in the corners. Burnish on the flat side and turn an edge on all eight corners. It will be found that the combination of high temper in the burnisher and low in the scraper does away with the annoyance of the scraper cutting the burnisher, thereby unfitting it for use, which is the case with a hard scraper and bradawl when resharpening. The work may be done by a little practice, especially if care is taken to save the edge. In burnishing on the flat side draw the burnisher in such a way as to return the edge, as the operation only sharpens the edge and should be turned back again. Always use oil on the burnisher. By the method I pursue I have been enabled to use one scraper constantly and keep it in order for a week without refiling, which is necessary when the corners become too rounded, so that at the end of the period named it would cut as nice a shaving as in the beginning.

The St. Nicholas Skating Rink.

The plans have recently been prepared for a building to be erected in the upper part of the city, just west of Central Park, which will embrace several novel and interesting features. The structure has been designed for use as an ice skating rink and club house—the rink covering a space of over 15,000 square feet and having a dome-shaped roof of glass. The building will be of steel construction, with front of light brick and stone and will cover a site approximating 225 x 100 feet. In design it will resemble the Romanesque. The rink proper will form the center of the building and will be about 12 feet above the street level. About a foot above the ice will be a broad platform extending on all sides, and 7 feet above this will be a gallery commanding a view of the entire rink ; also buffet, toilet and retiring rooms. The ground floor will be fitted up for use as storage rooms, offices, lockers, &c., as well as accommodations for visiting teams of hockey players. In the basement will be located the plant for the manufacture of ice and also the electric light and power plants. The structure will be put up by the St. Nicholas Skating & Ice Company, and will be located on West Sixty-sixth street, just east of Columbus avenue.

A model of the famous cathedral of St. Peter's at Rome will be a feature of the Midway Heights at the Cotton States and International Exposition. This is the same model that attracted so much attention on the Midway Plaisance at Chicago. It will be an exact reproduction, on a small scale, of the world famous cathedral.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

A SECTIONAL view showing the hights of stories, hights of windows above the floor, lengths of windows, &c., is presented in Fig. 37 of the engravings. The heavy shading or diagonal lines indicate the principal sections of the wall up to the top of the second story. Different sections should be drawn at varied angles, so as to show them more distinctly. This will be found especially valuable in representing different members which join in close connection, as shown at A of the engraving. W T, represents the water table, W the main wall, S sill, and J the jamb of frame and subsill. The hight or length of a window is represented by the distance between sill or subsill and head jamb, as shown. For example, take the first floor. We find the hight of story 10 feet between floor and ceiling; to the top of lower jamb or subsill 1 foot 8 inches; hight of window, 6 feet 6 inches. In making the ordinary calculations for windows, 6 inches in length is usually allowed for the sash and 4 inches for width; 3 inches are allowed for bottom rail, 1 inch for meeting rail and 2 inches for top rail, making a total of 6 inches to be added to the length of glass. The side rails are 2 inches, making 4 inches in width to be added to the glass measure. Thus a two-light 24 x 36 window will require an opening, exclusive of the jambs or frame, 2 feet 4 inches by 6 feet 6 inches. These figures are presented in order to give a little information as to the manner of calculation.

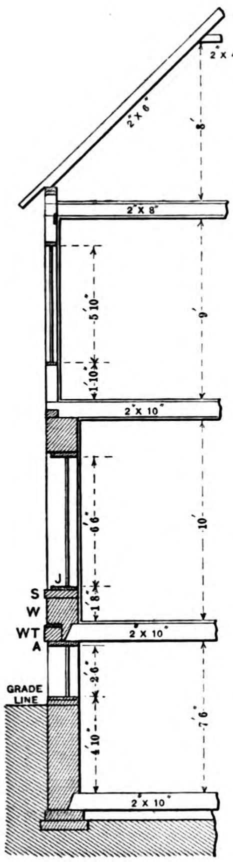


Fig. 37.—Section Showing Manner of Drawing and Marking Hights of Stories, Windows, &c.

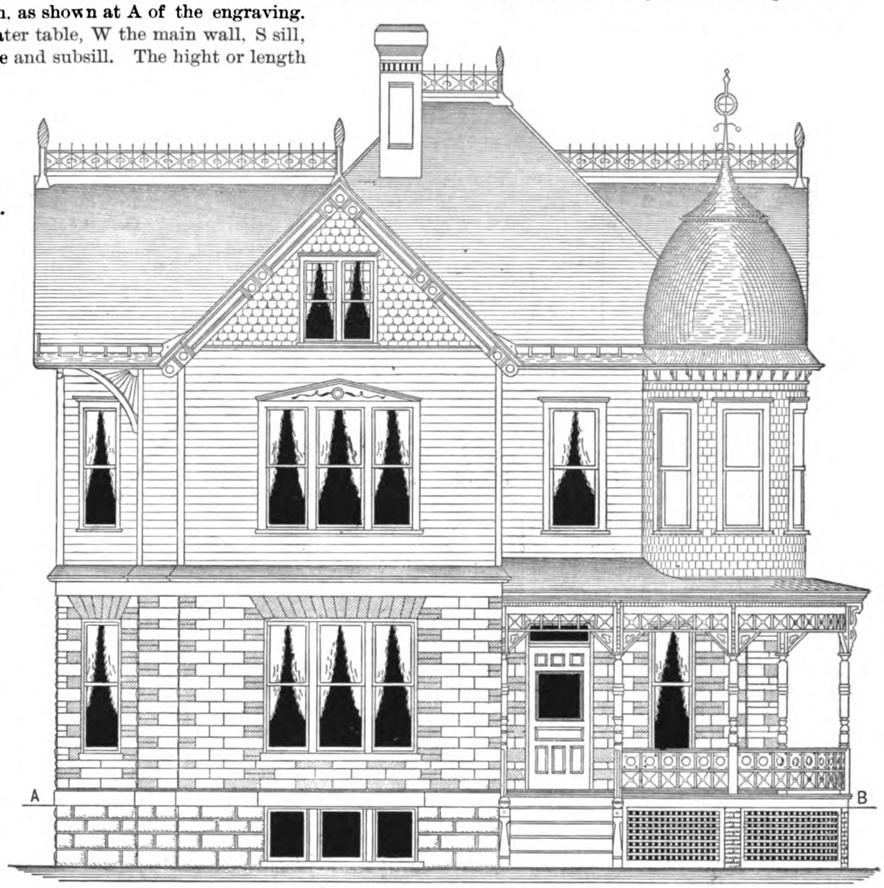


Fig. 38.—Front Elevation, Showing Method of Shading, &c.

Architectural Drawing for Mechanics.—Section and Elevation.—Scale, ⅛ Inch to the Foot.

The frame part of the building starts from the second floor, and the general arrangement and construction will be readily understood from the drawing. In making the drawing, first draw the outside perpendicular wall line from bottom to top; then set off the thickness of walls, and proceed to draw the joist lines, floor and plaster lines, division lines of the different members and sections, and hights of windows and ceilings, leaving the section shading for the last. In figuring a drawing, as in setting off the hights, make the figures before inking the line, which will leave them plain and distinct.

The sectional drawing must correspond with the elevation as regards the hights of windows, sections, &c. It does not make any material difference which is prepared first if proper calculations are made. By making the sectional drawing first the proportioning of the windows to the hights of stories is much easier, because it shows the exact position of the windows as regards the hights on the inside, while the elevation shows the general arrangement and appearance on the outside.

Generally the elevation is drawn first and the section drawn to correspond, as it is not always easy to tell from the section just the hight at which a window will look best in the elevation, and a few inches difference on the inside is immaterial; but it must be borne in mind that the section and elevation must correspond no matter which is made first. The best way for the draftsman is to make both the section and the elevation at the same time, on the same sheet and in the same line. Leave room to the left of the

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elevation for the sectional drawing, and sketch the elevation; then sketch the sectional drawing and they will be in proper shape for comparison. Any changes in the planning and proportioning for improvement in general arrangement and appearance can be readily seen and made before the inking and finishing of the drawings.

The front elevation of the design is presented in Fig. 38, and as, in a former portion of this work, the manner of sketching and finishing an elevation step by step has been shown, we will not repeat the details at this time, but submit the elevation as an example for practice, calling attention only to the features worthy of note. Working drawings do not necessarily require anything more than plain lines; but as drawings for publication are frequently embellished with more or less shading to give the design stone not being shaded, but taking them in an order that prominently distinguishes the corners and openings of the building and obviating the plainness in appearance which would otherwise result. The slightly irregularly curved lines on the corners shown from course to course of the stone indicate that the stone are rock faced. If the stone were square faced the corners would be represented by a straight line.

In the windows the deep black shading represents the glass, while the scallops extending through the windows in a somewhat diagonal manner indicate lace curtains. The two windows to the left in the drawing do not show the right side sash rail, for the reason that this portion of the wall is an octagon corner, and in a direct front view this portion of the sash is hidden. The roof, however, on

Architectural Drawing for Mechanics.—Fig. 39.—Side (Right) Elevation, showing Parts of the Work in Different Stages of Completion. —Scale, 1/8 Inch to the Foot.

an artistic appearance, attention will be directed to a few points on shading. Shading is not one of the necessary requirements, but by proper shading a more pleasing effect to the eye can be produced, and the draftsman who can display the most artistic skill, combined with other qualifications, is most likely to meet with success. Therefore it is hoped that the few ideas which may be presented will prove but the starting of work which the readers will carry out much better than here indicated. We will give the ideas, but the manner of best presenting them in drawing can only be acquired by study and practice.

The starting point of the elevation is taken on the line A B, which is the bottom line of the stone base or water table. The stone below this line may be considered the foundation walls, and the shading is represented by somewhat irregular diagonal lines—a common way of representing stone foundations. The block stone above the water table is shaded with diagonal parallel lines, every this octagon end has been framed similar to a square or plain gable roof, and the projecting corners are supported by large curved brackets, as shown in the elevation. It will be noticed that the roof of the tower is cross lined and appears finer toward the outlines, so as to indicate circular construction. Having now briefly referred to a few points on shading, it is suggested that the draftsman increase his knowledge in this particular direction by closely studying architectural designs as presented in first-class architectural journals.

Referring now to Fig. 39, the right side elevation, we will show the several parts of the work in different stages of completion, believing this to be the best method of clearly indicating the plan of procedure. As before stated, the design should be first sketched in pencil, in doing which it is often necessary or convenient, at least, to make some superfluous lines or marks to aid in setting off different parts of the work, but which are not required in the finished drawing. These lines are often necessary in making calculations, and in order to show their usefulness and distinction all such will be represented as dotted lines in Fig. 39.

It should be borne in mind that all the work is first sketched in pencil, while in the completed drawing only the lines required are inked, after which the superfluous lines, represented as dotted lines, may be erased. By closely following the sketch step by step the draftsman will soon become familiar with this work, as a portion of every part, both in a finished and unfinished state, will be shown. The starting point is from the line A B, the bottom line of the stone water table. After this has been drawn set off the hight of the foundation above grade and draw the ground line, as shown. Next set off the angles shown in the plan on the line A B; compute the hight at the top of rafter or roof at the wall plates and draw the plumb lines of the corners. As the cornice extends below the top of these lines, the portion which extends through the cornice lines is indicated by dotted lines. The top of these lines, as shown by C D E F G, are the points from which to make the calculations for the elevation of the roof, and after establishing these points compute the hights of roof at the essential points and draw the general profile of the roof in outline, taking the gables, ridges, hips, valleys and cornice lines. Next outline the finials, cresting, chimneys and gutters. The dotted plumb line showing center of tower and the portion of dotted hip line joining at D plainly indicate that it is necessary to locate this point in order to correctly represent the roof. By comparing Fig. 39 with the first floor plan it will be seen that the dotted plumb line virtually represents one of the main corners of the plan, but the tower being built out on this corner from the second floor would of course hide the line from view, consequently it should not appear in the finished work. Attention has been called to this simply as one case perhaps out of hundreds where the drawing of temporary lines will aid in making calculations and completing the permanent drawing. After these temporary lines have served their purpose they should be erased before inking or finishing the work. The dotted lines shown in the drawing of the front chimney and finial on the tower indicate their usefulness again in shaping and setting off the different parts of the work.

The next step is to locate and outline the upper windows. First find the proper hight for bottom of sill and draw the line which will represent the bottom line of frames. Locate the windows on this line, and set off the thickness of the sill. Next set off and draw the size of the opening, allowing for thickness of subsill in the hight. Set off the width of casings, cap, &c., and draw the lines, finishing the frame, as shown in the upper right corner of the elevation. The manner of drawing the sash in the frame is plainly shown by comparing the finished window with the unfinished one in the double frame at the left. This method of setting off and drawing frames will be found easier and better than the one set forth in an earlier part of this work, as the draftsman is not obliged to make calculations so far in advance of the work. The method referred to is the outlining and drawing of frames, and shown in Fig. 11 of a previous article.

The next step in the progress of the work is the outlining of the porches, second story base, first story frames and so on down to the ground line.

Having the building now thoroughly outlined, we will proceed to finish portions of the different parts, so that the learner can see more readily just how to proceed. We will not go through with the finishing step by step, as we believe that the work, as shown in Fig. 39, is presented so plainly that further description is unnecessary. It will be sufficient to say that in finishing begin at the top and work down, which avoids to a great extent rubbing the tools and hands over the finished work, and will aid very much to keep the drawings looking neat and clean.

(To be Continued.)

TRADE SCHOOLS AS A SUBSTITUTE FOR APPRENTICESHIP.

IT IS generally conceded that the time-honored system of apprenticeship whereby, in order to enter a trade, a lad was bound down by indentures to serve a master for a term of years, no longer fits in with the changed conditions of modern industrial life and work. The apprenticeship system is in fact practically obsolete. The master mechanic in taking a youth into his shop is unable in these days to spare the time to teach him every part of his trade. Moreover, the American youth, educated as he is under the public school system, is not content to go through the years of drudgery and servile work which his predecessors were constrained to do under the old apprenticeship system. Consequently, an effective substitute for the decayed system has been sought for. Many thoughtful and far-seeing friends of American labor think such a substitute has been found in the trade school system, of which the late Colonel Auchmuty was the originator and founder. The history of the New York Trade School is well known to our readers, and its results are fully appreciated by the majority of employers in the different trades taught therein, as well as by those young men who have secured the advantage of the training offered by that school. It is no secret, however, that a bitter opposition to trade schools, as such, exists among the large body of skilled workmen in the United States. The different trades are organized into trade unions, and among these unions there obtains an almost unvarying theory that the best and only method of securing constant employment and high wages for their members is by limiting the number of apprentices entering those trades. They go on the principle that there is only a certain amount of work to be done, and that the fewer workmen there are in the trade the more easily will they be able to command high wages for the labor of their hands. Thus they have endeavored to introduce hard and fast rules whereby every impediment is placed in the way of the American boy seeking to enter a trade. In some trades, according to Chas. F. Peck, the former Labor Commissioner of the State of New York, an authority friendly to the unions, the rules allow for only one apprentice to three, four, five and sometimes as high as ten men. It is even stated that the employer in a few trades cannot put his own son or nephew to the bench or the vise except as a favor and concession. Thus the average trades union workman objects most strongly to an institution which turns out bright young mechanics well instructed in both the theory and practice of their trade who are likely within a short period to take the places of journeymen whose knowledge is limited to rule of thumb. They argue that if they do not limit the number of boys at trades in a very short time they would be compelled to work for lower wages, if not forced into partial and possibly complete idleness. Thus the doors to many trades are practically closed to the American boy, although, at the same time, skilled foreign workmen in the same trades are allowed to pour over into this country and are received with open arms by the unions which reject the native youth. It is this unfortunate condition of things which Colonel Auchmuty strove to remedy when he founded the New York Trade School. His dream was that that school should merely be the model for a national system of similar institutions.

It was with considerable interest that we were recently privileged to be present at a discussion held at the Social Reform Club, on the East Side of New York City, the subject of which was "Trade Schools and the Apprenticeship Rules of Labor Organizations." This club is mainly composed of workingmen belonging to various labor unions. Unfortunately, the failure to attend of several prominent speakers on both sides of the question detracted somewhat from the value of the debate, which resolved itself, after the first two or three addresses, into a scattering discussion. Nevertheless, some good points were obtained, more particularly in regard to the principles which actuate union workmen in opposing trade schools and the entrance of trade school graduates into their organizations. An exceedingly able and logical statement in favor of the modern trade school system was made at the opening by Edward Murphy, the well-known New York plumber, who has been a member of the committee of the New York Trade School since its foundation. Mr. Murphy showed how the changed conditions of modern labor, whereby manufacturers sometimes employ thousands of workmen and where the journeymen in a shop are totally unable to spare the time for teaching apprentices, had gradually caused the old apprenticeship system to lapse into disuse. At present, he said, boys are taught a trade in a haphazard system, picking up what they can about the shop and depending entirely upon their own abilities to assimilate and apply the scraps of knowledge thus gained. To this system, or rather, want of system, Mr. Murphy attributed the large number of "botch" workmen with which many trades are now afflicted. Under these circumstances, where, he asked, are the successors of the old apprentices to come from? Surely not by the haphazard plan alluded to, if the standard of the trades is to be maintained at any high level. The best solution of the difficulty he could suggest was the general adoption of a system of trade schools which could supply workmen for all the different branches of the mechanic arts. The trade school, he contended, gave the boy not only a good practical training, but also grounded him in the principles of his trade, in the theory and knowledge of materials, &c., and so trained both the head and hand as to enable him to become within a comparatively short time a sufficiently competent workman to go out and command a living, acquiring quickness of hand and the other requisites of a skillful handicraftsman by further experience in practical work. If the trade school idea, he argued, was carried out and allowed to develop to the extent to which it is capable, the trade school would become a very efficient substitute for the old apprenticeship system. To objections raised by union workmen present on the score of a possibly unlimited number of new workmen being poured out from trade schools onto an already overstocked labor market, the reply was given that there was no necessity whatever to fear any such danger if trade schools were systematically conducted on the lines, for instance, of the law schools and medical schools. The workmen could, if they chose, regulate the number of youths to be turned out so that they should not swamp the trades. This question of overproduction of workmen was one that seemed to possess the minds of most of the speakers on the union side of the question.

Exception was taken to the trade school by one speaker on the ground that only boys of well-to-do parents are able to secure the advantages of a trade school education on account of the fees charged, and that therefore the poorer class of youths were shut out from the benefits of these institutions. To this objection the point was made that the fees charged at the New York Trade School were placed at the lowest possible figure and barely covered the cost of waste materials used in the course of instruction, and that the majority of young men receiving instruction were already working at their trades during the day and thus earning sufficient money to add to their knowledge in the evening classes. Another grievance ventilated by the workmen was that boys were drawn from all over the country into the New York Trade School, and after being trained there were thrown upon the labor market of this city. This Mr. Murphy showed was not the case, as almost without exception these young men from other States returned to their homes and utilized the knowledge gained in the trade school to build up a trade of their own in districts where skilled workmen were scarce and where their labor could command a constant reward. Throughout the entire discussion—in which the speakers almost uniformly took up an anti-trade school position—the idea of the necessity of strictly limiting the number of skilled mechanics in order to provide steady work and good wages for the members of the unions was strongly and frequently insisted on. The right of American boys to work and to choose their sphere of labor was ignored entirely.

LAW IN THE BUILDING TRADES.

IRON BUILDING CONSTRUCTION.

The thirteenth claim of the Buffington patent for "improvements in iron building construction," being "the combination, with the posts and girts of the angle plates connecting them, and forming supports for the veneer shelves," does not include a claim for the idea of supporting horizontal sections of masonry veneer on the iron frame work of a building, or the combination of such veneer and the shelves supporting it with the iron frame, merely because shelves and veneer supported thereon in horizontal sections are described in the spcifications of the patent.—Buffington's Iron Building Company *vs.* Eustis, Circuit Court of Appeals, Eighth Circuit, 65 Fed. Rep., 804.

WHAT IS NOT A PARTY WALL.

Where one intending to construct a wall for his building within the line of his lot by mistake extends the foundation slightly onto an adjoining lot the wall does not for that reason become a party wall. The party constructing a wall so that it projects for an inch and a fraction onto an adjoining lot may be compelled to remove it so that it shall not encroach. Parties have no right either in law or in equity to occupy land that does not belong to them.—Pile *vs.* Pedrick, Supreme Court, Pa., 31 Atlantic Rep., 646-7.

DURATION OF EASEMENT IN BUILDINGS.

A deed conveying the right to use the stairway in a building, by which means alone the grantee could reach the upper rooms of his premises, creates an easement which continues only so long as the building of which the stairway is a part exists, and ceases with the destruction of the building.—Douglas *vs.* Coonley, Supreme Court, Third Dept., 32 N. Y. S. Rep., 445.

POWERS OF ARCHITECT IN PURCHASE OF MATERIAL.

Whether an architect who furnishes the designs and undertakes to superintend the construction of a building is also such an agent of the owner as to bind him personally for material furnished by a contractor who undertakes to construct the building, depends upon the contract between the owner and the architect; but whether originally so authorized or not, if the architect assumes to act as such agent and purchases material upon the credit of the owner, with his full knowledge and consent, the latter thus ratifies the assumed agency of the architect and is bound for the price of such materials.—Crockett *vs* Chattahoochee Brick Company, Supreme Court, Ga., 21 S. E. Rep., 42.

EQUITABLE LIEN FOR BUILDING MATERIALS.

A contract for the purchase of materials to be used in the construction of a house, and notes given for the price, reserving title in the seller until payment, who is thus deprived of a lien under the statute and also cut off from an action at law until the notes are due, creates an equitable lien on the house and lot which may be enforced in a court of equity.—Rose *vs.* Parry, Supreme Court Alabama, 16 So. Rep., 915.

HOMESTEAD SUBJECT TO MECHANICS' LIEN.

A constitutional provision that a homestead shall be liable for work and material used in improvements upon it renders it liable to one who agreed to make the improvements and made a contract with another party to actually do the work. A lien on a homestead for labor and materials for improvements may also be created by express contract.—Walters *vs.* Texas B. & L. Association, Court Civil App. Texas, 29 S. W. Rep., 51.

IDENTITY OF BUILDING UNDER MECHANICS' CLAIM FOR LIEN.

A lien claim for material furnished for "a one story refrigerating machine building and boiler house" is not at variance with the proof that there were two buildings on the ground, where it is shown that they were so substantially connected as to make but one building, and that there could be no mistake as to the identity of the structure.—Peterman *vs.* Milwaukee Brewing Company, Supreme Court Washington, 39 Pacific Rep., 452.

WIND BRACING IN HIGH BUILDINGS—II.

FOR a second example, we will refer to a skeleton constructed 17-story fire proof office building, Fig. 4, located on the corner of two streets with 32 feet front, 100 feet deep, and 194 feet high above curb level. The long side not facing the street is protected from wind pressure by an adjacent building from 50 feet above curb; and in order to be liberal in our considerations we will assume the adjacent building capable of resisting the thrust from wind pressure on the structure under discussion when acting against it. Then the maximum effects of wind on columns, girders and connections will be when it is blowing at right angles to the portion of structure over the adjacent building. The maximum strain on girders, bracings and the connections, also the bending in columns, will occur in the floor system at the level of the adjacent roof and all tiers below it. The maximum vertical reactions in columns and foundation will occur, of course, in the lowest tier of columns. For the transmission of stress from horizontal to vertical members we will assume that form of bracing which is readily introduced into this class of buildings, consisting of knee bracing located at the juncture of the floor system with the columns. The dead weight of the walls and floors is conducted by means of supporting girders to the columns, and the amount of wind pressure which it will directly counteract depends largely upon the kind of column connection. Suppose the 12 x 12 inch columns which connect at the fifth tier of beams have strong 3½-inch flanges, making the total width of base 19 inches, and allowing the center of resistance to come within 2¼ inches of edge of flange, the total resisting moments from the dead weight at the three rows of columns will counteract an aggregate wind pressure on the exposed surface of about 4 pounds per square foot, which corresponds to a velocity of 31 miles per hour.

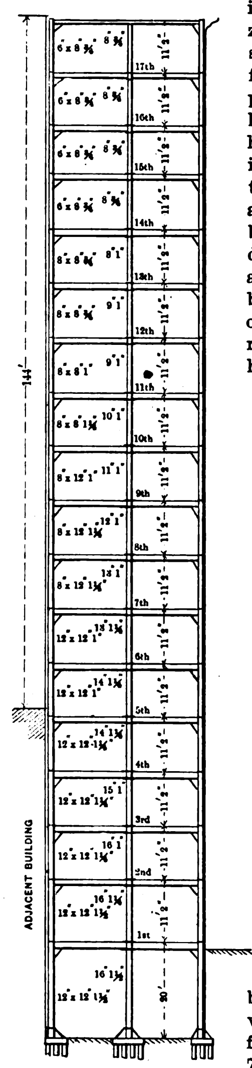

Fig. 4.—Section of a 17-story Office Building.

For the benefit of those who are sanguine about the efficiency of partitions and cross walls for resisting horizontal forces, assume that they have been especially built with that purpose in view. The partitions will seldom be located concentrically with reference to the center line of wind pressures, and their location will often vary in different stories, but the floor system with arches completed is capable of distributing the pressures, and their eccentricity need only be taken into consideration when it is so great as to permit danger of torsional movement.

Suppose the partitions are of 4-inch terra cotta blocks laid in Portland cement and have doorways as shown in plans (the floor beams are assumed to be able to withstand the stress imposed by partitions when acting as braces without appreciable deflection), then we will have in principle a system of trusses with partitions acting as struts. On account of the tendency to side flexure, the allowable unit stress must be taken very small. Allowing 25 pounds per square inch for partitions laid in cement 11 feet high, the aggregate capacity of those in fourth story will resist a horizontal force of 10,000 pounds.

End walls have five mullions 20 x 20 inches, 8 feet high, which will resist a horizontal force of 10,000 pounds at each end wall at 100 pounds per square inch, mean compression. Hence the capacity of partitions and end walls in fourth story aggregates a total of 30,000 pounds horizontal force, or an average of a trifle over 2 pounds per square foot of exposed surface. The total resistance thus far discovered provides for a wind pressure of about 6 pounds per square foot, or a velocity of 38.5 miles per hour. Therefore, to provide for a velocity of 87 miles per hour, or a pressure of 30 pounds per square foot, the bracing provided in the steel structure must be capable of taking 24 pounds horizontal pressure per square foot. The aggregate shear for 24 pounds pressure at fifth tier of beams for one bay is 55,500 pounds. This will be equally divided among the three braced connections of columns and girders, so that the horizontal force to be transformed by each will be 18,500 pounds. In view of the uncertainty of cast iron columns and their imperfect connections for resisting transverse loads, it is but fair to consider them as hinged at each story in determining the stresses for knee

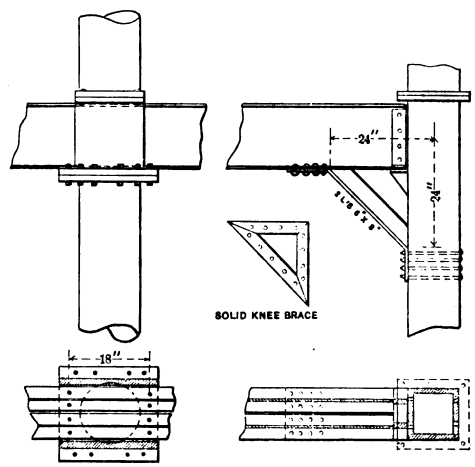

Fig. 5.—Details of Interior and Wall Columns.

Wind Bracing in High Buildings.

braces, bending in columns, &c. By referring to detail it will be seen that the 18,500-pound shear at the foot of the fourth-story columns will cause a horizontal stress of 101,750 pounds at foot of knee brace and an end reaction at girder connection of 83,250 pounds. The stiffener of the knee brace being at 45 degrees, the stress on it will be 143,500 pounds. The bending moment from the braces on the floor girders will be 138,300 foot pounds.

The moment of resistance of the 12 x 12 x 1¼ inch cast iron column being 175, the extreme fiber strain caused by the transverse load at foot of knee will be 11,400 pounds per square inch at fourth story, and at all lower tiers having 12 x 12 x 1¼ inch columns. The direct dead load over second story is 470,000 pounds, on the 12 x 12 x 1¼ inch columns, and the aggregate live load at an average of 50 pounds per square foot is 96,500 more. The vertical reaction due to 26 pounds wind pressure will be 105,000 pounds.

Taking the dead load and the vertical wind reaction together on the leeward column in second story, it will be strained by a direct load to 10,500 pounds per square inch, and in fourth story to 9000 pounds per square inch. At the foot of brace, where the transverse load causes an extreme fiber strain of 11,400 pounds per square inch, the metal will be strained to 21,900 pounds per square inch compression in second story and 20,400 pounds in fourth story, without considering the live loads which may be on the floors. This amount is in excess of allowable stress on cast iron, and under the conditions it is believed to be too much for safety.

The connection of the top of column to the floor girder must be able to resist a horizontal force of 88,250 pounds, and the connections at foot of columns themselves must resist a shear of 18,500 pounds, not considering friction. The knee brace should have a section of two 6 x 4 x ½ inch steel angles riveted together, and with sufficient bolting to the columns and to the girders to take a shear of 101,750 pounds. The vertical reaction at seat of girder due to brace will be 89,000 pounds, and connections must be able to take the resultant of this amount and the 88,250 pounds horizontal reaction with no load on floors. The same general conditions exist at the windward side as at the leeward, execpt that all moments are opposite in direction. With steel columns and rigid connections, making them continuous, and the knee brace with a substantial web sufficiently connected with column and girder to make all act as one piece, the point of contraflexure will be half way between lower column connection and foot of brace. The maximum bending in column will occur at foot of brace and at column connection, and will be 999,000 inch pounds. If the column should have a moment of resistance of 175 (same as cast iron column), the maximum fiber strain would be about 6000 pounds per square inch, while the strain on knee brace would be reduced practically one-half.

Considering the interior column hinged at base and the cross girder connected to its top, as shown in detail, Fig. 5, the maximum bending from wind pressure in the column will be 2,000,000 inch pounds. The moment of resistance of the 14-inch diameter column, 1¼-inch metal, being 147, the extreme fiber strain will be 13,600 pounds per square inch. The dead load coming on the fourth-story column is 250,000 pounds, and the direct stress therefrom is 5000 pounds per square inch, or, assuming an average live load of 50 pounds per square foot floor surface (in addition to dead load), the direct stress will be 8000 pounds per square inch.

This will cause a maximum compression of 18,600 pounds per square inch in the first case, or 21,600 pounds in the latter case. The bending moment at the top of the column must be resisted by the connections of the girder to it; supposing the centers of girder bolts on the opposite sides of column are 18 inches apart, the vertical reaction at each connection to girder flange will be 111,000 pounds, for which force the bolting must be made sufficient. Buildings of this description should be provided with steel columns, and it will generally be found economical to increase the section where maximum bending occurs to take up the transverse loading.

In conclusion, the writer begs to refer to an instance of the yielding of a skeleton constructed building to wind pressure. The building was 23 feet front, about 85 feet deep and 125 feet high above curb. It was protected from wind by buildings 6 feet high on either side. The structure was designed to resist wind pressures by means of front and rear walls and the special connections of cross girders with columns. The constructor evidently did not consider the importance of these details, ignored them entirely, and, instead of utilizing the entire depth of girder, he gouged holes for fastening it to columns in the middle part of the girder webs. When the walls were up (except the top story) and the floor arches were yet to be put in the three upper floors, the building, during a wind storm moved westerly from 8 to 10 inches, beginning at the roof of the adjoining westerly building and increasing to the top. The reason is evident: the building, under the force of the wind, had to move until the joints came to a firm bearing, and there it remained stationary. The building was righted and made secure by elaborate knee bracing made sufficient to take the horizontal force independently of the original connections.

Moving a Factory Building Without Stopping Work Within.

An interesting piece of work in the way of moving a large brick factory building several hundred feet without causing a suspension of manufacturing operations, has just been successfully carried out at Jamaica Plain, Mass., where is located the plant of the Sturtevant Blower Works. By reason of the raising of the railroad tracks at that place it was necessary for the concern named to move one of their largest buildings a little more than 300 feet to the south and then 50 feet to the east. The structure was 175 feet long, 50 feet wide and three stories in hight, with brick walls twenty inches thick at the first floor and sixteen inches thick at the second floor, the roof being of the monitor type, heavily timbered. Nothing was removed from the two upper floors, but as the lower floor was laid on the ground it was necessary to remove all the tools from that space. The moving was accomplished in the ordinary way by means of ten horses, connected with capstans and ten sets of rope and blocks. It was at first contemplated to move it with rods and turn buckles, but it was found that even after they had been made large enough to withstand the strain, the process was too slow. The progress with the turn buckles was only thirteen feet in ten hours, but with the final arrangement the best progress was something like sixty feet in one day. Before moving the building it was tied together lengthwise and crosswise by heavy iron rods and had blockings and rolls placed under the side and end walls as well as under the center posts. The whole building was moved without any injury, although the last 200 feet of the journey was over filled ground.

While the successful moving of such a large structure is of great interest to builders and contractors, the method employed by which manufacturing operations were continued is equally interesting, showing, as it does, the advantages of electricity for the purpose. An electric motor of about twenty horse-power was located on the second floor of the building and belted to the main line of shaft. On this floor was erected a reel of wire, one end being connected to the motor and the other end to the generator set in the engine room, and as the building was moved away from its original place and from the power plant the wire was unreeled, and in this way an electric current was furnished for the driving of the motor at all times during the moving of the building.

New Publications.

CONCRETE. By Thomas Potter. Size, 5 x 7½ inches ; 290 pages ; nearly 200 illustrations ; bound in board covers. E. Van Nostrand & Co. Price $3, postpaid.

This work deals with the use of concrete in building and the construction of concrete walls, floors, roofs, &c. The edition has been entirely rewritten, the author having been moved to do this by reason of the fact that the original edition has long since been out of print, and because 17 years' additional experience and observation have enabled him to deal with the subject matter in a more complete form. The object of the present work is to make clear to all who are interested in concrete—and this of course includes all connected with the building trades—the means by which concrete can be successfully employed. The volume is divided into two parts, the first of which deals with the material required for making concrete, its manufacture and the formation of artificial foundations, while the second part has to do with the construction of walls of various kinds, concrete pavings, a brief history of fire proof and concrete floors, with a description of the best known systems, the use of concrete for roofs, what is generally known as cast work and other purposes for which concrete is well adapted. At the present time a great deal of attention is being given to the use of concrete and cement construction, and this edition of the work will doubtless prove a valuable addition to the builders' library of trade literature.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

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First vice-president..C. A. Rupp of Buffalo.
Second vice-president.James Meathe of Detroit.
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Proposed Amendments to the Constitution of the National Association of Builders.

In accordance with the requirement of Article X of the Constitution, notice is hereby given that the following amendments to the Constitution offered at the last convention by the Special Committee on Revision of the Constitution will be in order for consideration at the ninth convention, to be held in Baltimore, Md., on the third Tuesday in October, 1895:

Amend the second paragraph of Article III by inserting after the word "exchange" in the second line the words "possessing an actual membership of not less than twenty (20)."

Amend Article IV by adding to the second paragraph the following:

And they shall meet at least once in each calendar year, such meetings to be on a call issued by the Executive Committee.

Amend the sixth paragraph of Article V by making it read as follows:

The President shall appoint the following committees from the members in good standing in any filial body.

Add to Article V the following new paragraphs:

In the event of failure of any member of any of these committees to be elected as a delegate to a convention held during his term of office, the said member shall be entitled to a seat in such convention and shall be recognized and privileged to discuss any subjects referred to the committee of which he may be a member. Such a member shall, however, in his capacity as a committeeman be debarred from speaking in convention upon other than the subjects mentioned, except upon invitation of the Chair, and shall in any case have no vote.

The first-named person on each committee appointed shall be its chairman until otherwise directed by said committee.

Amend Article VII by striking out the word "annual" in the first paragraph, and inserting after the word "held" the word "biennial."

Add to Article VII a new paragraph as follows:

No filial body shall be entitled to representation in excess of membership upon which the pro rata assessment has been paid.

Amend the second paragraph of Article IX so as to read as follows:

This assessment will be due on the first day of January of each year and must be paid within sixty (60) days thereafter.

Notice is also given that the following amendments to the Constitution have been offered and will be in order for consideration at the ninth convention aforesaid.

To amend Article II so as to read:

ARTICLE II.

PURPOSE.

The purpose of this association is defined as follows:

1. To unite the contracting builders of the United States through local organizations under a central advisory body.

2. To secure through this central advisory body the observance of uniform customs and practices in the various business relations which contracting builders are called upon to assume toward each other, toward workmen, toward owners and architects and toward the business community generally.

3. To formulate general principles upon the basis of the experience and judgment of the whole constituency of builders for the guidance and protection of every individual builder.

4. To acquire and disseminate valuable information to all persons connected with the body.

5. To educate the whole building fraternity up to higher levels of action, to the end that honorable methods and practices and sound business conditions may prevail.

To amend Article III so as to read:

ARTICLE III.

ORGANIZATION.

The basis of organization shall be local associations of builders in the various cities and towns of the country, which associations shall be represented in this central body through subsidiary organizations of the National Association within State lines, to be known and recognized as State branches of the National Association; both local and State Associations to be organized in form approved by the National Association.

To amend Article IV so as to read:

ARTICLE IV.

PRINCIPLES AND METHODS OF OPERATION.

The principles and methods of operation of this body shall be those defined and fixed herein, together with such others as may be adopted at conventions, and they shall be administered by the officers and directors hereinafter fixed, under such special direction as may be determined at conventions, and otherwise as the Board of Directors may determine.

To amend Article V so as to read:

ARTICLE V.

OFFICERS AND DIRECTORS AND THEIR DUTIES.

The officers of this Association shall consist of a President, two Vice-Presidents, a Secretary, and a Treasurer, who shall be and hereby are constituted the Executive Committee of the Association, and as such shall have direct charge in carrying out all orders and recommendations of the Association as expressed at conventions and of all detail work of the Association not otherwise specially ordered.

There shall be a Board of Directors which shall consist of the officers herein mentioned, and of the Presidents of State Associations herein referred to.

These officers shall be chosen at the annual conventions of the body and shall be elected to serve one year or until their successors be chosen. They shall enter upon their duties immediately after the adjournment of the convention at which they are elected.

The President shall preside at all meetings of the Association and shall perform all other duties usually incumbent on the office. He shall act as chairman of the Board of Directors and of the Executive Committee. He shall approve all bills before payment by the Treasurer.

The First Vice-President shall perform the duties of the President in case of his absence.

The Second Vice-President shall perform the duties of the President in case of the absence of the President and First Vice-President.

The Secretary shall keep record of all meetings of the Association. He shall collect all dues and fees, paying over the same to the Treasurer, taking his receipt therefor. He shall act as Secretary of the Board of Directors and as Clerk of the Executive Committee, performing the usual duties incident thereto. He shall render such service as may be proper for the carrying out of the purposes of the Association under general direction of the Board of Directors and of the Executive Committee. He shall be paid such salary for his services as may be determined from year to year by the Board of Directors.

The Treasurer shall receive all moneys for dues and fees from the hands of the Secretary, giving his receipt therefor, and shall hold all such or other funds of the Association subject to drafts duly authorized by approval of the President, and shall pay all such drafts and bills from said funds only when presented to him duly approved as aforesaid.

To Amend Article VI so as to read:

ARTICLE VI.

CONVENTIONS AND MEETINGS.

There shall be a convention of the Association each year, and it shall be held at such time and place as may be decided at the convention immediately preceding.

Other general meetings may be called by the Board of Directors, but such meetings shall be considered as special meetings and as not as regular conventions.

To amend Article VII so as to read:

ARTICLE VII.

REPRESENTATION.

Representation in this Association shall be (as referred to in Article III of this Constitution), by and through Associations of builders established under the direction and subject to the jurisdiction of the National Association, within the lines of the various States, as State branches of the National Association, each being distinguished by the name of the State it represents.

To obtain and maintain such representation, State Associations must be constituted as herein set forth and must otherwise conform to such rules and regulations of this body with reference to composition and form of organization as may be determined by action of the conventions of this body.

State Associations must be composed of bodies of builders, constituted, organized and maintained in accordance with form prescribed by the National Association and located within the lines of the State in which such State Associations may obtain jurisdiction through the National Association; not more than one body in any one city or town to be admitted to membership in any State Association.

In all conventions and meetings of this Association each State Association shall be represented by the President of the Association and one delegate for each one hundred members in the total membership of the various Associations comprehended in said State Association, as shown by the per capita tax in annual dues paid thirty days prior to election of such delegates.

All delegates to conventions or meetings must have credentials in form approved by this Association of their appointment from their several State Associations, and will not be entitled to take part in the meetings unless they be so furnished. Each delegate shall be entitled to one vote and may be represented by alternate or proxy.

No delegate shall hold or use more than one proxy and no delegate shall hold or use a proxy from outside the State Association which he represents.

In case any delegate present at any convention or meeting holds a proxy, he must submit the said proxy with his credential to the Committee on Credentials at the said convention or meeting.

No delegate will be entitled to a seat in any convention or meeting of this Association unless the dues of the Association he represents shall have been paid into the national treasury in accordance with this Constitution.

Organizations holding membership in this Association at the time of the adoption of this revision of the Constitution shall be entitled to continued membership and representation upon the following plan:

When but one organization within any State lines holds membership in the National Association at date of this revision, that organization shall be recognized as the State Association, and together with such other local organizations as may be joined with it thereafter under the rules prescribed, shall hold representation under the revision herein comprehended.

When two or more organizations within any State lines hold membership in the National Association at date of this revision, they shall at once proceed to form themselves into a State Association under such rules as may be prescribed by the National Association, and they, together with such other local organizations as may be joined with them thereafter under said rules, shall hold representation under the revision herein comprehended.

To amend Article VIII and IX so as to make new Article VIII and to read:

ARTICLE VIII.

FEES AND DUES.

Annual dues shall be assessed upon the State Associations for the ensuing year at each Convention and shall be payable into the treasury of the national through the officers of the State Associations. Said dues shall be assessed upon the total per capita of the various local organizations represented in the State Associations.

Said assessment shall be due immediately upon the adjournment of annual conventions and must be paid at least thirty (30) days prior to the election of delegates to the next annual convention.

Default in payment of the said assessment at time fixed shall work a forfeiture of membership and representation, except the Executive Committee decide that circumstances in special cases warrant an extension of time of payment.

Payments on account of per capita assessment may be made during the year.

To amend Article X so as to make new Article IX and to read:—

ARTICLE IX.

AMENDMENTS.

Amendments may be made to this Constitution by a two-thirds vote of all delegates present in person or by proxy at any regular convention, provided that printed notice of the substance of such proposed amendments shall have been mailed by the Secretary to every State Association not less than sixty days prior to said convention.

Outside Influence.

The extent of the field influenced by the work of the National Association of Builders is being continually demonstrated as much larger than that comprehended in its filial bodies. Its recommendations and advice are scattered far and wide, and builders in many localities are benefited by its work without recognizing the source from which were issued the plans and methods they have adopted for their protection and advancement. A good example of this state of affairs is the experience of a certain builders' exchange whose secretary recently addressed the national secretary on some matter of information, and stated in his letter that the exchange was in good condition; that it had been formed on very careful lines and only after mature consideration of the principles upon which it proposed to act. It was also stated that the organization had tried to be original in its methods and to avoid patterning after other organizations of a similar character. In earnest of his sincerity the local secretary sent to the national headquarters a copy of the constitution, by-laws and rules and regulations of his exchange.

Upon investigation it was found that the constitution was largely made up of a combination of the constitution of the National Association of Builders and a portion of the by-laws of one of its filial bodies—the latter being the one usually employed by the national secretary as a desirable model for new organizations. The rules and regulations were made up entirely from a combination of the "Rules and Conditions for Estimating Work" and the "Code of Practice" issued and recommended for use by the National Association of Builders.

The letter from the local secretary indicated no recognition of obligation to the National Association of Builders for the methods which had operated so beneficially for his exchange, and it is doubtful if those who helped to form his organization realized that they were making use of information which was the result of labors of the National Association.

Such cases as this indicate that the work of the National Association is permeating the whole fraternity, and that conditions outside of its recognized field of operation are being improved through its efforts. The objects for which the association exists are thus being prosecuted in ways that are effective, although the National Association does not receive due credit, and such exchanges as the one mentioned will be the more valuable when they finally ally themselves with the national work for the training they have already had in its methods and purposes.

The Ninth Convention

Notice is given that on this page of the October issue will be printed the official announcements relating to the ninth convention of the National Association of Builders. Full instructions as to method of securing reduced railroad fares, application for which is now pending, programme of the business of the meeting and other information for the benefit of the delegates will appear.

CONTENTS.

HOUSE IN WORCESTER, MASS., ARRANGED FOR TWO FAMILIES.

GEORGE AND J. P. KINGSTON, ARCHITECTS.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
96-102 READE STREET, NEW YORK.
OCTOBER, 1895.

American Institute of Architects.

The American Institute of Architects will hold their twenty-ninth annual convention in the city of St. Louis, Mo., October 15, 16 and 17. The headquarters will be at the St. Nicholas Hotel, where there will be a session on the forenoon of each day followed by a lunch given by the members of the St. Louis Chapter. According to the circular of information which has been sent out by Secretary Alfred Stone, there will be a formal reception on Tuesday evening, October 15, at the Museum of Fine Arts as the guests of the St. Louis Architectural Club. On the afternoon of Wednesday there will be a carriage drive through the residence portion of the city and the parks and a luncheon at the Columbian Club. or an excursion on the river. On Thursday afternoon the members of the institute will visit prominent buildings, completed or in course of erection, and in the evening will attend a theater or the exposition. This is the first time the institute has held a convention as far West as St. Louis, and the local chapter has made an especial effort looking to the entertainment of its guests. An invitation is extended to practicing architects not members of the institute to attend the convention, and it is hoped that a large gathering will result.

The Atlanta Exposition.

The opening of the Cotton States and International Exposition, at Atlanta, Ga., on September 18, was an event of great importance in the history of the "New South." The undertaking is the most weighty enterprise of its kind ever inaugurated in that section of the country. It is one that is calculated to do much in many ways to promote the development of the Southern States in general and of the Southeast in particular. Visitors from the North and from all other quarters will there find ocular demonstration of the splendid progress which has marked the course of the South in late years. They will be brought face to face with abounding evidences of advance in trade, industry and business enterprise. Much will be learned regarding the rich mineral and agricultural resources possessed by the South and of the means which are now being actively used to develop those resources. The effect of this knowledge on the outside world cannot but prove highly beneficial to the Southern States. It will also be advantageous to the rest of the country, in tending to promote better trade relations with the South, to the profit of all concerned. It is to be regretted that Eastern manufacturers and business houses are not more fully represented at the exposition. Nevertheless, the general industrial and commercial showing is reputed to be exceedingly satisfactory. As a demonstration of what the rejuvenated South is capable, the Atlanta Exposition must be regarded as a most promising token of the future prosperity of that region.

The Builders' Convention.

It appears, from correspondence addressed to the secretary, that the proposed reorganization of the National Association of Builders on the lines indicated by the amendments to the constitution published in these columns last month is attracting the attention of the members of exchanges throughout the country. The changes proposed have received careful and intelligent consideration in many localities, and a large number of the delegates to the convention will be prepared to discuss the subject understandingly and to good purpose. The character of the National Association of Builders will be in no way altered by the adoption of the proposed changes, the only thing involved being an alteration of methods, whereby the principles formulated may be diffused through a much greater constituency. The introduction of the new element—the State Association—is for the sole purpose of binding the builders of the several States into cohesive bodies for the better and wider application of the principles evolved from the experience of the whole. By making all local exchanges homogeneous through the adoption of uniform constitutions much greater results and efficiency are expected; and each exchange, save for the difference in degree, will be as important as any other to the welfare of the builders of the State. An invitation has been extended by the National Association of Builders to all unaffiliated builders' exchanges known to the secretary to send a delegation as visitors to the convention in order that a clear understanding of the nature and purpose of the organization may be obtained. As actual contact with members of successful exchanges and the privilege of listening to the consideration of matters of common concern to all builders would seem to be the best means of acquiring practical information as to the functions and benefits of organization, there is no doubt that unaffiliated exchanges will profit greatly by accepting the invitation.

Technical Education.

One of the features of the ninth convention will be an address by Robert D. Andrews, a member of the American Institute of Architects, on the question of combining instruction in the building trades, as given in schools of the type of that maintained by the Master Builders' Exchange of Philadelphia, with instruction in architecture as given in the schools of architectural design. Mr. Andrews is a man fully capable of giving the subject a careful and practical presentation, having devoted a large amount of time to the consideration of the matter. A synopsis of the address will be given in a future number of the paper, as well as a summary of the proceedings of the convention.

Basis for Bids.

Plans and specifications are probably more widely employed to-day than ever before. In some trades these have been considered as important in the construction of the work as the building material. In others they are so new that the majority of people have no acquaintance with their existence or advantages. A local paper recently gave two columns to an account of the debate and discussion which occurred with reference to heating a small school building, owing to the difference in the methods of heating the building which were proposed by the different bidders. As a means of disposing of the question it was suggested by one member that some person who was competent to decide on what would be needed should draw up a paper explaining the requirements of the building and describing what it would be necessary to furnish to satisfy the committee. These specifications were to be furnished to each of the contractors who had submitted a proposition for heating the building, so that all might bid on the same system and from the same basis. The idea met with enthusiastic approval and was looked upon as a valuable suggestion. Those who are to bid on putting the roof on a building, or placing a plumbing and drainage system in it, or installing a heating plant, can readily appreciate that much time could be saved and labor avoided if those who wish work done would employ some one who is competent to lay out a plan that will be satisfactory to them and prepare a specification of the requirements which must be met. In large work this system is so general that the suggestion that it should be followed is unnecessary, but in smaller work it has been avoided to save expense, and those who have proposed it have met with opposition. The early part of this year has been noted for the immense number of estimates which have been furnished; and these have been viewed in the aggregate as an enormous loss of time. Many contractors who have previously opposed any system of surveillance or restriction as to the method of their doing work are now advocating a more general provision of plans and specifications for work to be done, as they think they can see in it a means of saving a large amount of time which can be spent in other directions with benefit.

The Philadelphia Bourse.

The building now practically completed, and which in the course of the next few weeks will be occupied as the Philadelphia Bourse, is a structure of which the Quaker City may justly be proud. The edifice is 364 x 132 feet in size and rises to a hight of eight stories, or about 130 feet above the level of the sidewalk. The exterior up to the sills of the third story is of Carlisle red stone, above which Pompeiian brick and terra cotta are used, terminating in a broad cornice. The hall of the Bourse, located on the ground floor, is a room 240 feet long by 126 feet wide, with a hight of 45 feet in the center to the skylight, which is 40 feet wide and runs the entire length of the room. On the ground floor are also a number of rooms, which will be occupied as a bank, railroad offices, telegraph offices, &c. Surrounding the great hall is a gallery 80 feet wide, which is to be used for news and bulletin rooms, where reports received from time to time will be posted in their proper departments; a newspaper room and a library. There will also be several rooms for the use of committees, executive offices of the Bourse, rooms of the trade associations and public sales and meeting room. The third, fourth, fifth and sixth floors are devoted exclusively to offices, arranged so as to be occupied singly or *en suite.* The eighth floor will be devoted to a restaurant, with kitchen, store rooms, &c., as well as to the living rooms of the chief engineer and to the various tanks supplying water for the building. A feature of special interest will be the exhibition department, which will occupy the whole of the seventh floor, covering an area of about 36,000 square feet. This space will be used for the display of manufactured goods of all kinds, while about 18,000 square feet in the basement will be used for machinery, which may be exhibited in operation if desired; heavy raw materials and such goods as pertain particularly to machinery. The ceiling of the seventh floor room is about 16 feet high, ample light being furnished by windows 8 feet square placed close together and with sills 7 feet above the floor so as to give wall space for the exhibits. It is thought that with the exception of the Builders' Exchange and the Stock Exchange, most of the other mercantile and trade associations will secure locations in the new Bourse Building, the cost of which is in the neighborhood of $1,500,000, exclusive of the site.

The following method of testing a brick-arch roof, at Beaume, France, is described in a recent issue of the London *Engineer*: The arch supported the superincumbent mass of rock, in which a water reservoir had been excavated for the purpose of the town supply. It consisted of a circular segment composed of two rings of brick laid flat with 0.3 inch of mortar between and covered with a layer of beton 9 inches thick at the haunches, the whole being plastered with cement mortar ¾ inch thick. The vault abutted on skewbacks cut in the sides of the solid rock excavation, and a section of it about 2 feet long was tested six days after it was built by a symmetrically disposed load of cement bags weighing about 10 tons. Half this weight was concentrated on about 3 feet at the crown and the remainder was distributed evenly over the rest of the extrados. No cracks or settlement whatever were apparent after 18 hours' application of the load.

Fire Proof Cement.

The fire proof quality of cement has long been recognized, but a recent test made in Germany is worthy of consideration. A safe constructed of cement, with steel wire netting placed in between, was tested by order of the Reichsbank, the German Government's banking establishment. The question to be decided was whether it is practical to build vaults of this material for safety against fire. A safe was placed upon a pyre of logs, drenched with kerosene, which, after being set on fire, kept the safe for half an hour exposed to a heat of 1800 degrees F.—that is, a heat in which iron will melt. Two hours after the safe was opened and the contents—silk paper, draft blanks and a maximum thermometer—were found to be absolutely uninjured. The maximum thermometer showed that within the safe the temperature at no time during the test rose above 85 degrees. Commenting on the results of this test an exchange says that "this seems to prove that cement safes within burglar-proof steel vaults fill all the requirements that can be possibly expected. Such evidence as this should tend to the increased use of cement in fire proof construction. It shows the material to be not only fire proof, but an excellent non-conductor, so that its capability in protecting iron work against the effects of fire is very great, a matter of the first value; and in many cases where fires arise in this class of buildings this quality would prevent fire spreading, and at the same time maintain the temperature of iron or steel supports where they would retain their normal strength and support the loads imposed upon them, one of the most important features in modern fire proof structures. The great heat developed by combustible merchandise in iron and steel structures is the great danger from its overheating supporting columns and iron beams, and the one thing sought is a non-conducting material. This test emphasizes this valuable feature of cement in such structures in this respect."

Efficiency of Building Materials Against Fire.

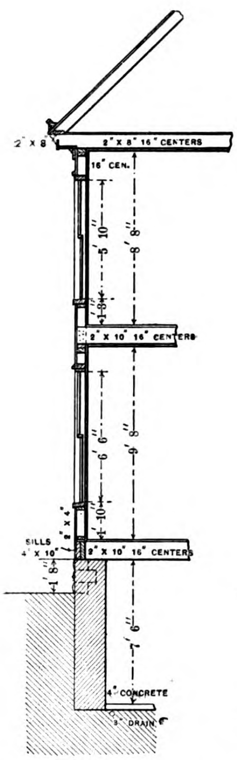
Experiments have lately been made in Vienna for the purpose of testing the efficiency of various building materials against fire, and also to ascertain what protection they were capable of affording to iron work. To make these tests a brick chamber some 12 feet by 8 feet in plan and 11½ feet high was built, and in the center an iron column was constructed consisting of two channel bars, 5½ inches by 2¼ inches. These channels were placed 2½ inches apart, back to back, and were braced together with light lattice bars. Within the space between the channels test bars composed of various alloys melting at temperatures between 150 degrees F. and 1650 degrees F. were placed, the column afterward being surrounded with brick work in mortar, thus forming a pier some 18 inches square. In order that the test should as nearly as possible resemble the conditions met with in actual practice, the column was loaded with a sufficient weight to cause a stress of 8½ tons per square inch on the iron work. Fuel was then strewed over the floor of the chamber to a depth of some 3 feet, and the firing was fully maintained for a space of 2½ hours, and was subsequently extinguished by the fire brigade. The heat had, however, been so great that it was not until the next day that a thorough examination of its effect could be made, but it was then discovered that although the edges of the brick work pier were crumbled to an extent of 1½ inches the iron column was quite uninjured, and only the test bar, capable of fusing at 150 degrees F., showed any indication of melting. It would thus appear that the brick work was of ample thickness to protect the iron work, and that when such construction is adopted in actual practice a building is probably as fire proof as it is possible to make it.

A FRAME DWELLING IN EATON, OHIO.

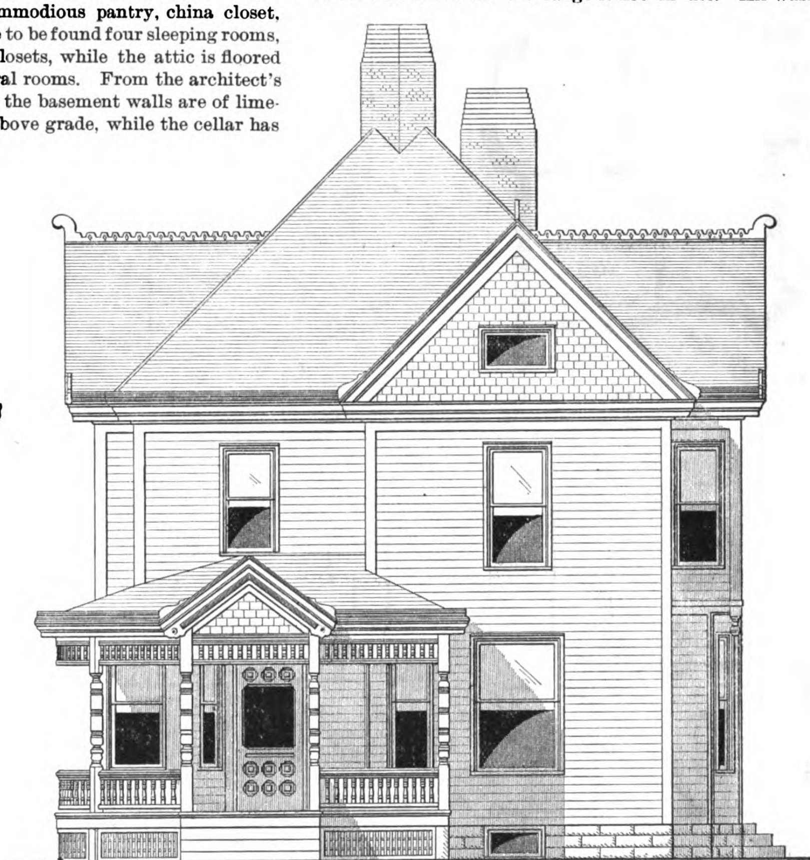
WE present to the notice of our readers this month illustrations of a frame dwelling designed and erected a short time since for his own use by W. C. McCabe of Eaton, Ohio. The house embodies many features of interest, and has been greatly admired, we are told, by reason of its convenience of arrangement combined with economy of cost. The floor plans, elevations and details presented upon this and the pages which follow give a very good idea of the general construction employed, while the half tone engraving which constitutes our supplemental plate shows the appearance of the house as it stands to-day. An inspection of the floor plans shows that upon the first floor there are four principal rooms, together with front and rear halls, a commodious pantry, china closet, &c. On the second floor are to be found four sleeping rooms, a bathroom and ample closets, while the attic is floored and affords space for several rooms. From the architect's specification we learn that the basement walls are of limestone, with pitched faces above grade, while the cellar has a floor of 4 inches of concrete. The frame of the house is yellow pine, sheeted with the same material laid diagonally and covered with water proof paper, over which is placed 5-inch beveled poplar siding, laid 3¾ inches to the weather. The roof is covered with 18-inch standard cedar shingles laid 5½ inches to the weather, and the gables with 4-inch diameter shingles.

The flooring throughout is of matched yellow pine boards 2½ inches wide and ⅞ inch thick. The inside finish of the kitchen, pantry, closets, back stairway and cellar entrance is plain 5-inch pilasters and caps with 8-inch bevel base, with the exception of the kitchen and cellar entrance, which are wainscoted 3 feet 6 inches high, yellow pine being the lumber employed. All other finish is in quartered oak. The outside wood work is painted three coats best lead and oil and pure white in color. All inside work is filled and given three coats best hard oil well rubbed down between coats. The house is wired for electric lighting, and is heated throughout by means of a hot air furnace. The house is supplied with hydrant water, which is kept cool in hot weather by running the supply pipe down to the bottom of an old well, shown on the foundation plan, and from there up to the sink. As the hydrant water in Eaton is "hard," a tank is placed in the attic for a supply of cistern water for wash stands, bathtub and hot water boiler. The tank is fitted with force pump at the sink or it can be filled by means of a motor propelled by hydrant water. The hot water boiler is heated by the usual connections with the range and also has a gasoline burner underneath in order to furnish heat in warm weather when the range is not in use. All wash stands, bathtub, laundry and kitchen sink are supplied with hot and cold water.

Mr. McCabe gives the actual cost of the house as $3271.18, the principal items being lumber and carpenter work, $1562.52; plumbing and drainage, $273.13; excavation, basement walls and concrete floors, $246.70; brick wall in basement and chimneys, $123.30; lathing and plastering, $165.16; painting and varnishing, $174.35; glass and glazing, $68.21; hardware and nails, $95.90; electric light wiring, $26.60; furnace and fittings, $193.20; grates and mantels, $112.55; tin and galvanized iron work, $68.96. The items also include wall paper, $92.60, and a safe in the china closet, the cost of which is given as $68. To this total may be added the work outside of the house covering grading, stone steps, walks, &c., $210.80, making a grand total of $3481.98. Mr. McCabe states that the above items were carefully kept during the erection of the house and is the net cost to him, the builder's profit not being included. If this were added it would probably increase the cost about 10 per cent.



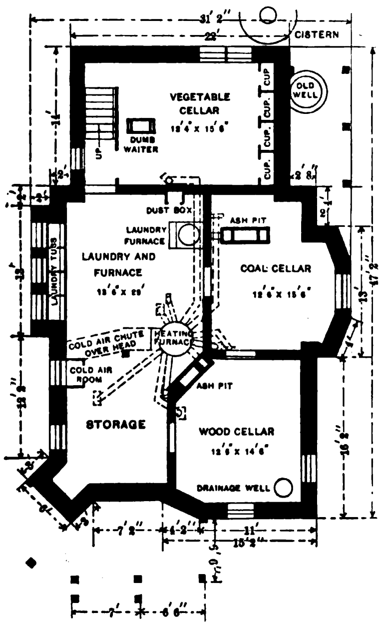
Section.


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

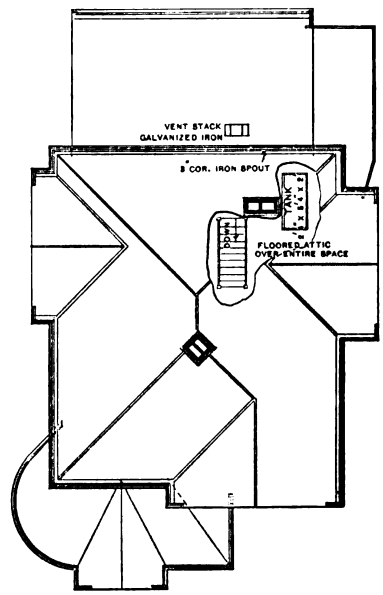
A Frame Dwelling in Eaton, Ohio.—W. C. McCabe, Architect.

Water Proofing Brick and Sandstone.

At a recent meeting of the Australian Association for the Advancement of Science, Professor Liversidge read a paper on "The Water Proofing of Brick and Sandstone with Oils." Experiments were made with the view of ascertaining the length of time that brick and sandstone are rendered water proof or protected by oil. The oils used were the three commonest and most readily obtainable for such purposes—viz., linseed oil, boiled linseed and the crude mineral oil known as "blue oil," used for preserving timber. The weatherings were made upon a flat portion of the laboratory roof fairly exposed to the sun and weather. Good, sound, machine made bricks were experimented on. The amount of oil and water taken up by the sandstone was very much less than that absorbed by the brick, although the area of the standstone cubes was much greater than that exposed by the bricks. Equal amounts of raw and boiled oils were absorbed; the blue oil, however, was taken up in much greater quantity by both brick and sandstone; but by the end of 12 months the whole o. the 13½ oz of blue oil had apparently evaporated away, and the brick had returned to its original weight. The bricks treated with raw and boiled oils remain unchanged. After the second oiling in November, 1890, and exposure for nearly four years and two months, they had practically retained all their oils, inasmuch as they had not lost weight, and were also nearly impervious to water. It was noticeable that the sandstone cubes treated with raw and boiled oils returned to their original weights, but do not appear to have lost the beneficial effects of the oils, being also practically water proof.



Foundation.



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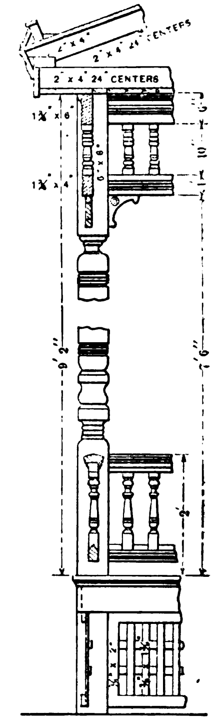
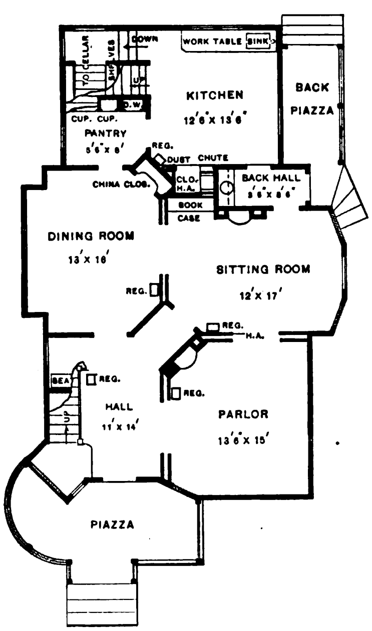
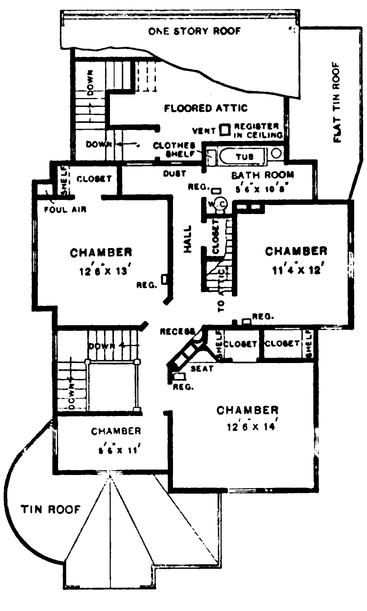


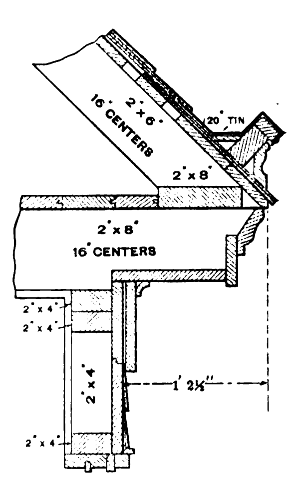
Detail of Veranda.—Scale, ⅝ Inch to the Foot.



First Floor.

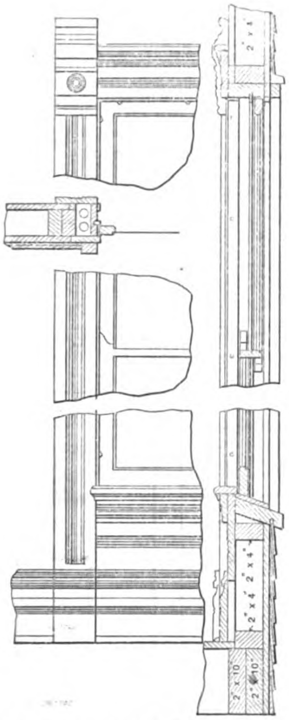


Second Floor.

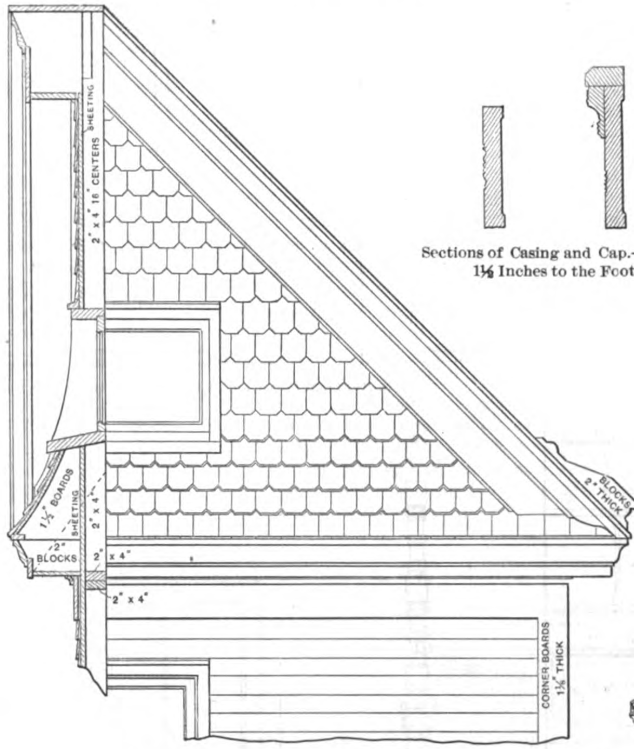


Detail of Main Cornice.—Scale, ¾ Inch to the Foot

A Frame Dwelling in Eaton, Ohio.—Floor Plans.—Scale, 1-16 Inch to the Foot.



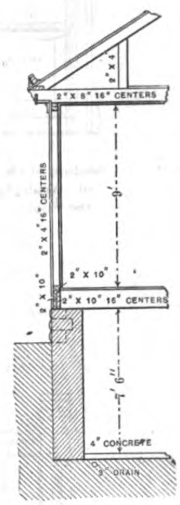
Details of Inside Finish.—Scale, ½ Inch to the Foot



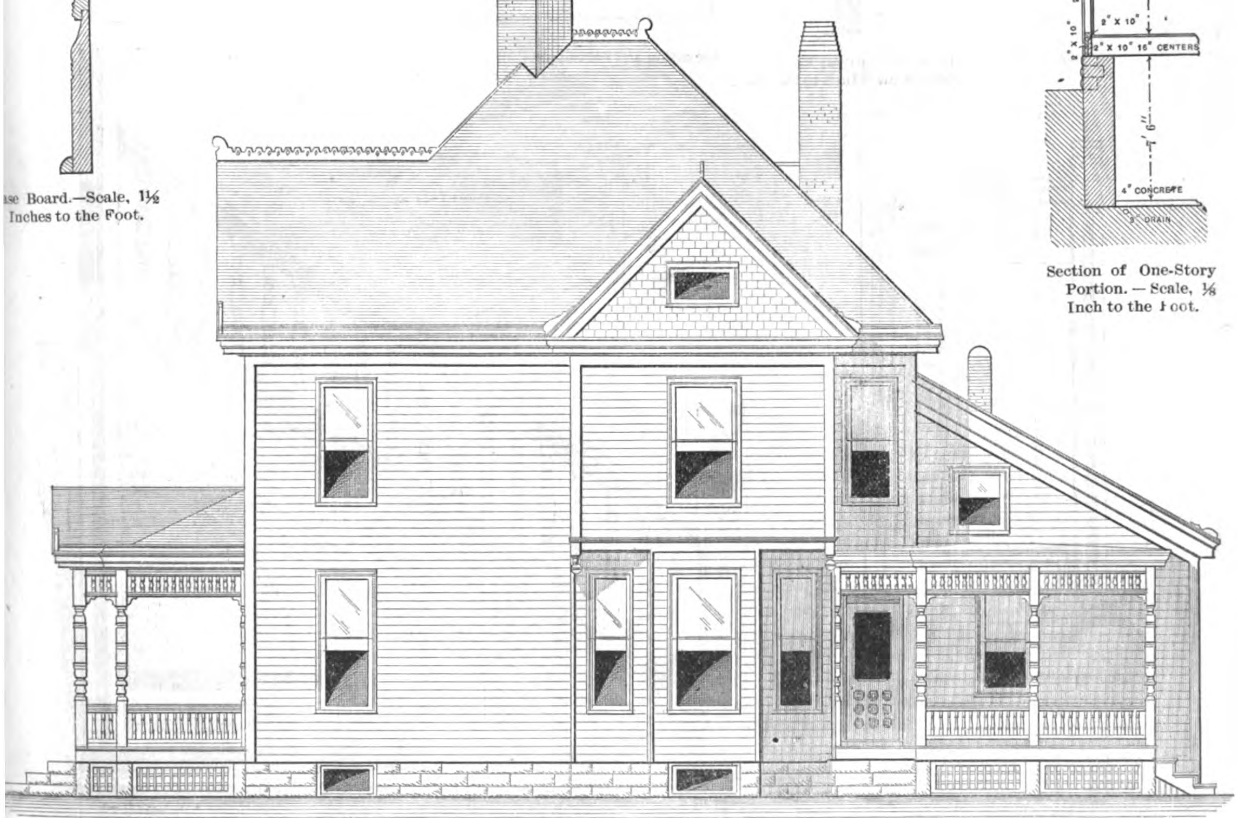
Details of Gables.—Scale, ⅜ Inch to the Foot.

Sections of Casing and Cap.—Scale, 1½ Inches to the Foot.

ase Board.—Scale, 1½ Inches to the Foot.

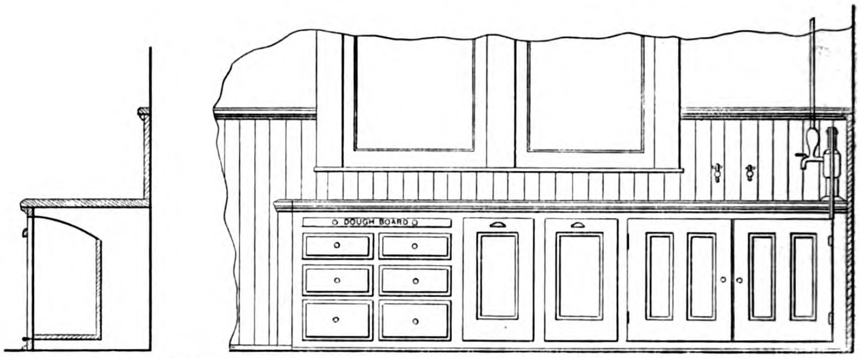


Section of One-Story Portion. — Scale, ⅛ Inch to the Foot.

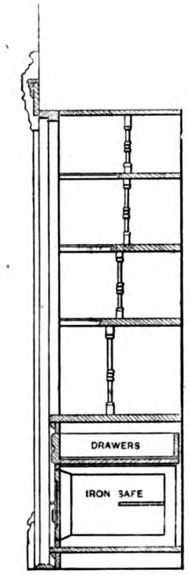


Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

Miscellaneous Details and Side Elevation of a Frame Dwelling in Eaton, Ohio.

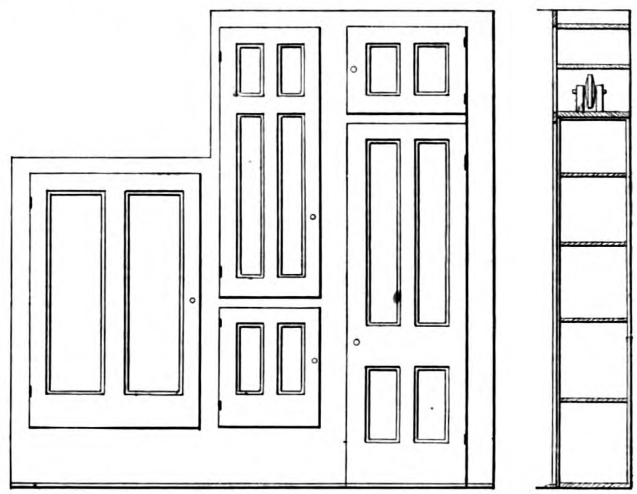


Section and Elevation of Work Table in Kitchen.—Scale, ⅜ Inch to the Foot.

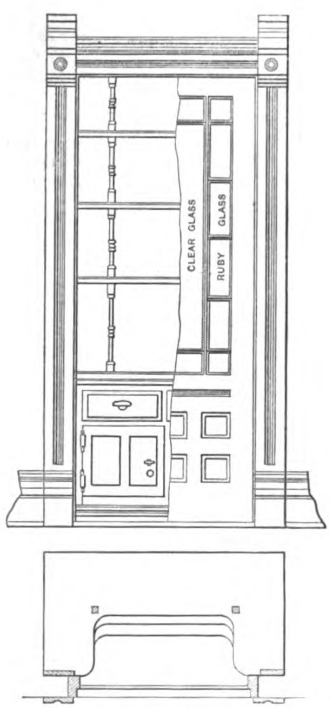


Section of China Closet.—Scale, ⅜ Inch to the Foot

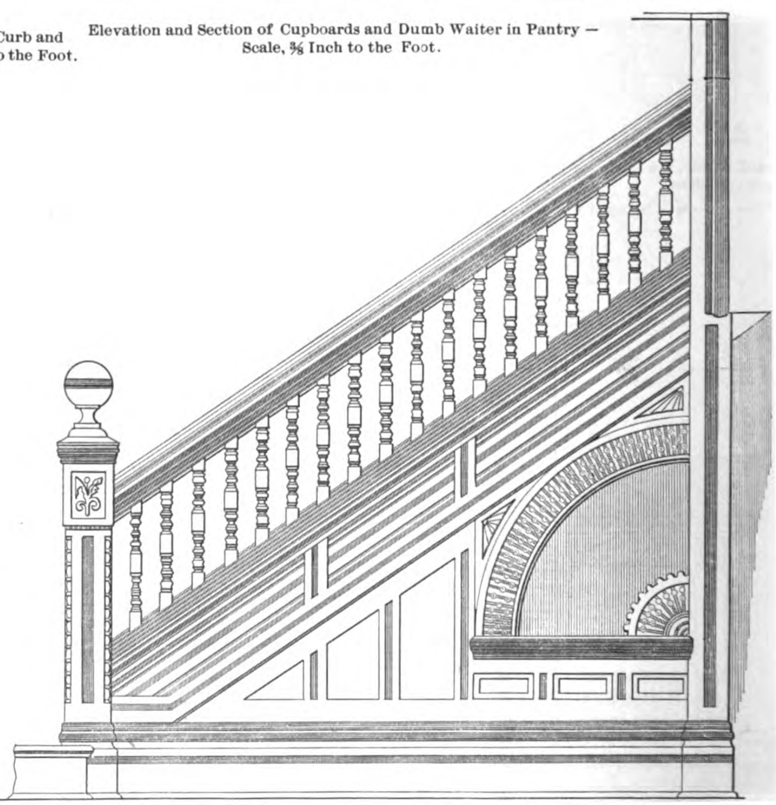
Detail of Stairway Curb and Rail.—Scale, 1 Inch to the Foot.



Elevation and Section of Cupboards and Dumb Waiter in Pantry.—Scale, ⅜ Inch to the Foot.



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



Detail of Main Stairs.—Scale, ⅛ Inch to the Foot.

Miscellaneous Details of a Frame Dwelling in Eaton, Ohio.

CHICAGO'S PUBLIC MANUAL TRAINING SCHOOL.

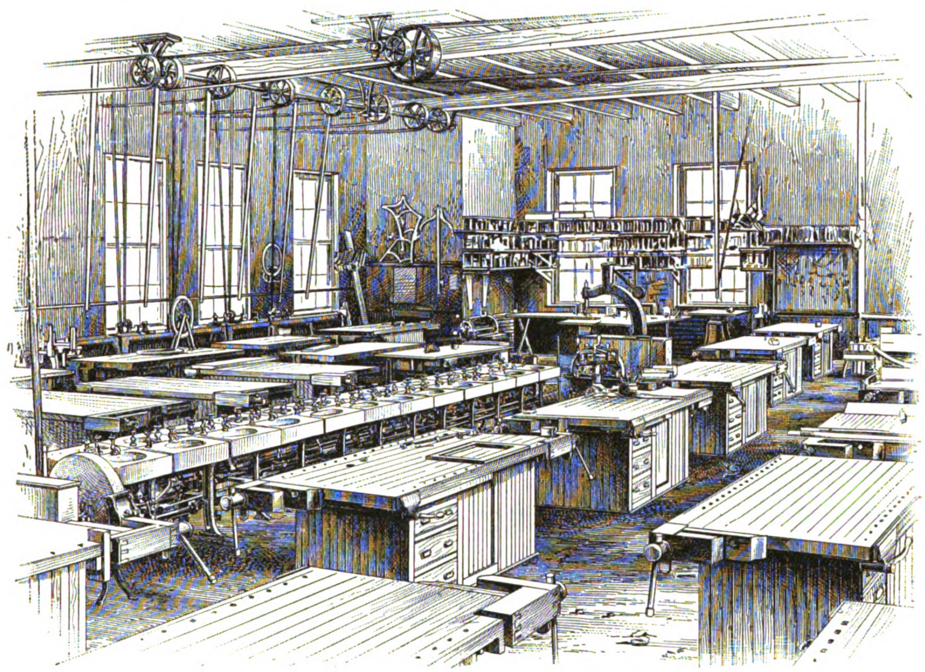
IN many sections of the West, and especially in the city of Chicago, manual training is receiving considerable attention at the hands of the public school authorities and business men, with the result that at the present time there are several institutions where young men are instructed in the elementary branches of carpentry and allied trades. The object is not to conflict in any way with the trades unions, but is designed to assist and aid to a better understanding of the relations between employer and employed, as well as to render young men more proficient in the branch of work which they may choose as a means of livelihood. In the public manual training school in the city named as many as 330 young men between the ages of 15 and 22 have been enrolled, and the number is showing each year a decided increase. The pupils are not only residents of the city, but come from adjoining as well as remote States for the purpose of attending the school and enjoying the benefits resulting from a course in the workshops of the institution. The course of study covers a period of three years and includes the high school studies and the sciences, interwoven with which is the course of manual training.

In the first year the student is instructed in freehand and mechanical drawing, the use of wood working tools in carpentry, joinery, cabinet work, wood turning and pattern making. There are also lectures delivered on wood as a material. Each student has a bench in the shop and a full set of tools, in the use of which he is carefully instructed and so trained that he may work entirely from working drawings, which he prepares in his drawing class. He is taught to saw, plane, bore, chisel and mortise; make all kinds of joints, glue and inlay. He is also instructed in regard to the different grades of woods, their strength, &c., how to use the lathe, and in the latter part of the year to make patterns from drawings prepared by himself. The carpenter shop is fitted with all the necessary apparatus and machinery required, and has accommodations for 95 boys in each class of two hours per day. In the illustration which we present herewith is represented an interior view of a portion of the carpenter shop. In the lathe room are 30 lathes, together with saws, emery wheels, &c.

In the second year of the course the students take up mechanical and freehand drawing, the use of iron working tools, the forge and foundry work, and attend lectures on iron as a material. The foundry is thoroughly equipped with all the tools and appliances necessary, and the students are instructed in making castings from patterns prepared during their first year. In the blacksmith shop there are 26 forges, with as many complete sets of tools. Here the student receives his ideas of iron and its uses, the method of welding, testing, making chains, tools, &c. It is stated that last year the students turned out 35 banquet and plain lamps, which they were allowed to take home on the payment of the cost of the materials used.

In the third year the student takes up the advanced studies and devotes a great deal of attention to mathematics in order to become proficient in his work. He is taught mechanical or architectural and freehand drawing, machine shop work and the management and care of machinery. The castings from the foundry are here finished and put together. In the architectural classes the students are required to design and draw the plans, front and side elevations and perspective of a house. The designs selected range from buildings from four to six stories high and from 50 to 85 feet deep. The student is also instructed in the use of water color, and wood carving has been added to the course of instruction.

The Young Men's Christian Association of the city have taken up the subject of instructing the youth of the city in manual work, and have had full classes in mechanical and architectural drawing, as well as in the various trades. There are several smaller schools in the city where bricklaying, masonry and plumbing are taught by competent instructors. The public generally, and the master builders particularly, are in hearty accord with the schools in the West, and the results accomplished are encouraging and gratifying in many ways.



Chicago's Public Manual Training School.—Interior View of the Carpenter Shop.

House Painting Two Hundred Years Ago.

In 1671 it was agreed that the wainscot in the hall of the Carpenter's Company should "be handsomely painted, and the walls above the wainscot on the south side hung with painted cloth of some neat painting work suitable to the front side," says an English writer. A French traveler in England in 1672 remarks that "the houses of Canterbury are well built and painted after the Dutch fashion." For many years after 1700 the following description from a work of the period will convey some idea of the extent of painting practiced: "Outdoor painting for doors, shop windows, window frames, pediments, architraves, friezes and cornices and all other exposed timber work ought at first setting up to be primed with Spanish brown, Spanish white and red lead (about a fifth part) to make the other two colors dry, ground in linseed oil; then again with the same color, only whiter; and lastly with fair white made of lead, and about a fifth part in quantity (not weight) of Spanish white." "Wainscot color," "white color," and "walnut color" are enumerated; also, "ordinary branched painting" and "plain japan, either black or white." On considering this recital of painters' work we may assume that these wainscot and walnut colors were used for the purpose of making wood work resemble those woods.

An interesting account has lately been published of a lady of rank who in 1612 or 1613 appears to have entirely changed the fashion of the arrangements of houses in France, and to have been the first who painted rooms in any other color than red or tawny. The next and last item in the description is "whiting and coloring on plasterers' work." The combined use of "color" (distemper) for interior work, down to so late a period as 1700, accounts for the extensive use made of it in our churches.

It is clear that from about 1700, oil paint became a disguiser of materials, and we know from his own description that the interior of St. Paul's Cathedral was painted under Sir Christopher Wren's direction. In a work of 1703 the contrivance of closets in most rooms and painted wainscot are mentioned as two great improvements.

Perhaps the first intimation of oil paint being used to a large extent internally is in a "Compendium" of 1721. It states that the taking of the dimensions for painters' works within doors is the same with that of joiners, by girtings about the moldings and members of cornices, &c.; but the painter never requires work and half work as the joiners do, but reckons his work once, twice or thrice primed or colored over. Wood in his "History of Bath" says "that about 1727, if the walls of any of the rooms were covered with wainscot, it was with such that was mean and never painted;" as the new buildings advanced the rooms were all wainscoted and painted in a costly and handsome manner. Ware, in 1767, writes that "fir, as it is cheap and works easy, since the use of paint has become so frequent, has in a manner superseded all other kinds." In the descriptions of buildings given at the end of his work he specifies that the walls are to be rendered and fronted for hangings, and paints all the wainscoted rooms a "common or stone color" three times in oil. In 1775 a large mansion in the country is stated to have paper to the ground floor rooms, while the walls of the bedrooms, garrets and basements were limewhited. And at the beginning of the present century, says a later writer, the houses of traders and middle classes, particularly in the provinces, were chiefly adorned with simple washings of rose pink, whitening and size. A friend, now in his eighty-fifth year, remembers the lining to walls being left unpainted, and much of the wood work even to the rooms connected with the Houses of Parliament was also of plain deal. The plastered walls of houses were colored, the sashes painted white, the door skirtings and other parts generally black. Several people can no doubt recall many houses in the country still exhibiting this ancient style of ornamentation. Thus we may conclude that house painting, or, as it has been very descriptively termed, the "three coats and flat work," did not come into fashion until about the period of William and Mary and Anne, up to which time either coloring by distemper or whitewash had been in vogue for plaster work, leaving inside wood work more or less untouched.

Classic Hearths.

The fire place was considered as the highest member of an altar, says a writer in a recent issue of the *Architect and Contract Reporter*. Used by itself it possessed the same sacred character, being among the Romans dedicated to the Lares of each family. It was, nevertheless, made subservient to all the requirements of ordinary life. It was sometimes constructed of stone or brick, in which case it was elevated only a few inches above the ground and remained on the same spot; but it was also frequently made of bronze and it was then variously ornamented and was carried continually from place to place. One found at Caere, in Etruria, is preserved in the British Museum. In Aristophanes (Achar, 888) persons are told "to bring the brazier and the fan." When a brazier was brought to Alexander the Great, scantily supplied with fuel in very cold weather, he requested to have either wood or frankincense, giving his host the option of treating him either as a man or a god. In the time of the Roman emperors the brazier of burning charcoal was sometimes brought to table with the meat for the purpose of keeping it hot, so that, as Seneca says, the kitchen accompanied the dinner. In accordance with the sentiments of veneration with which the domestic fire place was regarded, we find that the exercise of hospitality was at the same time an act of religious worship. Thus the roasting of a hog in the cottage of the swineherd in the Odyssey is described as a sacrifice. To swear "by the royal hearth" was the most sacred oath among the Scythians. Suppliants, strangers, all who sought for mercy and favor had recourse to the domestic hearth as to an altar. The phrase "Pro aris et focis" was used to express attachment to all that was most dear and venerable. Among the Romans the focus was placed in the atrium, which in primitive times was their kitchen and dining room. There it remained, as we see in numerous examples at Pompeii, even after the progress of refinement had led to the use of another part of the house for culinary purposes. On festivals the housewife decorated the hearth with garlands; a woolen fillet was sometimes added. In farm houses the servants, who were often very numerous, were always disposed for the purpose of taking their meals around the hearth. The focus, though commonly square, admitted of a great variety of forms and ornaments. At Pharae, in Achaia, a marble hearth was placed before a statue of Mercury in the forum, having bronze lamps fastened to it with lead. To adapt the focus to culinary purposes a gridiron, supported by four feet, was placed over the fire so as to hold pots and pans as well as steaks, chops and other pieces of meat which were to be roasted. Some of the braziers found at Pompeii also include contrivances for boiling water.

Refrigerated Office Buildings.

A correspondent writing from Washington to one of the New York daily newspapers suggests the following scheme for keeping office buildings cool in summer: In view of the fact that architects plan buildings and fit them with appliances so that they may be warm in winter, why would it not be quite as much in their line so to construct buildings that they would be cool in summer? I might suggest, for instance, that in erecting, let me say, a ten-story building, it be built with a court in its center 20 feet square, with windows and doors opening into it on every floor. Now, at the top of this court put a fan like the ordinary electric fan, only larger, say 19 feet in diameter, and start it going at 1000 revolutions or so a minute. This would create a draft that would make office life in summer in such a building quite worth living and would be a decided improvement upon the small individual fans now in use. The court might also be used as the elevator shaft, or such part of it, at least, as the elevator might occupy. What's the matter with that sort of an office building?

HINTS ON WOOD CARVING.*

By CHAS. J. WOODSEND.

In classic architecture there are several kinds of acanthus leaves employed, and although the general outlines are much the same they differ greatly in the matter of details. The acanthus leaf, which forms the subject of the present article, is suitable for a Grecian-Corinthian capital. The background for this is flat, and consequently it can only be used upon a pilaster, as for a column it would require to be somewhat modified. In the first place works perfectly smooth and plastic. In addition to the tools and clay there will be required a bowl of water in which to dip the tools and fingers, and also to occasionally moisten the work; a piece of wire bent U-shape with one long leg, and a flat piece of board upon which to do the work. Take a piece of clay and place it upon the board, working it with the fingers until somewhat resembling the shape of the leaf. Then insert the wire and gradually

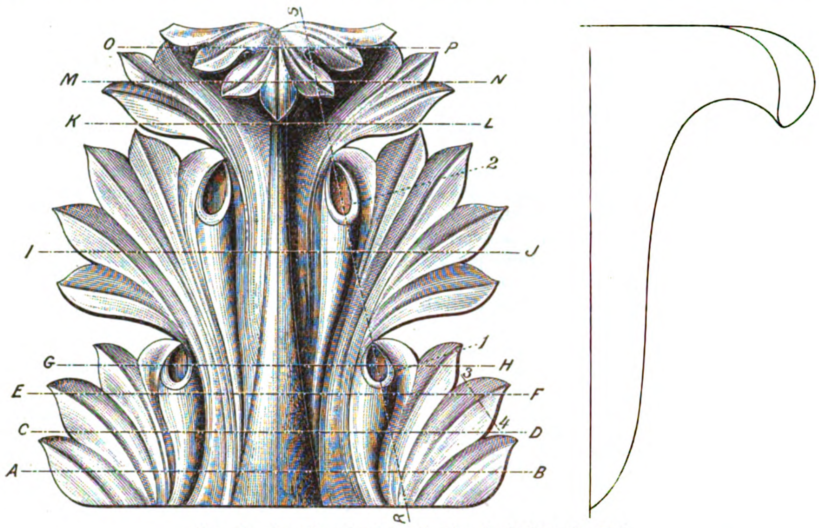


Fig. 85.—Acanthus Leaf for Grecian-Corinthian Capital.

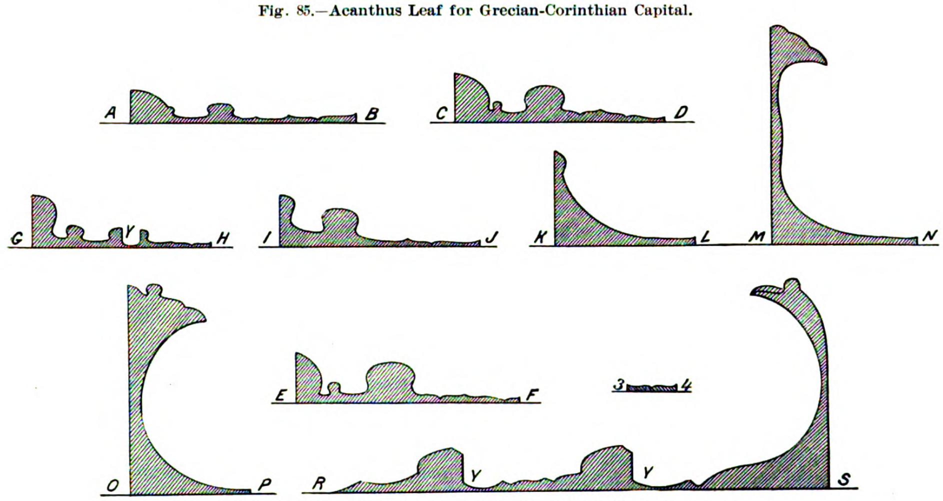


Fig. 86.—Various Sections of the Leaf taken on the Lines Indicated.

Hints on Wood Carving.—The Acanthus Leaf.

decide upon the size it is proposed to have the carving, and prepare full size drawings of the plan, profile and sections. Before proceeding to cut the figure in wood it is advisable for the student to model it in clay. It will not be wasted time by any means, for in order to be a successful carver a knowledge of modeling is absolutely necessary. The tools required may be made by any one out of pieces of thin steel and wood, old clock springs being about as good as anything for this purpose. The tools may be made as required, for they do not need to be elaborate; in fact, a considerable portion of the work can be done with the fingers alone. The clay for the purpose can be purchased at any pottery, or if there is not one near it may be secured from a brickyard. If obtained at the latter place, however, it must be ground over again, which can be done by running it two or three times through a coffee mill until it build up for the overhang. It will be necessary to place a few small pieces of wood across the top of the wire in order to carry portions of the work, these pieces being built in as the work proceeds. In modeling in clay it is best to gradually build up the work, for if starting with too much clay at once an endeavor to press it into shape may cause one part to be pressed to the required outline, while other places will be pushed out so that they will require to be scraped and shaved off. As the work proceeds take the measurements from the drawings already prepared, using for the purpose a pair of calipers. Keep the clay well moistened, for if it becomes dry before the figure is finished it will be spoiled. After the figure is modeled place it in a rather moist situation, or at least in the shade, so as not to dry out too quickly at first. Afterward it may be placed in the sun or dried out in an oven.

In starting to cut this figure in wood, proceed as with

* Copyrighted, 1894, by David Williams.

other designs already given. Saw out according to the general outline and glue upon the background. It is proposed to work from the clay model, as by having that before the eye the different shapes of the piece can be noted and measurements can be taken wherever desired as the work goes on, without depending on any settled point, as would be the case if a drawing was employed. After the piece is glued upon the background, rough out according to the general contour, leaving the upper side of the overhang for later consideration. Work the central rib or stem of the leaf and then the swelled parts upon each side of the rib. The central rib and the swelled portions of the leaf, it will be noticed, are slightly undercut. Let it be understood that when reference is made to working any portion of the figure it is not intended to mean that it be worked to a finish, as that in this case is impossible; neither is it desirable unless it is spoken of specifically. All that is required in the early stages of the work is to get the general outline of each member and gradually work down to a finish. The outlines may be and are better traced—that is, cut with a small veiner, running a gouge around afterward, and working alternately with the veiner and gouge until the requisite depth is obtained. Shave down those portions of the leaf that are just below the overhang and then work the under side of it, working these portions of it alternately as required and to a finish. It is well to bear in mind that the finishing must be done with the gouges and chisels, and without the aid of scraper or sand-paper. It is well to measure every part as the work proceeds and compare it with the clay model.

The next part to be worked is the upper portion of the overhang, and this may be carried to a finish, after which the central and lower portions of the leaf are taken in hand, gradually working them down to a finish. Those portions of the swelled parts of the leaf between the two nearly parallel lines indicated by the arrows, and numbered 1 and 2 of Fig. 85, are cut with a very flat gouge, convex side down, and slightly hollowed in the longest diameter. The center parts are removed, that is, cut out, as shown by the letter Y upon the sections on lines G H and R S. One thing to which it is desirable to call attention especially is the shape of those parts of the leaf which finish at the points. A section upon the line 3 4 is presented in Fig. 86, being twice the size of that indicated in the previous figure. What it is especially desirable to notice is the outer edges, which are hollowed inward slightly, and which are carried along so as to sharply define the dividing line between the different portions of the leaf. This will be seen by studying the section taken upon line A B. All must run in the directions indicated by the lines upon the general view shown in Fig. 85. The veinings are run out with a veiner and the edges slightly rounded with the concave side of the gouge. For cutting the figure here shown two additional gouges will be required. One must be a flat sweep and the other a medium sweep, both short bent. The widths will be according to the size of the work.*

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

(To be Continued.)

PORTABLE STORE FRONT.

NO small portion of the work which the architect and the builder is called upon to consider in the course of a year is in connection with alterations or the remodeling of structures, presenting in numerous instances problems of great interest to all connected with building operations. In this city not long since a concern occupying a large store desired on account of increasing business to obtain more space for the display of their goods, and to do this it was decided to dispense with the central store window by removing the sash and substituting a series of portable sash doors with movable mullions, so that the whole central portion could be thrown open for the entry and exit of customers, while at the same time giving a more extensive view of the interior of the store and its contents. The work was carried out according to plans prepared by Owen B. Maginnis, and consisted of a system of three pairs of detachable sash doors which were made to correspond both as regards size and design with the doors used in the other portions of the store. These doors were hung to movable posts, or mullions, by means of broad loose joint hinges. They were fastened at night by a spring bolt at the top, the bolt being placed on the right hand doors. On the bottom wrought spring bolts were used, fitting into holes bored in the cast iron saddle. The movable mullions were of ⅞ inch oak, solidly glued and nailed to white pine cores or centers, and having a continuation at the foot which fitted into mortises cast in the saddle. At the top a peculiar form of joint was necessary, and it was found best to allow the pine core to run up 1 inch behind the outside casing on the transom, and by loosely mitering the outside casing on the mullions with those on the transom the mullions would drop into their place perpendicularly. The core formed a stop in addition to that produced by the beveled inside casing on the mullions. The top ends of the mullions were kept from falling out when weighted by means of a spring joint bolt with which each door was provided, thus rendering them fixed or movable as desired.

Plan for a Great Chicago Tower.

If the mammoth tower which a local company want to build in one of the Chicago parks is ever completed it will surpass even the great Eiffel Tower of Paris.

At the last meeting of the West Park Board the tower company, in the person of D. R. Proctor, the president, proposed to erect the structure in one of the West Side parks, preferably in the trotting circle at Garfield Park, just south of Madison street. The company asked a ten-year lease of the premises, expecting their remuneration from the crowd of sightseers. The proposition was referred to the Committee on Improvements and will be acted upon at the next meeting of the board.

The proposed tower is to have a base 450 feet square. It resembles the Eiffel Tower in general appearance, standing on four widely separated legs. The total hight to the top of the iron work will be 1150 feet. The plans call for seven landings, with a total capacity for holding 40,000 people. Fourteen elevators are to be used to the fourth landing, the three remaining points of view being reached by stairways. The first landing is planned to be 225 feet from the ground and 225 feet square. The second landing, reached by four elevators from the first, will be 450 feet high and 125 feet square. The third landing will also have four elevators running and will be 75 feet square, 675 feet from the ground. The last main landing, reached by two elevators, is to be 1000 feet from the ground and 50 feet square. The last point of view is to be 1060 feet from the ground and 25 feet square.

At the top of the tower are to be placed powerful search lights and a telescope. On the various floors will be restaurants and theaters, with a variety of amusements. The machinery connected with the tower is to be run by electricity. D. R. Proctor is the designer of the tower as well as president of the company proposing to build it. The cost is estimated to be $600,000.

The Ferris Wheel has been re-erected on the North side of the city, a short distance north of Lincoln Park, but will probably not be formally opened to the public until next spring.

An interesting fact in connection with the tall office buildings which have lately been put up or are now in progress of erection in New York City is that the owners are beginning to lease or purchase adjoining properties so as to preserve for their towering structures the benefits of unimpeded air and light.

Design for an Iron Roof.

Some time since we presented in these columns illustrations showing the method of constructing a timber roof of 62 feet span, and as being of possible interest in that connection we here give details of an iron roof having a clear span of 35 feet. The engravings show how the several joints are made, and include a detail of the glazing, these being some of the more essential features of the work

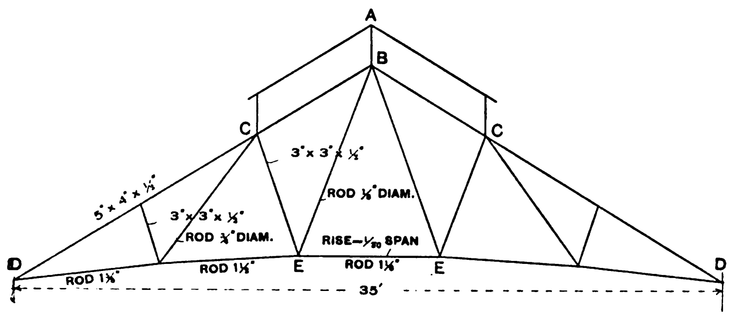


Fig. 1.—Elevation of Truss for Roof of 35 Foot Span.—Scale, ⅛ Inch to the Foot.

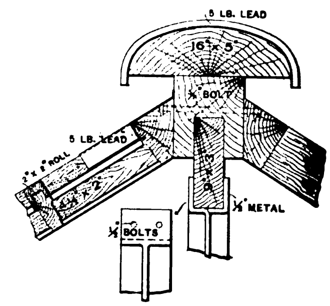


Fig. 2.—Detail of Joint at A of Fig. 1.

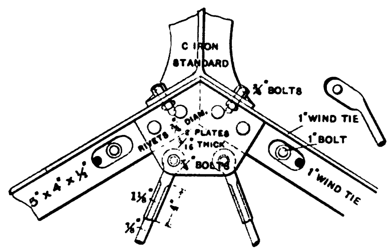


Fig. 3.—Detail of Joint at B.

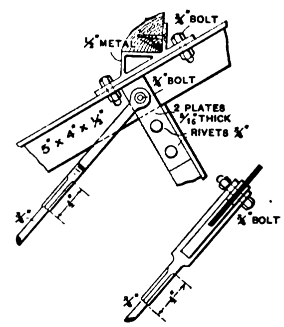


Fig. 4.—Detail of Joint at C.

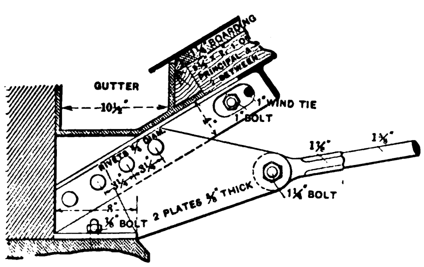


Fig. 6.—Detail of Joint at D.

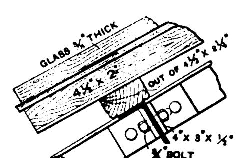


Fig. 5.—Detail of Glazing.

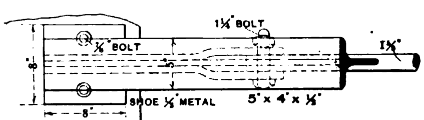


Fig. 7.—Top View of Joint at D.

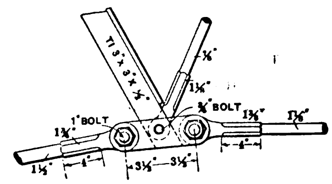


Fig. 8. Detail at E.

Design for an Iron Roof.—Details of One of the Trusses.—Scale, ¾ Inch to the Foot.

which are likely to interest the readers of the paper. The specification calls for the angle and T-irons to be capable of bearing a strain of 22 tons per square inch, and that for a flat, round or other shaped bars 23 tons per square inch. Fig. 1 of the engravings represents an elevation of the truss, Fig. 2 shows a detail of the joint at A, Fig. 3 a detail of the joint at B, Fig. 4 a detail of the joint at C, Fig. 5 a detail of the glazing, Fig. 6 a detail of the joint at D, Fig. 7 a top view of the joint at D, and Fig. 8 a detail at E E. A diagram of the truss, drawn to a scale of ⅛ inch to the foot, is represented in Fig. 9 of the cuts, while Fig. 10 represents a diagram of strains to a scale of 5 tons to the inch.

Test of Fire Proof Flooring.

An interesting public test recently took place in New York City of a system of so-called fire proof flooring. The test was made in an incomplete structure for a warehouse at Varick and Spring streets, under the superintendence of an architect employed by the manufacturers of the material. It was desired to put the new flooring in the building, but the City Department of Buildings would not permit it to be used until it had been thoroughly tested. The new material is designed to take the place of the hollow tiled flooring so extensively used in the large business buildings of the city. The bulk of the material used is 75 per cent. plaster of paris and 25 per cent. of wood chips. The preparation of the flooring is described as follows: Cables consisting of two strands of galvanized wire are twisted together and laid at right angles to the iron floor beams and 1½ inches apart. At the extremities the cables are fastened to the beams with heavy wire hooks. The composition is then molded around the floor beams and the cables so that all are covered and the floor itself is about 6 inches thick. Over this the wooden flooring is laid. The manufacturers claim for this system of flooring that it is fire proof, strong, elastic, durable and cheap, and that its weight is considerably less than brick or tile flooring.

In the first test pig iron, carefully weighed, was piled on an unconnected bridge of the flooring, laid from beam to beam, so that there was a weight of 350 pounds on each square foot under the iron. Under this weight the floor sunk $\frac{9}{16}$ inch. When the weight was removed the elasticity of the flooring drew it back nearly into place. Then the flooring was tested, so that weights of 700 and 1000 pounds a square foot—in some cases unevenly distributed—bore on it without breaking it. Finally an iron weight of 155 pounds was dropped on one spot of the flooring from a hight of 6 feet. It practically broke through the flooring on the seventh fall; when the weight was dropped from a hight of 10 feet it made a hole in the floor in the third fall.

Finally a fire test was made in order to demonstrate the fire proof qualities of the material and its efficiency in protecting the iron beams around which it was placed. A brick furnace was built under the flooring, and after an intense heat had been maintained in the furnace for over an hour the fire was extinguished. It was then found that the temperature of the protected iron beam had risen but 2 degrees and that the fire proof composition was virtually uninjured.

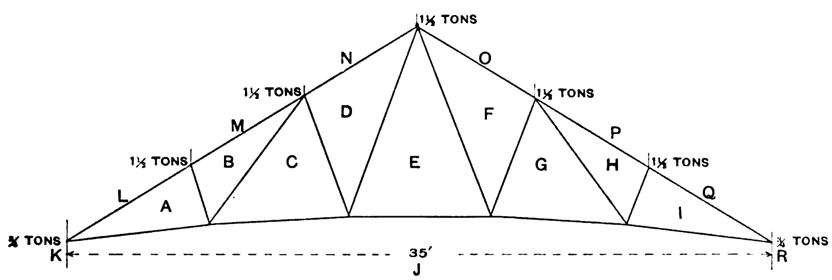


Fig. 9.—Diagram of Truss Shown in Fig. 1.—Scale, ⅛ Inch to the Foot.

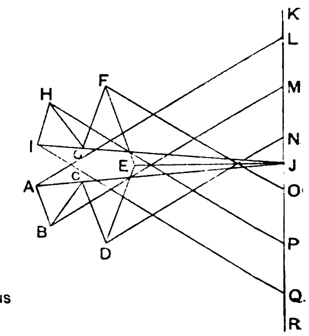


Fig. 10.—Diagram of Strains.—Scale, 5 Tons to the Inch.

Design for an Iron Roof.—Skeleton of Truss and Strain Diagram.

Windows and Rooms.

It seems a self-evident proposition, yet one that is continually disregarded, says Aston Webb, that the size of the windows must be regulated by the size of the rooms that they are intended to light, yet nothing is more common than this example, where three windows all of the same size, "to preserve the uniformity of the elevation" as the speculative builder says, light three rooms of totally different sizes, the result being that one bedroom is fairly lighted, the other is very dark, while the dressing room is so light that you hardly dare dress in it without the blind being drawn down, as you seem to be quite out in the open air. It is extremely difficult to lay down any law giving exact rules as to the proportion of lighting space necessary for a given room—much depends, for instance, on the position of the light. In the well known example of the Pantheon at Rome the building is amply lighted by a small circular opening in the roof. The cubic contents of this building are given at 1,934,460 cubic feet, and the area of the circular opening only 572 feet, or about one third the amount required had the lighting been from the side.

The rule said to have been adopted by Sir William Chambers is to add the depth and hight of the room together, and an eighth of the result will give the width of window. Gwilt gives, as a general rule, 1 foot super. of light in a vertical wall to every 100 cubic feet in the room.

Robert Morris says that the superficial area of the window should equal the square root of the cubical contents of the room. This, however, though no doubt approximately true, must evidently be open to large variations, according to the width of the street and especially according to the aspect and the climate, and the exact size of certain windows to suit certain shaped rooms can only be learned by observation and experience. The matter is one of the greatest importance, and cannot be too carefully considered. It should also be borne in mind that certain rooms will require more lighting than others; a drawing room more than a dining room, a dressing room more than a bedroom, and so on. And if this is carefully attended to (and, of course, taste and discrimination used), the elevation will be at least an honest and truthful one, and you will not find the principal windows on the ground floor lighting, as is often the case, a cloak room or a water closet.

Roman Masonry.

The ancients, according to Palladio, first squared and worked the sides of the stones which were to be placed one upon the other, leaving the other sides rough. The edges of the stones, being beyond the square, were then smoothed. But the roses between the modillions and similar ornaments of the cornice, which could not commodiously be done when the stones were fixed, were carved upon the ground. If the works were very great, as the Arena of Verona, the Amphitheatre of Pola and other buildings, to save expense and time, they worked only the imposts of the arches, capitals and the cornices; the rest they left rough. But in temples and other buildings which required nice work they spared no pains in the execution, glazing and smoothing even the very flutes of the columns and polishing them carefully.

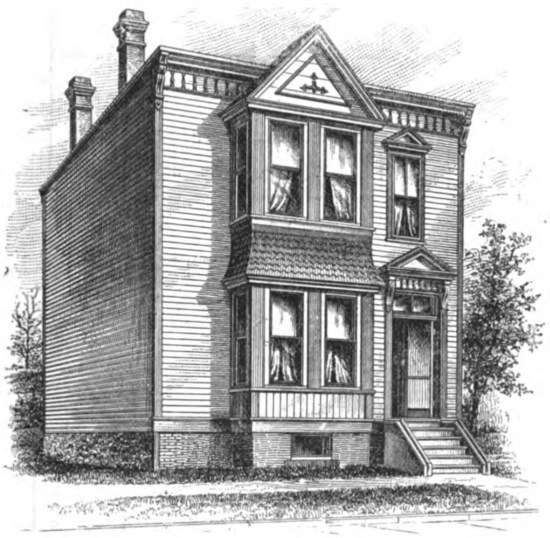
Underground Water Supply for a New York Building.

The contractors who are engaged in sinking the foundations for the immense store building for Siegel, Cooper & Co., on Sixth avenue and Eighteenth and Nineteenth streets, New York City, reference to which was made in these columns a month or two since, have struck several underground streams in their excavations. These streams are found to be branches of the Minetta Brook, well known in the history of old New York. It has been decided to utilize the water from these sources, and for this purpose a large steel tank will be placed below the surface of the basement floor, which is to be supplied by pipes laid along the beds of the streams. The water, which flows across the site from north to south, will be conducted to the tank, and partly filtered. The utilization of this water, and the consequent saving in Croton water rents, will, it is calculated, more than offset the great additional expense caused by the presence of water in the foundations, as the consumption of water will be very large in the building. It is believed that this will be the first large city building to be supplied by an underground stream. The water will be used to run hydraulic elevators, fill the fire tanks, flush the sidewalks and for many other purposes.

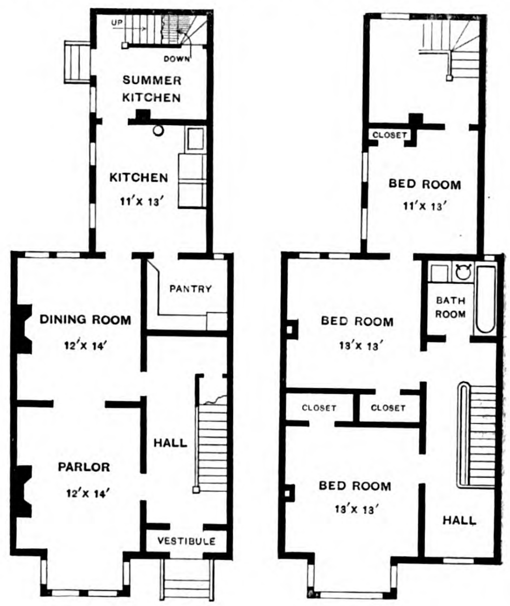
CORRESPONDENCE.

A New Brunswick Cottage.

From J. H. BURNETT, *St. John, N. B.*—I send photograph and floor plans of a cottage erected by me in this town, the design of the front being taken for the most part from one published in *Carpentry and Building* about six years ago. The floor plans show the arrangement of the cottage and may prove interesting to readers in other sections. The size of the lot upon which the cottage stands is 40 x 141 feet. The width of the house is 21 feet and the depth of the main portion 34 feet, while the ell is 12 x 24 feet. There is a cellar under the entire house. The hight of the cellar is 7 feet, the hight of the ceiling of the first story is 10 feet and of the second story 9½ feet. The dining room, as may be seen from an inspection of the floor plans, is 12 x 14 and the parlor the same size. In the kitchen are washtubs fitted with hot and cold water connections. The foundation walls of the cottage are of stone and the inside finish is of pine grained and painted. Each of the sleeping rooms on the second floor has a closet. The bathroom is wainscoted with ash and walnut, with marble top for the basin. The house faces east and every room receives the direct rays of the sun at some portion of the day. The sum of $2000 was spent in the erection of the cottage here shown.



General View of Cottage as Reproduced from a Photograph.



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

A New Brunswick Cottage.—G. H. Burnett, Builder.

Striking Out an Eyebrow Window.

From T. W. B., *Brooklyn, N. Y.*—Although not at present a subscriber to the paper I was one for several years and have since purchased it from dealers. I take the liberty of seeking information, or rather the elaboration of information already given. In the April issue, on page 96, in reply to a Chicago correspondent, J. H. Monckton presented a method of striking out an eyebrow window Now, while the article is plain enough for even a schoolboy to understand, I am at a loss to know the source from which he obtains his dimensions, such as, for example, the rise 21½ inches to 9 feet 11 inches in plan; the radius 4 feet 9 inches and the radius 36 inches. What relation do these dimensions bear to each other or are they mere matters of taste ?

Note.—In regard to the above inquiry Mr. Monckton furnishes the following: I would inform the questioner that all of the measurements in connection with the eyebrow window published in the April issue of the paper were governed entirely by judgment or taste, and may be subject to changes on account of pitch of roof, lack of space or difference of opinion regarding hight, spread of curve, &c. An agreeable form of this window cannot be produced without comparatively long flowing curves on the front, A E B, Fig. 1 of the illustrations in the April issue, and a similar curve from E of Fig. 2, the top of the window gliding into the pitch line of the main roof higher up at S. If, for instance, at the hight of this window, C E, the connecting curves are made much shorter the effect on the outline would be to give it a lumpy, ungainly look.

Plans for an Ice House.

From W. H. W., *Ridgebury, Pa.*—I would like some of the readers of the paper to give me the plans of an ice-house.

Note.—This is an interesting topic for discussion, and we trust those of our readers who have had experience in work of this kind will freely respond to the inquiry above. We would say to our correspondent that he may possibly derive some valuable suggestions from communications presented in issues of the paper for last year under the title of "Cold Storage Buildings." We would refer him especially to the issues for April and August, in which various forms of icehouses are described somewhat at length.

Warped Chimneys.

From E. W. H., *New York.*—Can any of the readers tell me why house chimneys that are in use, when built with flat sides east and west, soon lean toward the east, and when built with flat sides north and south lean toward the north ? I have seen chimneys that rose about 6 feet above the roof which, after several years of use, would be some 4 inches out of plumb in the directions mentioned.

Witness Marks in Timber Framing.

From W. H. F., *Alpine, Texas.*—Since I have been a reader of *Carpentry and Building* I have seen a great many things illustrated pertaining to different branches of the trade. I notice in the July issue sketches showing different witness marks in timber framing. I do not think that "Tramp's" methods are what any one should use, especially where a number of men are employed, for some will understand and cut them all right while others will not. I know from long experience that a foreman's time cannot be spent in explaining matters of this kind, so all marks should be as simple and short as possible. I think the method of "L. L. F.," Fig. 4, in the July issue is the only correct way that has ever come to my notice, and is one that I have used in my 20 years' practice. Tell the men to cut out all witness marks and that is all the attention it is necessary to give them. There will not be one mistake in twenty.

Design for Barn.

From C. R. V., *Shingle House, Pa.*—I send sketches of a barn in answer to the request of "O. G. P.," Elmdale, Kan. After drafting the frame measure down from the top of the plate 1 2 of Fig. 1 the distance the roof is to project and draw the line A B. From the center of the frame E erect a perpendicular. Lay the square on the line A B, place the 6-inch point at C and 12 inches to the right and draw the line C D. Turn the square on the line A B, with the 6-inch point at F, and 12 inches to the left draw the line F K. Set the dividers at B and C and describe the half circle C H G F. Divide it into four equal parts and

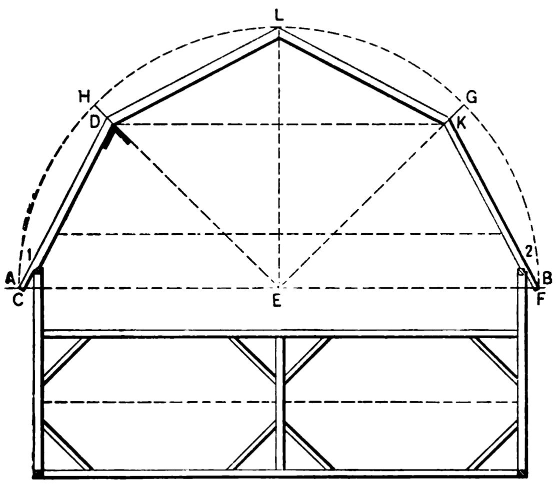


Fig. 1.—Elevation of One of the Bents.

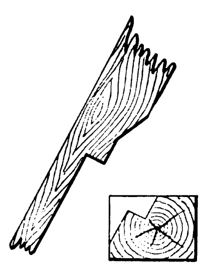


Fig. 2.—Foot of Rafter with Plate Gained to Receive It.

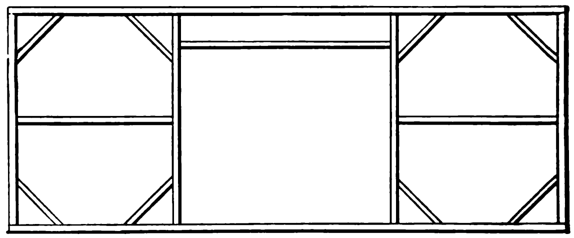


Fig. 3.—Front Framing Elevation of Barn.

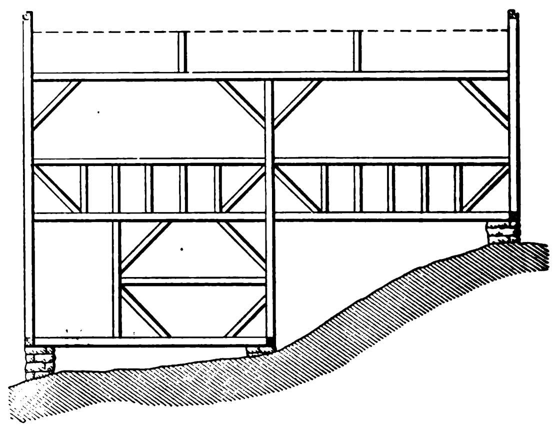


Fig. 4.—A Center Bent, Showing Stable in Basement.

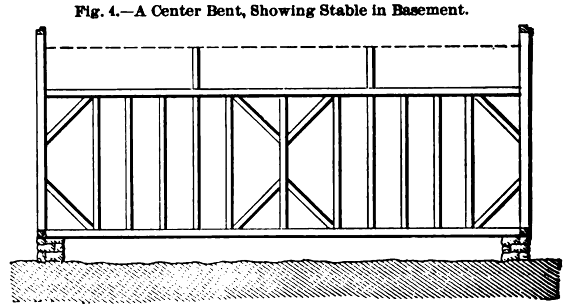


Fig. 5.—Framing of Stable Side of Barn when there is no Basement.

Design for a Barn.—Illustrations Made from Sketches Submitted by "C. R. V."

draw the lines E H and E G. Connect the point D with L and the point K with L. The cut at L is 6 on the tongue and 12 on the blade, the tongue giving the cut. The bevel set at D will give the cuts at D and K. For the bottom cut refer to Fig. 2, showing the rafter and gain in the plate. The dotted lines in Fig. 1 represent girts. The rafters are fastened together in the same way as described by "J. B. Y.," Peru, Ind., in the issue of *Carpentry and Building* for August, 1894. In Fig. 3 of the sketches I show a front framing elevation with space for doors 12 x 14 feet. Fig. 4 represents a center frame with basement for stable if built on a bank, the breast beam to be 3 feet 4 inches from the floor. The sketch shows the studding for sheeting. The dotted line at the top is a beam for loft joist over the floor 12 feet in the clear. Fig. 5 represents the stable side of the barn if no basement is used. The braces have 3 feet run.

Tools for Making Sash for an Eyebrow Window.

From TRIANGLE, *Stanwick, N. J.*—I have been a reader of *Carpentry and Building* for the last five years and have learned a great deal from the Correspondence Department. I have been much interested in the use of the slide rule and the letter of Mr. Monckton with illustrations relating to an eyebrow window. I should like very much to see published a description of the tools necessary for making sash for an eyebrow window. Will not some of the readers favor me in this particular?

Note.—In reply to the inquiry above, it may be stated that no tools are required for the work other than those found in a carpenter's kit. If the work cannot be conveniently cut out by means of a band saw, then a sweep saw will serve, and for finishing the sash the little molding—a straight bevel will answer—and rebate required on the edge can be readily worked by hand, using a small cutting gauge and a half-inch chisel.

Battery for Electric Door Opener.

From D. C., *Port Jefferson, N. Y.*—I have an electric door opener which operated satisfactorily on three or four cells Leclanche or dry battery, but will not work on the crow foot or curved battery unless I use from 40 to 50 cells, and even then they must be in good condition. Will magnets of greater or less resistance give better service? The door opener is of the Seil & Starke make.

Answer.—The crow foot battery belongs to that class of batteries possessing great internal resistance, hence giving a weak current, but able to do this continuously for a long time. They are not adapted to the work for which our correspondent is using them. Increasing the external resist

-ance would help matters in a measure, but would not make them work satisfactorily, as this type of battery is at its best only when working continuously. Consequently it can never be satisfactory for open circuit work. To obtain the best results the internal resistance of the battery should be no greater than the resistance of the circuit. We would advise our correspondent to use only batteries of the Leclanche type for his door opener.

Steaming Box for Exterminating Vermin.

From F. J. GRODAVENT, *Denver, Col.*—I noticed some time ago a correspondent wished to know something regarding a steaming box for bugs, and I therefore inclose blue prints of a box of this kind used at Fort Logan for renovating hospital and bunk bottoms. It was designed by Captain L. E. Campbell, Acting Quartermaster, United States Army. When first made the box was very much used, but of late it seems to have been retired. The steam pipe is $\frac{3}{4}$-inch and the holes about $\frac{3}{32}$-inch. The device was considered very effective in its work, as the steam entered all small places. It has, however, one disadvantage—it soon rusts the wires, but it is death to the bugs. Fig. 1 of the sketches shows the box open, Fig. 2 represents it in the same position, but with end and side removed showing a single bunk in place, as well as the relative position of the perforated steam pipes; Fig. 3, the method of securing the top when closed, while Fig. 4 is a section through the steam box showing two bunks in place.

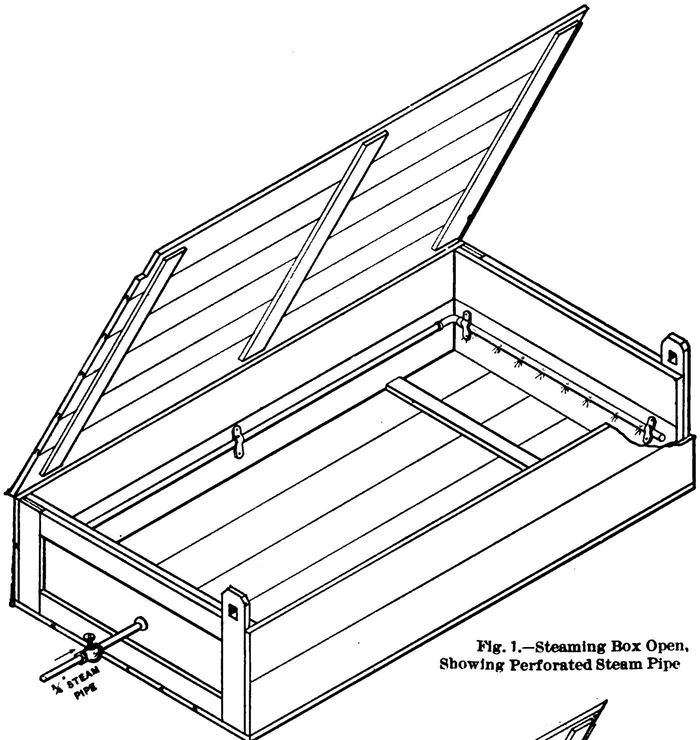


Fig. 1.—Steaming Box Open, Showing Perforated Steam Pipe

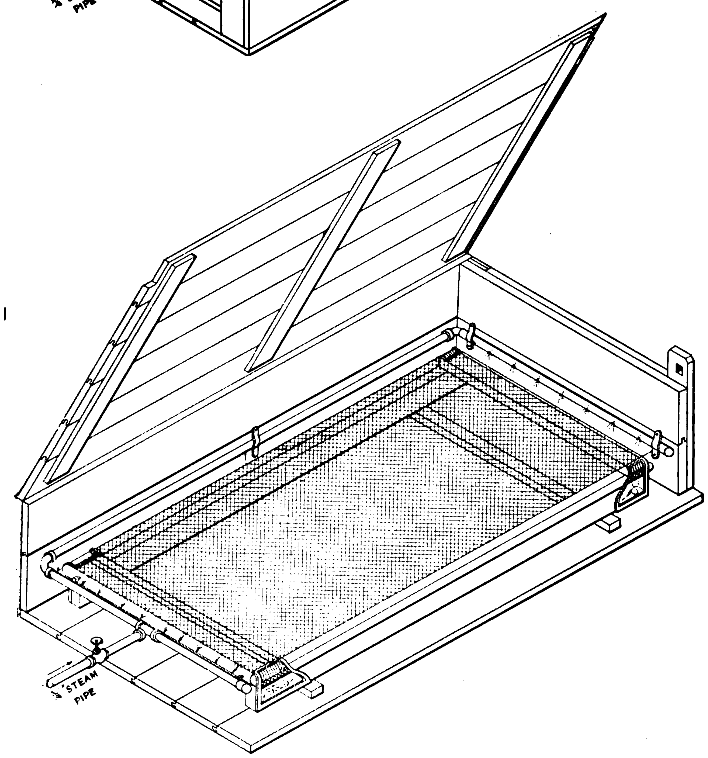


Fig. 2.—Steaming Box Open and having End and Side Removed, Showing a Single Bunk in Place, as well as Relative Position of Perforated Steam Pipes.

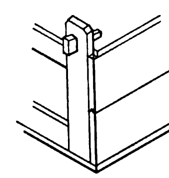


Fig. 3.—Method of Securing the Top when Closed.

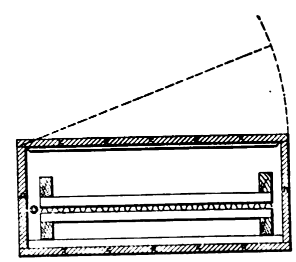


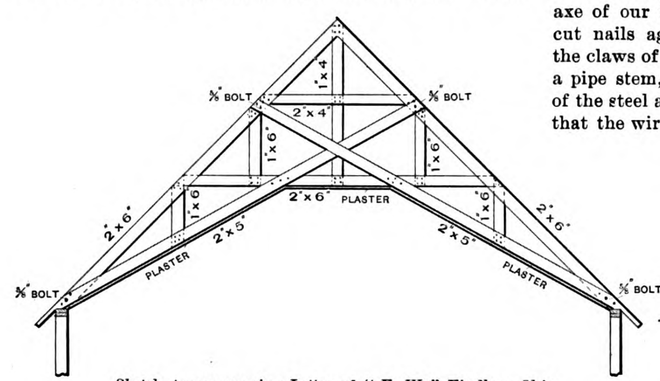
Fig. 4.—Section through Steam Box, Showing Two Bunks in Position.

Steaming Box for Exterminating Vermin.

High Pressure Water Heating.

From C. C. S., *Woodbury, N. J.*—Please inform me what is meant by high pressure water heating and what is meant by low pressure hot water heating.

Answer.—On all hot water heating systems an expansion tank is located at some point to receive the excess of water in the heating plant due to expansion when it is heated. In low pressure heating this expansion tank is open to the atmosphere, and no attempt is made to confine the water under pressure. In high pressure heating the expansion tank is hermetically sealed, leaving a space equal to one-twelfth of the bulk of water in the system for air in the tank above the water line in the system when the water is cold. When the water expands the air acts as a cushion and the pressure is proportional to the amount of space left in the air chamber, a small air space resulting in a high pressure and the pressure being reduced as the air space is enlarged. On such system a safety valve is always placed on the expansion tank at the top of the air chamber to permit the escape of air or water after the pressure has reached a given point. Some experience and skill are required in adjusting the pressure hot water heating system correctly, and the use of such systems is very small compared to what



Sketch Accompanying Letter of "F. W.," Findlay, Ohio.

is known as the open tank or low pressure system. In case of the safety valve being weighted too heavily or becoming stuck to the seat, higher pressure is liable to be developed in the system than was intended, and in some cases the system has burst with considerable force and damage. On the liberation of water heated to a temperature considerably above 212 degrees, owing to the pressure the water immediately turns into steam. Experienced men prefer the open tank or low pressure heating.

Self Supporting Roof.

From F. W., *Findlay, Ohio.*—I send herewith a reply to the letter of "H. H. R.," which appeared in a recent issue of the paper. I think, however, if all brother chips would let the wire nails rest a while and furnish more talk about floor and roof plans it would be better all around. I send a sketch of a self supporting roof which is 28 feet span. I put up one about a year ago, of 30 foot span, one-half pitch, although the roof would be solid with the same size timbers as marked on the sketch, even if the span was 36 feet. I plastered up the false rafters, placing the rafters 2 feet apart, and furred in between for lathing. The walls are 5-inch studding and ⅞-inch siding. The walls are just as straight and plumb to-day as when they were finished and as yet there are no cracks in the plaster. I hope the sketch will suit some one of the many readers sufficiently for him to try it, or else to spend his leisure time in picking out flaws in it. Let us hear from all. I think "H. H. R.'s" plan of a self supporting roof is a good one for small roofs, but I should like to have the question further discussed.

Iron Cut Nails.

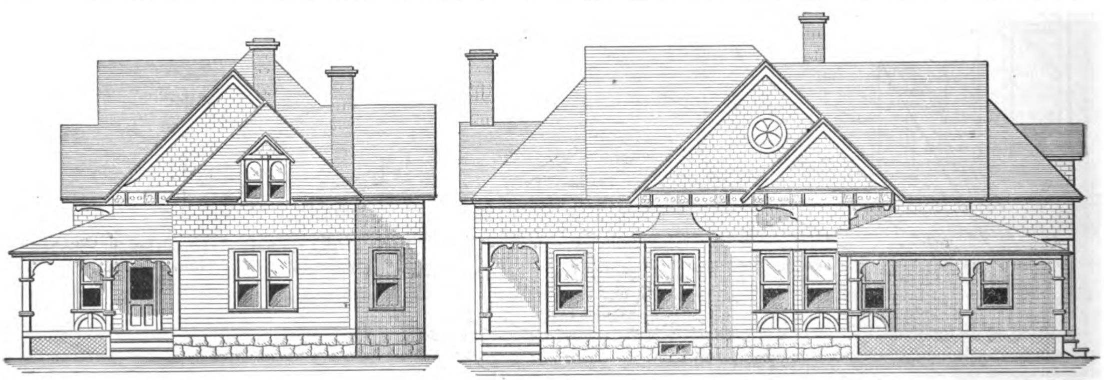
From D. G. R., *Sheldon, Iowa.*—In reply to the letter of "A. H. R." of Lostant, Ill., concerning the steel cut and wire nail question, I would say that I believe with the majority of carpenters that the lasting qualities of the steel and wire nails are far behind the old iron nails. Right here, however, I want to say that we might as well talk of resurrecting the old cycle or digging up the old broad-axe of our forefathers as to think of using the old iron cut nails again. I can take one of the old iron nails in the claws of my hammer and break it as readily as I could a pipe stem, and every one knows the breaking qualities of the steel and wire nails. My opinion on this subject is that the wire nail of to-day will last long enough for me or this generation. I commenced using these nails some ten or twelve years ago, and so far as I know none of the buildings that I helped to erect have fallen down nor have any of the roofs blown off through the rusting of the nails. I have sometimes met with a little difficulty in splitting when driving into hardwood or when driving close to the end of siding; but I think all nails do that more or less. I will content myself with the wire nail until aluminum becomes cheaper; then, perhaps, we can have nails made of that material. Let well enough alone, dear brothers, for I think that anything we can say on the subject will not stop the manufacture of wire nails nor resurrect the old iron nail.

Elevations for a Six-Room Cottage.

From G. L. H., *Torrington. Conn.*—In answer to "J. W. R." of Vandalia, Ill., who asks that some one present elevations for a six-room cottage, the floor plan of which appears in the issue of *Carpentry and Building* for July of last year, I send drawings herewith. They show the front and left elevations and will, I trust, prove of interest not alone to the correspondent inquiring, but to others as well.

Framing Hip Roofs.

From H. V. SWYNY, *Butte, Mont.*—In my opinion a good subject cannot be discussed too often for the benefit of the younger readers of *Carpentry and Building*, and roof planning is that subject. I am a regular reader of the paper and would not be without it if it cost $1 a month instead of 10 cents. I consider it the A No. 1 building periodical of the day, and is of as great value to the architect as to the builder. In the September number last year there was presented a system of roof framing by A. B. Campbell of Brandon, Manitoba, in which he suggests that if one is working from a drawing to do so with as few lines as possible. He concludes by saying: "I have shown in this figure that with the addition of three more lines everything necessary is indicated for setting out a hip roof, no matter what the pitch of it may be." He should have added, providing the plates are at right angles to each other. I submit the sys-



Front Elevation. Side (Left) Elevation.

Elevations for a Six-Room Cottage.—Scale, 1-16 Inch to the Foot.

tem by which I obtain all lengths, cuts and backing, and I think it will work, providing the building is a square or rectangular structure, but not if it is a parallelogram, trapezoid or trapezium.

Let us now proceed to lay out the plan of a hip roof, the four sides of which measure 24 feet respectively and are at right angles to each other. The roof, we will say, is one-quarter pitch. First lay down a horizontal line 12 feet long, as A B of the accompanying sketch. At B erect a perpendicular line of any length and set off on it the distance 12 feet, as at C, which point will therefore be 12

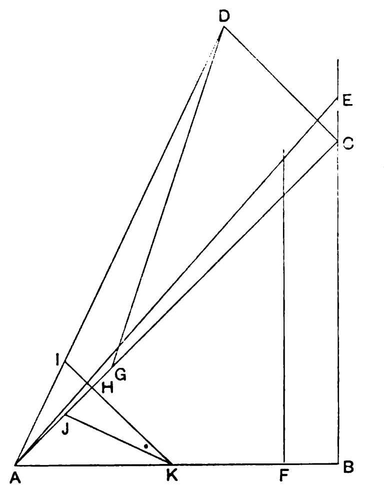


Diagram Submitted by Mr. Swyny of Butte, Mont.

feet from B, as B is 12 feet from A. The point C then gives the corner of the deck or end of the ridge pole, as the case would be, in a square or rectangular building. Connect A C, which gives the seat of the hip rafter.

The pitch is one-quarter, which means one quarter the width of the building—that is, 6 feet. Set up C D, the rise, 6 feet, at right angles to the seat of the hip rafter; then connect A D and we have the length, top cut and bottom cut for the hip rafter. Then transfer the length of the hip rafter from A D to A E, taking A for the measuring point, and E represents the place where the extreme length of the hip rafter will cut the continuation of the line B C. The line A E is the one which gives the length of the jacks, also the bevel cut for the same. Now, at a distance of 2 feet from the seat of the first common rafter B C establish on the plate the point F, setting up from it a perpendicular line until it cuts A E. This gives the center or working line of the first jack rafter and the bevel cut against the side of the hip rafter when the hip rafter is set up in place. If the jacks are set 2 feet on centers the second jack rafter will be 2 feet 3 inches shorter than the first, and so on down to the bottom of the hip rafter. The bottom cut for the jacks is the same as the bottom cut for the common rafter. Now lay off 12 feet from C on the seat of the hip rafter, which gives the point G. Connect G with D and we have the length, top and bottom cuts of the common rafter. Square across from any point on the seat of the hip rafter, as, for example, from H to K. Extend the line until it cuts the hip rafter at I. Transfer the distance I H to the seat of the hip rafter. Take H for a measuring point in both cases, which gives as a result the point J. Connect J K and we have the backing of the hip rafter. The whole operation can be performed with the steel square and a pencil. Mr. Campbell does not give the backing, and I claim that the roof is not framed unless the hips are backed. The practice of drawing back the hip until its corners at the toe are even with the plates is a bad one and throws the whole roof out of order. I employ in my system ten lines, and I think I have given all lengths, cuts and bevels. Mr. Campbell uses 16 lines, and says that with the addition of three more the plan will be complete. Now, will some of the readers of *Carpentry and Building* endeavor to knock off a few more lines?

Tar and Gravel Roofs.

From S. B. N., *Salem, N. C.*—Please inform me if you know how a roof of tarred felt and tar and gravel will stand in this climate. Which will be the best, one of this kind or one made of Worcester tin? I know nothing of the life of tar roofing and would deem it a great favor if you could furnish information on this subject.

Note.—It is suggested that if our correspondent lay four-ply Jowitt's carbonized string roofing felt well mopped between laps and cover on the top with a good coat of coal tar and rosin, half and half, and then cover with clean gravel that will screen through a ½-inch mesh wire screen, he will have a satisfactory roof.

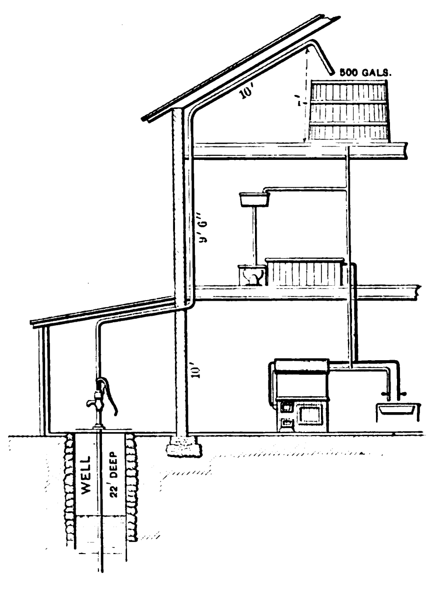
Varnish for Tools.

From M. R. N., *Washington, D. C.*—Please give me a receipt for varnish to keep bright tools and similar goods from tarnishing.

Answer.—A receipt given as a varnish for tools is as follows: Melt together 40 ounces of tallow and 2 ounces of rosin and strain while hot; apply with a brush to tools and it will prevent them from rusting. Another receipt described as a varnish for polished metal is to pound bleached shellac in a mortar and then put it in a bottle of alcohol, agitating the alcohol frequently until it has dissolved as much shellac as it will; then pour off the clear liquid. The metal surface is first warmed and the varnish applied to it with a brush, giving a transparent coating that will protect the polished metal.

How Can a Windmill be Attached.

From J. G. S., *Norristown, Pa.*—I submit the following sketch of the water works system in my house, and I would like to learn from the readers of *Carpentry and Building* some way to change the supply from a hand force pump to a windmill. I do not wish the windmill to be attached to the building, but wish it away from the house, yet I desire it to be attached to the same pump



How Can a Windmill be Attached?—Sectional View Accompanying Letter of "J. G. S."

without taking it out or going to any great expense. It is quite probable that some of the readers have solved a similar problem in the past and I know that their method will be of interest to more than myself alone.

Note.—We hope our readers will respond to the request of this correspondent, who, however, will also find some information that may be useful to him in *Carpentry and Building* for July of the present year.

WHAT BUILDERS ARE DOING.

THE month of September has been practically a repetition of August so far as any changes in the general conditions prevailing in the building trades of the country are concerned. No locality has had a marked increase or decrease in the volume of work being done, and there have been no serious differences between employers and workmen reported. The predictions in the midsummer review seem to have been well founded up to the present time, and there is little indication of any radical changes. Labor's holiday was becomingly celebrated by the workmen in the building trades in nearly all the large cities, and several organizations of contractors took advantage of the day as a good opportunity for an outing.

The principal topic of interest to the contracting builders who are members of local Builders' Exchanges is the annual convention of the National Association of Builders, to be held in Baltimore, beginning October 15. Certain proposed changes in the organic law of the association have made the convention of unusual interest to builders, especially those in the smaller cities, who have hitherto felt that their organization was too small or unimportant to become a factor in the national body. The proposed changes contemplate a reorganization upon such lines as will give to all exchanges a proportionate working share in the association and a corresponding benefit from its efforts.

Builders in exchanges as yet outside of the National Association are especially interested in the outcome of the convention.

Appleton, Wis.

The new Builders' Exchange of Appleton, Wis., is making excellent progress. It already has a membership of almost 50 members and many still knocking at its doors for admission. Among the names on the membership roll will be found nearly all of the mason contractors and all dealers in mason material in the city, carpenter contractors and lumber dealers, hardware and plumbing firms. The exchange has had some difficulty in securing rooms large enough in which to hold its weekly meetings, but the difficulty has been overcome by securing the second story front rooms in the new Tesch Building on Appleton street, where the rooms will be fitted up expressly for its accommodation.

Baltimore, Md.

The members of the Builders' Exchange of Baltimore are arranging the final details of the preparations for entertaining the delegates and others attending the ninth annual convention of the National Association of Builders. The various entertainment features have been so appointed as not to in any way interfere with the business of the meeting, and are such as to assure a most enjoyable time between sessions for all visiting builders. The following members of the Exchange have been elected to represent that body in the convention: Delegates, John Trainor, John F. Buckley and John E. Smith. W. C. Stewart, J. C. Doyle, and Joseph Lamb are named as alternates. Noble H. Creager, whose term as president of the National Association expires with the Baltimore convention, has been elected a delegate at large to the tenth convention. The Y. M. C. A. Hall has been selected as the place of meeting, and is spacious and centrally located.

Business among the builders continues good, and from present indications the outcome of the season's work will be satisfactory.

Boston, Mass.

The stability and influential character of the Master Builders' Association of Boston have been again demonstrated by further recognition of its standing, by the city authorities.

A joint standing committee on building laws has been created for the purpose of studying the laws with a view to their improvement, and to keep a watch over proposed legislation affecting these ordinances. The joint committee is made up of committees of the Associated Board of Trade, the Real Estate Exchange, the Boston Society of Architects and the Master Builders' Association, and the *personnel* is as follows: Representing the Board of Trade, B. B. Whittemore, E. Noyes Whitcomb, F. H. Viaux, F. N. Bardwell, and H. B. Shepard; the Boston Society of Architects, Arthur G. Everett, William G. Preston, E. M. Wheelwright, John A. Fox and John G. Stearns; the Real Estate Exchange, William Minot, Moses Williams, Luther M. Merrill, Albert Geiger; the Master Builders' Association, William H. Sayward, Ira G. Hersey, L. P. Soule, William N. Young and D. H. Andrews.

E. Noyes Whitcomb, whose name appears in the committee of the Board of Trade, is the president of the Master Builders' Association, being one of its representatives in the board.

This strong combination of leading men representing the trades and professions most interested in building is intended to prevent unwise additions to the laws and the imposition of needless burdens on real estate owners and builders, and also to defeat schemes to weaken the statutes in the interest of poorer construction.

The Master Builders' Association has been steadily pushing to the front among the business organizations, and now occupies a place second to none.

Names have been placed in nomination for the election of delegates and alternates to the ninth convention of the National Association, and it is anticipated that a party of about 50 members and their ladies will be present at the convention.

Just before September 1 the union steam fitters took action to secure an eight-hour day. The men struck, and declined to return to work until their demand was granted. Many of the employers were favorably disposed toward the shorter day, and in a short time those who at first declined to concede to the reduction consented to work their men eight hours only, and the men gradually returned to work. Although some annoyance was felt by the employers, the stoppage was not serious enough to greatly retard the progress of work. Everything is quiet in the other branches of the building trades, and the volume of business on hand is very satisfactory.

Bridgeport, Conn.

An interesting meeting of the Builders' Exchange of Bridgeport was held September 9. A matter much discussed of late by the members is the idea of holding a banquet, which, it is thought, would be an excellent means of bringing together all the members, and men who would make good members will be invited to be present. No date has been set. The union of trades for mutual protection and the general advancement of their interests are the objects for which the exchange exists. A member, in discussing the matter, said that manufacturers and wholesalers should protect the retail dealers, at the same time not advancing prices to the consumer. This protection can be secured if the wholesalers and manufacturers will strictly adhere to their trade and not to any retailing.

It has been decided that the admission fee to membership will be increased after October 1.

Buffalo, N. Y.

The Builders' Association Exchange of Buffalo has adopted the following resolution with regard to the place of meeting of the National Association next following the coming convention in Baltimore:

Resolved, That the Builders' Association Exchange of Buffalo, in meeting assembled, extend a hearty and cordial invitation to the National Association of Builders to hold its tenth annual convention in the city of Buffalo; and further

Resolved, That the delegates of the Buffalo Exchange to the ninth annual convention of the National Association, to be held in Baltimore, October 15, 1895, be instructed to use every honorable means to secure the said convention.

At the suggestion of Secretary J. C. Almendinger, the trustees decided that it was the sense of the meeting furthermore:

That in conveying this invitation the delegates desire to reiterate the request made at the seventh annual convention, held at St. Louis, Mo., Feb. 14, 1893, to come to Buffalo and assure the national body that, in case the invitation is accepted, we shall leave nothing undone to make the visit to our city one of benefit to every individual who shall become our guest, and we bid you one and all a sincere and hospitable welcome to the Electric City, assuring you that if we shall be your choice we will try to make your stay with us so pleasant that it will long be remembered by all participants.

The foregoing will be presented to the ninth convention by the delegates from the Buffalo Exchange, and unless the custom of seniority in the advancement of the first vice-president to president and the holding of the convention in his city is changed, the tenth meeting will be held in Buffalo, the residence of the present first vice-president, Mr. Charles A. Rupp. The following are the names of the delegates and alternates elected to the ninth convention: John Feist, J. J. Churchyard and M. McNamara, delegates, and George Duchscherer, F. P. Jones and William Schumacher, alternates; delegate-at-large, William D. Collingwood.

The annual outing of the Exchange was held on Labor Day, and proved a thorough success and most enjoyable occasion. The programme, as outlined in these columns last month, was carried out, and the committee having the affair in charge were deserving of the thanks of all who attended.

The threatened strike of the plumbers reported last month failed to assume the proportions expected, and everything is again quiet throughout all branches of the trade.

The amount of work on hand fulfills the predictions of the earlier season, and the total of the year promises to compare favorably with the more prosperous years of the past.

Chicago, Ill.

Chicago builders are of the opinion that business is improving a little, and that the season will close with more work on hand than was anticipated earlier in the year. The past month has been free from any general disturbance between employers and workmen with the exception of a strike of lathers for $3 per day. The men have been receiving all the way from $1.50 to $2.50 per day. The workmen in the several sections of the city combined and went out together. A number of employers conceded the demand, and it is expected that the others will have fallen in line by October 1.

The *Tribune* in a recent issue comments on the condition of affairs in the building trades as follows: Building operations in Chicago are better to-day than they have been for several months. This applies to all sections of the city, North Side, South Side and West Side, and to the suburban towns as well. The operations are far in excess of what recent building permits granted by the Building Department would indicate. Much building is being carried on under permits which were granted at some time prior to the present year, and holders of these permits were waiting for cheap material and cheap labor. This came with the opening of the present building season, and many contracts were made at rates which could not now be duplicated. Many of the contractors who made bids under the figures given them a few months ago now find it impossible to get material on those figures. There has been a decided increase in the cost of many kinds of building material, particularly iron, and in addition to this contractors are finding great difficulty in getting their orders filled. A number of the building contractors in Chicago who had made bids on work in prospect notified the persons receiving the bids that they would expire August 15. In consequence of this, contracts were closed at that date for a goodly number of new buildings, ranging from homes for workingmen to be erected at small cost to homes for the rich and to business buildings. Persons who contemplate building, and whose work is yet to be bid upon by contractors, are likely to find they have waited too long. They will find advances of from 5 to 50 per cent. in building materials, and a conservative estimate of the additional cost now over six months ago is put at 15 per cent.

Many of the buildings which are under way in which structural iron is being used are being delayed considerably by the nability of contractors to secure material from the mills. There is a building on North State street where operations have been suspended for three weeks, owing to the inability of the contractors to get iron. There is likely to be more delay in future in this particular than there has been during recent weeks. Many of the mills had turned out great quantities of structural iron during the dull season, which has been utilized in filling orders this summer. That is now about exhausted, and the great quantities of orders which have been sent by railroads for new equipments will monopolize the mills, so that when structural iron is turned out it will be done at an advance in price.

Detroit, Mich.

There has been little, if any, improvement in the building business in Detroit during the past month, and there is little prospect that anything like the activity of former years will be felt before next season. Relations between employers and workmen are undisturbed at present, and nothing of the nature of a serious difference is anticipated while the present quiet prevails. The union bricklayers at work on one of the public school buildings struck early in September, because one of their number had been discharged at the instance of the inspector. The union refused to sustain the action of its members on the ground that the inspector had in no way discriminated against union workmen by his action, and the men returned to work.

The masons' helpers of Detroit—that is, the mortar mixers, hod carriers, &c.—are highly incensed at Contractor Cotteral, who has, they allege, imported 14 colored men from Cincinnati to do that work on the new high school building. They are not alone in their denunciation of what they term an "outrage on Detroit citizens" by importing men to work on public work while so many residents of the city are idle.

Lowell, Mass.

The Lowell Master Builders' Exchange has elected the following delegates and alternates to the National Convention at Baltimore : Delegates, E. S. Foss ; at large, Charles P. Conant and Patrick B. Quinn ; alternates, George H. Watson, Frank L. Weaver and James Whittet.

No new building of moment has been undertaken in Lowell during the past month, and nothing has occurred to disturb the amicable relations between employer and workmen.

Milwaukee, Wis.

The Builders and Traders' Exchange of Milwaukee has been always to the front in taking a hand in affairs of general interest or welfare of the city. At the last monthly meeting the following resolutions were adopted :

Whereas, The members of the Builders and Traders' Exchange of Milwaukee are interested in the welfare of our city and proud of its record in the past ; and

Whereas, We favor any movement looking to the general success of its citizens in the future (which success will be shared by us) ; and

Whereas, There is a movement at present to celebrate the semi-centennial of the city in a manner becoming the metropolis of the great State of Wisconsin ; therefore be it

Resolved, That the members of the Builders and Traders' Exchange interest themselves in the work as a body to the extent of giving assistance in such manner as may be necessary to make the celebration so successful as to reflect credit on the enterprise and patriotism of our fellow citizens.

A committee, consisting of Henry Ferge, P. L. Peterson and Secretary Louis A. Clas, was appointed to solicit subscriptions to the fund, and it was expected that at least $1500 would be raised.

The delegates to the convention of the National Association have been instructed to invite the organization to consider Milwaukee as the next new applicant for the place of meeting. The delegates will urge the claims of their Exchange to recognition. It is expected that a large delegation will attend the meeting.

A special meeting of architects, builders and others, held recently in the rooms of the Merchants' Association to consider the amendment of the building ordinance resulted in the adoption of the following resolution :

Resolved, That a committee consisting of three members from the Builders and Traders' Exchange, two architects and two members of the Board of Fire Underwriters, be named to consider carefully the present building ordinance of Milwaukee and to make and suggest such changes as are necessary and proper.

The members of the Builders and Traders' Exchange are C. A. Sercombe, P. E. Posson and Henry Ferge, the two architects, Howland Russel and A. C. Clas, and the two members of the Board of Fire Underwriters are C. F. Hibbard and L. A. Wheeler.

One of the carpenters' unions has recently taken action to prevent the return to a ten-hour day, but seemingly without need, for the majority of the contractors are satisfied with eight hours, and there appears to have been no ground for the fear which actuated the union in question.

New York City, N. Y.

The condition of the building trades in New York City has been very satisfactory during the past month, and work has progressed with a remarkable freedom from disturbance between employers and workmen. Such differences as have occurred have been of trifling importance, and confined to individual cases. The five weeks' strike against the employment of non-union electric workmen on the Hoffman House was settled early in September by an agreement on the part of the contractors to discharge the objectionable men and employ union men only in future. Work had been practically suspended during the strike. Later in the month the arbitration committee of the Board of Walking Delegates held a meeting at the Building Trades' Club with a similar committee of the Electrical Contractors' Association for the purpose of adjusting several questions of difference and taking action with a view to preventing further trouble.

One of the contracting painters of the city who has for some time been paying less than the regular wages has finally signed an agreement to employ only union men and to pay $3.50 a day for plain painting and $4 for decorative painting, the union scale of wages.

A peculiar case of action against a contracting painter by a trades union has recently occurred. The contractor ageed to pay his workmen the union scale of $3.50 per day, but exacted through his foreman a rebate of 50 cents per day from his workmen. When the union learned of the state of affairs a warrant was procured and the contractor arrested. The work being done on a public building—the Normal College—the union scale of wages was required by law. A decision has not been made public in the matter up to the present time. An effort has been on foot for some time among the various trades unions of the city to secure some form of co-operation or organization which shall prevent the possibility of the constant quarrels among the unions, which now weaken their strength and destroy their power of concerted action. Several plans have been proposed, but as yet no general action has been taken.

The members of the Mechanics and Traders' Exchange are making ready for sending their usual delegation of representatives and visitors to the annual convention of the National Association of Builders. The proposed amendments to the constitution have been carefully considered, and the regular delegates are prepared to take an active part in the consideration of the questions involved. The following are the gentlemen who have been elected to officially represent the exchange during the proceedings of the convention : Delegates, Stephen M. Wright ; at large, John J. Tucker, John L. Hamilton, John J. Donovan, T. Hugh Boorman and Alexander Brown, Jr. ; alternates, Henry M. Tostevin, George J. Wills, William T. Ritch, Colonel George Moore Smith and Isaac A. Hopper. It is expected that a large party in addition to the foregoing will attend the convention.

At a meeting of the exchange, held September 3, an amendment to the by-laws of the exchange was adopted which provides that any person identified with the building industry desiring to avail himself only of the privileges of the floor of the exchange and appurtenances thereto, may, on payment of $12 per annum, in advance, become entitled to these privileges. A floor member has the same advantages as a regular member, excepting that he cannot vote at meetings, nor be an officer in the exchange, nor share in any of the funds or property of the exchange.

Philadelphia, Pa.

Nothing worthy of note is reported as having transpired in the building trades of Philadelphia during the past month. There have been no strikes, lockouts or other disturbance of a serious nature affecting the relations between employers and workmen, and present indications point to continued tranquillity throughout the remainder of the season.

The exhibit of the Master Builders' Exchange at the Atlanta Exposition includes a model of the City Hall tower, the miniature Japanese temple, photographs of prominent buildings erected by members of the exchange and specimens of the work of the pupils of the trades school. The committee appointed to take charge is composed of John S. Stevens, George Watson, F. M. Harris, John Atkinson, Charles H. Reeves and Secretary William Harkness.

It is said that November 14 will be "Pennsylvania Day" at the exposition, and that Governor Hastings and his staff will be present. The exchange is also invited to be there in a body on that day, and it is probable that a sufficient number of members to make a good representation will accept the invitation.

The exchange is preparing to send a good sized delegation to Baltimore to attend the national convention, in addition to the regular delegates and alternates whose names were printed in this department last month.

Providence, R. I.

General business conditions among the Providence builders continue very favorable, and the prediction that the total of the year would set a new mark appears to have been well founded. There have been no differences between employers and workmen of sufficient importance for notice, and the present amicable relations are likely to be preserved during the rest of the season.

The Builders and Traders' Exchange has elected the following members to attend the National Convention as official representatives : Delegates, Patrick Tierney and Spencer B. Hopkins ; alternates, Richard Hayward and Secretary William F. Cody ; delegate-at-large, Thomas B. Ross. The probable number of visitors who will accompany the delegates to Baltimore is yet uncertain, but a considerable party, it is expected, will attend.

Rochester, N. Y.

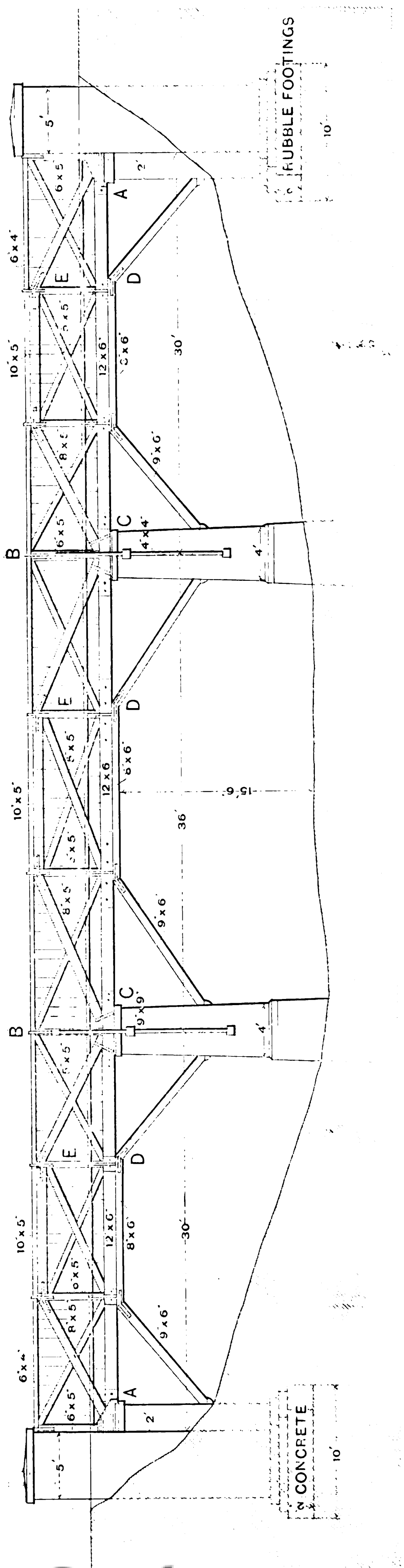
It is reported from Rochester that the building business is in good condition and free from labor troubles. The Builders and Building Supply Dealers' Exchange has been making careful examination of the proposed amendments to the constitution of the National Association of Builders to be acted upon at the coming convention, and the members have prepared themselves for taking an active part in discussing the proposed changes. The following delegation has been elected : H. H. Edgerton; at large, Fred P. Stallman and Justus Herbert Grant ; alternates, John Luther and J. J. L. Friederich. A number of other members will accompany the delegation.

San Francisco, Cal.

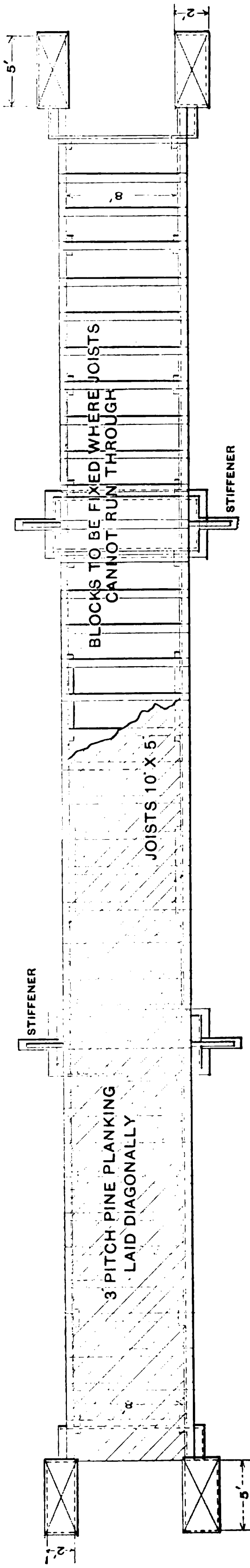
The attempt of the contracting masons of San Francisco to establish the custom of direct dealing with the owner instead of being sub-contractors to the carpenter builder, as referred to in the August number of this journal, is still an unsettled issue. The San Francisco *Report* in a recent issue comments on the situation as follows :

The Builders' Exchange is preparing to move from Post street to its new quarters on New Montgomery street ; but this fact is less interesting to members than a war which is imminent against the carpenters by the other master builders. About a week ago the carpenters decided not to bid for work on any building where the work was segregated, except in special cases. The other master builders interpreted this to mean that they were to be subordinated to the carpenters, and there is talk of open rebellion. The carpenters are said to control the organization of the exchange, but the other trades are now working to have a segregation of the bids and, if possible, will arrange to deal directly with the owner or architect. They expect to obtain the support of the sub-contractors.

The plumbers have for a long time worked under independent contracts, and the others think they can do the same. The present movement was begun by the masons, who say they



Side Elevation of Timber Foot Bridge.



Plan View of Bridge.

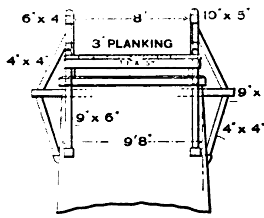
A Timber Foot Bridge.—Plan and Elevation.—Scale, 3-32 Inch to the Foot.

will take no work from a carpenter that amounts to over $500, and the plasterers will be the next to follow suit. If the carpenters who are members of the exchange will not come to their terms the other builders think they will be able to make a successful revolt. One of the protesting contractors said to-day that during the first seven months of this year 716 buildings were arranged for under 667 contracts as filed. Of these, members of the exchange obtained 306. He said this showed that the revolters would have a good field, even should the fight lead to their withdrawal from the exchange.

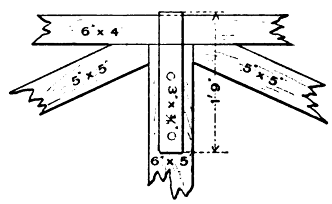
Wilkes-Barre, Pa.

A new organization was formed in Wilkes-Barre about September 1, known as the Builders' Exchange, composed of the most prominent contractors and builders.

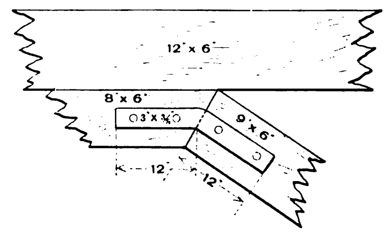
The objects of the organization are to collect and disseminate information among its members ; to improve the condition and advance the interests of all persons connected with the building interests ; to foster friendly intercourse among its members ; to secure honorable dealings with each other, employers and employees ; to establish such methods of business as will be just and honorable between man and man and promotive of the best interests of the organization ; to co-operate with the National Association of Builders in securing needed reforms and elevating the standard of the calling.



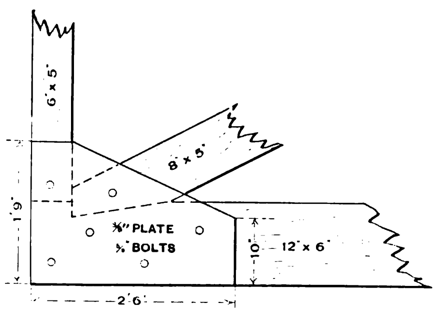
Section of Bridge.—Scale, 3-32 Inch to the Foot.



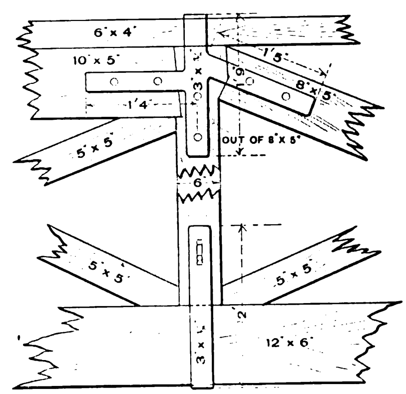
Detail at B.



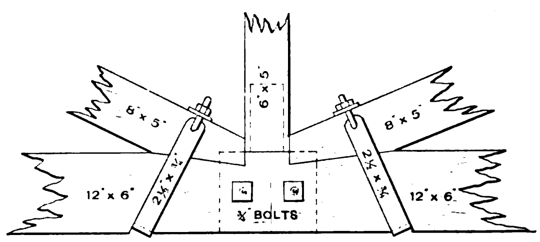
Detail at D of the Elevation.



Detail at A of the Elevation.



Detail at Joints E E E.



Detail at Joints C C.

A Timber Foot Bridge.—Various Details.—Scale, ¼ Inch to the Foot.

Any person engaged in business as general contractor may become a member.

The Builders' Exchange is located on the second floor of 13 South Main street. The question of a Master Builders' Exchange has been long talked of and much desired, but until recently no concerted action was taken for the formation of such an organization.

The members are convinced that such an organization would be of general advantage, for it must be evident to most people that in the erection of the larger modern buildings, with their many stories, faulty construction would result in menacing life and property, and to the end by reason of lectures by those eminent in the profession and a general interchange of views, the discussion of the higher branches of the science of mechanical arts, such interchange will meet a long felt want, resulting as it must in mutual benefit to all, and in a measure correct some, if not all, of the abuses perpetrated on those engaged in the profession from numerous sources.

Wilmington, Del.

The building business in Wilmington has hardly been up to the mark during the past season, although the contractors have been fairly busy. During the past two months nothing has occurred to change the character of the prospect for the rest of the season, and no serious difference between employers and workmen has transpired. The Builders' Exchange has pursued the even tenor of its way, and has elected the following gentlemen to attend the National Convention : W. H. Foulk and G. H. McCall. A. S. Reed is the delegate at large. Several members of the exchange intend to accompany the delegates to Baltimore.

Worcester, Mass.

The Builders' Exchange of Worcester has elected the following members as its representatives in the national convention : Delegates, Charles H. Vaughan ; at large, O. S. Kendall and George W. Carr ; alternates, Thomas J. Smith and F. E. Powers. The exchange is arranging to send as many members, as can spare the time as visitors to the meeting, and it is expected a good representation will be present.

Business among the builders remains in about the same condition that has prevailed during the past few months ; nothing in the shape of new work having been placed on the market. Everything is quiet between employers and workmen.

A Timber Foot Bridge.

One of the branches of the building trades in which a carpenter is frequently called upon to engage is the construction of timber bridges, and it is therefore important that he possess a thorough knowledge of the work in all its various phases, so as to successfully execute the most difficult job. As a general thing bridges of larger size are, at the present day, built of iron and steel with piers of solid masonry, but there are many places where a timber bridge will serve the purpose equally well, more especially if the spans are short and the bridge is intended simply for the passage of vehicles and foot passengers. A bridge of the latter character is illustrated in the engravings herewith presented, which show the plan, elevation and some of the more important constructive details. It will be noticed that in this case the spans are short, the shore ones being only 30 feet each and the middle one 36 feet. The dimensions of the various pieces of timber employed are marked on the elevation and details, which so fully explain themselves that extended description seems to be unnecessary. We therefore offer the design in the hope that it may serve as a suggestion to those having similar work to do.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

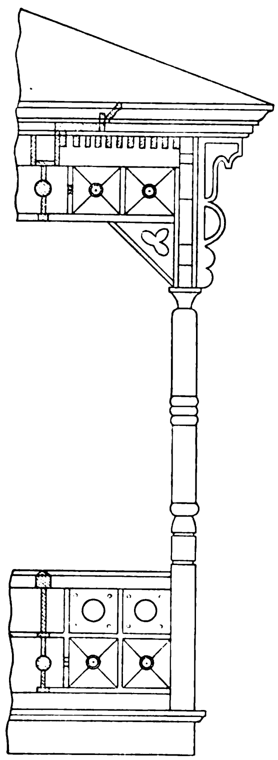
FOR a lesson in outlining which will present a few new features in drawing, the attention of the student is directed to Fig. 40, representing in outline the left side elevation. It will be noticed that this view of the plan presents an octagon end from the ground line to the eaves, finished with a square gable, the projecting corners being supported by large brackets. This is a form frequently met with in practice, and will therefore serve as a valuable lesson to those who wish to make a special study of the art of drawing. Beginners are liable to grasp the idea that an elevation showing an octagon design should be represented by drawing the side lines of the octagon on a slight angle, as shown by the dotted lines next to the ground line. If this were the case, then all the parallel lines on these sides would necessarily have to be drawn on the same angle from the ground line to the starting of the roof. Such a course as this would give the drawing a rather crooked appearance. It should be remembered that all horizontal lines shown in a direct face view of an octagon elevation are to be drawn straight across all sides as shown. The miter lines shown so distinctly in the perpendicular lines representing the corners plainly indicate the portion of the elevation having the octagon form.

We do not consider it necessary to give more than a brief description of outlining this elevation, believing it best to leave the greater portion for the study and practice of the learner. First draw the base line, set off the corners and then draw the perpendicular lines of the corners. Calculate the hight to the eaves and draw the bottom line of roof—not the cornice line, but the shingle line, for example. Next compute the hights of roof, gables, &c., and draw the outline of the roof. Locate and sketch the chimneys, then the cresting, finials, &c. It will be noticed that a comparatively small portion of the front chimney is visible in this elevation, for the reason that as viewed from the left side the roof hides a portion of the chimney. The same is also true of the tower, only a small portion of the top and the finial being visible from the left side elevation.

These points serve to show that the plan and corresponding elevations have to be carefully studied and watched during the entire progress of the work. In the sketch is shown a portion of the cresting, finished in order that the difference in the views from the right and left sides of the same may be distinctly seen, as in one view the tower appears in front of the cresting and the other shows what would be the exposed portion back of the cresting. These points will be plainly seen by comparing the Figs. 39 and 40. In outlining the gutter the lower portion is represented by dotted lines, because in the finishing the short perpendicular lines representing the small brackets should be drawn before drawing the horizontal lines between the brackets. This is plainly shown in Fig. 39.

After outlining the roof the next in order will be the cornice, such as the molding, frieze, &c. Some advantage can be taken by drawing the parallel cornice lines at the same time the eave line is drawn, as they are in close connection, and all that is necessary is to make proper calculations in doing the work. The next step is to draw the

Architectural Drawing for Mechanics.—Fig. 40.—Side (Left) Elevation in General Outline.—Scale, ⅛ Inch to the Foot.



Architectural Drawing for Mechanics.—Fig. 41.—Detail of Porch, Showing Method of Drawing the Different Members.—Scale, ⅜ Inch to the Foot.

base and water table lines which mark the division of the two stories so distinctly in this drawing. Next calculate the hight of windows to the bottom of sills and draw the lines which are to represent the bottom line of windows. From these lines set off and draw outlines of windows, as shown.

We think now that the details of outlining have been made sufficiently plain to enable any one to go to work in an understanding manner and complete the drawing. We would recommend that as a lesson for practice nothing could be better than for the learner to complete the unfinished work shown in Figs. 39 and 40 in a manner similar to the work shown by Fig. 38, using a scale of not less than ¼ inch to the foot. Fig. 41 shows a portion of the porch finished in detail to the scale of ⅜ inch to the foot. First draw the base and floor lines, then two perpendicular lines representing the column. Set off the hight from floor to bottom of frieze and draw the bottom line of porch frieze finish, which will give good starting points for all future calculations. From the bottom line of frieze finish the different parts may be readily set off to top of roof. From the floor set off the hight of the railing and draw horizontal lines first, spacing and filling in as shown. The turned portion of porch column may be easily drawn by spacing and setting off the hights of the different members as shown. The sectional parts show the general construction of the work. The spindles are ball turned and set between square upright pieces, as shown. For general practice we would suggest that such details be made on a scale of ½ inch to 1 inch to the foot. We have now passed through the several parts of the work of making a set of plans which bring to notice a very wide range of work in the art of drawing, and if the learner has thoroughly mastered the work thus far he is qualified for further advancement. Our next subject for consideration will be that of a store front design.

(To be Continued.)

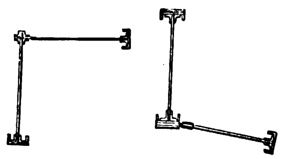
WIND BRACING IN HIGH BUILDINGS—III.

IN the discussion of the paper of Mr. Waite, a number of well-known engineers took part. George B. Post spoke of one difficulty, which may possibly arise from making a steel frame very rigid by knee bracing. In spite of the greatest care which can be taken in design it is almost impossible to be absolutely sure in all cases of equal settlement. Unequal settlement has occurred in some cases where the greatest care has been taken, and in such examples unexpected and severe strains might be brought on almost any part of the steel cage, which might have serious results. In case of a rigid steel cage construction, if the settlement in the wall at the side of an adjacent building should be much greater than on the other side the tendency would be to throw the whole burden of sustaining the pressure upon the adjoining building, or to make the building itself overhang the adjoining lot. If a building 175 or 200 feet high, with a steel cage inclosed by a few inches of outside brick work, should overhang a lot and an order of the court was procured to cut off that overhang, he would like to inquire what would be done with it and how it could be jacked up again?

He thought that the great danger in our present system of construction is from corrosion unless the greatest possible care is taken during the process of construction to protect the metal from subsequent alternate wetting and drying. He observed that steel cage construction put up without this proper care is dangerous, and believed that the time would come when there would be failures among these buildings from corrosion of important bearing parts. He had had long experience with both cast and wrought iron in connection with masonry; but a very small experience, of course, with steel, as steel is a matter of recent introduction in building construction. The first tier of beams of the New York Times Building, when he altered it, had been in position for at least 35 or 36 years. They were incased, not in plaster or in light arches, but in the heaviest kind of solid brick work. With the exception of the lower flanges of the beams, they were vertically incased in brick work; yet many of the beams were discovered to be so entirely destroyed by corrosion that the flange could be broken with the fingers. He also had had much experience in observing the way in which moisture will go through brick walls. He had built a great many tall buildings, and some not so high and with very thick exposed walls. In all storms the moisture penetrated through the northeast walls of the Mills Building, nearly 4 feet in thickness, and the water ran down on the inside face, although the wall was laid up with hard North River brick with Norton's cement mortar, and was as good a piece of masonry as he had ever seen, and it was not until this outside wall was painted that the water ceased to leak through at the particular place which was exposed to the storm.

He mentioned that these cases of corrosion were with wrought iron, but he believed that the danger would be much less with structural steel. He proposed to build steel cage construction, and also to use the utmost ingenuity of which he was capable to protect the iron structure, so far as possible, from the effects of alternate wetting and drying.

F. W. Skinner referred to the steps taken in recently constructed buildings to provide for wind bracing and instanced one where it was secured in many of the columns by solid plate bracket knees braced 2 feet on the side with two angles on each of the three sides of the web. In the Masonic Temple at Chicago, which has been built perhaps four or five years, there are two sets of sway bracing rods; the vertical diagonal rods of one system extending but one story, making the columns of one story and the two successive floor beams form the struts for each panel of wind truss. The panels of the truss of the other system cover two stories, with the screw rod diagonals intersecting at the center of the floor. The American Tract Society Building, in New York City, is over 300 feet high, and the only provision made for wind bracing, besides the rigidity of connections, consists of lattice girders 4 feet deep which surround the light well on one of the rear sides of the building at every story above the fourth. The building in plan is something like the letter U. There is in Boston a building 10 or 11 stories high which, in his opinion, involves a novel construction. It is wholly a plate girder construction; the corner columns are plate girders, and the intermediate ones are of riveted I section reinforced in the lower stories with plates and channels on thin flanges, which in some cases have uneven areas to correspond to eccentric loading. Each one of the four corners has a column, two of which are shown in cross section in Fig. 6. The webs are from 35 to 51 inches deep; there are six or eight angles, which are reinforced by channels on the outside; these form continuous plate girders from the pavement to the top of the building. In the heavy wall girders in the long side of the building there is a further provision not common ; in that allowance is made for the temperature expansion and contraction. The girders are web connected to bracket pieces riveted on the sides of the columns and have slotted bolt holes at one end; over the portal they are further strengthened by heavy bracket web plates.



Wind Bracing in High Buildings.—Fig. 6.—Cross Sections of Columns Used in a Boston Building.

W. H. Breithaupt expressed the opinion that the method of vertical bracing by means of knee braces at all connections of beams to columns, in the manner of the old style of wooden framing, has much to recommend it. Such braces should not be under the beams only, but across all four of the angles in the plane of intersection of beam and column. It is generally easily put in, and does not obstruct space; the objection to it is that under unequal loading it induces bending moments in the columns. Another method is to have in effect vertical webs, not at every panel point, but at alternate panel points, or further apart, as the case may require, extending continuously throughout the hight of the building, to the foundations. This bracing either of rods or stiff, should preferably extend directly across the panels. When this causes detrimental obstruction heavy gussets are required, and columns and beams must be reinforced for the ensuing bending moments. A frequent weak point in iron building construction is that the connections are inadequate.

G. Leverich pointed out that if the spaces inclosed by the vertical and horizontal members of the frame work be closely filled in with the materials comprising the outer and inner walls of the building, such, if sufficiently resistant, will serve as a means to transmit the diagonal stresses. Generally the outer walls should be detached from the frame work, and the inner walls must be placed and provided with openings, without regard to their possible work or efficiency as members of a composite structure. The other equivalent for diagonals to prevent deformation of the frame work is a system of braces connecting the horizontal and vertical members at their several joinings. A slight consideration of this device will show that thereby the beams and columns may be subjected to stresses transverse to their axes; in the former, perhaps, surely opposed by the dead loads they carry, but in the latter, tending to cause flexure and in uncertain degree thereby to disable these long vertical members from sustaining the dead loads imposed. Therefore, in conclusion of this treatment of the problem, it may be urged:

1. That the columns be substantially continuous from foundation to top, and the beams in each direction securely joined to them.

2. That diagonals be inserted in as many of the severa rectangular inclosed spaces as the case will permit.

3. That in all other spaces a brace be placed at each joining, dimensioned to inclose as large a triangle as practicable; also, that where this is done, the connected column be there proportioned to safely withstand the transverse as well as the axial stresses to which it may thus be subjected.

In practice, to solve the problem considered, the measure of the imposed forces must be known. The architect, builders and users of these buildings will fix with reasonable correctness the loads per unit of floor space to be sustained, and with these given, so soon as the design is outlined, the maximum vertical forces to be provided for may be computed with reasonable accuracy. Were these the only forces to be dealt with, a safe plan, consisting of simple vertical and horizontal members, could readily be made without the aid of an engineer. The measure of the horizontal forces, those due to wind pressure alone, and which make necessary the insertion of diagonal parts or their equivalents, is, however, yet indeterminate.

TREATMENT OF FLOORS.

THE treatment of a floor depends upon the use to be made of the room, but in any case the wood should be well seasoned and laid in narrow strips. For kitchens and sitting rooms raw linseed oil with hand rubbing or rubbing with the wax polishing brush is a good method of treatment. For a chamber where a brighter finish is desired after the first coat of oil take 2 parts of linseed oil, 2 parts of alcohol, 1 part of turpentine, and 1 ounce of ether to a quart of the mixture. Apply briskly with a rag and use as often as needed. The darkening of hard pine floors by oil may be obviated by first putting on a thin film of shellac on which varnish may be placed. The shellac preserves the brightness of the new wood, and what the oil in the varnish would darken. But on hard woods, such as oak and cherry, raw oil and a little turps and paste drier makes an excellent priming coat, being especially durable. Apply this to the raw wood, and when dry fill, finishing up with a good elastic varnish. For outside hard pine floors, such as those of piazzas, says a writer in an exchange, there is nothing better than oil if the natural finish is desired. Otherwise paint is best. Yellow pine does not wear well under exposure. It rots easily, especially where there is much dampness beneath. Hence, such floors should be coated with paint, the under side and edges, before being laid. And this will indeed apply to all inside floors of the first story. Floors are frequently stained and also painted. A few years ago it was quite a fad to paint all the floors in the house in alternate stripes of buff and brown. The kitchen floor is frequently painted, while stain is very popular for borders and even entire floors. Any color of stain may be applied, and when the required depth of color is obtained take stained putty and stop all cracks and imperfections. This is important, and should be well done. The varnish may be rubbed down with pumice stone and water or with crude petroleum and rotten stone. I have a kitchen floor which I gave two coats of shellac to last spring and there is no suspicion of the shellac this spring. I shall now clean it well and give it a few coats of oil, rubbing it in well, and repeating the operation through the summer.

The Texas State Association of Architects held their ninth annual convention at Galveston, Texas, on August 27, President Thomas J. Wood being in the chair. Various papers were read and discussed and the reports of numerous committees accepted. The officers elected for the ensuing year were: President, Thomas J. Wood; first vice-president, J. R. Gordon; second vice-president, A. A. Messer; secretary, S. P. Herbert, and treasurer, M. R. Sanguinet. The Executive Committee consists of C. A. Gill, chairman; F. S. Glover, Alfred Muller, Burt. McDonald and A. N. Dawson. A committee of three was appointed to form a code of ethics in competitions, and the convention adjourned, to reconvene in the same place next August.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

OFFICERS.

President.............Noble H. Creager of Baltimore
First vice-president..C. A. Rupp of Buffalo.
Second vice-president.James Meathe of Detroit.
Secretary............William H. Sayward of Boston.
Treasurer............George Tapper of Chicago.

LIST OF DIRECTORS.

E. L. Bartlett	Baltimore.
E. Noyes Whitcomb	Boston.
W. D. Collingwood	Buffalo.
William Grace	Chicago.
Geo. F. Nieber	Cincinnati.
Arthur McAllister	Cleveland.
Alex. Chapoton	Detroit.
Geo. W. Stanley	Indianapolis.
E. S. Foss	Lowell.
J. S. Pool	Lynn.
H. J. Sullivan	Milwaukee.
Geo. Cook	Minneapolis.
Stephen M. Wright	New York City.
J. Walter Phelps	Omaha.
Stacy Reeves	Philadelphia.
Wm. H. Scott	Portland.
Thomas B. Ross	Providence.
H. H. Edgerton	Rochester.
Wm. J. Baker	St. Louis.
Geo. J. Grant	St. Paul.
Luther H Merrick	Syracuse.
A. S. Reed	Wilmington.
Chas. A. Vaughn	Worcester.

To Builders' Exchanges Not Affiliated with the National Association.

For the benefit of builders' exchanges not affiliated with the National Association of Builders, the following statement is made relating to the proposed amendments to the constitution published in this department last month.

The intent of the second set of amendments, which, if adopted, will supersede the first set, is to reorganize the Association upon lines which will bind the builders' exchanges of each State together into much closer relationship than exists at present, making them more efficient as exchanges and greatly extending their influence as a means of protection and benefit to the builder through centralzing action upon his interests within State limits. The national relationship and unity of purpose and action will be preserved through the State Associations which will become the links of the chain that holds the builders of the country together.

The reorganization if adopted will, it is hoped, encourage the establishment of new exchanges both because the increased representation, which it is expected will result, will greatly lessen the expense per capita of maintaining the National Association; and because of the greatly increased importance of the local exchanges as active factors for the promotion of general welfare which must follow the localizing of action within State lines.

The proposed changes are recommended to the attention of non-affiliated exchanges and should the changes be adopted at the coming convention the rules for the government of State and local organizations prescribed by the new constitution will be printed in these columns.

The interests of builders, which are second to but one or two others in the country, demand the protection of harmonious action everywhere, and the proposed amendments are intended to provide for the co-operation of exchanges governed by uniform rules and regulations, and to give the same relative significance to exchanges in the smaller cities as is now given to those in the larger, as necessary instruments for preserving the welfare of the whole fraternity.

It would be especially helpful to unaffiliated exchanges in understanding the nature and effect of the proposed change in the methods of the Association if they would send a delegation, as visitors to the ninth convention, to be present during the consideration of these subjects. The National Association will gladly welcome any members of such exchanges and be pleased to extend to them all of the courtesies of the occasion except voice and vote in the meetings,

Ninth Annual Convention of the National Association of Builders.

The Ninth Annual Convention will take place at Baltimore, Md., beginning Tuesday, October 15, 1895. The programme is as follows :

MORNING SESSION.

Address of welcome by Mayor of the city of Baltimore.
Address by President of the Baltimore Exchange.
Address by the President of the National Association of Builders.
Appointment of Committee on Credentials.
Address by Mr. Robert D. Andrews of Boston. Subject: "The Union of Building Trades Schools with Schools of Architectural Design."

Wednesday, October 16.

MORNING SESSION.

Report of Committee on Credentials.
Roll call.
Appointment of Committee on Time and Place of next convention.
Annual report of secretary.
Annual report of treasurer.
Annual report of standing committees.
Annual report of special committees.
Presentation and reference of resolutions.

AFTERNOON SESSION.

Consideration of amendments to constitution.

Friday, October 18.

MORNING SESSION.

Report of Committee on Resolutions.
Report of Committee on Time and Place for next convention and nomination of officers.
Election of officers.
Unfinished business.
Miscellaneous.

The Place of Meeting is the Young Mens' Christian Association Hall.

The afternoon of Tuesday, October 15, has been reserved by special request of the Baltimore Exchange to enable them to take their guests to drive about the city and to Druid Hill Park.

On Wednesday, October 16, while the convention is in session, the Baltimore Exchange has planned an excursion for the ladies down Chesapeake Bay as far as Annapolis, visiting there the State House and Naval Academy.

Thursday, October 17, has been reserved at special request of Baltimore Exchange to enable them to take the gentlemen delegates and visitors on a trip down Chesapeake Bay. On Thursday evening a reception to the ladies has been planned, including a musical and literary entertainment. A committee for the special purpose of entertaining ladies will be in charge during the week to show them different places of interest about the city.

The following circulars have been issued by the secretary of the association :

CIRCULAR NO. 1.

Office of the Secretary, 166 Devonshire Street,
Boston, Mass., September 15, 1895.

To all Filial Bodies of the National Association of Builders :

Exchanges already affiliated are entitled to representation in accordance with the constitution as follows :

ARTICLE VII.—Representation at Conventions.

Each exchange affiliated with this association shall, at annual or other conventions, be entitled to representation as follows :

One delegate at large, who shall be the director chosen at the preceding convention, and one delegate in addition for each 50 members or fractional part thereof, upon which membership per capita tax has been paid 30 days prior to the election of delegates to the annual convention.

Each delegate shall have one vote, and may be represented by alternate or proxy.

No delegate shall hold more than one proxy.

Each delegation must present a credential signed by the secretary and president of the association they represent, giving names of all delegates. These credentials must be upon a blank provided for the purpose by the National Association and certified by the National Secretary.

Issued by order of the
EXECUTIVE COMMITTEE.

WM. H. SAYWARD, Secretary.

CIRCULAR NO. 2.

TRANSPORTATION.

A reduced fare has been conceded by railway passenger associations except that governing the territory lying west of the Mississippi River and north of the north line of the State of Illinois, at the rate of one and one-third fare for the round trip on the "certificate plan," to delegates and others attending the ninth annual convention, and the National Association has guaranteed the fulfillment of the following

CONDITIONS.

Each person attending the convention must purchase within three days, Sunday excepted, before the opening of the convention, a first-class ticket at the regular rate from the point of departure to Baltimore, obtaining therewith a certificate of such purchase from the local ticket agent. This certificate, upon being signed by the national secretary and indorsed by the representative of the passenger associations at the convention, will entitle the holder to a return fare, over the same route by which he came, at one-third of the regular rate.

Tickets for return journey will be furnished only on certificates procured not more than three days before the meeting assembles, and will be available for continuous passage only; no stop over privileges being allowed on tickets sold at less than regular unlimited fares. Certificates will not be honored unless presented within three days after the date of the adjournment of the convention. It is understood that Sunday will not be reckoned as a day. In no case will the reduced rate for return ticket be granted without a certificate properly signed and indorsed as above, and no refund of fare can be obtained because of failure to secure certificate at point of departure.

NOTICE TO DELEGATES.

Delegates from exchanges located west of the Mississippi River and north of the State of Illinois, in order to secure the reduced rate, should purchase tickets to the nearest point within the limit described, and there secure through tickets to Baltimore, obtaining a Central Traffic Association certificate therewith.

All certificates must be presented to the secretary at the convention for his signature and to be viséd by the railroads' representative, whereupon they will entitle the holder to a return ticket, over the same route by which the trip to Baltimore was made, at one-third of the regular fare, subject to the foregoing conditions.

All persons are cautioned that certificates by which reduced return fare is obtained must be used only by original purchaser, as the National Association will be obliged to refund an amount equal to full return fare for every ticket found in the hands of any person other than the one entitled thereto. Should the National Association be compelled to refund any sums of money for tickets improperly used, the local exchange whose member has broken these conditions will be expected to reimburse the National Association. By order of the
EXECUTIVE COMMITTEE.

WM. H. SAYWARD, Secretary

N. B.—Delegates in securing tickets and certificates are requested to present themselves at the local ticket offices not less than 30 minutes prior to the departure of their trains.

All persons attending the convention are requested to secure certificates whether or not they intend to avail themselves of the reduced rate, as the certificates are the evidence of attendance upon which the passenger associations base their concession.

Issued from the office of the secretary, September 15, 1895.

New Publications.

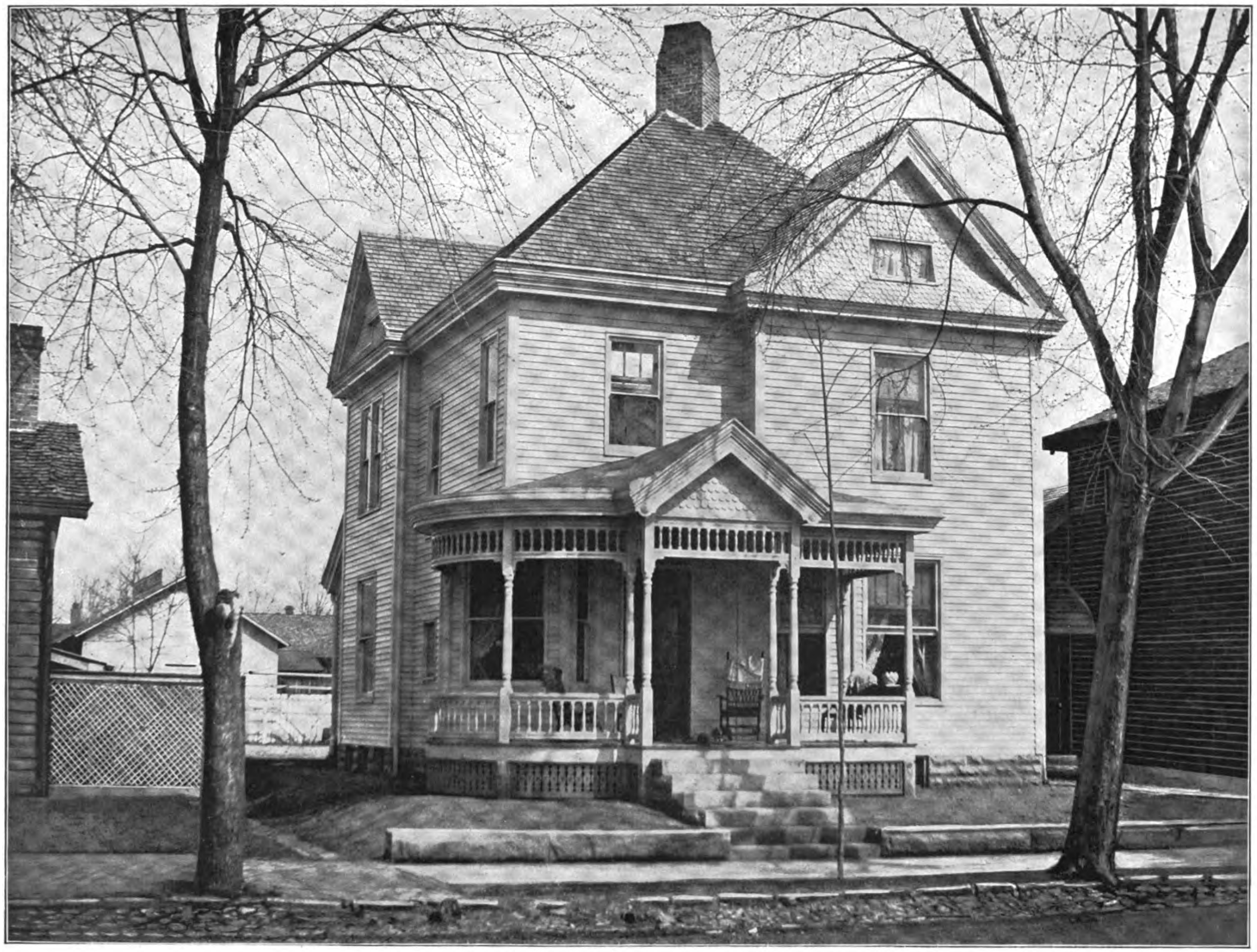
THE ARCHITECTS' DIRECTORY FOR 1895-96. Size, 5 x 6¾ inches; 116 pages; bound in stiff paper covers. Published by William T. Comstock. Price, $1.

As indicated by the title this volume contains a list of the architects in the United States and Canada classified by States and towns, with the architectural associations to which they belong indicated against each name. The names of the architects are arranged in alphabetical order as well as the cities and States in connection with which they are presented. A valuable feature of the little volume is a directory of the American Institute of Architects, showing the officers, board of directors, chapters, &c.; also a list of the officers of the Architectural League and of the Ontario Association of Architects. Among the closing pages is a classified list of manufacturers and dealers of building materials and appliances. In comparing this second edition of the directory with last year's issue a great many changes are noticeable, giving evidence of careful revision and an earnest effort to secure the greatest possible accuracy.

HENDRICKS' ARCHITECTS' AND BUILDERS' GUIDE AND CONTRACTORS' DIRECTORY OF AMERICA. Size, 7¼ x 10¼ inches; 832 pages; bound in stiff board covers. Published by Samuel E. Hendricks Company. Price, $5.

This well-known work, published annually by the concern named, is intended especially for the use of builders, contractors, manufacturers and dealers in all kinds of building supplies. It is, in fact, a complete directory of the construction industries of the country, containing over 200,000 names, addresses and business classifications. The lists include among others architects, architectural wood workers, carpenters, builders and contractors of all kinds, brick manufacturers, makers of and dealers in builders' hardware, manufacturers of all kinds of building iron, cornices, dumb waiters, fire proof building material, granite producers, dealers and workers, makers of iron and steel roofing, lathing, mantels, grates, fenders, tile, paint, plumbers' specialties, house heating boilers, radiators, sash, door and blinds, and in fact everything connected with the building industries. An idea of the extent of the work may be gathered from the statement that the list of contractors, carpenters and builders occupies something like 180 pages, covering all sections of the country. The list of architects, alphabetically arranged, occupies 80 pages, masons and builders and their materials 37 pages, plumbers, gas and steam fitters 40 pages, and roofers and dealers in roofers' materials something over 30 pages. The matter is arranged with a great deal of care, the lists covering manufacturers of and dealers in everything employed in the manufacture and apparatus used in the building industries, from the raw material to the manufactured article, and from the producer to the customer.

CONTENTS.



A TWO-STORY FRAME DWELLING IN EATON, OHIO.

W. C. McCABE, Architect and Builder.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
96-102 READE STREET, NEW YORK.

NOVEMBER, 1895

Strikes and Lockouts.

The report which has just been issued by United States Commissioner of Labor, Carroll D. Wright, contains a vast amount of interesting information relative to strikes and lockouts during the past seven and a half years. The subject is treated in an exhaustive manner and gives a very good idea of the relations which have existed between capital and labor during the period named. The industries most affected by strikes and in which our readers are largely interested, are headed by the building trades, with 20,785 establishments involved. There were also 1998 stone quarries and stone cutting works affected, 459 furniture factories and 406 brick concerns. The building trades also lead the list of industries most affected by lockouts, there having been 1900 establishments involved and 489 stone quarrying and cutting works. The report shows that the total number of employees involved or thrown out of employment during the period was 2,891,208. An interesting feature of the report is the tabular statements showing the States in which the majority of the strikes and lockouts occurred. These were Illinois, Massachusetts, New York, Ohio and Pennsylvania the strikes in these five States having been about 70 per cent. of the whole number in the United States, while the lockouts were about 76 per cent. These five States contained 51 per cent. of all the manufacturing establishments and employed 56 per cent. of the capital invested in the mechanical industries, taking the census of 1890 as the basis of computation. The State of Illinois had the largest number of establishments affected both by strikes and lockouts, there having been 10,060 of the former and 1198 of the latter. New York is second on the list, with 9540 establishments involved in strikes and 723 in lockouts, while Pennsylvania is third with 8219 strikes and 490 lockouts. Out of a total of 10,488 strikes for the entire country more than 56 per cent. occurred in 26 cities, the number of establishments involved in strikes being 46,863, of which 61 per cent. occurred in these 26 cities. The total wage loss in these 26 cities is given in round numbers as $85,000,000 for employees, and the loss to employers something less than $29,000 000. The number of lockouts as compared with the strikes for the same period was small in the aggregate, but the losses incurred were largely increased. The total number of lockouts was 244, with a loss of wages to the employees of $12,000,000, while that of the employers was nearly one-half this sum. Out of the 46,863 establishments affected by strikes occurring during the period covered by the report, the employees were successful in their demands in 20,397, partially successful in 4775 and failed in 21,687 establishments. Of the 3853 establishments having lockouts, the employees succeeded in gaining their demands in 1183, were partially successful in 391 and failed in 1558. The report gives the leading cause of strikes as an increase of wages, such strikes representing 25 per cent. of the whole number. Thirteen per cent. were for a reduction of hours, 8 per cent. were against a reduction of wages, 7 per cent. were sympathetic, 6 per cent. were for an increase of wages and reduction of hours, 4 per cent. against employment of non-union men and 3 per cent. for a recognition of the union. The rest of the strikes are attributed to various causes.

The Ninth Builders' Convention.

The ninth convention of the National Association of Builders, an account of which appears elsewhere in this issue, was one of the most significant in the history of the association. The reorganization as projected in the proposed amendments was carried without essential change, such alterations from the announcements made by the secretary prior to the meeting being matters of detail rather than of principle. The delegates had given the matter careful attention, and such criticism and discussion as developed during the process of its consideration indicated an excellent understanding of what was involved by the proposed changes. The alterations in the constitution, comprehend a change of method alone ; representation by the filial bodies being still based upon the same lines of representation by exchanges as those which prevailed before. The State Association created by the new constitution, while an intermediary, in a certain sense, in no way intervenes between the local and the national organization. It is intended to operate solely as a means of more closely cementing the builders of a given State into one composite body, for the better adjustment of all relationships involving their common calling. Through the greater cohesion of all parts, within the jurisdiction of the laws of a given State, it is hoped that a unity both of practice and method may be accomplished which was, under the diversified conditions which prevailed heretofore, impossible.

Defections.

The defection of nearly one-third of the organizations which, at the time of the last convention, formed the contituency of the National Association is significant, but when the situation is properly understood this significance is promising rather than ominous. Up to the present time the National Association of Builders has accepted applicants for membership upon the sole requirement that they be identified with the building interests, but from this time forward all filial bodies admitted to memberhsip must be created upon lines which, from the experience of the whole fraternity, are best calculated to bring about a permanent and progressive improvement of those conditions for whose betterment the national body exists. It is noted with especial satisfaction by those most deeply interested in the work of the National Association of Builders that there is already practically in existence the first State association provided for by the new constitution. The delegates from New York City, Buffalo and Rochester have created a State Association for New York, with John L. Hamilton of New York City as temporary chairman and J. C. Almendinger of Buffalo as temporary secretary. The date set for the meeting for effecting a permanent organization is December 11, at the Building Trades Club in New York City. It is expected that other associations will be formed immediately, and the work of binding the builders of the several States together under the new method will be pushed forward with as much rapidity as is compatible with careful organization.

Trade Classes of the Y. M. C. A.

Some months ago we briefly referred in these columns to the completion of the new building of the Teachers' College. Morningside Heights and West 120th street, New York City, and to the excellent facilities provided in the various departments devoted to manual training. The rooms and the shops of the college are being further utilized during the present winter by evening classes in carpentry, joinery, architectural and mechanical drawing, sheet metal work, forging, &c., by classes conducted under the auspices of the Harlem Branch of the Young Men's Christian Association. The course in carpentry includes instruction on Monday and Wednesday evenings of each week, and in drawing on Friday evenings. Exercises in laying out work with the rule, square and other marking tools are given, these being followed by the making of various models involving the use of brace and bit, chisel and plane. The rest of the course deals chiefly with the joints used in carpentry and joinery, with occasional models illustrating their application. Such other instruction is given to the class as may be necessary to secure the best advancement of the student, this being supplemented by careful individual instruction at the benches, students being taught not only what to do, but why they do it. At intervals during the course short illustrated lectures on the properties of wood, principles of construction and other subjects of practical value to the wood worker are given. The course in drawing begins with a few geometrical problems and the principle of projection, followed by the making of working sketches and drawings for shop use. A large number of models are provided for use in giving instruction. The room occupied by the class in carpentry is well equipped, there being 20 benches, each furnished with a quick action vise and a set of tools, also 20 turning lathes, grindstone and other appliances necessary for the purpose. Each student also has a locker for the purpose of keeping his unfinished work from lesson to lesson. The drawing room is equipped with drawing stand, drawing board, T-square and an instrument locker for each student. The room for the class in joinery contains 30 benches with the necessary tools, lockers, &c. The terms are of ten weeks each, the first of which commenced on October 14 and the second will begin on January 6 next.

The Massachusetts Mechanic Association.

For a period of 100 years the Massachusetts Charitable Mechanic Association of Boston, Mass., has been steadily performing excellent service in the encouragement and fostering of American manufactures and the mechanic arts. The centennial celebration of the association was held last March, and on October 2 was opened its centennial exhibition, consisting of valuable examples of mechanical and scientific objects, products of the mechanic arts, exhibits of new inventions and processes, and a very excellent art collection. The present exhibition, which is open to the public during the months of October and November, is the nineteenth given by the association. The first of the kind was held under its auspices in the year 1886, and it has been continued triennially since that time. The board of managers determined to make their centennial year memorable by a display which would far excel all previous efforts. A large and varied exhibit of very great interest is the result of their labors. A commendable feature of the show, wherein it differs from most exhibitions of the kind, is the practical exclusion of the trading element. No buying or selling is conducted in the building. It is an exhibition pure and simple, and not a trading fair. Thus its value to the mechanics, for whose benefit it is primarily held, will be greatly enhanced. The history of the Massachusetts Mechanic Association is interesting. It was first organized in January, 1795, by a number of public spirited tradesmen, mechanics and manufacturers of the Bay State "to extend the circle of individual usefulness, to encourage industry and to promote inventions and improvements in the mechanic arts." At the first regular meeting of the association, in April of that year, Colonel Paul Revere, of Revolutionary fame, one of the most influential mechanics of Boston, was elected the first president. During its history the association has steadily increased in influence and usefulness, and has played a prominent part in a number of public movements. The organization moved from one location to another as its needs grew, until, in 1881, it entered into possession of the great Mechanics' Building on Huntington avenue, costing $500,000 and covering a plot of ground 600 x 300 feet, where the present exhibition is being given. Among the various lines of work covered by the association are classes of instruction, courses of lectures, and a large library founded in 1820, with reading rooms and other advantages for the use of mechanics. Such an institution, laid on plans which are broad and lasting, must be reckoned as one of the most valuable of those organizations which make for the best life and development of American industries and crafts.

Increasing Use of Bathtubs.

Manufacturers of bathtubs of all kinds report an increased sale of these goods. The showrooms in New York exhibit more of the expensive imported earthenware tubs than have probably ever been seen in the past, and are disposing of a sufficient number of them to consider their trade satisfactory. Porcelain lined cast iron tubs of various shapes and styles are being used in plumbing contracts largely, not only in the cities, but in smaller towns where hitherto they have been looked upon as something of a luxury. The tendency to use open work plumbing goods is strongly manifested in the large sales which have been made of the new solid copper baths and the incased copper baths which have been longer before the trade. Notwithstanding the sales which have been made in this character of bathtub, it is reported that large numbers of the old wooden baths lined with tinned copper are still being used. One factory is reported to have increased its facilities for turning out this grade of tub, and found its capacity taxed to its fullest extent for a considerable time in the past and the demand still holds good. It is remarked by one who makes frequent trips among both the manufacturing and consuming trade that the public seem to consider the bathtub a greater necessity than in days gone by. It is now noticed that in the cheaper houses the bathtub is one of the demanded fixtures, and in some cases it is not the cheapest class of tub which is used in these houses.

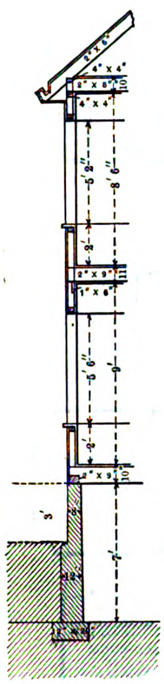
The Standard Oil Company have recently filed plans in the Department of Building of New York City for enlarging their present structure at 26 Broadway and for a new building adjacent thereto. The new building is to be 15 stories in hight, having a frontage of about 28 feet on Broadway and a depth of 115 feet. In design and general appearance it will harmonize with the present building, the front being of polished marble. The edifice will be of the steel skeleton frame construction, fire proof throughout, and will cost in the neighborhood of $500,000. It will be equipped with six elevators, have marble tile floors, steam heating apparatus, electric lighting and power appliances and other improvemennts. The structure now occupied by the Standard Oil Company will have six stories added to make it correspond with the new building and the interior will be remodeled according to designs of the architects, Messrs. Kimball & Thompson, who, it will be remembered, prepared the plans for the sky scraping structure of the Manhattan Life Insurance Company in lower Broadway. Owing to the unusual hight of the stories of the Standard Oil Company's building the improvements will make it nearly as high as the Manhattan Life building, which rises 347 feet above the grade line.

A SUBURBAN COTTAGE.

THE design of a suburban cottage published in this issue of the paper embodies features of arrangement and construction which cannot fail to interest a large class among our readers. It will be seen that the exterior is well broken up by numerous bays, gables and dormers, all of which combine to produce the effects sought by the architect. A very good idea of the appearance of the completed structure may be obtained from the half-tone supplemental plate which has been prepared from a photograph taken specially for the purpose. The interior is divided into nine rooms and a bath, not counting a large reception hall, conservatory, butler's pantry and numerous closets designed for various purposes. The main floor has four rooms of good proportions, three of which are separated from each other by folding doors. The dining room and parlor open directly from the reception hall, while from the library one may enter the conservatory, and through it reach the kitchen. There is also communication between the dining room and kitchen by means of the butler's pantry, which is fitted with drawers, shelves, flour bin, &c. The second floor has five sleeping rooms and a bathroom, the latter being in the rear of the house and cut off from the main hall. The attic is unfinished, but has sufficient space for one or more sleeping rooms or store room if desired.

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

A Suburban Cottage.—H. Galloway Ten Eyck, Architect, Newark, N. J.



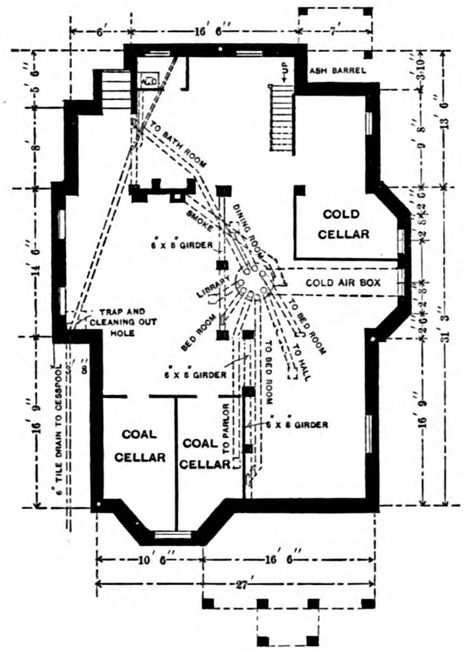
Section.

The foundation is a brick wall 12 inches thick below grade and 8 inches thick above, faced with selected brick and pointed with red mortar. The cellar is finished with a bottom of concrete. The timber for the frame work is hemlock, the sills, ties, plates and posts being 4 x 6 inches, the floor beams 2 x 9 inches, placed 16 inches on centers, the rafters 2 x 8 inches and the studding 2 x 4 inches. The frame is sheeted with 1-inch hemlock boards, put on diagonally, over which are 6-inch clapboards of white pine. The roof is covered with cypress shingles. The exterior is painted with two coats of white lead and linseed oil. The flooring throughout the house is of yellow pine, while the trim is of white pine. The staircase is of ash and the stair landing is lighted by means of colored glass sash, a feature which is indicated on the side elevation. The interior of the house is finished in the natural wood. The plumbing throughout is first-class in all respects, and involves the use of the latest sanitary specialties. The building is heated by means of a hot air furnace located in the cellar, the position of the registers in the various apartments being indicated on the floor plans. The dwelling illustrated herewith was erected at Forest Hill, at a cost of about $4500, a little more than two years ago, for Prof. K. S. Blake, the drawings being prepared by Architect H. Galloway Ten Eyck of Newark, N. J.

Concrete Floors for Stables.

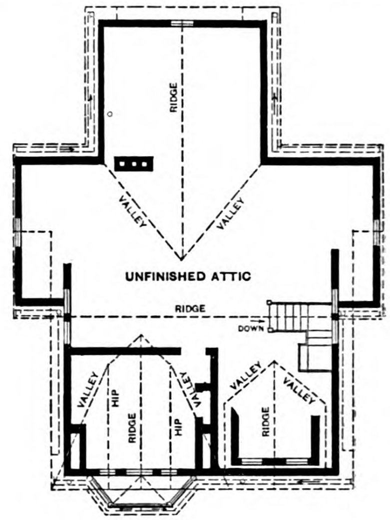
In reply to a correspondent making inquiry as to the best method of laying a concrete floor for a stable, the Canadian *Architect and Builder* in a recent issue says:

The floor should consist of three layers, first, about 3 inches of broken stone and brick, in pieces that will pass through a 3-inch ring, second, 2½ inches of gravel, sand and cement, mixed in proportions of four of gravel and sand and one of cement, topped off with a ½-inch floated coat of clean sharp sand and cement, mixed in proportions of two of sand to one of cement (best Portland cement to be used). The floor is to be so laid as to have proper fall to drain off all water, and provision is to be made for this. The usual method is to give it a slope to the rear, where there is a gutter to carry off the liquid matter. The surface of the top coat should be scored. As concrete makes a hard and unyielding floor for a horse to stand on, planks may be laid down over it, which can be easily removed for cleansing and airing. Instead of the plank sawdust may be employed. It makes good bedding, is soft under the horses' feet and is cheap. What is soiled can be removed



Foundation.

avenue and Fifty-eighth street, and erected thereon a dwelling costing in the neighborhood of $100,000. When the house was built it was the intention of the merchant to make the locality a residence section for the wealthy of the city, but the erection of the many extensions to Roosevelt Hospital, the construction of the Vanderbilt Clinic, the Sloane Maternity Hospital, and gas works, all within a block, apparently defeated his object. He was so much joked about his project by his friends that he finally resolved to move his house to a new location. He therefore secured some lots further up town in Sixty-eighth street, just west of Central Park for this purpose. The house was



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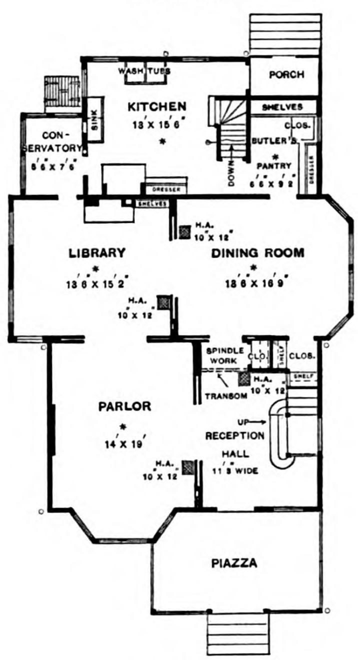
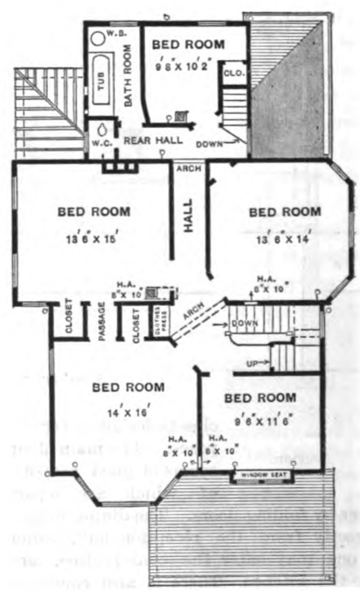


First Floor.



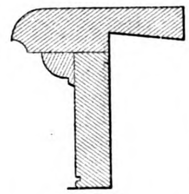
Second Floor.

A Suburban Cottage.—Floor Plans.—Scale, 1-16 *Inch to the Foot.*

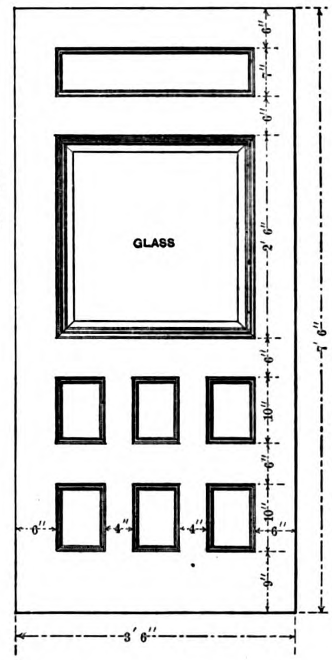
every day and replaced by fresh. Vitrified brick is considered by some as making a better stable floor than concrete.

We have in previous issues of the paper described the removal from one place to another of various kinds of buildings, but an instance has recently occurred in New York City which is different from any to which we have before called attention. Some 15 years ago a merchant bought a large plot of ground at the corner of Tenth

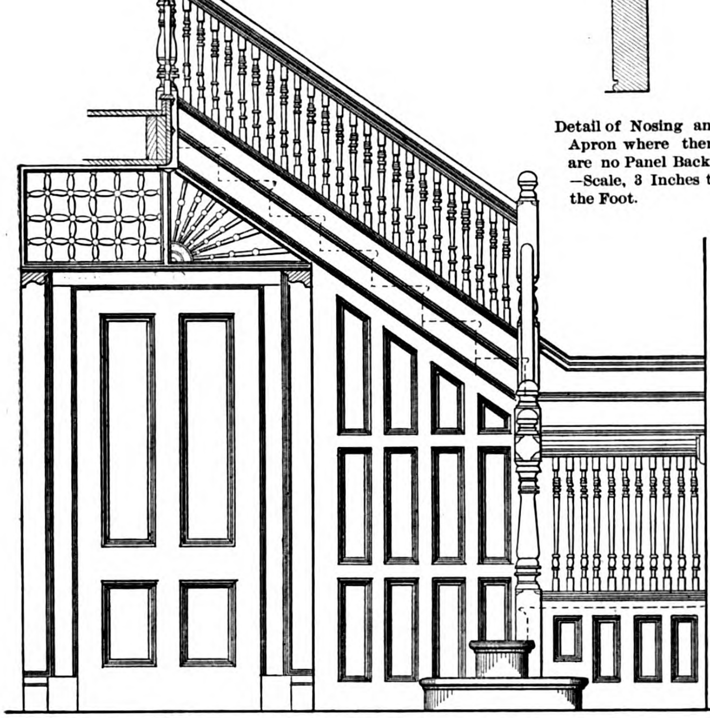
a four-story structure, the first story being of cut brown stone, while the rest was of brick. Instead of moving the building intact, which was a practical impossibility, each stone as it was taken from the old site was numbered and replaced in a similar position on the new site. There were 4755 of these brown stones and fully half a million brick. All the wood work which was made to order was also transferred. It is stated that the cost of the removal was equal to about one-half of the original cost of the dwelling.



Detail of Nosing and Apron where there are no Panel Backs. —Scale, 3 Inches to the Foot.



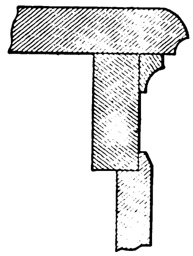
Detail of Front Door.—Scale, ½ Inch to the Foot.



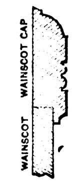
Main Staircase, looking toward the Dining Room.—Scale, ⅜ Inch to the Foot.

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

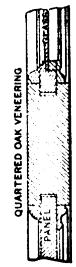
Elevation and Miscellaneous Details of a Suburban Cottage.



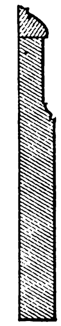
Section of Pantry on the Line E F.—Scale, 3 Inches to the Foot



Detail of Wainscoting.—Scale, 3 Inches to the Foot.

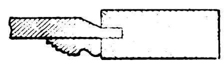


Detail of Front Door.—Scale, 1½ Inches to the Foot.

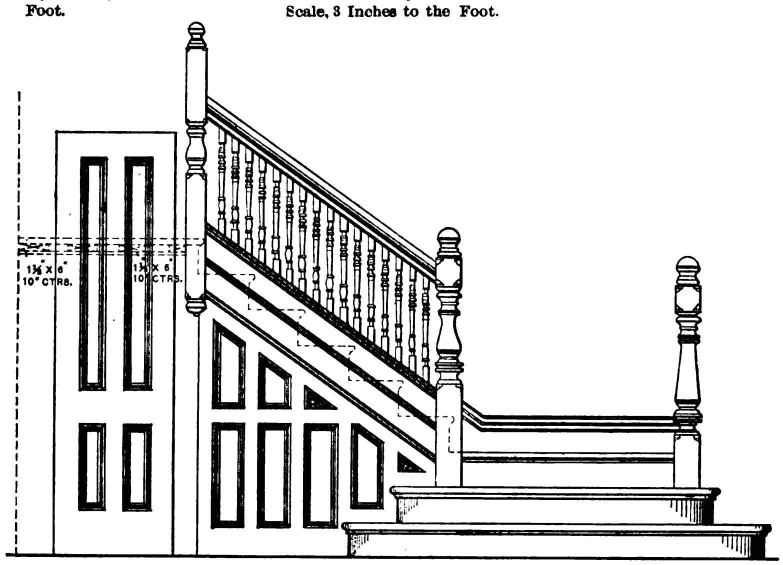


Detail of Base Board.—Scale 3 Inches to the Foot.

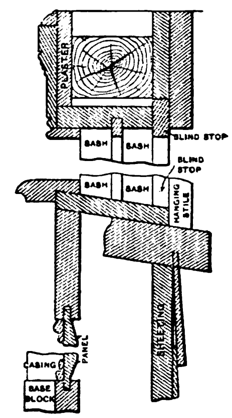
Section Through C D of Pantry.—Scale, 3 Inches to the Foot.



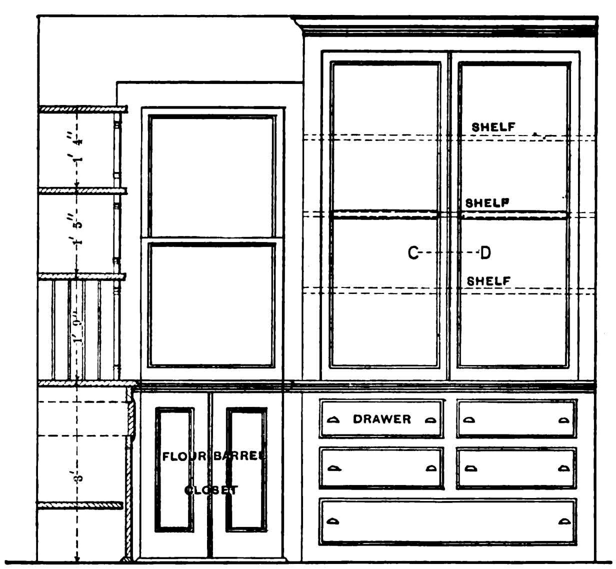
Detail of Pantry at G H.—Scale, 3 Inches to the Foot.



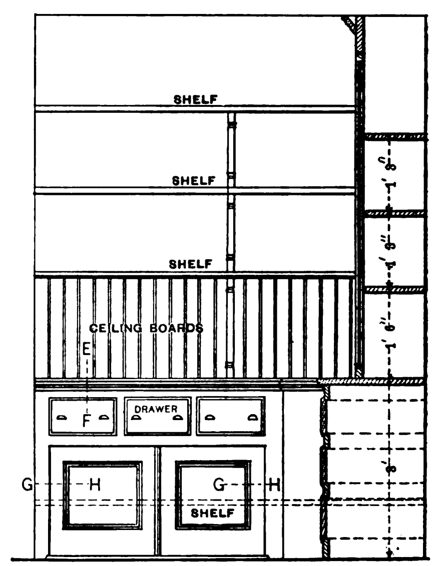
Main Staircase, as viewed from the Parlor.—Scale, ⅜ Inch to the Foot.



Detail of Window Construction.—Scale, 1½ Inches to the Foot.



Section of Pantry, looking toward the Dresser.—Scale, ⅜ Inch to the Foot.



Section of Pantry, as Viewed from the Dining Room. Scale, ⅜ Inch to the Foot.

Miscellaneous Details of a Suburban Cottage.

CHIPPING AND HAND TRIMMING BRICK.

BY JAMES F. HOBART

IT frequently occurs that a few brick are required cut to a certain bevel for the purpose of ornamenting some portion of a piece of work. Sometimes the number of brick required is so small that it will not pay to order them expressly for the job and in such a case the brick can be chipped by hand at moderate expense. In the illustrations which are here presented, Fig. 1 represents a brick to be trimmed from the dotted line down to the diagonal lines, or heavily shaded portion. In doing this work, the first step is to mark the brick with a lead pencil to the full diagonal lines shown. The marking may be done with an ordinary bevel square, but if only 25 or 30 brick are to be marked it will pay to nail up three pieces of thin board so that they will just fit over the edge and two sides of a brick. The next thing to be done is to cut the pattern to such shape that when the brick is standing on end and the pattern resting on the bench the top of the pattern is just right to pass the pencil along in order to make the desired marks on the bricks. Next trim down one face at a time, using a thin, wide faced cold chisel, as represented in Fig. 2. The cutting edge of this chisel is long enough, being over 4 inches, to take the whole side of a brick at once. Trim down carefully as shown in Fig. 3, taking off a thin chip each time, and inclining the chisel so as to cut away from the brick, as indicated at A of the engraving. Do not try to cut right down to the dotted line or the split will surely run and the brick be spoiled for the purpose.

After cutting back $\frac{1}{8}$ or $\frac{1}{4}$ inch at a time, as shown in Fig. 3, turn over the brick as indicated in Fig. 4 and trim that side in the same way. Then set the brick up edgewise, as shown in Fig. 5, and trim the edge, cutting down the end of the brick as far as necessary. This is about the best that can be done with a cold chisel and hammer, although if plenty of time be spent the end of the brick can be cut down to a very true surface. After three sides of the brick have been chiseled enough, the end must be trued up in some manner. If there should be found running anywhere near the shop or works a high, coarse, rough emery wheel it would be a good scheme to get permission to hold the bricks on the side of the wheel for a few minutes, and the desired result will be obtained. It will take but a very short time for an emery wheel to put a fine end surface on each brick—less time, in fact, than it takes to tell of it. It may also be stated here that the emery wheel is the best thing under the sun on which to true up an oilstone. It does the business quickly and perfectly, but with either brick or oilstone put it on the side of the emery wheel and not on its face.

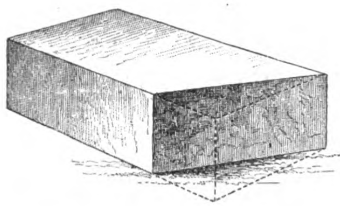
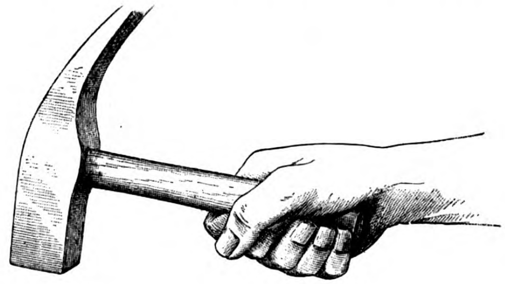


Fig. 1.—Brick After it Has Been Trimmed.



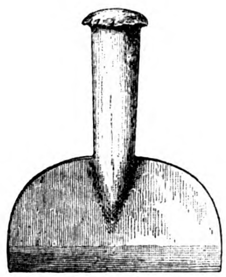


Fig. 2.—Cold Chisel for Trimming Brick.

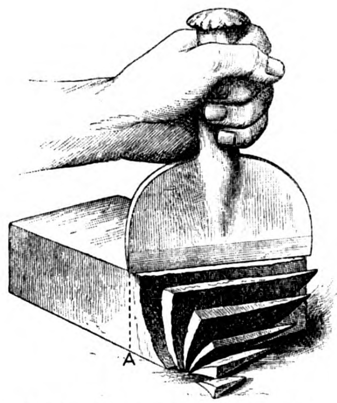


Fig. 3.—Trimming One Side of a Brick.

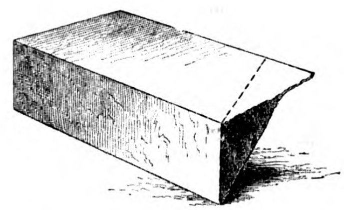


Fig. 4.—Brick with One Side Trimmed.

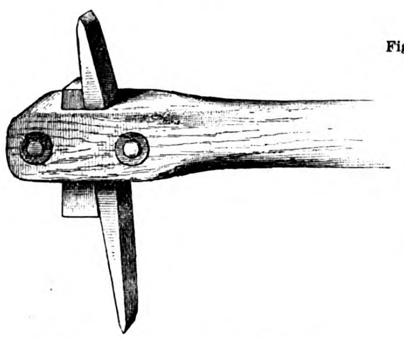


Fig. 6.—View of Head of a "Scutch."

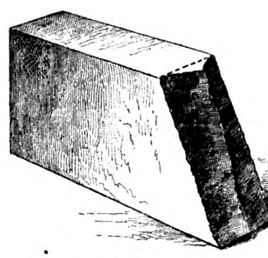


Fig. 5.—Edge to be Trimmed.

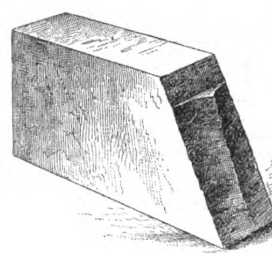


Fig. 7.—Showing Effect of "Scutching."

Chipping and Han l Trimming Brick.

A man, however, does not always have a 12-inch emery wheel in his kit, especially when it (the wheel) is running 800 to 1000 revolutions a minute. He must then dress up the brick by hand, using the "scutch" for the purpose. There are plenty of masons and bricklayers who do not know anything about a tool of this name, but it looks much like the article illustrated in Fig. 6. It consists of a wooden handle of hard wood with a couple of rivets through the head end, which is mortised about 1 inch square. The wood is about 11 or 12 inches long and the end is rounded down into a handle. The cutter is made of steel, 5 or 6 inches long, about 1 inch wide and ¼ or ⅜ inch thick in the center, from which it tapers toward each end. Both ends of the steel bit are sharpened, and when one becomes dull the steel is taken out, turned the other end up and replaced in the handle. The steel is held in the handle by a wooden wedge, plainly shown in the engraving. It will be noticed that the wedge is put in from the bottom, for if it is driven from the top it will not stay in place very long. To use the "scutch," place a brick on edge, as shown in Fig. 7, then use the tool to strike with, it being a regular stone adz. Hew down the end surface as shown in the illustration. By taking care not to strike over the edges of the brick, which would split off pieces from the face, and putting one blow very close to the previous one, the entire end can be very quickly dressed down almost as smooth as the regular face. It is hardly necessary to state in this connection that face brick are to be treated in this manner, as the process is hardly ever necessary for common kinds of brick. Another use for the "scutch" is in cleaning brick which have been laid and to which the mortar still clings. The tool is of such a character that it removes the old mortar with celerity and dispatch.

LAW IN THE BUILDING TRADES.

SUFFICIENCY OF VERIFICATION.

A VERIFICATION of a mechanics' lien which states that affiant knows the contents thereof, and believes the same to be "true," is not invalidated by the use of the word "true" instead of "just," as provided by statute. A verification of a claim of mechanics' lien is not invalid because it refers to such claim of lien as "the foregoing lien."

A lien claim which states that the contractor entered into an oral contract with claimant to furnish materials for the construction of said building and that, in accordance with said contract, claimant furnished the material described sufficiently shows to whom the materials were furnished.—Sauter *vs.* McDonald, Supreme Court of Washington, 40 Pac. Rep., 418.

PERFORMANCE OF CONTRACT.

A contract to put a gravel roof on a building, to be done in first-class shape, and guaranteed for a certain time, does not require the personal services of the contractor, so as to prevent his hiring another to do it under his supervision and instruction.—Curran *vs.* Clifford, Court of Appeals of Colorado, 40 Pac. Rep., 477.

A contractor who has abandoned work for which he contracted cannot recover on a *quantum meruit* for the part done by him unless the contract was rescinded, or its complete performance was rendered impossible by the wrongful conduct of the owner. The fact that the owner upon the statement of the contractor that his failure to prosecute the work was owing to his inability to get mechanics, employed extra men himself, does not show a recission of the contract by the owner nor cause for recission by the contractor.—McGonigle *vs.* Klein, Court of Appeals of Colorado, 40 Pac. Rep., 465.

In an action to recover for work done under a contract and for breach of the contract by the owner in preventing further performance, a report made to the contractor by his workmen that they had been stopped by the owner, accompanied by proof that they had been stopped by him, is competent to show the reason why the contractor ceased further performance of the contract.—Raven *vs.* Smith, Supreme Court, General Term, Second Department, 33 N. Y. Sup. Rep., 972.

APPLICATION OF PAYMENT.

A contractor received money from one W., for whom he was building a house, and paid it to a material man, who had filed a lien against the house, and to whom the contractor was indebted on several accounts. At the time of making the payment the contractor stated that he received the money from W., and that "I give it to you on account." The material man applied it to an account other than that for materials furnished for W.'s house. It was held that a claimant who had filed a subsequent lien against such house was not entitled to have the payment applied to the account for the materials furnished for W.'s house, merely because the money came from the owner.—Orr *vs.* Nagle, Supreme Court, General Term, Second Department, 33 N. Y. Sup. Rep., 879.

MECHANICS' LIEN CANNOT BE APPLIED TO SCHOOL PROPERTY.

The right to a mechanics' lien has no existence, except by virtue of the statute. While a liberal construction should be given to its provisions, to the end that the purposes of its enactment may not be defeated, still its scope cannot be enlarged by attaching to the language employed a forced or unusual meaning. The rights and remedies of a subcontractor are, to a certain extent, measured by those of the original contractor. The foundation of the right of either to a lien is the original contract, and if that is not such as the statute contemplates, and cannot, therefore, be made the basis of a lien in favor of the original contractor, a contractor under him is entitled to none. The original contract must be made with the owner of the land upon which the building is erected, or with some person authorized to act for him, and the resultant lien is coextensive with his interest or claim in the property. An owner is one who has dominion over that which is the subject of the ownership. He has the right to make such use of it, consistent with the rights of others, as he may see fit. The ownership may extend to the entire thing, or may be limited to an interest in it; but whatever is the subject of the ownership, it is held by the owner for his own individual benefit. For the purposes of the act, an assignable, transferable or conveyable interest or claim in the thing constitutes ownership, but the right to assign, transfer or convey resides in the person having the interest or claim, to be exercised at his pleasure, so that his relation to the interest or claim is that of "owner" under the general definition of the term. By the terms of the statute all school property within the district is held by the school board in trust for the school district, for the benefit of the school, and the school is a State institution. We do not think that either the school board or the school district is, within any definition of the term, the "owner" of the school property, and the provisions of the Mechanics' Lien law cannot be applied to public school buildings. But it does not follow that the lienor is without a remedy. He has recovered judgment against his immediate contractors. A school district is a quasi corporation, and not subject to a process in garnishment; but if the board has money in its hands belonging to the contractors, and the lienor is unable to realize anything upon his judgment, the money can be reached by a proceeding in equity. A Court of Chancery will subject property and funds to the satisfaction of a judgment, when they cannot be reached by legal process, and the judgment cannot otherwise be satisfied.—Florman *vs.* School Dist. No. 11, El Paso County, Court of Appeals of Colorado, 40 Pac. Rep., 469.

CLAIM FOR ADDITIONAL WORK.

A building contract contained the following provisions: "The contractors shall make no claim for additional work unless the same shall be done in pursuance of an order from the architects, and notice of all claims shall be made to the architects, in writing, within ten days of the beginning of such work." The Supreme Court of Minnesota held that this provision is not effectual limitation upon the legal competency of the parties to the contract, or their authorized agents, to modify or waive any of the terms of the contract, except in the particular manner stipulated.—Michaud *vs.* McGregor, 63 N. W. Rep., 479.

MEASURE OF DAMAGES FOR BREACH OF CONTRACT.

Where a party has contracted to move a building for a stipulated sum of money, and then neglects or refuses to perform, the other, if he has the work done by some one else, is entitled to recover as damages the difference between the contract price and the reasonable cost or expense of performance in accordance with the contract, if there is any difference.—Anderson *vs.* Nordstrom, Supreme Court Minnesota, 61 N. W. Rep., 1132.

DAMAGES FOR BREACH OF CONTRACT.

Where two parties have made a contract, which one of them has broken, the other must make reasonable exertions to render his injury as light as possible; and he cannot recover from the other damages which might have been avoided had he performed such duty.—Uhlig *vs.* Barnum, 61 N. W. Rep., 749.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

IT is hardly necessary to go into all the details of outlining the elevation, section and plan of the store front, as we believe sufficient has been said upon the subject to enable the learner to study the work which will now be presented and to master it without other suggestions than a few brief instructions. The knowledge gained by the practice and experience of working out the several parts of the drawing for oneself will be far more beneficial to the learner than to have mentioned every little detail, many of which have been thoroughly explained in connection with other drawings. We will, for the most part, take up such portions of the work as possess new features. A special feature to which we wish to call attention is the corresponding lines of width and hights in the plan of the front and sectional view as compared with the elevation. The drawing, Fig. 42, is a combination of the plan of front, sectional view of the walls, &c., and the elevation, and it shows plainer than words can describe the relation one part bears to the other. It shows very plainly how to draw the elevation in accordance with the plan of front and to carry up with the greatest degree of accuracy and convenience the section corresponding with the hights shown in the elevation. By this method, mistakes and discrepancies in the different parts closely connected are avoided. In order that the learner may start aright, it may be stated that the sidewalk line in the drawing is the most favorable starting point and it will be found easy to make calculations from this line in any direction necessary to complete the work. The sidewalk line is the base line of the elevation, therefore set off on this line the width of the building and square down sufficiently to draw the plan of the front. Draw the outline of the front and the thickness of the wall; then set off the doors, windows, columns, &c., as shown in the plan. The dotted plumb lines show how to carry up the front in accordance with the plan. The location of the second-story windows, as a matter of fact, necessarily has to be in accordance with the front of the second-floor plan. The circular dotted line on the left corner of the plan of the front has been drawn to show how to get the required projection of the oriel window, built out from the second floor. This is plainly indicated by the long dotted plumb line. The starting of the support to the projecting window is from a point plumb over the center of the octagon corner in the plan. This, of course, makes the outside scroll appear more elongated than the inside scroll. The window being round and starting on the side of an octagon corner accounts for this appearance and a little study of the plan and elevation will make this point clear to the mind.

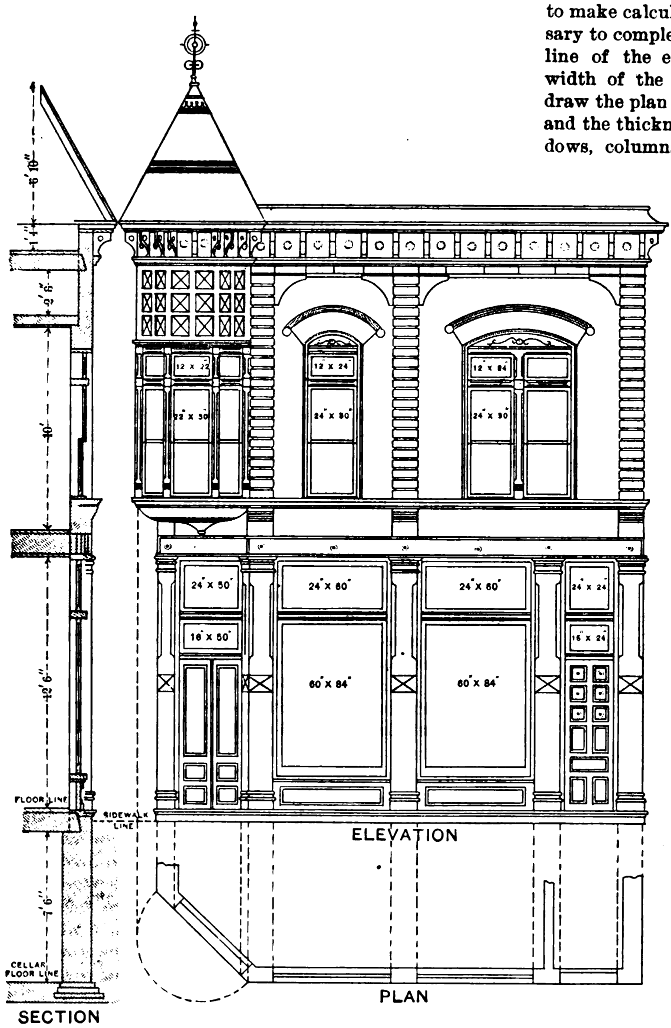


Fig. 42.—Showing the Relation of the Plan, Elevation and Section of Store Front to Each Other and the Method of Drawing.—Scale, ⅛ Inch to the Foot.

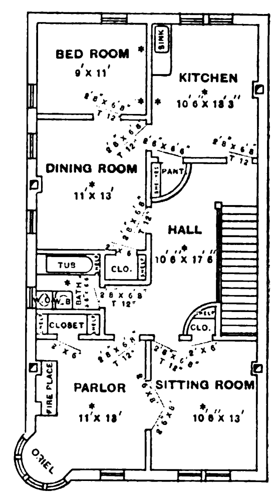


Fig. 43—Plan of Second Floor, Showing Special Features of Planning —Scale, 1-16 Inch to the Foot.

Architectural Drawing for Mechanics.—Section and Elevation of Store Front with Plan of Second Floor.

By comparing the elevation with Fig. 43, the second-floor plan, it will be observed that either a direct front view or a direct side view of the plan would show us three windows or part of three windows in either a front or side elevation. In the front elevation there is in reality more of the outside window shown than is in strict accord with the second-floor plan. This point will serve to impress upon the mind of the draftsman that it will often require his closest attention in comparing drawings and his best judgment in executing the work to keep the proportions in accordance with the point of view taken of the plan and elevation. Of the section showing hights of ceilings, &c., very little need be said. It should be sketched with the elevation as a guide to correspond with hights of windows, floors, &c. The first-floor hight shows a section of the store front sash. A section in line of the doors would be slightly different, as double transoms have been provided in order to lessen the hight of the doors, as shown.

This store front is designed with heavy cut stone columns from base to the I-beam. From the top of the I-beam the columns are continued with block stone to the cornice line and a stone coping is run across at the bottom of the second-story windows. The oriel window, tower and cornice is of frame construction, although the same design can be executed in sheet metal on a wooden frame work. The body of the work is to be of brick, as are also the arches over the windows. The caps to the windows are to be galvanized iron. There are no brick lines drawn in the elevation, as these will be left for the practice of those who wish to still further carry out the design and improve upon it.

We will now give a few hints in regard to planning, a feature which should also command the attention of good draftsmen. Small and irregular shaped rooms should be avoided. All rooms should have square corners if possible; projecting corners and recesses should not appear in a plan unless caused by a chimney or a bay window. There is nothing nicer than plain, square cornered rooms, especially when it comes to the carpeting and furnishing. Octagon corners should generally be avoided; also three-cornered closets across the corners of rooms. A much better way for such closets is to allow a little more room in a hall or some other part and build the closet out from the room, as shown on the floor plan, Fig. 43. This circular form gives a much better shaped closet by avoiding the sharp corners, giving more room and leaving the rooms with all square corners. There is also plenty of room left in the hall. Long and narrow halls should be avoided, also steep and crooked stairs. The architect and designer should plan to reach as nearly as possible all the rooms on each floor from the main hall and to use all the room to the best possible advantage.

In the floor plan is shown the method of marking where transom frames are used in the interior; thus 2′ 8″ x 6′ 8″ T 12″ means that the transom to be used should be 12 inches in hight, glass measure. The elevation shows the method usually employed in marking size of windows, and the figures give the glass measure.

(To be Continued.)

HOT WATER HEATING.

THIS is a subject in which every one connected with the building trades is interested to a greater or lesser degree, depending upon the particular branch in which he may be engaged. While he may never be called upon to install a system of hot water heating, he is desirous of knowing how it is done and the general principles which underlie its satisfactory operation. He will therefore find much that is of value in the following extracts from a paper read by James Mackay of Chicago, Ill., before the Steam Fitters' Protective Association, at a meeting held in the city named. After touching upon the early forms of apparatus employed for hot water heating, the introduction of the high pressure system in America, proportioning boiler surfaces, &c., the author considers the different kinds of radiation and says :

There are three kinds of radiation in common use—viz.: Direct, indirect and direct-indirect. The last two named are used more especially for ventilation. In apportioning the amount of radiation required for any given exposure account must be taken of the temperature at which it is proposed to operate the apparatus, bearing in mind that the lower the temperature at which proper results can be obtained the better will be the quality of the heat and the greater the economy of fuel. I should recommend that a hot water heating apparatus be capable of maintaining a temperature of 70 degrees during coldest weather, with a temperature in the water not to exceed 160 degrees. Under those conditions a larger amount of radiation would be required than if a higher temperature were carried, but it would be more satisfactory to all parties concerned. The outside wall and glass exposures in any room or building exert the greatest influence in lowering the temperature therein, and for this reason they should be considered as the most important factors in apportioning radiation. The cubic contents also must be considered and good judgment used to ascertain how many cubic feet of air will have to be warmed per hour due to the change of air that may be effected through properly provided channels or through badly fitting doors and windows.

Apportioning Radiation.

The wall surface may be reduced to its equivalent in glass surface and the whole figured as so much glass, or each factor may be treated separately. The latter plan I consider best. In apportioning direct radiation to a given room, in which it is intended to maintain a temperature of 70 degrees—and in the water of the heating apparatus, a temperature of 160 degrees—it has been my experience that 1 square foot of radiation to each 60 cubic feet of contents, 1 square foot to each 2 square feet of glass and 1 square foot to each 8 or 10 square feet of outside wall will do the work properly. Great care must be exercised in judging as to the exposures, construction of the walls and fitting of doors and windows, together with any local conditions which might affect the result, and due allowance made. If a temperature of 200 degrees be carried in the water the radiation may be decreased about 20 per cent.

To ascertain the amount of direct-indirect radiation required for any given room, the usual method is to ascertain the amount of direct radiation required, and to this amount to add 25 per cent. I have found under these circumstances that each radiator should have a cold air duct of an area in the ratio of 40 square inches to each 100 square feet of radiation. This duct should be brought through the wall a little above or below the radiator, so that it will make a right angle turn before entering the base of the radiator. It should also be accessible for inspection and cleaning purposes. Air can be delivered through a direct-indirect radiator at a velocity of about 3 feet per second.

Indirect radiation is usually apportioned by adding 50 per cent. to the amount of direct radiation required. This calculation would answer if wrought iron surfaces were used, but it is entirely inadequate for heating purposes if cast iron indirect radiation, taken at its commercial rating, is used. In such a case I should recommend increasing the amount required for direct radiation 100 per cent.; then the amount will not be found any too liberal.

Size of Air Ducts.

The warm air ducts from indirect radiators, if discharging upon the first floor, should be as near as possible $1\frac{1}{2}$ square inches in area for each square foot of radiation in the radiator to which they are connected. If discharging upon the second floor, $1\frac{1}{4}$ square inches in area to each square foot of radiation should be provided, and 1 square inch in area to each square foot of radiation if discharging upon the third floor. The cold air duct should be from 25 to 33 per cent. smaller than the warm air duct, and the radiator should be so incased that all of the incoming air will pass over every inch of the heated surface. There should be an air space above and below the radiator, that above being a least 20 per cent. larger than that below, and the lower space should not be less than three times the area of the cold air duct. The warm air should be discharged on the opposite end from that at which the cold air is admitted.

There is another factor governing the sizes of direct and direct-indirect radiators, upon which we have not touched —that is, as these radiators heat entirely by convection warming the air to a given temperature, a certain quantity of air will be required to produce certain results, eithe in warming or ventilating. Under known conditions, the velocity of the air passing in at the air duct can be calculated, and the duct so proportioned as to deliver the proper quantity of air ; then the radiating surface must be apportioned according to the amount of air it will warm per hour, regardless of its relation to the direct radiation, as before described. One square foot of indirect radiation at a temperature of 160 degrees will heat 87 cubic feet of air per hour from zero to 70 degrees. In order to attain this efficiency large amounts of air must be passed over the radiator. In large rooms where the air is changed from four to seven times per hour, even better service can be obtained. Indirect radiators should be arranged in groups as compactly as possible, and in connecting them with the mains they should be favored so as to maintain proper circulation with light as well as with heavy fires. A properly erected hot water heating apparatus, on heat being applied at the base of the column of water, will circulate uniformly throughout the system of piping and radiation. This circulation is due to the cold column of water descending and displacing the heated water, which ascends through the piping into the several radiators, where it is cooled and returned to the source of heat. The point at which the return mains are connected to the heater should be the base of the column of water and the point at which heat should be applied.

Systems of Piping.

There are many systems of piping in use, and experience has taught us that they are all good under some conditions. The two-pipe system is possibly better known than most of the others. It consists of two mains—a flow and return. Sometimes they are carried direct from the heater to the different divisions of the work, and in such cases small pipe is used. At other times two large trunk mains are used, from which branches are taken to the different parts of the building. In this system the mains usually ascend from the top of the heater, rising about 1 inch in 8 feet, although it is quite common to cause the flow mains to descend from the top of the heater, venting the high point into the expansion tank. In such cases the extreme end of the flow main is connected through a small pipe into the return opening of the heater, and the return main commences at the point where the first connection is taken from the flow main and runs parallel to it around the basement, receiving the return connections in the order in which they are supplied from the flow main and returning them to the heater in the same order—*i. e.*, the first radiator supplied is the last returned to the heater, and the last supplied is first returned. The size of the main is governed by the amount of radiation supplied. If it is long and exposed, 1 square inch in area should be allowed for each 100 square feet of radiation. If short and compact, the area of a 1-inch pipe will be found sufficient for every 100 square feet of radiation supplied.

When very large mains are used, trouble sometimes occurs through internal circulation in the main itself, and for this reason I would recommend that nothing larger than 5 or 6 inch pipe be used in any main. If greater area is required than this will afford, divide the work and use two or more 5 or 6 inch mains.

Overhead Piping.

The overhead system of piping is also much used. With it all of the water is carried in a large riser to the top of the building, where the main is distributed to different parts of the work, and descends to the basement through single drop mains called risers. The radiators are placed, as far as practicable, immediately above each other, so that they can be conveniently connected to one of these drop mains, both flow and return connections being at the same end of the radiator, the flow at the top and the return at the bottom ; both are connected to the same drop main. No air valves are required, as all air is vented through the top connection of the radiator into the riser. The horizontal mains diverging from the top of the main riser descend about 1 inch in 10 feet, thus making this point the highest in the system of piping. Above it is located the expansion tank, connected with an expansion pipe from the bottom of the tank into the side of the most convenient horizontal main. A vent pipe is also taken from the extreme highest point in the main and connected with the side or top of the expansion tank above the water line. By this arrangement all air from the system is discharged into the tank.

It is not a bad plan, especially if the tank is located only a short distance above the main, to put it under a slight pressure and maintain an air cushion in it. Years ago it was the custom to govern this air cushion by a common ball cock, sometimes placed in the tank and at other times cased up at the side of it. In appearance it was not unlike an automatic water feeder. Of late years, however, automatic air valves have been used for this purpose, but it cannot be said that they properly answer the purpose or that they are reliable. In the basement the risers are connected into the side of the return main, which is carried around the basement and connected with the bottom of the heater. The area of the main in all its parts should be equal to the area of a 1-inch pipe for each 100 square feet of radiation supplied. Radiators may be tapped ¾ inch up to 40 square feet, 1 inch up to 70 square feet, 1¼ inches up to 125 square feet ; larger than this, 2 inches.

Single Circuit System.

One of the oldest systems of piping used for hot water heating is known as the single circuit or one-pipe system. It is exceedingly simple, and where suitable is very effective. It consists, as its name implies, of a single main, which, starting from the heater, is carried vertically as high as the ceiling will permit, then turned and carried as a horizontal main around the basement in a continuous circuit, having its highest point where it leaves the vertical pipe, and descending about 1 inch in 10 feet until it reaches a point immediately at the rear of the heater, where it drops and is connected with the return opening of the heater. If the heater is located in a position that is central to the work, two circuits may be taken from the vertical pipe and carried in opposite directions around the basement. Flow connections to radiators and risers are taken from the top of this main, and return connections brought into the side of it.

The expansion pipe from the bottom of the expansion tank should be connected with the bottom of the heater, and a circulating pipe taken from the top of the highest point in the main and connected to the side of the expansion tank below the water line. The size of the main for this system should not be less than 1 inch in area for each 100 square feet of radiation supplied, and it should not be reduced in size at any point. Air valves are necessary on all radiators. Up to 50 square feet radiators may be tapped 1 inch ; up to 100 square feet, 1¼ inches ; up to 200 square feet, 1½ inches ; larger than 200 square feet, 2 inches.

In all work due provision must be made for expansion and contraction. To my mind a square elbow from the top of a main to lateral branches compensates better for expansion than a 45-degree elbow.

Convention of Building Inspectors.

A very interesting meeting of the National Association of Building Inspectors was held in Baltimore, Md., during the third week of October. The delegates were formally welcomed by Mayor Latrobe, the speech being responded to by President Damrell on behalf of the association. A number of valuable papers were read, among them being, "Qualifications of Building Inspectors," by J. M. Hazen of Minneapolis, Minn.; "Fire Proofing," by M. W. Fitzsimmons, Boston; "Strains and Floors," by J. J. Barry, superintendent of construction, Boston, and "Electricity," by E. S. Brophy, also of Boston, Mass. The subjects of Fire Escapes, Mill Construction, Heating and Ventilating and Smoke Consumption were among the other topics discussed.

The officers elected to serve for the ensuing year were: President, John S. Damrel, Boston, Mass.; first vice-president, John M. Hazen, Minneapolis, Minn.; second vice-president, R. W. Schuch, Peoria, Ill.; third vice-president, P. Lacreix, Montreal, Can.; fourth vice-president, Charles P. Foote, Milwaukee, Wis.; fifth vice-president, William C. Haddick, Philadelphia, Pa.; secretary, Capt. James J. Barry, Boston, Mass., and treasurer, J. T. Oster, Baltimore, Md.

It was decided to hold the next convention in the city of Buffalo.

Meeting of Expanded Metal Companies.

An interesting meeting of representatives of the various expanded metal companies was held not long ago at the Astor House, New York, there being present H. B. Chess of the Central Expanded Metal Company of Pittsburgh; W. W. Ramsay of the North Western Expanded Metal Company Chicago; Chas. A. Morss, Jr., of the Eastern Expanded Metal Company, Boston; W. C. Lewis of the Southern Expanded Metal Company, Washington; W. P. Tostevin of the Expanded Metal Fire Proof Construction Company of New York, and Merrill Watson, New York representative of the Central Expanded Metal Company. Representatives from Phialdelphia and St. Louis were unavoidably detained. The primary object of the meeting was to perfect plans for the joint issue of a catalouge that will more thoroughly represent the various lines of fire proof building construction into which their material enters. They now have several complete systems of fire proofing as applied to floors, ceiling, walls, elevator shafts—in fact, every feature of fire proofing known to the demands of the architectural world; and the wide scope and magnitude of their business, as at present accomplished, is really remarkable. The various corporations representing five manufacturing companies and as many more construction companies, will this year put in place over 1,000,000 yards of lathing, as well as many hundreds of thousands of feet of flooring. Their various systems are all along the line of concrete work as distinct from the block system, and this idea is gaining very rapidly in the building world. They have in hand now complete jobs in some of the very finest office, theater, hotel and apartment buildings in the country, reaching from Boston to Austin, Texas, and it is believed that the concrete idea is yet in its initial steps. The fire resisting qualities of cement cinder concrete have been so well established that the underwriters of the country are giving them every encouragement. They promise to produce a catalogue during the fall months that architects and engineers will find of much interest as well as value in their daily calculations. They have associated with them several expert architectural engineers, who join with them in the firm belief of a bright future for their business. Among the interesting things at the meeting Mr. Chess exhibited samples of a new product far in advance of anything heretofore produced. These were samples of much heavier material than they have ever produced, being sheets cut from steel ¼-inch thick into meshes measuring from 1 to 6 inch diamonds.

Twelfth Century Houses.

It is probable the Normans, after their arrival in England, adopted the dwellings they found in existence until the necessity of their removal, through decay, induced the re-erection of the buildings in an improved and more commodious form and it began to be found that the repeated destruction by fire of the frail tenements of their predecessors induced the necessity of a change in the material of the houses. Accordingly, in the twelfth century, says the *Architect*, stone with shingle or thatch as a roof covering began to be employed by those who had the means of doing so. This, of course, tended to confine the ravages of fire to the building where it originated, but the houses thus erected were comparatively few in number, and it is to be remarked that in the decrees of the Assize of London, in the first year of Richard I's reign, no provision is made for chimneys. Richard's ordination says the walls were to be 3 feet thick 16 feet high and of hewn stone; upon these were built wooden gables of hights irregular, and instead of thatch they were to be slated or covered with brent tile. But this material must have been very sparingly used, as we find, so late as 1472, the buildings were remaining uncovered for want of the article, there being " none to get for no money; " so that probably, notwithstanding the royal command, thatch was extensively used interspersed with wooden shingle, and in a few cases lead was adopted. This is a very curious document, containing much valuable detail respecting town houses in the twelfth century—among the rest, the privileges accorded to all who should rebuild their timber buildings more substantially in stone with tile roofs; regulations as to party walls (the *avant courier* of a building act) are inserted, together with some instruction as to drains, cesspools, &c.

Raising the Roof of a School Building.

There are times when additional room is required in a building, and the architect or contractor is puzzled as to the best way of securing it. Sometimes it is done by the erection of an extension, at other times by raising the building and putting a story underneath, while a third method is to elevate the roof and add a story on top of those already existing. A case of the last kind has recently occurred in the City of Toronto, where the Board of Public School Trustees, in order to secure additional accommodations in one of the school buildings, decided to elevate the roof and put under it another story. The building was 115 x 57 feet in size and two stories in hight, with a brick extension in the rear 57 feet square. The story to be added was 14 feet in hight, and after it had been constructed the roof was lowered in place. In doing the work the roof of the addition was sawed off in line with the brick wall of the main structure. The floors, from the basement up, were shored with stout timbers, and a strong scaffold was built on the upper floor on which the jack screws were operated. As it was necessary that the stone and brick pediments should be lifted with the roof, 12 x 14 inch needles were placed under them, and 55 jacks set in position under the main roof and 24 under that of the extension. The jacks were of the ordinary type with the exception of those at the four corners, where anchor jacks were employed. The roof was raised 16 feet by means of the jacks. The joist for the new floor were then put in and jacks placed on them. The roof was then raised 8 feet more and the brick wall for the new story built, when the roof was lowered until it rested upon the wall. For the purpose of preventing any sagging in the center of the roof when it rested upon its supports 16 jacks, placed upon a scaffold in the hallway in the center of the building, were worked simultaneously with those around the outside. These 16 jacks operated upon two 12 x 14 inch principals about 115 feet long running from end to end of the building. These timbers were built up of 2 x 14 inch joist and were fastened together with a tie beam at each end to keep them in place. The upper part of the tower, with its roof, was raised at the same time, it being supported on a frame work which rested on timbers suspended by chains from the plate, two guy ropes serving to stay it. For the purpose of guarding against the roof being dislodged by the wind while the work was in progress, purchase screws were attached and made fast to the joist of the first floor, the screws being let out as the roof was raised. It is stated that the operation of raising and lowering the roof to its new position was so successfully carried out by I. Wardell & Son that the plaster of the ceiling was not cracked. It was, however, afterward considered advisable to remove it and substitute a metal ceiling. The work was successfully carried out in the space of 21 days from the commencement of operations.

The Grand Jury in New York City have brought in indictments for manslaughter in the second degree against the architect, superintendent of construction, contractor, building inspector and architect's assistant in the case of the Ireland Building collapse on West Broadway in August last.

CORRESPONDENCE.

Putting up Red Wood Tanks.

rom J. J. D., *Cornwall, Cal.*—I desire to ask the prac- readers of the paper if in putting up red wood tanks best to space all the staves and bottom ⅛ inch or to ly drive them close up? I hope my brother chips take up this question in the next issue and give me the lts of their experience.

Figures on an Engineer's Rule.

From BENEM, *Washington, D. C.*—Some time ago I sent editor a rule that he might present a picture of it to the ders of *Carpentry and Building* together with an ex- nation of its lines and figures. Since then I have come o possession of another ivory rule well covered with ures and lines which some of the readers may no doubt ravel, though it will possibly puzzle a few, among hom is "Benem."

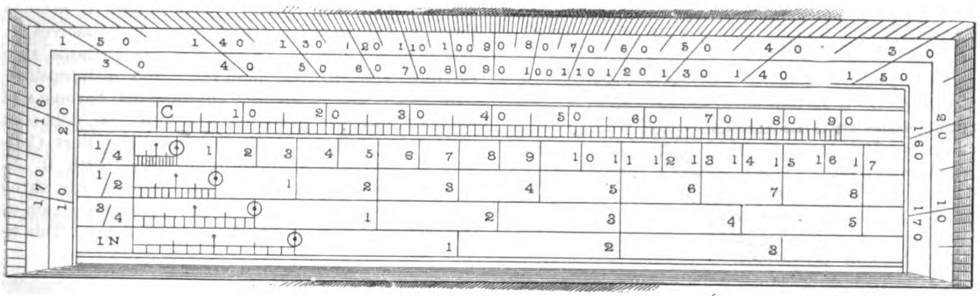


Fig. 1.—Face of Rule.

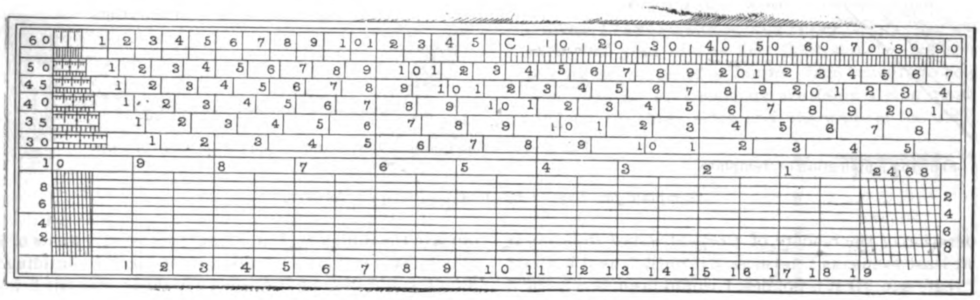


Fig. 2.—Opposite Side of Rule.

Figures on an Engineer's Rule.—Illustrations Made from the Rule Submitted by "Benem."

Note.—Our readers will observe by comparing the illustrations showing the two faces of the rule with the engravings given in the February issue of the paper that many of the scales are similar in the two instances, some being self explanatory, while in the case of many of the lines there is food for thought for the curious.

Riddell's System of Handrailing.

From S. P. G., *San Antonio, Texas.*—With regard to the problem in handrailing submitted by "C. W." of Toronto, Canada, in the February issue of the paper, "Jere" of Davenport, Iowa, wishes to know what fault he finds with Riddell's system of handrailing. If I understand it correctly, "C. W." does not find fault with the system, but that it will not work on the particular job in question. Neither will any other, for that matter. The man who gets a good rail on stairs where the balusters in the cylinder are crowded will have to make his own lines. I have "been there" on several occasions and know whereof I speak. I have found but one way out of the difficulty—that is, by having three different lengths of balusters. A few contributions on the subject of carriages will not go amiss in *Carpentry aud Building.* On handrailing we have had a number of excellent articles, but very little has been said about carriages.

Note.—The art of carriage building is entirely separate and distinct from that of carpentry as commonly understood, and this journal has therefore given little or no attention to the subject. It is possible, however, that in some sections carpenters are called upon to do work of this kind, and it may be for this reason that the correspondent offers his suggestion. If there are those among the readers who have had experience in this line we shall be glad to have them write us for publication.

Questions in Heating.

From J. S., *Omaha, Neb.*—Please give in *Carpentry and Building* a method and scale for finding how much radiation will be required to heat a room, for example, 50 x 22 x 13 feet. What would be the best way to set the radiators? Please give a scale stating how many square feet of radiation is exposed in 1 foot of wrought iron pipe from ½ inch to 2 inches. Give the tables for radiating for both steam and hot water heating. What per cent. of increase in heating surface is allowed in frame buildings over brick and stone buildings? Is there any difference in the allowance made for walls, doors and windows?

Answer.—The secret of successful heating may be said to lie in calculating the amount of heating surface required for different buildings and the information desired by our correspondent covers too much ground to be treated in a limited space. We would suggest that in order to obtain the best rule on the subject about which he inquires, he should read some of the books published in reference to it. Among these may be mentioned "The Metal Worker Essays on House Heating," "Baldwin's Steam Heating for Buildings," and "Hot Water Heating and Fitting." With regard to the room mentioned by our correspondent, it is found by calculations to contain 14,300 cubic feet and in hot water heating it might be safe to estimate 1 square foot of heating surface to 30 cubic feet of space; therefore 480 square feet of radiation would be required. In steam heating 1 square foot of surface might be used to heat 50 cubic feet of space, and 285 square feet of radiation would be needed. In hot water heating for houses or smaller rooms 1 square foot to 25 or 30 cubic feet of space, according to the character or exposure of the building, is used; and in steam heating work, 1 foot to 40 or 50 cubic feet of space is generally used. One square foot of glass surface, as it is exposed in the window, is supposed to have the same cooling effect as 10 feet of ordinary wall surface. To be able to use the rules they should be read in full and be studied at some length and then applied with considerable judgment to secure the best results. The surface exposed in different sizes of pipe is given in almost all price-lists of pipe and in the books recommended. Radiators should be set in front of a window in preference to any other location in a room.

Template for Laying off Jack and Cripple Rafters.

From JERE, *Davenport, Iowa.*—King Solomon, one of the greatest builders, said : "There is no new thing under the sun." I am not prepared to say whether he had any reference to the ways and means employed in the building trades, but I can say that in many respects I am not like him, particularly in this one, for I believe that there is something new under the sun. The thing that I submit for the

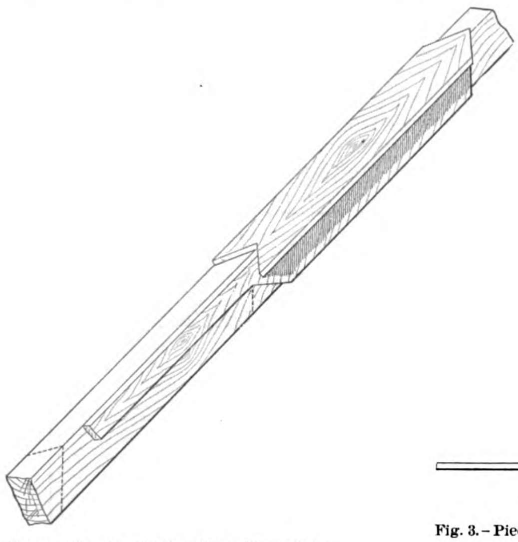


Fig. 1.—Showing Application of Template.

Fig. 2.—Showing the Plumb Cut.

Fig. 3.–Piece Cut with Side Bevels and Nailed on the Edge of Piece Shown in Fig. 2.

Template for Laying Off Jack and Cripple Rafters.

consideration of the readers of *Carpentry and Building* is new, at least to me, as I never saw it until I used it about seven years ago. If it is not new I would deem it a favor if some one of the many readers would verify the saying of the old builder above referred to. The article to which I would call the attention of the readers is a template, shown in Fig. 1, for laying off jack and cripple rafters. It is made as follows: Take a 1 x 6 board and cut it equal to the hypotenuse of the triangle, the base of which is equal to the distance of the rafters from center to center. The hight attained will be according to the pitch of the roof. Thus if the pitch is one-third and the rafters are 2 feet on centers, lay the square with 2 feet on the blade and 16 inches on the tongue. Make a plumb cut, as shown in Fig. 2. The piece shown in Fig. 3 is cut with side bevels and nailed on the edge of Fig. 2, as shown. After the lookout is marked slide the template the number of times that the jack or cripple is spaced from the corner of the building. The tally can be kept at L and R of Fig. 3 for right and left hand pieces.

Cement Pavements.

From C. H. C., *New York City.*—In looking over the August issue of the paper I notice the letter of "E. H." Detroit, Mich., asking for a receipt for cement pavements. I assume that he refers to foot walks rather than street pavements, and suggest that he use for the bottom layer a concrete of the proportions of one barrel Portland cement to two barrels of sand and five barrels of broken stone. For the surface layer or coating, use one part Portland cement and one part sand. The proportions are taken from an authority on cement and should prove satisfactory, although I cannot speak from personal experience.

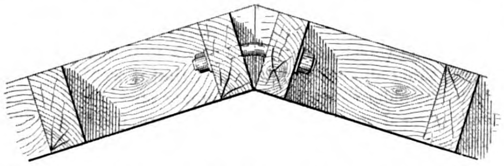
Natural Gas and the Sweating of Chimneys.

From H. L. CAMPBELL, *Leesburgh, Fla.*—In the April issue of the paper on page 98 a correspondent signing himself "F. W. H." presents an inquiry with regard to the sweating of a chimney. As being of possible interest to this writer I take the liberty of presenting the following remarks: 100 cubic feet of natural gas weighs about 4.28 pounds, and is composed of about 1.07 pounds of hydrogen and 3.21 pounds of carbon. For perfect combustion it requires about 970 cubic feet of air. The products of combustion are about 9.5 pounds of steam and 11.75 pounds of carbonic acid. As the gas blows the air necessary for combustion in through the burner, no draft is necessary except to carry off the products of combustion. In order to conserve the heat as much as possible the outlet to the chimney is constricted to the smallest possible dimensions that will serve the purpose, and here the trouble commences. The steam condensing in the flue soon penetrates the brick, carrying the soot with it that has been dispersed in the flue from former coal or wood fires. Being strongly impregnated with carbonic acid it attacks the lime in the mortar, disintegrates it, dissolves it and eats out the joints. When the gas contains sulphur, sulphuric acid is formed and the action is intensified and hastened, so that in time the chimney will become a pile of loose bricks. The gas from Bradford, Pa., field contains little or no sulphur, while that from the Port Colborne field in Canada is strongly impregnated with it. There is no remedy except to line the chimney true, throwing the drafts wide open and hustling gas and steam out of the chimney before it has time to condense. This would obviate the difficulty, but it would occasion a waste of heat which few consumers would countenance. In building new flues I would suggest the use of vitrified sewer tile 8 inches in diameter for medium size furnace and grate flues, and 6-inch for kitchen and other stoves. They should in all cases extend down to the cellar and provision should be made to carry the condensation to the drain. These sizes of flues will admit of coal being used at any time the gas gives out, which it does occasionally.

In the case of old flues already built they can be lined with wrought iron pipe as large as the flue will receive, but this method will clog the flue to such an extent as to render it useless for coal. The better way for furnaces is to put in a smoke pipe T anywhere between the furnace and the chimney. Put a close damper in the smoke pipe between the T and the chimney, and run a branch out from the T through a cellar window and turn it up vertically about 6 feet with a suitable cowl. The pipe should be graded so that the condensation will run out to the elbow, where a small hole should be made for it to escape with that from the vertical part of the pipe. A close damper should also be put in the branch pipe. With this arrangement, which is the least expensive that can be devised, coal or gas can be used at will by simply turning the damper in either pipe. A similar arrangement can be used for a kitchen flue, carrying the auxiliary pipe out through the side of the house, using, of course, proper safeguards. The condensation from a kitchen flue, however, is rarely sufficient to cause trouble. All the smoke pipes for natural gas should be of galvanized iron. When a new flue is not carried down to the cellar it should rise in a galvanized iron funnel, to which a small drain pipe is attached and leading outside to discharge on the ground.

Constructing the Corners of an Octagon Building.

From H. W. N., *Salt Lake City, Utah.*—In the May issue of the paper "S. F. W." of Leroy, Pa., presents an inquiry in regard to the best method of constructing the corners of an octagon building. I would say that I have constructed in this city a building much larger than the



Method Suggested by "H. W. N." for Constructing the Corners of an Octagon Building.

size he gives. I made the angles according to the sketch which I send. The top and bottom plates are made to the exact size of the building and mitered at the angles, all the studding being put in square the same as an ordinary building. The studs at the angle are bolted together with common bolts bent as shown in the sketch. I found that four bolts in the hight are sufficient, with blocks at intervals fitted and nailed in to the angle. The building referred to has been erected for a period of 30 years, and although it was lathed and plastered without any corner board or anlge strips, it is as good and firm to-day as when first put up. If "S. F. W.," does not find this a satisfactory answer to his question, I trust he will write again.

Carpenters' Work Bench.

From A. C. P., *Vincennes, Ind.*—I send drawings of a bench of mine which may possibly prove of interest to

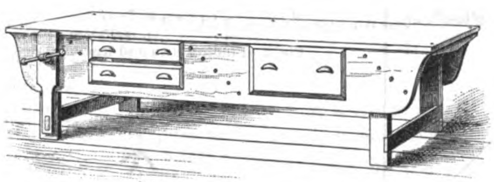


Fig. 1.—General View of "A. C. P.'s" Work Bench.

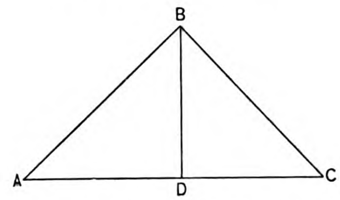
Fig. 2.—View of One of the Wooden Cleats.

Carpenters' Work Bench.

some of the many readers of *Carpentry and Building.* When I want a tool I am not obliged to climb over a dozen door and window frames and then set over a dozen more to one side in order to get it, as a man generally does who keeps his tools in a chest. It may also be interesting to state that I have secured a number of jobs of work by having such a bench as that shown, and which I would not otherwise have obtained. The bench can be made of any length or width, but I would advise a width not to exceed 28 inches, so that it can be taken through any house door. The top of the bench should be in a single piece, the material of which mine was made being $1\frac{3}{8}$ inches thick. The two small drawers are 8 inches deep, while the large one is 16 inches deep. The top piece should be plowed and there should be two grooves on the undersides, 1 and 5 inches respectively from the edge. In Fig. 1 of the sketches is presented a general view of the bench, while in Fig. 2 is shown one of three cleats, the top of which is slightly convex. The cleats are bolted under the top piece at each end and the center.

Obtaining the Miter Cuts for Hopper Work.

From J. J. D., *Cornwall, Cal.*—I send for publication a sketch and description of a method for obtaining the butt or miter cuts for hopper work. Referring to the sketch let A C represent the straight edge of a board and the line A B the flare of the board. Place the square on the face of the board so that the blade will coincide with the flare of the hopper A B, then mark by the tongue the line B C; then square from the edge of the board, cutting the angle B. Now we have a figure that will, when used on the steel square, give the cuts for a hopper of any flare, either with butt or miter joints. To find the bevel of the cut across the face of the board take A B on the blade and A D on the tongue, the bevel of the tongue be-

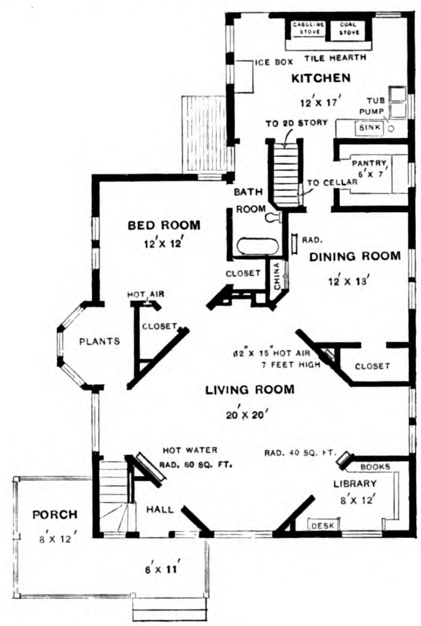


Sketch Contributed by "J. J. D."

ing the bevel required. To find the bevel for the butt joint take B C on the blade and A D on the tongue, the bevel on the tongue being the bevel required. To find the bevel for the miter joint take B C on the blade and D C on the tongue; when the bevel of the tongue is the bevel required. I will also state how I lay off angles of 60 and 30 degrees. Mark any number of inches, say 14, on an indefinite line. Place the blade against one extremity of this distance and the 7-inch mark of the tongue at the other, the tongue forming an angle of 60 degrees, with the indefinite line and the blade an angle of 30 degrees.

Novel Floor Plan Arrangement.

From DIAMOND ROOM, *Red Wing, Minn.*—Inclosed find tracing of plan of the first floor showing my idea of arranging the rooms of a house. The benefits to be derived from such an arrangement are large living room, with windows on three sides and the walls of the main living



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

room not exposed to the outside. The latter is a matter of importance in this cold climate. I should like to have some of the readers furnish an elevation for this plan. I do not care to have more than two rooms in the second story, the kitchen part being one story high. I do not want anything expensive, but on the contrary something plain and substantial of the colonial style. After the elevation has been published I will give my ideas relative to the heating and ventilation of the house.

Finding the Lengths and Bevels of Braces.

From C. E. C., *Marshall, Wis.*—In looking over back numbers of *Carpentry and Building* I noticed in one of the issues a question by "M. J." of Minersville, Pa., in regard to finding the lengths and bevels of braces in trestle work. I have failed to see any answers to the question asked by this correspondent, so I take the liberty of sending several sketches which I trust may prove of interest to "M. J.," as well as to other readers of the paper. Fig. 1 of the sketches represents the end bent of a building, the roof of which has a rise of 4 inches to the foot. Now let a b represent two braces with a run of 3 feet from the angle of the principal rafter and braced as shown. In order to find the lengths and bevels of the two braces we must first find the run and rise of the brace. To do this we will let Fig. 2 represent a board 12 inches wide. Measure off 3 feet from a to f, which is the run of the brace on the rafter, as shown in Fig. 1. Now take 4 inches on the tongue of the square and 12 inches on the blade, which correspond with the pitch of the roof, and lay the square on the board with the 12-inch mark at a and scribe along the tongue. Now move the square along until the 12-inch mark coincides with the mark of the tongue and scribe along the tongue as before. Now move the square along until the 4-inch mark on the tongue strikes the mark f, as indicated by the dotted lines, and scribe along the tongue to point c, and then by measuring from c to d we find it to be 10¼ inches. This would make 2 feet 10¼ inches from a to c, which is the run of the two braces a and b of Fig. 1. In order to find the rise we must add to 3 feet 11 5/12 inches the distance from f to c in Fig. 2. This gives the brace a a rise of 3 feet 11 5/12 inches and the brace b will have a rise of 3 feet, less 11 5/12 inches, which is 2 feet and 7/12 inch. Now that we know the run and rise of the two braces a and b, we must next find the bevel. Referring to Fig. 3 of the sketches, let a b be drawn square across a board and measure from a to c the run of the two braces. Now take 4 inches on the tongue and 12 inches on the blade of the square and draw the line d e, intersecting a b at the point c. Now measure from a to g the rise of brace a and draw the line g c. Now measure from a to f the rise of brace b and draw the line f c. Now set the bevel as shown, the one at c giving the top cuts and the bevels at f and g the bottom cuts. I should think if "M. J." would frame his braces as shown by c and d it would be much easier. I should like very much to see in the columns of *Carpentry and Building* more drawings of heavy timber work such as barns and warehouses, &c. I think it is the most important thing about a building and that it would be a big help to the older as well as the younger ones, for there are plenty of good mechanics when they are working under some one else, but who, when they come to lay out a frame with the steel square and 10-foot pole, are "not in it," so to speak.

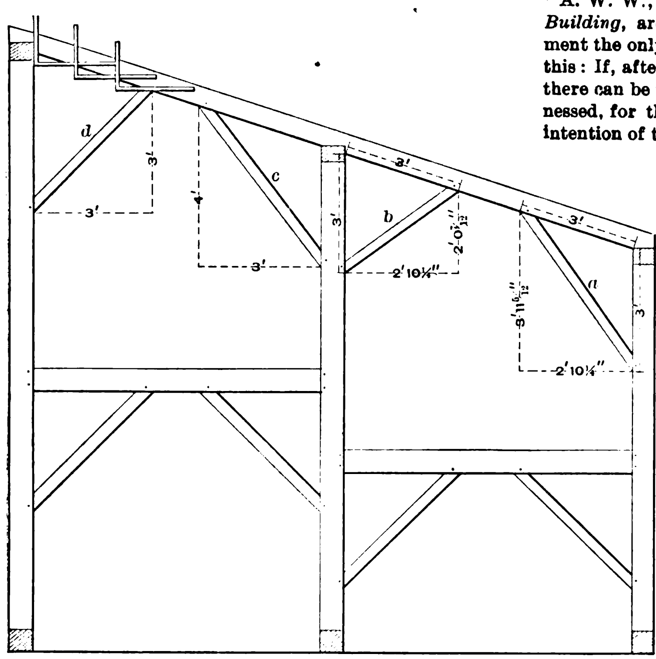


Fig. 1.—End Bent of Building with Roof Having a Rise of 4 Inches to the Foot.

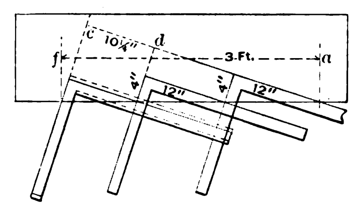


Fig. 2.—Finding Run and Rise of Brace.

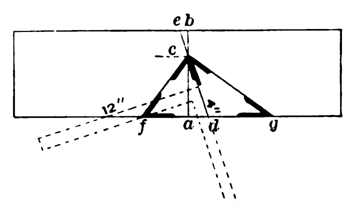


Fig. 3.—Method of Finding the Bevel of the Brace.

Finding the Lengths and Bevels of Braces.—Diagrams Accompanying Letter of "C. E. C."

Witness Marks in Timber Framing.

From G. W., *Jermyn, Pa.*—The manner of witnessing in timber framing, as shown by "M. D. S.," in Fig. 6, and "A. W. W.," in Fig. 8, in the July issue of *Carpentry and Building*, are the best thus far indicated, and in my judgment the only correct way. The reason for my opinion is this: If, after the work is done, it is found to be wrong there can be no question as to how it was laid out or witnessed, for the marks are left as witnesses to prove the intention of the one laying out the work. This applies to rough timber, which is used in seven-eighths of the framing done. When planed stuff, such as exposed roof trusses, &c., is to be framed, then adapt the means to the end and witness in such a way that the finished work will not be disfigured.

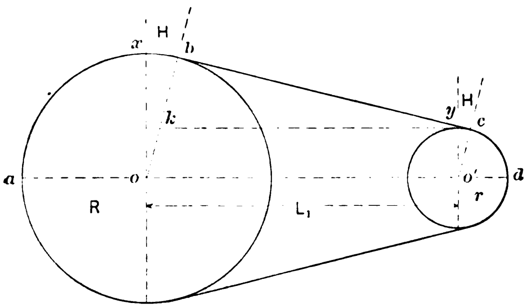
Lengths of Belts.

From J. M. B., *Monroeton, Pa.*—I have a problem which I desire to submit to the readers of the paper for solution. I can obtain the result near enough for all practical purposes, but I do not know how to properly figure it out. The problem is this: Given two pulleys, one 10 feet in diameter and the other 1 foot in diameter, with the centers 10 feet apart, what is the length of a belt which will reach around them? I inclose a sketch illustrating what I mean.

Answer.—The problem presented by our correspondent is not altogether simple in its solution, but to those who are familiar with algebra and geometry it will not prove difficult. We have engraved the sketch submitted by our correspondent, in combination with one taken from "Cromwell's Belts and Pulleys," from which the formulæ which follow are taken. Let the distance between the centers of the two pulleys be denoted by L_1, the radius of the larger pulley by R, the radius of the smaller pulley by r, and the total length of the required belt by L. In the sketch here given the lines $o\,b$ and $o'\,c$ are parallel, for the reason that each is perpendicular to the line $b\,c$; hence the angles $x\,o\,b$ and $y\,o'\,c$ are equal. Let each of these angles be denoted by H. It is evident from the figure that the total length of the belt must be

$$L = 2\,(b\,c + \text{arc}\ a\,b + \text{arc}\ c\,d).$$

Draw the line $c\,k$ parallel to $o\,o'$, when we shall have $c\,k = L_1$ because $o\,b$ and $o'\,c$ are parallel. In the triangle



Lengths of Belts.—Diagram Illustrating the Method of Finding the Length of a Belt.

$b\,k\,c$ in which the angle $k\,b\,c$ is a right angle, we shall have

$$b\,c = \sqrt{\overline{c\,k}^2 - \overline{b\,k}^2} \text{ or } b\,c = \sqrt{L_1^2 - \overline{b\,k}^2}.$$

But $o\,k = o'\,c = r$ and $b\,k = o\,b - o\,k = R - r$, hence

$$b\,c = \sqrt{L_1^2 - (R - r)^2}.$$

The arc $a\,b$ is equal to the arc $a\,x$ + the arc $x\,b$; the arc $a\,x = \dfrac{2 \times 3.1416\ R}{4} = 1.57\ R$ and the arc $x\,b = \dfrac{3.1416\ R\ H}{180} = 0.0175\ R\ H$.

Therefore

arc $a\,b = 1.57\ R + 0.0175\ R\ H = (1.57 + 0.0175\ H)\ R$.

Also the arc $c\,d$ is equal to the arc $d\,y$ minus the arc $y\,c$; the arc $d\,y = \dfrac{2 \times 3.1416\ r}{4} = 1.57\ r$ and the arc $y\,c = \dfrac{3.1416\ r\ H}{180} = 0.0175\ r\ H$.

Hence we shall have

arc $c\,d = 1.57\ r - 0.0175\ r\ H = (1.57 - 0.0175\ H)\ r$.

Adding together the values of $b\,c$, the arc $a\,b$ and the arc $c\,d$ we have for the total length of the belt

$$L = 2\left[\sqrt{L_1^2 - (R - r)^2} + (1.57 + 0.0175\ H)\ R + (1.57 - 0.0175\ H)\ r\right]$$

Another method which will perhaps be found sufficiently accurate for most purposes is to first draw a diagram of the two pulleys to as large a scale as may be convenient, taking great care to have the diameters and the distance between centers of the pulleys correct. Next draw the line $b\,c$ tangent to the two circles representing the pulleys and extend it in either direction indefinitely. Now step off with a pair of dividers the distance from b to a, measured on the circumference of the larger circle, and set it off to the left of b on the line $b\,c$. In the same way step off the distance $c\,d$, measured on the circumference of the smaller circle, and set it off to the right of c on the line $b\,c$. Then the distance $c\,b$ plus the two measurements which have been added will represent to scale one-half the length of the required belt.

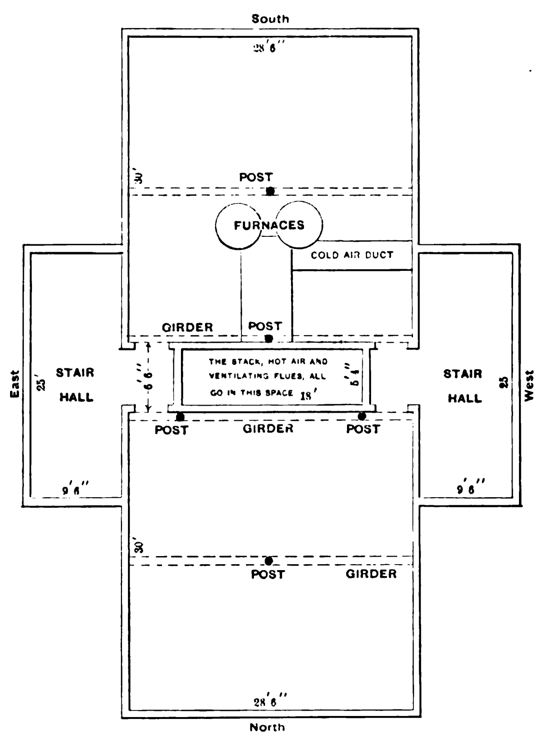
Setting Floor Tile.

From M. S. E., *Westminster, Md.*—I would like to get some information about laying a tile floor in a bathroom and also about setting the tiles for wainscoting. I do not know what kind of cement to use for laying the tile on the floor, or how the tiles in the wainscoting are kept in place until the cement sets.

Note.—We shall be glad to have our readers give their methods of doing this work. In order that our correspondent shall have some information to aid him in his work he can adapt the following suggestions to his use. A common practice is to nail strips lengthwise to the joists far enough below their top surface to permit a board flooring to lay upon them, with a brick pavement on top of this again, so that the surface of the brick just comes flush with the top of the joist. After the floor is thus prepared it is grouted with a cement made of one part good sharp clean sand and from three to five parts of Portland cement. After this has been carefully done and the surface leveled up while the cement is yet soft the tiles are bedded into the cement. It will be readily seen that the greater the care used the smoother and more level the floor will be. For wainscoting, the face between the studs is filled in with a board back up to the hight the wainscoting is desired, and sufficient space is left for brick on edge to be set in good mortar against this back. The surface should be plastered over the same as if it were to be a finished wall and then the face scratched in order to make a key for the cement. In setting the tile of the wainscoting more skill is required, and in order to have the cement set quickly and smoothly a quantity of plaster of paris is mixed with it. The success of getting a smooth, true surface for the wainscoting depends largely upon smoothing up the surface of the brick work before using the cement.

Ventilating a School Building.

From S. W. D., *Ashland, Pa.*—Under the head of Correspondence in the June issue of the paper, "A. S.," of Lancaster, Ill., sends a plan of a school building and asks about ventilating it. He does not say how it is heated or where the heat is delivered to the rooms. It is very important to know this, so as to obtain proper ventilation. I am at present architect for a new school in this town arranged somewhat similar to the plan which he contributed. I inclose a rough sketch of the school building and would state that the heat, smoke and ventilating flues all go into the central space, thus leaving an unbroken black board surface against the central walls, which is a very important point. It will be much better if "A. S.," puts his vents inside the cloak rooms so as to give an unbroken black board surface. There is in my building a cloak room in each stair wing; besides, by the construction which



Ventilating a School Building.—Plan Submitted by "S. W. D

I employ, the boys and girls are kept separate, even to the cellar where the cremating closets are placed. The rooms are heated on both floors by hot air flues running to points near the ceiling, with down currents from near the floor level to the cellar, where they connect with the heated ventilation flue. By this means the air in the room is changed from six to eight times per hour. I would state that the hight of the rooms is 12 feet in the clear and the cellar 9 feet in the clear from floor to joist. The stack in the center is about 55 feet high, measuring from the floor level. The area of the class rooms is 10,260 cubic feet, while the area of the building is four times that, or 41,040 cubic feet.

Method of Attaching Wind Mill to Pump.

From G. H., *New York*.—In reply to the inquiry from "J. G. S.," Norristown, Pa., which appeared in the issue for October, I would offer the following suggestions for an indirect connection for a wind mill and pump which I hope may prove useful to him: The bell crank shown in the sketch, Fig. 1, is a convenient and cheap method of connection. The bell cranks may be made of cast iron from a pattern that may be made by any carpenter, a forging, or they may be made of heavy sheet iron with stiffening braces forming the pin bearings. If the mill is at a distance from the house, say 100 or 200 feet, a No. 8 iron wire may be used to advantage with two or three supports on poles to keep the wire from sagging. In this arrangement a counter weight, as shown at C in the cut, must be attached to the pump rod connection to keep the wire taut and carry the bucket down in any single acting force pump. If a double acting force pump is used then the T-shaped bell crank shown at E must be used, for in

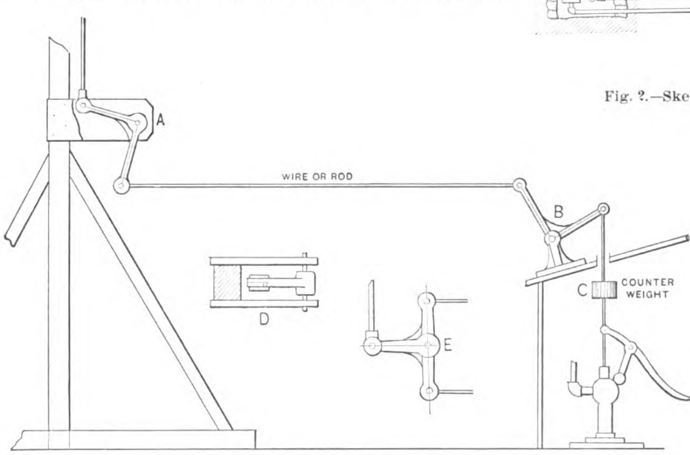


Fig. 1.—Bell Crank Method Proposed by "G. H."

Method of Attaching Wind Mill to Pump.

this class of pumps the pressure is alike in both up and down stroke. If the weight was used in this case it would need to be too heavy for the operation of the wind mill. The wire should be tightly stretched with the use of the T bell crank to prevent lost motion. The connection with the head of the pump handle may be made with a wide yoke or Y clip, as shown at D, and a long bolt inserted to pass through the three pieces that form the joint. If at any time it becomes necessary to run the pump by hand, slipping the Y clip off, by withdrawing the bolt and keeping the pump handle connected, will be a quick way of disconnecting the mill. Where the wind mill can be set within 25 feet from the pump a wooden rod makes the best connection, in which case the counter weight C will not be needed for any class of pump. The relative length of the arms of the bell cranks may be so arranged as to suit any length of stroke in the pump or mill.

From RUBE, *East Hampton, N. Y.*—In looking over the paper for October I notice the inquiry from "J. G. S.," Norristown, Pa., about setting a wind mill. I send a sketch, Fig. 2, showing my idea upon the subject, which illustrates a plan which I have seen worked very satisfactorily. The water can be drawn in this way and the discharge pipe laid in the same trench. The pipes run in as direct a manner as possible. The mill should be set over the pit at any distance from the house on a level, provided the upright lift is not more than the sketch shows. Referring to the illustration: A is the pit, B the cylinder specially made for wind mill work, C the check valve and D the tee and plug to drain the pipe. The pump rod is shown at E. The tee D is left out in case the pipe is run

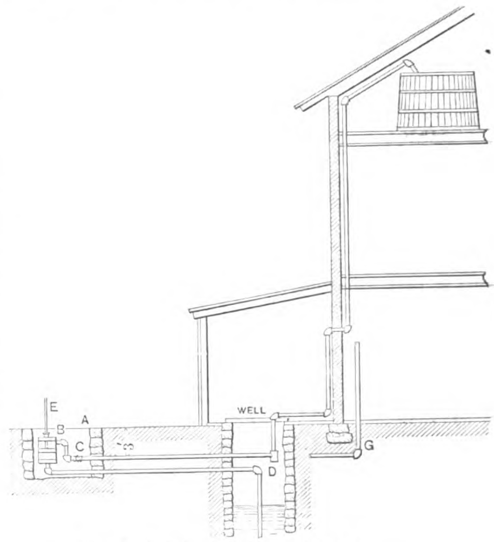


Fig. 2.—Sketch Submitted by "Rube."

in the most direct way, as shown by the supplementary sketch G.

Weather Boarding a Round Tower.

From G. G. R., *New Philadelphia, Ohio*.—Will some of the readers tell how to weather board a round tower with lap siding so as not to throw the ends down lower than the center nor have the siding stand away at the top edge?

Problem in Board Measure.

From A. P. McL, *Roslindale, Mass.*—I would like to have some of the readers of *Carpentry and Building* solve the following problem: A board is 12 feet long, 6 inches wide at one end and 8 inches at the other; where must it be cut to give two halves of equal size? What distance from each end should the board be cut? The ends are cut square with the center line, which is the working line. I would like to learn the rule which would apply to a board of any size.

Carpenters' Pocket Rule.

From J. J. D., *Cornwall, Cal.*—Will some reader of the paper tell me what is the best kind of carpenters' rule to use and which is most employed by carpenters generally?

The National Brick Manufacturers' Association will hold their tenth annual convention in the city of Atlanta, Ga., during the week commencing December 3. The headquarters will be at the Kimball House, and the sessions will be held in the hall of the Young Men's Christian Association close at hand. There will be a session in the forenoon of each day, while the afternoons and evenings can be devoted to visiting the exposition, sightseeing, &c. The programme which has been prepared includes a number of valuable papers and addresses upon practical subjects covering every branch of the business.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

THE subject for present consideration is a capital of the Roman-Corinthian order, and in the article I shall describe the methods employed in preparing the drawings for either modeling or carving. In classic architecture all details are subject to certain rules as regards their dimensions. Referring to the subject in hand, the measurements for the different parts are made in modules and minutes. A module may be 2 inches or 2 feet, or even less or more, as the case may be; but it is always the semi-diameter of the column taken at the bottom of the shaft and just above the point where the base commences. The module is subdivided into 30 equal parts called minutes, and these two units of measure are employed in preparing all drawings and models for this class of work. As all members and parts are subject to certain rules the use of modules and minutes for the units of measure simplifies the matter considerably, more than would be the case if feet and inches were used. Of course after the drawings or model is prepared feet and inches can be used as the units of measure for transferring it, but in the first preparation of the model or drawings modules and minutes are employed to the best advantage. By referring to the scale of hights shown on the left of Fig. 87, it will be noticed that the full hight of the capital is 70 minutes, or in other words, 2 modules and 10 minutes, being subdivided as follows: The full hight of the shorter leaves is 19 minutes, while the longer ones extend 18 minutes above the shorter ones, or 37 minutes in all; from the top of the long leaves to the under side of the volutes and hellices is 9½ minutes: the volute takes up 13½ minutes and the balance, 10 minutes, is taken up by the abacus. These are the general divisions of the hight.

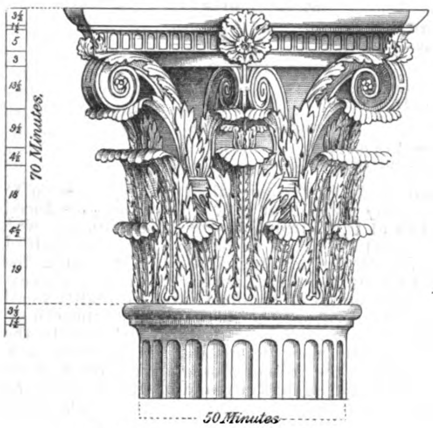


Fig. 87.—Roman-Corinthian Capital.

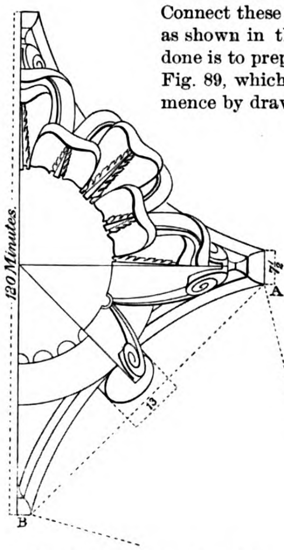


Fig. 88.—Half Plan of Capital.

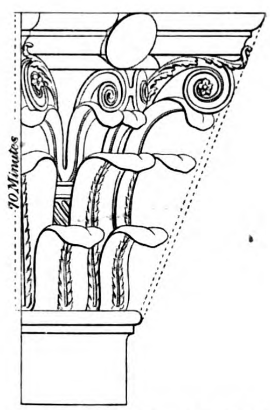


Fig. 89.—Half or Angular View of Capital.

Hints on Wood Carving.—A Roman-Corinthian Capital.

The next principal divisions are the overhang of the leaves, each of which is 4½ minutes. The abacus takes up 10 minutes, divided as follows: The ovolo, or upper member, takes 3½ minutes; the fillet, or square member, 1½ minutes, and the cavetto, or lower member, 5 minutes. Other subdivisions will be given as the work proceeds. The torus, or fillet, given in Fig. 87, does not belong to the capital, but for certain reasons which will be subsequently explained, it is necessary to know the sizes and lay them down upon the drawing. The hight of the torus, taken the same as the previous hights were obtained, is 3⅓ minutes, while the projection is 5 minutes. The fillet below the torus is 1⅜ minutes in hight and projects 2½ minutes. These projections are measured from the throat or upper part of the column, which is 50 minutes in diameter.

We will next proceed to lay down the plan, half of which is shown in Fig. 88. Commence by drawing two lines crossing each other at right angles and of indefinite length. From the intersection of the lines as a center and with a radius of 60 minutes mark the four lines already drawn, and at the points found erect perpendiculars upon both sides extending indefinitely. Upon these perpendiculars, using the intersections as centers and with radii of 3¾ minutes, connect the points as indicated by the line A B of Fig. 88. Now upon the line A B erect an equilateral triangle, the apex of which will be the center from which to strike the curve for the upper edge of the ovolo of the abacus and the radius will be A B. From the curve just located measure toward the center of the capital 3 minutes, and from the same center as before construct this line, which will be the line of the fillet of the abacus. From the line of the fillet set inward again 2⅓ minutes, and, with the same center as before, construct this line, which will be the lower edge of the cavetto of the abacus. Connect these lines across the horns of the capital as shown in the figure. The next thing to be done is to prepare an angular view of the capital, Fig. 89, which is in reality a half view. Commence by drawing a line for the center; mark upon this line the different hights as given in Fig. 87 and erect perpendiculars from them. Next transfer the projections found upon the plan, Fig. 88 to their proper places in the angular view. Now mark the throat of the column, fillet and torus, the projections having been previously given. After this is done, draw a line from the ovolo to the torus so as to just touch the outer curve of both. This line gives the projection of the volutes. From the upper corner of the fillet under the torus draw a line parallel to the last line, which will give the projections of the leaves. In every perfect capital of this order there are eight volutes and eight hellices, or small volutes. The volutes are situated immediately under the four horns of the abacus and the hellices are midway between the volutes. By referring to the scale of hights given in Fig. 87 it will be noticed that the top of the hellices is 3 minutes below the top of the volutes the bottom side of both hellices and volutes being the same. In order to find the projection of the hellices bisect the line A B, shown on the plan view, Fig. 88; then take the distance from the point found to the center of the capital. Transfer it to the angular view. Fig. 89, and upon the top line of the ovolo. Then from the point found draw a line touching the torus at the bottom of the capital, which will give the projection required.*

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

(To be continued.)

CONVENTION OF THE NATIONAL ASSOCIATION OF BUILDERS.

THE ninth annual convention of the National Association of Builders was held during the third week in October at Baltimore, Md., and although the character of business, with one exception—that of the proposed amendments to the constitution—was much the same as usual, the volume of business was less than that transacted at the last convention. Considering the radical nature of the changes affected by the amendments to the constitution, the meeting was the most important that has been held since the preliminary organization which resulted in its institution. Notwithstanding the fact that there had been a falling off in the number of constituent bodies of one third of the total membership during the past year, the character of representation was exceedingly satisfactory, both in point of numbers and earnestness of the delegates. A keen and intelligent interest in the proposed changes was manifested from the first, and when the time for their consideration arrived the representatives of the various exchanges expressed themselves freely and to good purpose on the subject.

The attendance at the sessions was excellent throughout, there being but few absentees at roll call. The Baltimore Builders' Exchange entertained the delegates and visitors to the number of nearly 300 with most lavish hospitality. Nothing was left undone for the comfort or amusement of the visitors, and all forms of entertainment were chosen with excellent judgment, which reflected great credit upon the members of the Builders' Exchange, and were so arranged as to in no way interfere with the business of the occasion. The hosts divided themselves into two parts, one having direct charge of the delegates and single gentlemen visitors and the other having for their particular duties the entertainment of the ladies attending the meeting, delegates and others. Throughout the entire time of the convention all were unceasing in the expression of their appreciation of the thoughtfulness and care exercised in providing for their entertainment. During the first session of the convention a large number of invitations were read by the secretary from those in charge of various points of interest in and about the city, many of which were accepted.

There were in attendance as regular delegates and alternates the following gentlemen :

BALTIMORE, MD.

At large, E. L. Bartlett.

Delegates.	Alternates.
John Trainor.	W. C. Stewart.
John Buckley.	Joseph Lamb.
John E. Smith.	J. C. Doyle.

BOSTON, MASS.

At large, E. Noyes Whitcomb.

Ira G. Hersey.	Cyrus T. Clark.
John F. Buerkell.	Alfred J. Neal.
Lyman D Willicutt.	William E. Sheriffs.
Walter S. Lyons.	James Nixon.
J. Arthur Jacobs.	

BUFFALO, N. Y.

At large, John Feist.

J. J. Churchyard.	S. P. Jones.
Alfred Lyth.	William Schumacher.
George Duchscherer.	

CHICAGO, ILL.

At large, William Grace.

George H. Fox.	John Rawle.
George Tapper.	William H. Mortimer.
Henry Appel.	L. L. Leach.
Alexander Gordon.	William Henry.
Robert S. Haldeman.	J. C. Thompson.
John Mountain.	W. L. Hoffman.
Murdoch Campbell.	Samuel I Pope.
E. B. Myers.	Wallace Carter.
J. G. McCarthy.	C. T. Drake.
Frank J. Johnson.	George Jackson.
Charles Dameier.	Griffith Hunter.

CLEVELAND, OHIO.

K. F. Gill.

LOWELL, MASS.

Charles P. Conant.
P. B. Quinn.

MILWAUKEE, WIS.

At large, H. J. Sullivan.

C. A Sercomb.
L. A. Clas.

NEW YORK, N. Y.

At large, Stephen M. Wright.

John M. Hamilton.
T. Hugh Boorman.
Alexander Brown, Jr.
Isaac A. Hopper.
Henry M. Tosteven.
George J. Willis.

PHILADELPHIA, PA.

At large, Stacy Reeves.

Charles Gillingham.	William S. P. Shields.
George Watson.	William Conway.
John S. Stevens.	Francis F. Black.
William Harkness.	A. C. Buvinger.
Franklin M. Harris.	James Hastings.

PROVIDENCE, R. I.

At large, Thomas C. Ross.

Patrick Tierney.	Richard Hayward.
Spencer B. Hopkins.	William F. Cady.

ROCHESTER, N. Y.

F. P. Stallman.
J. H. Grant.
John Luther.
J. J. L. Friederich.

ST. LOUIS, MO.

Thomas J. Ward.	P. J. Moynihan.
John Ratchford.	Joseph L. Guedry.
John F. Hines.	Charles B. McCormack.
Thomas F. Hayden.	Anthony Ittner.

ST. PAUL, MINN.

Edward E. Scribner.
George J. Grant.

WILMINGTON, N. C.

A. S. Reed.
George H. McCall.

WORCESTER, MASS.

Charles A. Vaughan.
F. H. Goddard.

President Noble H. Creager called the first session to order on Tuesday morning at 10.30 o'clock and introduced Hon. Ferdinand C. Latrobe, Mayor of Baltimore, who extended a hearty welcome to the delegates on behalf of the city. The Mayor was followed by S. B. Sexton, the president of the Builders' Exchange of Baltimore, who expressed cordial feelings of fraternity and hospitality to all visiting builders, assuring the delegates and others in attendance on the convention of a warm welcome by the members of the Builders' Exchange. Mr. Sexton took occasion to refer to the present prosperous condition of the exchange as being largely the result of the efforts of the National Association in some form or another. The visits of the Baltimore delegates to the several sister exchanges in which the preceding conventions have been held have been the means of demonstrating the practicability of the recommendations of the National Association of Builders, and have so imbued the members with the sense of the benefits of associated effort that much has been accomplished that otherwise would have been impossible. During the past year the exchange has been incorporated and has built for itself a permanent and beautiful home, situated in one of the most favorable locations in the city. In addition to the other favorable features of this move, there has resulted already a feeling of solidarity and unity that is a most satisfactory evidence of the wisdom of the step. The history of the organization was recited and its existence was shown to be the direct outgrowth of the first steps toward organization taken by the National Association. Mr. Sexton attributed much of the success of the exchange directly to the influence of the National Association, and referred to the value of the broadening effect of meeting in close and friendly contact the members of similar exchanges located in various parts of the country. In closing Mr. Sexton expressed full appreciation of the benefit of the National Association to the local exchange and pledged the loyalty of the Baltimore Association, which owed its origin to the national body.

President's Address.

The next in order was the annual address of the president, which was substantially as follows :

" What steps are necessary to adapt the National Association to this new and wider field of usefulness will be the most important question to come before us. There will be preambles and amendments to the constitution looking to this end. I would recommend their careful consideration, and such amendments made to the constitution as will bring the local exchanges to a closer relation with each other, especially those in our smaller cities with those in our larger ones, so there may be other binding links in addition to those of the National Association.

" Exchanges should be careful in the selection of their membership. Efficiency and not numbers should be their aim. To be a member of an exchange affiliating with the

National Association should be a guarantee not only of mechanical skill, but also of responsibility and fair dealing. I would recommend a reduction of the per capita tax if it can be done without impairing the efficiency of the good work of the National Association One strong point seems to be evidenced in the growth and permanency of local exchanges—namely, the necessity of enlisting the interests of the members in the erection and maintenance of a home for the exchange. This has been effected in many of our large cities, and wherever it has been accomplished the local exchange has prospered and established a permanency that could not be obtained without it.

"I think it is of great importance to urge upon the various exchanges comprising this National Association the necessity of securing homes for their local bodies.

THE SELFISH INTEREST.

"Human nature is so constituted that an appeal to a personal interest is a test of friendship, and from observation I can say that whenever men have a moneyed interest in an association they feel a far deeper interest in its success than when their membership is merely the payment of small annual dues. This has been done with great success in Boston, Philadelphia and Buffalo, and I can speak of its efficiency here in Baltimore most confidently. The Baltimore Exchange has not been so greatly enlarged numerically, but since they enlisted their members in their building project the exchange has gained a character and permanency which did not previously exist. The experience in Baltimore will be repeated in every city if the steps are pushed vigorously to produce the result. You will be astonished to see how easy it is when you once make up your minds to it.

CAPITAL AND LABOR.

"While the National Association in its declaration affirms 'that absolute personal independence of the individual to work or not to work, to employ or not to employ, is a fundamental principle which should never be questioned or assailed, that upon it depends the security of our whole social and business prosperity, and that employers and workmen should be equally interested in its defense and preservation,' this association can and should be in a position to lead the way to a more effective and satisfactory method for the settlement of disputes between employer and employee than strikes. In every strike, even the best conducted, there is either present or latent an element of force and violence which renders the occurrence of such labor disturbances disastrous alike to both parties concerned. A movement which shall replace this through the creation of a sentiment of fair treatment, and which shall bring about a condition of mutual understanding, will be a distinct step in the direction of minimizing the probability of strikes, of demonstrating to employees that their interests can be as effectually, if not more so, guarded and advanced than by a recourse to the more violent methods, and the realization of such a condition is as worthy and important as any which this association can place before itself.

"For the realization of this a condition must be created in which the employee shall feel that a claim presented by him for that which is right in itself, and presented in a proper spirit, will be received in like manner, and be far more apt to result in that which is sought than when made the form of a demand, backed by numbers or force, and in accompanying it, may be, with attempts at intimidation. One element in any such matter of vital importance is that agreements should be made so far in advance of the time when they are to take effect, or through which they are to operate, as not to interfere with or embarrass the carrying on of contracts then on hand or which shall be undertaken upon the faith of agreements made, and an agreement once made should be by every party thereto kept inviolate to the end, true to the spirit and intent thereof, without effort or thought of evasion or seeking cover under some naked technicality.

MANUAL TRAINING.

"Another needed and important step on the part of the association, through its local exchanges and individual members, should be in all practical ways to give direct encouragement to the higher education of the mechanic through the medium of trade, manual training or polytechnic schools, such as are now being inaugurated in many of our cities as a part of our public school system. Such schools should, if they do not already, stand upon the same plane as our high schools or institutes of whatever name, which represent the culmination of our public education. The mechanic, as well as the students in other professions, should have ample facilities to profit himself in his line of trade. To the world at large, and to the community in which he lives, he is, as a rule, of far greater importance than the mere student, and the means whereby the hand, eye and every faculty is taught should be provided and encouraged. In many of our large cities schools of this character have been kept up by private subscriptions and donations, and much public good has been the result. Then, why should not the public support that which is for the public benefit? Most of the higher grades of skilled mechanics are of foreign birth. While we welcome all such who come to stay, we should give the American boy a chance and afford him opportunity to compete with his more fortunate brother by adoption. No valid reason exists why the large body of mechanics should not enjoy every advantage that education can give, for in this way only can the artistic sense be fostered and developed; in this way only can the artisan be afforded the opportunity for development into the artist. Mechanics will never hold the high places that are their due until the artistic side of their labor is recognized.

"In Baltimore there is in our public school system a polytechnic school. It is a beginning only in this important work, but enough to demonstrate that when it shall be more fully equipped, and with wider range of instruction, its powers and effect will be invaluable. There has been more or less opposition to this school among the labor unions, but when proper representations were made to them, followed by careful investigation into the work intended to be effected, the opposition was quickly changed to a more favorable attitude, and to-day the workmen in many of these unions are warm admirers of, as well as attendants at, this institution. This result was brought about at the initiative of the Baltimore Exchange and the Federation of Labor working in perfect harmony in advocacy of the good work. I would recommend that this convention should urge upon its affiliated bodies the usefulness of these schools, and also that the various exchanges are proper bodies to press this matter upon the attention of the school boards of their respective cities.

"There should be some legislation to protect American workmen against that class of foreign laborers known as 'birds of passage,' who come across the ocean in the busy season and depart in the fall, carrying their earnings out with them. Living while here as they do in Europe, they take with them nearly all they earn, adding nothing to the country's prosperity. So far as its practical effect on the American workmen is concerned, I cannot see wherein this differs from contract labor, the importation of which is prohibited by United States laws."

Committees Appointed.

At the conclusion of Mr. Creager's address the appointment of the following committees was announced :

ON CREDENTIALS :

John S. Stevens of Philadelphia, E. E. Scribner of St. Paul, Anthony Ittner of St. Louis, and Ira G. Hersey of Boston.

ON TREASURER'S REPORT :

Stephen M. Wright of New York, and E. Noyes Whitcomb of Boston.

Building Trades Schools.

The first session closed with an address on "The Union of Building Trades Schools with Schools of Architectural Design," by Robert D. Andrews of Boston. Mr. Andrews is a member of the American Institute of Architects and the Boston Society of Architects and has given considerable attention to the subject matter of his address. His remarks were received with close attention and hearty applause and are summarized as follows :

Mr. Andrews began his address by stating that he considered it an honor and a privilege to address the master builders of the country as represented by the National Association of Builders, and while he felt that there was no question of the interest of the builders of the country in the advancement of architecture as a science, the modern tendency toward specialization has caused the essential unity of the two callings, building and architecture, to be lost sight of, and so an appreciation of the immense importance to art of close relations between the designer and the executor has been obscured.

The speaker stated that his purpose was to show that the tendency to separate design from execution, historically, has always attended a retrograde movement of the art ; while, conversely, the arts have arisen to their highest degree of excellence only when design and execution were united in the closest possible bonds. From this evidence he deduced that it should be the special aim of both architects and craftsmen, in considering the question of education, to prepare students, in each, more and more to work together sympathetically and intelligently. He hoped that this end could be obtained by the collaboration of the two sorts of schools now so unreasonably kept apart. The speaker proceeded to a discussion, concise and pertinent, relating to the advance and decline of Greek and Gothic art ; it being his purpose to show that, historically considered, the arts have risen to their highest excellence when design and execution were closely coupled. After his extended review, which was received with the closest attention, Mr. Andrews said: "I have dwelt upon this historical review of the rise of great arts of European civilization because its lesson is somewhat unfamiliar We have been in the habit of accepting art as one of those gifts which somehow come of themselves. I have tried to show that there is a logic in it as intelligible as the logic of business science, and that the fundamental necessity of good craftsmanship and good design lies in their close association. Art arose while design was left in the craftsman's hands. We shall see its decline when design is taken from the craftsman's hands and put in the hands of outsiders."

After his review Mr. Andrews closed his address as follows :

"I think that we may now feel that we have given the historical side of our subject sufficient attention, and may hasten on to its applications. Twice we have seen a great art built up in all unconsciousness by craftsmen through simply working out the conditions normal to the life about them. And we have seen the architect appear upon the scene only in time to follow the art, already declining at his appearance, down to its grave. This is fact. Yet we may neither praise the craftsman nor blame the architect for these results. Each served with his part under the conditions of his time, and the good work of both must be recognized. The important thing for us to note is this great principle—separation of design from execution is the death knell of art. It is the divorce of two faculties which normally belong together. Every analogy reinforces our deductions from the history of architecture. Let religion withdraw itself from popular wants and standards and become a mere matter of creeds and theological dogmas, and its sentence is pronounced. The people will cast it aside.

AMERICAN ARCHITECTURE.

' The recent impetus which has come to American architecture is derived directly from contact with the work of its great periods. The steam engine and the photographic camera have opened this to us for the first time in its fullness. The effect has been extraordinary when we consider the depth of dullness to which we had descended about 1850. But after all it is a strength that has come to us from without and upon which no reliance is to be placed after its first effects have passed. It has come through the architects and not the craftsmen, and thus has been an agent in widening the gap between them by increasing the craftsman's dependence upon the architect's assistance. The crafts to-day are literally in a state of servitude. They have no power of initiative. A drawing or model is demanded for everything. And by a natural law which demands that a faculty must be exercised in order to grow and sets extinction as the final penalty of disuse, they are losing such faculty for design as their occupation should develop. Contact with materials and their actual modes of employment is what has made an art, always ; and this is exactly what the architect, who alone at present is privileged to design, does not get to any appreciable extent.

"Follow in mind the training of the average architect. If he begins after leaving the high school, say at 17, the chances are that in his days of knocking about he will see something of building, but after all what he sees is very little. His work in an office is to make drawings, and there he stays until he goes to a school. Here it is still a paper education he receives. It is only during the first year or two of practice, if he be clever and successful, that he really gets a chance to learn something of the facts of craftsmanship. There his practice grows to such an extent that he gradually becomes less and less an architect and more and more an administrator. He divides his work with partners and hires many draftsmen and comes to be known as a rising man. He is facile with pencil and learned in the art of putting hands on the things he wants in the books; but he never has had any real education in practcal design. He has not been taught to see effects in material, but upon paper. His knowledge is of the diffuse, vague sort, which the schools are obliged to teach because they are not equipped to demonstrate their instruction in the concrete.

"Not having been trained to a mastery of the methods of the building crafts, he is obliged to make his experiments at the expense of his clients and the public who daily must see his work. He must do this, besides, with men who are for the most part new to him, and without any training other than their experience under others equally incompetent. These men having to serve many masters in turn, learn that there is only one safe course for them, to do whatever is told them, with such good will as they can command. Oftentimes they are in entire ignorance of the nature of the work demanded and take refuge in a purely mechanical interpretation of their instructions.

"Now if we could read what was in the minds of the exasperated architect and the perplexed workman as they thus struggle in a vain effort to comprehend each other, we should doubtless find the same wish: and it would be, 'Why ain't you educated to understand the work that you pretend to do?' The architect has in mind some especial feature or treatment that he has seen in the old work, but which is unknown to his workman and of which even from detailed drawing or photograph he is incapable of getting a sympathetic comprehension. But it is also quite among the possibilities that what the architect wants is some stupid imitation effect which he considers artistic, but is so foreign to the material he is using that it can only result in defective workmanship and bring down upon the workmen the employer's condemnation and possibly mean to him a money loss.

"Each wishes that the other had a more intelligent sympathy with his point of view. Now to secure this sympathy, I propose that architect and workman be given co-education. We have trade schools and schools of architectural design. Why not bring them together? It means economy in a great many ways.

"This question presents to me the aspect of a building inclosing a great central court, the building on the right side being the school of architecture, or we will say the school of design, the building on the left side being the trades school and the group of buildings in the center being the museum, the library and all the buildings that cluster about a college where the students find the things that they want to study in common. In proposing that, the idea is simply that we want to aid all. We want to make these young men understand each other, the idea being that, when they go out in after life and have to practice, there will be a mutual understanding and a sympathy between those who are working together to absolutely the same end, such as a beautiful building. For that reason, I would have this school under a skilled guide, who would use his discretion in bringing the courses and methods of study together. Each school, of course, would be distinct and have its own establishment, exactly as they now do. I would not attempt to make the architect learn to use tools, nor would I attempt to make the craftsman, the man who is to be the foreman upon the work, proficient in rendering shaded drawings and knowing the intricacies of history, but I would hold it essential that those men should each understand the other's point of view, and that the craftsman in each line of work should be acquainted with the masterpieces of the work of his craft; so that, when an architect says 'Don't you remember the wall at such a chateau, how that thing was arranged, and the way those joists went?' or 'Don't you know we worked that out in the courtyard?' he immediately understands what has been done and he says 'Certainly,' and the thing goes ahead and it is easy.

"The architect now has to spend some time to train a new man, who has never before been at a building, to do a thing which that man never heard of and cannot have the remotest idea of. Don't you see it is an enormous friction and that, if we get craftsmen who know the whole range of their trade, whatever it may be, who have had enough experience to know what the architect is driving at or talking about, we may perhaps do these things? The whole profession of architecture is very much more interesting, very much easier and very much richer in results.

"I have been pleased, as I said in the beginning, to find that I was speaking upon a subject which had already been brought up by your president. I came here rather asking help for the architects than trying to tell the craftsmen and builders what to do. My point of view is that our designs will go to the dogs unless we come in touch with the actual fact, and we want the builders to help us in making that claim upon established institutions. These things are now established apart and naturally they have been so; it is easier to do that. We want to bring them, as far as possible, I think, together. We want to recognize that an essential principle of artistic progress and help is that design and execution should be equally allied, and that, if we want to save our architecture from deterioration, there is no possible way to do it except by bringing the architect and the builder, design and execution, into relations that are more sympathetic, intelligent and mutually satisfactory than they are at present."

WEDNESDAY, OCTOBER 16.

The morning session was called to order with President Creager in the chair. The Committee on Credentials reported that there were in attendance 64 delegates représenting 15 exchanges in the following cities: Baltimore, Boston, Buffalo, Chicago, Cleveland, Lowell, Milwaukee, New York, Philadelphia, Providence, Rochester, St. Paul, St. Louis, Wilmington and Worcester.

The president next appointed the following gentlemen as a Committee on Credentials: John Feist of Buffalo, chairman; H. J. Sullivan, Milwaukee; Thomas B. Ross, Providence; John J. L. Freiderich, Rochester; Charles B. Conant, Lowell; George H. Fox, Chicago, and Charles Gillingham, Philadelphia.

Report of Secretary.

The secrtary's report was next in order of business and was substantially as follows:

The secretary commenced by announcing that though a year and a half had passed since the last meeting, his report would be very much shorter than the one usually presented. He touched upon the fact that though it is desirable to reiterate the principles upon which the association is founded during the entire year, he would spare the delegates the presentation of them now. In explaining the situation regarding membership it was necessary to report that while the association began the year with

27 exchanges, through the disintegration of Saginaw, Grand Rapids, Minneapolis, Waco, Texas, and the withdrawal of Cincinnati, Omaha and Indianapolis the organization had lost nearly one-third of its constituent body.

In those exchanges that withdrew, the general reason of expense was partly attributed as the cause of their defection, Cincinnati stating that the principal cause for her action was the fact that her members, although fully appreciating the value and importance of the work of the National Association, failing to adopt the same felt the payment of a *per capita* tax to be unjustifiable. The Indianapolis Exchange, after paying its *per capita* tax in full for the current year, announced its intention to withdraw, alleging no reason for its action, and up to the present time no response has been received to the inquiries of the secretary in regard to the matter. The expense was doubtless the cause of the action of the Indianapolis people, as at the last two conventions their delegates were instructed to vote for the reduction of the *per capita* tax. Omaha, being unable to pay its *per capita* tax, owing to the disastrous effect of the depression of business in that vicinity, felt that the only honorable course left for them was withdrawal. On behalf of the exchange the local secretary expressed the sincere regret of its members at this compulsory action, and stated that it was their hope to soon be again identified with the National Association. Syracuse may be considered as out of existence, as nothing has been heard from that city, either in response to private letters or general circulars of information issued by the national secretary.

None of the exchanges mentioned have ever attained a satisfactory degree of efficiency as exchanges. Cincinnati, Indianapolis and Omaha developed a moderate amount of cohesion among their members, but the exchange idea, as developed and advocated, has never been carried out. The withdrawal and disintegration of the exchanges mentioned leaves the National Association with affiliation in the following cities: Baltimore, Boston, Buffalo, Chicago, Cleveland, Lowell, Lynn, Milwaukee, New York, Philadelphia, Portland (Maine), Providence, Rochester, St. Louis, St. Paul, Wilmington and Worcester.

Several exchanges, notably those of Chicago, Milwaukee and St. Louis, have had the question of withdrawal under consideration, but have in each case either defeated the proposition or indefinitely postponed it. The secretary said: "The conditions of membership cited are significantly unpleasant, but I will postpone comment upon them until the latter part of my report, simply saying that I believe I am right in assuming that if membership in the National Association cost nothing there would be no withdrawals."

STATISTICS.

As has been customary for a number of years, the secretary included in his report that usually comprehended in the work of the Committee on Statistics. He stated that he had eneavored as usual to keep track of all organizations nearly or remotely connected with building interests, but that during the past year considerable difficulty had been experienced in gaining the information required. This fact is attributable to the depression of business which has prevailed during the past two or three years, under which many of the smaller organizations have entirely vanished. Many exchanges with but poorly understood knowledge of the foundation upon which their organization should be based, have gone entirely out of existence with the first stress of adversity. The customary schedule of exchanges and other organizations connected with the building trades was presented, but in a much more condensed form than usual, only those organizations having to do with the constructive branches of building being reported. As compared with last year the schedule showed a net decrease of 69 organizations having to do distinctly with the constructive branches of the building business. The number listed and not reported included 302 organizations, while those having to do with the constructive branches of building numbered 365.

CONDITION OF FILIAL BODIES.

In referring to the condition of filial bodies the secretary stated that it was not his custom to refer to any one exchange as being a shining example, and that he did not intend to depart from his custom at this time, but that it was impossible to avoid the conclusion that those oranizations which had followed the recommendations of the National Association were in very much better condition than those which had not. "While there are some exchanges which, as heretofore indicated, have benefited by following the advice and adopting the recommendations of the national body, it is a painful duty to report that in a majority of cases the members of our filial bodies have been apparently 'too busy' to take the necessary steps to make the labors of the National Association bear fruit through their own special exertions. This would seem to be a paradoxical statement of conditions existing, for the past few years have been far from exacting in the amount of business done; therefore there must be some other cause for the comatose condition of so many of the existing bodies of builders throughout the country. I am constrained to the conclusion that it is not lack of time, but lack of inclination on the part of the members, that causes the apparent paucity of result from the National Association endeavor." The secretary stated that, owing to the very exhaustive nature of his last report—which might be had upon application—he would not again thresh over old straw, but that the arguments used at that time are quite as solid now as they were then. "That there are enough measures of reform to stimulate every organization to constant activity goes without saying. Why, then, do not the various associations keep at the good work? The paths in which they should tread have been indicated over and over again by the National Association, and there seems to be no good reason why some progress should not be made by each and every one. It is fair to say in this connection that we may sometimes undervalue the indirect benefit which results from the simple announcement of principles. While we may be impatient because large results are not manifest, we may at the same time fail to recognize that worse conditions might prevail were it not for the existence of some authoritative center, to which we may refer for judgment as to what constitutes correct methods and practices. Before leaving this branch of my report I must, at the risk of repeating myself to excess, insist that the welfare of exchanges depends upon the following fundamental principles:

"1. Selection in membership. This is the bedrock of success. I mean by this a selection which shall recognize that only those who are skilled and competent, who are financially responsible, who are square and honest in competition and in dealing with their employees, and who will in all respects conduct their business on sound, wholesome principles, should be entitled to membership. A careful following of this principle will gradually make an exchange recognized as a clearing house of builders, and the public will eventually look to it for assurances of safety in the securing of reliable and competent contractors for building work. I do not mean by this that even the most solid and powerful of exchanges, resulting from the application of this principle, would ever be able to utterly drive out of existence the unreliable, incompetent and unfair contractor, for as long as humanity exists the cupidity and shortsightedness of owners will encourage the existence of such undesirable, unsafe and destructive elements in our business world. Nevertheless, the existence in any community of a strong organization formed and conducted strictly upon this basic principle will act as a corrective and diminish materially that class of contractors who have really no right to exist; being as they are a menace to the welfare of the honest, reliable and competent contractors, they are really harmful to the whole community. The statement is frequently made that there are too many men in business. There are too many men in business who are neither competent nor trustworthy, and there are too few in business that are fully equipped with brains and means, and who, most of all, are honest and true in their whole business fiber. Every effort which will tend to weed out the bad and give the good a fair opportunity to live should be welcomed and supported. Unless organizations recognize and live up to this principle of selection in membership, they might as well give up, for they assuredly will go down or become a disgrace and a stench in the nostrils of the community in which they exist; and such a result would be worse than the effect of no organization at all.

"2. Liberality in management. Exchanges cannot be run successfully on penurious lines. Liberality of expenditures in the administration of affairs is absolutely essential. Narrowness is sure to defeat any good object, and this axiom is nowhere more certainly applicable than in the conduct of a builders' exchange. The total cost of maintaining an organization, when considered per individual, becomes insignificant; and individual members of exchanges should bear this fact in mind. One of the first requisites to liberality in management is the employment of a secretary of ability; such a man would be sure to earn whatever salary he might be paid. Ability must be had in this chief executive officer.

"3. The third and last general principle upon which the best life of an exchange depends is the existence of a lively interest among the members in its affairs, a belief in its value, a readiness to serve it and to secure its services when available. Many men seem to think that an organization to which they may happen to belong can cure some evil, of which they are conscious, without co-operation from them. Unless an exchange is thoroughly believed in by its members, and unless each one realizes that he is an essential element in its life and vigor, the organization will be lacking in effectiveness and strength."

MISSIONARY WORK.

Under the head of "Missionary Work," the secretary stated that, in view of the proposed radical changes to the constitution, very little "proselyting" had been attempted. At least a dozen exchanges had manifested a desire to join the national body, but were advised to wait until after the ninth convention.

The Uniform Contract was reported as increasing in general use in about the proportions which have hitherto prevailed.

ARBITRATION.

The system of arbitration proposed by the National Association for use between employers and workmen has not been adopted to a satisfactory degree; but it was significant to note that the form had been applied with signal success by employers outside of the building business. The secretary expressed a hope that this example might result in the adoption by builders of that which they themselves have advocated.

PUBLICATIONS.

Under the head of "Publications," the secretary stated that the customary matter presented in the columns of *Carpentry and Building* had been published throughout the year, and that the Bulletin authorized at the last convetion had been added to the list of publications of the organization. The Bulletin has met with a very flattering reception among both builders and regular publications connected with their interests, and also with the daily press of the country. By means of the Bulletin (which is sent to every member of the National Association), and matter regularly published in *Carpentry and Building*, the recommendations and methods advocated by the National Association of Builders are given a wide and increasing circulation. There is a continual call for the National Association literature from all sorts of sources; builders contemplating organization, members of organizations already in existence, specialists studying economic problems, and State bureaus of labor, have requested that they be supplied. It is interesting to note that, by request, its various publications are on file in nearly all of the prominent colleges of the country.

VALUE OF ASSOCIATED EFFORT.

The secretary deduced from the conditions which prevail among builders generally at the present time the conclusion that business men generally fail almost utterly to comprehend the value and necessity of associated effort. Business men in all lines make spasmodic efforts to work together for those ends which can only be attained by working together, but partly because their impulses are narrow and selfish and partly because of lack of knowledge such efforts dwindle and pine away until they become too attenuated to sustain themselves. There are schools of moral philosophy, applied ethics, and schools of every name and nature, but there is no school from which business men may get even glimpses of safe paths to tread, in an endeavor to secure harmonious action, possible only by common consent. Business men need, above all things, a school of the ethics of associated effort. This latter has been the principal function of the National Association of Builders. It teaches operative bodies what ends may be safely sought and how to proceed in search of these ends. Its constant effort has been to educate its constituency in matters pertaining to competition, proper forms of estimate, submission of bids and award of contracts, treatment of bids in architects' hands, character of the contracts, lien laws and other protective legislation, bonds on contract and other contingent features, the exclusion of dishonest contractors from competition, the dissemination of proper principles and methods, exchange administration, and in all matters pertaining to the protection of the interests of contractors in their relation to workmen. How, in any of these matters and in scores of others too numerous to mention, upon the true adjustment of which so much depends, can any betterment be hoped for except through associated effort? Exchanges and individuals complaining of the prevalence of evils and not exerting themselves to correct them after being shown the way, need to be constantly reminded of Curran's great saying, "Eternal vigilance is the price of success."

AMENDMENTS TO CONSTITUTION.

The closing portions of the report were devoted to the proposed amendments to the constitution. The secretary stated that the purpose of these amendments was to give wider dissemination to the work of the national body by adding to its machinery an intermediary organization to be known as the State Association, whose functions should be solely to bind builders within State lines into a more cohesive body. The State Association in no way conflicts with the National Association and is intermediary between the national and local organization only in so far as stated. The individuality of the local exchange is preserved and its identity is in no way submerged or lost in the State Association; direct connection with the National Association, and direct representation in its conventions, is based upon the same general requirements that have heretofore prevailed. The adoption of the proposed amendments constitutes State associations out of the filial bodies now represented under the forms of constitution by which they are now controlled. But a uniform constitution is prescribed for all filial bodies admitted after the adoption of the proposed amendments.

The secretary announced as his opinion, based upon his experience of organizations, that the homogeneous character of State organization would bind the builders together so closely that the constituency will be greatly increased in time and therefore the cost *per capita* of maintaining the National Association ultimately very much reduced.

Report of the Treasurer.

The report of the treasurer showed an ample balance on hand at the present time, and from an approximate estimate as to the amount of expense involved in carrying on the work of the association to the end of the year, it was determined that there would be a balance at that time of about $150.

Reports of Committees.

The only committees reporting action during the past year were the committees on Uniform Contract and Trade Schools. The former stated that the contract had increased in use during the past year to a marked degree, and although a much greater protection was afforded the builder under the present form than under those heretofore in use, there was still some room for improvement, particularly in the clause relating to arbitration. The committee stated that the Joint Committee would consider the improvements suggested at the earliest practicable moment.

The Committee on Trade Schools reported that while there has been little practical progress in the establishment of new schools, there is a marked increase in attention given to the subject in various quarters. The trade schools which have been referred to frequently in the publications of the National Association were all reported as being in excellent condition. The report recited the condition of trade school movements in several cities in which such a project has been agitated, showing little increase in the practical evidence of the establishment of schools. The report of the committee closed with the most urgent appeal for the establishment of trade schools and with expressions of confidence in the great good that inevitably results therefrom. Schools under the control of the various filial bodies similiar to that in Philadelphia were earnestly advocated.

Resolutions.

The next in order was the presentation and reference of resolutions, which will appear in the report of that committee, printed in the proceedings of the last day. Mr. Thomas J. Ward of St. Louis presented and asked immediate action upon the following:

"*Whereas*, There is now being held in the city of St. Louis a convention of the American Institute of Architects; therefore, be it

"*Resolved*, That the convention of the National Association of Builders' now in session, send greeting and ask the assistance of the Institute in securing a larger use of the Uniform Contract.

"*Resolved*, That our secretary be instructed to send the foregoing to the president of that organization."

In acordance with instructions, a telegram was immediately sent to the president of the American Institute.

Afternoon Session.

The afternoon session was devoted to the consideration of the amendments to the constitution, and it was decided, after much argument pro and con, which did not get beyond the first article, that the wisest way would be to refer the matter to a committee for consideration and report at an extra session on Thursday morning. The committee consisted of one delegate from each city represented and was made up as follows: Baltimore, John Trainor; Boston, Ira J. Hersey; Buffalo, John Feist; Chicago, William Grace; Cleveland, K. F. Gill; Lowell, Charles P. Conant; Milwaukee, H. J. Sullivan; New York, Stephen M. Wright; Philadelphia, Stacy Reeves; Providence, Thomas B. Ross; Rochester, John Luther; St. Louis, Anthony Ittner; St. Paul, Edward G. Scribner; Wilmington, A. S. Reed; Worcester, C. A. Vaughan; to the foregoing were added the president, secretary and treasurer *ex-officio*. The convention then adjourned to meet at 9 o'clock on Thursday morning, after consuming about three hours in discussing the amendments proposed.

THURSDAY, OCTOBER 17.

The convention was called to order shortly after the time set, with President Creager in the chair. The business of the morning was the report of the special Committee on Revision of the Constitution and action thereon. Several changes in the proposed amendments as submitted to the constituent bodies by the secretary prior to the convention were made by the committee and their report, as read by the secretary, is as follows:

To amend Article II so as to read:

ARTICLE II.

PURPOSE.

The purpose of this Association is defined as follows:

1. To unite organizations of employers of workmen in trades connected with the construction of buildings under a central advisory body.

2. To secure through this central advisory body the observance of uniform customs and practices in the various business relations which such employers are called upon to assume toward each other, toward workmen, toward owners and architects, and toward the business community generally.

3. To formulate general principles upon the basis of the experience and judgment of the whole building fraternity for the guidance and protection of all concerned.

4. To acquire and disseminate valuable information to all persons connected with the body.

5. To educate the whole building fraternity up to higher levels of action, to the end that honorable methods and practices and sound business conditions may prevail.

To amend Article III so as to read:

ARTICLE III.

ORGANIZATION.

The basis of organization shall be local Associations of employers of workmen, in trades connected with the construction of buildings in the various cities and towns in the country. The organization comprehends the establishment of subsidiary organizations within State limits to be known and recognized as "State Branches of the National Association," whose functions shall be to unite the various bodies of the employers of workmen, in the building business located in cities or towns within any State, so that objects of importance to such employers and having special significance within the said State, may be unitedly considered and harmoniously acted upon, and so that a greater emphasis and a more complete following of the principles and recommendations of the National Association may be secured. Both local and State associations must be organized in form approved by the National Association of Builders, but this requirement shall not apply to local organizations affiliated at the time of the adoption of these amendments.

To amend Article IV so as to read:

ARTICLE IV.

PRINCIPLES AND METHODS OF OPERATION.

The principles and methods of operation of this body shall be those defined and fixed herein, together with such others as may be adopted at conventions, and they shall be administered by the officers and Directors hereinafter fixed, under such special direction as may be determined at conventions, and otherwise as the Board of Directors may determine.

To amend Article V so as to read:

ARTICLE V.

OFFICERS AND DIRECTORS AND THEIR DUTIES.

The officers of this Association shall consist of a President, two Vice-Presidents, a Secretary and a Treasurer, who shall be and hereby are constituted, the Executive Committee of the Association, and as such shall have direct charge in carrying out all orders and recommendations of the Association as expressed at conventions and of all detail work of the Association not otherwise specially ordered.

There shall be a Board of Directors, which shall consist of the officers herein mentioned, and one director from each local body.

These officers and Directors shall be chosen at the annual conventions of the body, and shall be elected to serve one year, or until their successors be chosen. They shall enter upon their duties immediately after the adjournment of the convention at which they are elected.

The President shall preside at all meetings of the Association, and shall perform all other duties usually incumbent upon the office. He shall act as Chairman of the Board of Directors and of the Executive Committee. He shall approve all bills before payment by the Treasurer.

The First Vice-President shall perform the duties of the President in case of his absence.

The Second Vice-President shall perform the duties of the President in case of the absence of the President and First Vice-President.

The Secretary shall keep record of all meetings of the Association. He shall collect all dues and fees, paying over the same to the Treasurer, taking his receipt therefor. He shall act as Secretary of the Board of Directors and as Clerk of the Executive Committee, performing the usual duties incident thereto. He shall render such service as may be proper for the carrying out of the purposes of the Association, under general direction of the Board of Directors and of the Executive Committee. He shall be paid such salary for his services as may be determined from year to year by the Board of Directors.

The Treasurer shall receive all moneys for dues and fees from the hands of the Secretary, giving his receipt therefor, and shall hold all such or other funds of the Association subject to drafts duly authorized by approval of the president and shall pay all such drafts and bills from said funds only when presented to him duly approved as aforesaid.

To amend article VI so as to read:

ARTICLE VI.

CONVENTIONS AND MEETINGS.

There shall be a Convention of the Association each year, and it shall be held at such time and place as may be decided at the Convention immediately preceding.

Other general meetings may be called by the Board of Directors, but such meetings shall be considered as Special Meetings, and not as Regular Conventions.

To amend Article VII so as to read:

ARTICLE VII.

REPRESENTATION.

Representation in this Association shall be by and through local associations, referred to in Article III of this Constitution, which associations are constituent parts of the State associations, also referred to in Article III.

In all Conventions and meetings of this Association each local association shall be entitled to delegates as follows: One delegate at large, who shall be the director chosen at the preceding annual convention, and one delegate in addition for each 50 members of that body upon which membership the per capita tax fixed at the preceding convention shall have been paid.

All delegates to conventions or meetings must have credentials from the associations they represent in form approved by this Association.

Organizations holding membership in this Association at the time of the adoption of this revision of the Constitution shall be entitled to continued membership and representation upon the following plan:

When but one organization within any State lines holds membership in the National Association at date of this revision, that organization shall be recognized as the State Association, and, together with such other local organizations as may be joined with it thereafter under the rules prescribed, shall hold representation under the revision herein comprehended.

When two or more organizations within any State lines hold membership in the National Association at date of this revision, they shall at once proceed to form themselves into a State Association under such rules as may be prescribed by the National Association, and they, together with such other local organizations as may be joined with them thereafter under said rules, shall hold representation under the revision herein comprehended.

To amend Articles VIII and IX so as to make new Article VIII and to read:

ARTICLE VIII.

ANNUAL ASSESSMENT.

Annual per capita dues shall be assessed upon all local associations in amount to be fixed at each Annual Convention.

Said assessment shall be due immediately upon the adjournment of each Annual Convention.

Payments on account of per capita assessment may be made during the year.

To amend Article X so as to make new Article IX and to read:

ARTICLE IX.

AMENDMENTS.

Amendments may be made to this Constitution by a two-thirds vote of all delegates present at any regular Convention, provided that printed notice of the substance of such proposed amendment shall have been mailed by the Secretary to every State and local association not less than 60 days prior to said convention.

It was immediately moved that the revision as reported by the committee be adopted, and upon being put by the president, was unanimously carried.

CONSTITUTION FOR STATE ASSOCIATIONS.

The Constitutions for government of the local and State associations being next in order, were read by the secretary, and save for alterations necessary to comply with the changes made by the committee in the national constitution, were adopted as a whole. As finally accepted and adopted, they read as follows:

ARTICLE I.

NAME.

This Association, by virtue of action taken by the National Association of Builders, is created and designated a State Branch of that body, and is to be known as the ——— STATE ASSOCIATION OF BUILDERS, with powers as defined in this constitution, which has been approved by the said National Association.

ARTICLE II.

PURPOSE.

The purpose of this Association is to unite the various bodies of employers of workmen, in the building business located in cities or towns within the State of ——————, so that objects of importance to such employers, and having special significance within the said State, may be unitedly considered and harmoniously acted upon, and so that a greater emphasis and a more complete following of the principles and recommendations of the National Association may be secured.

ARTICLE III.

MEMBERSHIP.

Any association of employers and workmen which is organized under the form of constitution prescribed by the National Association of Builders, and none other, shall be eligible to membership in this body. Not more than one organization in any city or town shall be admitted to membership.

ARTICLE IV.

ADMISSION.

Any association desiring membership must file an application for admission with the Secretary of this body, accompanied by a copy of its constitution, names of its officers, and number of its members. Upon approval of the application by the Board of Management of this body, the said association shall become a member upon signing this constitution by hand of its President.

ARTICLE V.

BOARD OF MANAGEMENT—OFFICERS AND DUTIES.

The management of this Association shall be vested in the President, Secretaries and Treasurers of the various associations in membership, and this Board shall, at the annual meeting hereinafter designated, elect from their number a President, a Vice-president, and a Secretary and a Treasurer (the latter two offices may be held by one person), which officers shall hold for one year or until their successors are chosen and shall fulfill the duties usual to such office. When the Secretary of any local organization is not a member of that body he may be permitted to act in this Board of Management if his association so elects.

ARTICLE VI.

REPRESENTATION AT MEETINGS.

Associations admitted to membership shall at all meetings of this body be entitled to representation by delegates, as follows: Presidents, Secretaries and Treasurers of each constituent body shall be delegates by virtue of their office. Each constituent body shall be entitled to two delegates at large. If the Secretary of any association is not a member of that body the association may, if it so elect, appoint a delegate in his place.

ARTICLE VII.

MEETINGS.

There shall be an annual meeting of this Association, to be held within two months after the annual meeting of the National Association, at such place as may be decided upon by the Board of Management. Special meetings may be held on call of the Board of Management.

ARTICLE VIII.

VOTING.

At all meetings of this Association each constituent body shall be entitled to as many votes as there may be members in that body, annual dues for whom shall have been paid into the treasury of this Association; but no votes for any constituent body shall be cast unless there be a duly accredited delegate present from that body. The vote of any local association may be cast, as a whole, by the chairman of the delegation; but if the delegates are divided in opinion, each delegate shall be entitled to cast a proportionate part of the total vote to which his association is entitled. A majority vote shall rule in all meetings.

ARTICLE IX.

ASSESSMENT.

There shall be such assessment levied annually upon the constituent bodies as the Board of Management may find necessary to meet expenses, and this assessment shall be levied per capita of membership in the constituent bodies.

ARTICLE X.

AMENDMENTS.

This Association being created by, and responsible to, the National Association of Builders, its constitution cannot be amended except by action of the National Association. By-laws may be established by this Association to cover local conditions and assist in government, but they must not conflict with this constitution.

CONSTITUTION FOR BUILDERS' EXCHANGES.

ARTICLE I.

NAME.

This Association shall be known as a local body of the ——— State Branch of the National Association of Builders.

ARTICLE II.

PURPOSE.

The purpose of this organization is to unite employers of workmen in the various building trades in such a manner and under such by-laws, rules and regulations as may best protect and advance their interests.

ARTICLE III.

MEMBERSHIP—REGULAR.

Any person or firm doing business as an employer of workmen, in any branch of the building business shall be eligible as an applicant for regular membership in this Association, said applicant to be passed upon as prescribed in Article IV. Regular members shall have sole voice and control in the conduct of affairs of this body.

ASSOCIATE.

Any person or firm carrying on a business tributary to the building business, but not as an employer of workmen, shall be eligible as an applicant for associate membership in this Association, said applicant to be passed upon as prescribed in Article IV. Associate members shall have no voice or control in the affairs of this body.

ARTICLE IV.

ADMISSION.

Admission can only be secured after application in such form as may be prescribed in the By-laws of this Association, and then only when the applicant shall be adjudged by such process as may be fixed in the By-laws as skilled in the trade or business he is carrying on, financially responsible, and as being honest and fair in his methods.

ARTICLE V.

OFFICERS AND THEIR DUTIES.

The officers of this Association shall consist of a President, a Vice-president, a Secretary and a Treasurer. The duties of these officers shall be those usual to the said positions. The office of Secretary may be held by a person not a member of the Association.

ARTICLE VI.

BOARD OF MANAGEMENT AND ELECTION.

The management of the affairs of this Association shall be vested in the officers provided for in Article V and at least five Directors, all of whom shall be elected in such manner as may be prescribed by the By-laws of the Association.

ARTICLE VII.

MEETINGS.

There shall be an Annual Meeting of this body on ———, and three (3) additional meetings at regular intervals during the year. Special meetings may be called at any time by the Board of Management.

ARTICLE VIII.

QUORUM AND VOTING.

A majority of all Regular Members in good standing present in person or by proxy shall constitute a quorum, and a majority vote of persons and proxies present shall rule, except when otherwise provided by the By-laws, except that in no case shall a smaller proportion of all possible votes be permitted to rule.

ARTICLE IX.

ADMISSION FEES.

An admission fee of such sum as may be fixed by the Board of Directors shall be levied on all persons or firms admitted to Regular Membership.

There shall be no admission fee for Associate Members.

ARTICLE X.

ANNUAL DUES.

There shall be an annual assessment upon each member, Regular and Associate, in such sum as shall be fixed by the Board of Management, as necessary to run the Association on a liberal basis. This assessment shall be due and collectible at such times and in such manner as may be prescribed by the By-laws.

ARTICLE XI.

AMENDMENTS.

Inasmuch as this body is a constituent part of the National Association of Builders through the ——— State Association of Builders, this constitution may not be amended except by action of the National Association; but this Association may adopt its own By-laws, provided none are adopted in conflict with this constitution.

The consideration of the constitutions for the government of State and local associations being the only business of the morning, the convention adjourned at 11.30 a.m.

FRIDAY, OCTOBER 18.

The first business of the morning was the report of the Committee on Resolutions, Stephen M. Wright, chairman. The committee presented the following:

Gentlemen: The Committee on Resolutions respectfully reports that it has considered the resolutions referred to it by the convention and recommends that the resolution offered by T. J. Ward of St. Louis be adopted as presented, and that the resolution offered by Stacy Reeves of Philadelphia be also adopted.

Signed by the Committee.

The resolutions were as follows:

Whereas, It is believed that the value of membership in the Builders' Exchange would be increased if some means were provided, under the rules or by-laws of the several exchanges in affiliation with the National Association, whereby matters of difference between members of sister exchanges could be adjusted or settled by the Committee or Board of Arbitration of that local exchange in whose jurisdiction the cause may arise, subject to rules and regulations of such exchange,

Resolved, That the National Association recommends all exchanges in affiliation to take such action as will best bring about the desired result.

Mr. Ward's resolution consisted of a preamble deprecating the serious damages which must inevitably result from the wholesale devastation of forests, and was followed by a resolution memorializing the Secretary of the Interior to stringently enforce all the laws looking to the protection of public forests and timber; also that the governors of every State and territory be petitioned to the same end.

The chairman of the Committee on Resolutions submitted the following, which was unanimously adopted:

Whereas, The National Association of Builders recognizes the immense value of the work undertaken by the National Association of Commissioners and Inspectors of Buildings, and the importance of its further prosecution upon the high plane on which that work is now being conducted; and,

Whereas, It is the duty of the whole fraternity to aid in every way the improvement of methods prevailing in every branch of its varied interests,

Resolved, That the National Association of Builders extends to the National Association of Commissioners and Inspectors of Buildings its cordial sympathy with, and appreciation of, the object and purposes of that association, and tenders it its hearty co-operation with all efforts looking to the betterment of the building industry.

Per Capita Tax.

The report of the Committee on Time and Place for next Convention and the Nomination of Officers was next in order, but owing to the fact that the report was still in preparation the delegates proceeded to the consideration of the per capita tax for the coming year. The question of reduction from $3 to $1.50 per capita was discussed at some length by the delegates instructed to vote for a lower assessment. Both the treasurer and secretary were called upon to make an estimated statement of the probable expense for the coming year, provided no reduction in cost of maintaining the association were possible. Both gentlemen stated that it would be impossible to conduct the association through the coming year upon less per capita than the tax prevailing at present with the number of exchanges now in affiliation. There seemed to be little doubt in the minds of the delegates but that after the next convention an appreciable reduction would be possible owing to the increased constituency expected as a result of the adoption of the amendments creating State associations. Several delegates proposed, in aid of the smaller association which felt the per capita tax to be too great, that some compromise be made pending the outcome of the year as to the increase in numbers of filial bodies. Mr. John S. Stevens made a motion that the per capita tax be fixed at $3, $2 of which to be due within 60 days, as is customary, and the other dollar to be called for only upon the determination by the Executive Committee of the need of further assessment. After several other plans had been proposed and discussed Mr. Stevens' motion was unanimously adopted.

Time and Place of Next Meeting.

The Committee on Time and Place being ready to report, their chairman presented the following:

To the Officers and Members of the National Association of Builders:

Gentlemen: Your Committee on Time and Place would respectfully recommend that the next meeting of your association be held in the City of Buffalo, on the third Tuesday in September, 1896. They would also nominate the following officers for election at this convention.

For President,
Charles A. Rupp of Buffalo.
For Vice-President,
H. J. Sullivan of Milwaukee.
For Secretary,
William H. Sayward of Boston.
For Treasurer,
George Tapper of Chicago.

We would also recommend that the office of second vice-president be left open, and that the Executive Committee be empowered to fill same when in their judgment it shall be deemed necessary.

Signed:

John Feist, Buffalo.
George H. Fox, Chicago.
Charles P. Conant, Lowell.
H. J. Sullivan, Milwaukee.
J. J. L. Friederich, Rochester.
Charles Gillingham, Philadelphia.
Thomas B. Ross, Providence.

The report of the committee was received with enthusiasm, and it was voted that the assistant-secretary be authorized to cast one ballot for the election of the various officers as reported by the committee. The assistant secretary cast the ballot, and the president announced the election of the officers.

Remarks of New Officers.

In response to the unanimous demand, Charles A. Rupp, the newly elected president, took the stage and made a graceful speech expressing his appreciation of the honor conferred not only upon himself personally but upon the builders of Buffalo as well. He pledged his earnest support of the principles and purposes of the National Association throughout the coming year, and said that it would be his earnest endeavor to help in the effective carrying out of the work projected at the convention just closing. Upon behalf of the Builders' Association Exchange of Buffalo he extended the delegates a hearty welcome when the time for the next convention should bring them together in that city. Mr. Rupp's remarks were very cordially received, and the president introduced the new first vice-president, Mr. Sullivan of Milwaukee, who responded to the demand of the delegates for a speech. Mr. Sullivan took occasion to pay a high tribute to the work of the National Association, citing the specific cases of its demonstration in exchanges which have adopted its recommendations. He expressed for himself, and for the Builders and Traders' Exchange of Milwaukee, an earnest desire that the National Association might hold its annual convention in his city, assuring the delegates that all would receive a hearty reception. Mr. Sullivan closed his remarks by thanking the delegates again for himself and for his exchange.

At this point the secretary read a telegram from the American Institute of Architects expressing cordial greetings from that body in return for those sent by the National Association during a preceding session.

Board of Directors.

The delegates next proceeded to the election of directors for the coming year. Upon calling the roll by exchanges the several filial bodies announced their choice for directors as follows:

Noble H. Creager	Baltimore.
E. Noyes Whitcomb	Boston
John Feist	Buffalo.
William Grace	Chicago.
Frank L. Weaver	Lowell.
Louis A. Clas	Milwaukee.
Stephen M. Wright	New York.
Stacy Reeves	Philadelphia.
Thomas B. Ross	Providence.
Justus Herbert Grant	Rochester.
Thomas J. Ward	St. Louis.
George J. Grant	St. Paul.
A. S. Reeves	Wilmington.
George H. Cutting	Worcester.

Vote of Thanks.

After the election of delegates John Feist of Buffalo asked immediate action on the following resolution, which was enthusiastically adopted:

Resolved, That we, the delegates and visitors in attendance at the Ninth Annual Convention of the National Association of Builders, held in the city of Baltimore, desire to place upon record our sincere and heartfelt thanks to the Mayor, the press, the citizens, officers, committees and members of the Builders' Exchange and to the ladies of Baltimore for the hospitable treatment and whole-souled entertainment tendered us during our stay in this beautiful city, and beg to assure them that the good impressions and friendships formed here will never be forgotten.

The closing action of the convention was a tribute to the excellence and courtesy with which President Creager had presided over the sessions and was presented in the form of a motion that the delegates so express themselves by Stephen M. Wright of New York. The motion was carried with evident appreciation of its fitness, and President Creager responded in a brief speech of thanks to the delegates, saying that the honor conferred upon him by the association would be one of the dearest memories of his life.

Entertainment.

Among the special entertainment features provided by the Baltimore Builders' Exchange were a carriage ride to all delegates and visitors on the afternoon of the 15th, a trip down the harbor to the ladies of the visiting delegations on Wednesday, the 16th, a similar trip down the harbor to the delegates on the 17th and a banquet and literary entertainment to the ladies on the same evening.

The carriage ride on the afternoon of Tuesday was attended by nearly all the strangers, and an extended ride was taken through Druid Hill Park and through such other portions of the city as were most interesting. The trip down the harbor extended to the ladies was taken on a special steamer, music and refreshments being provided, and all reported a most thoroughly enjoyable occasion. The steamer left the wharf shortly before noon, and the party did not return until the early evening. After the close of the extra session of Thursday morning the delegates and other gentlemen in attendance upon the meeting accepted the invitation of the Builders' Exchange to an excursion on the steamer "Columbia" down the harbor, touching at Annapolis and other points of interest on Chesapeake Bay. The weather was beautiful and the trip enlivened by music, and made further enjoyable by the presence of an elaborate collation. All who attended the excursion were of one mind as to the praise due the Committee on Entertainment for providing so thoroughly for the entertainment of their guests. While the gentlemen were on the trip down the bay a banquet at the Hotel Rennert was tendered to the ladies, followed by an entertainment in Y. M. C. A. Hall for their exclusive benefit. The entertainment was most enjoyable, including such features as the Handel Quartette, and several recitations, and readings were given.

Everybody who attended the convention, in whatever capacity, has ample reason to remember with feelings of cordial regard the sincere and untiring efforts of the Baltimore builders to provide for their enjoyment, and all carried away with them memories which will linger pleasantly with every thought of the ninth convention.

In addition to the pleasant memories every delegate and visitor carried away with him from Baltimore a beautiful souvenir book bound in morocco, containing many illustrations of points of interest in the city and describing those various features most attractive to the stranger. The Entertainment Committee also provided theater tickets for all in abundance.

The American Institute of Architects.

The twenty-ninth annual convention of the American Institute of Architects was held in Baltimore the third week in October, the members assembling in the banquet hall of the St. Nicholas Hotel. A large representation was present, many of the members being accompanied by their wives. The sessions were presided over by President D. H. Burnham of Chicago, who opened the meeting with a very interesting address which was warmly received. Secretary Stone read a number of invitations from various local clubs and institutions inviting the members to visit their buildings during their stay in the city. The first regular business was the report of the Board of Directors, which was read by Secretary Stone. This was discussed at considerable length, and an informal test vote showed that the majority of those present were in favor of adopting its suggestions. The next business was the report of the treasurer, which showed a working balance on hand. Secretary Stone then read a synopsis of the reports of the chapters, following which W. L. B. Jenney of Chicago read his report as chairman of the Committee on Foreign Correspondence. Henry Van Brunt, Kansas City, presented the report of the Committee on Education, and Mr. Jenney, who was also chairman of the Committee on Publication and Library, read his annual report. There were also presented the report of the Committee on Uniform Contract, and the report from the Committee on Fire Protection. E. H. Kendall of New York, on behalf of the Board of Directors, presented a report on the Modification and Simplification of the By-laws, which brought out considerable discussion. After a luncheon in the convention hall the report of the Board of Directors was again taken up, and five grades of membership established as recommended by the board. In the evening the delegates were tendered a reception by the members of the local chapter at the Museum of Fine Arts, where an exhibition was held.

The first regular business of the session of the second day was the appointment of nominating committees to select candidates for election to office, following which N. H. Patton of Chicago read a paper entitled "Co-operation *vs.* Competition." Mr. Van Brunt presented a report relative to the establishment of the American School of Classical Study at Rome, following which James B. Cook of Memphis read a paper on "Suggestions by which a Greater Influence may be Exercised by the Institute Among the Architects of the Southwest, and at the Same Time Promote the Elevation of the Profession Before the Public." In the afternoon the delegates visited various points of interest about the city, and in the evening a meeting in memory of ex-President Richard M. Hunt was held at the St. Nicholas Hotel.

The session of the third day was devoted to the reading by Secretary Stone of a paper prepared by L. De Coppet Berg entitled "Prevention of Staining of Plastering on Damp Walls and Fire Proofed Surfaces," and to one prepared by George W. Bullard of Tacoma, Wash., entitled "Woods of Washington," this being read, in the absence of the author, by C. W. Saunders. After the reading of the papers the members proceeded to the election of officers, which resulted as follows:

President, George B. Post of New York City; first vice-president, Henry Van Brunt of Kansas City, Mo.; second vice-president, William C. Smith of Nashville, Tenn.; secretary, Alfred Stone of Providence, R. I.; treasurer, S. A. Treat of Chicago, Ill.

Directors elected for three years were: D. H. Burnham, Chicago, Ill.; James W. McLaughlin, Cincinnati, Ohio; William S. Eames, St. Louis, Mo.; Charles F. McKim, New York City; F. M. Day, Philadelphia, Pa.; H. L. Warren, Boston, Mass.; N. S. Patton, Chicago, Ill., and Robert D. Andrews of Boston, Mass.

There was more or less discussion relative to the establishment of a permanent home for the Institute, and a committee consisting of ex-President D. H. Burnham, George B. Post and Charles F. McKim was appointed to consider the project and devise ways and means for carrying it into execution. After luncheon the delegates took another carriage drive about the city, and in the evening they were guests at numerous theater parties.

New Publications.

A GUIDE TO SYSTEMATIC READINGS IN THE ENCYCLOPÆDIA BRITANNICA. By James P. Baldwin, Ph.D. Size 8¼ x 5½ inches; 316 pages; published by the Werner Company. Price, $2.

The volume before us is intended as a help to those who wish to study or read intelligently in the Encyclopædia Britannica. It is pointed out that that monumental work contains such a mass of information that one is lost in attempting to pick out what is most desirable. For busy people the labor of choosing and selecting the articles to be read in following out any certain line of investigation is entirely done away with by the guide, which gives directions, or rather makes reference to articles to be read in studying a variety of topics. The guide is divided into three parts, the first for young people, the second for the student and the third for the busy world, the latter giving the courses of reading for manufacturers, mechanics, engineers, railroad men, miners, mineralogists, chemists, &c. Altogether, there are 54 courses of reading enumerated. To those who wish assistance in utilizing the Encyclopædia Britannica the guide will be serviceable.

CONTENTS.

RESIDENCE OF PROF. K. S. BLAKE, AT FOREST HILL, NEW JERSEY.

H. GALLOWAY TEN EYCK, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, NOVEMBER, 1895.

CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
96-102 READE STREET, NEW YORK.

DECEMBER, 1895.

Fires in "Fire Proof" Buildings.

The destruction by fire of the handsome building of the Manhattan Savings Bank, on Broadway and Bleecker street, this city, together with some other conflagrations which have occurred lately in modern fire proof structures so called, has attracted the interested attention of the members of the building trades as well as of the fire insurance companies. It is announced that, in consequence of these fires, the Tariff Association of Fire Underwriters of this city has decided to change the rate on fire proof buildings. Several old and conservative insurance corporations have refused to have anything to do with fire proof buildings at the rates heretofore fixed by the association. The managers of these institutions have made careful investigation in cases where fires have occurred and have discovered that while fire proof buildings offer greater resistance to heat than timber and stone, nevertheless, when they are attacked and burned out, the destruction is complete and the salvage is reduced to a minimum. The criticisms of the companies are directed solely against the modern mercantile structures. Purely office buildings and structures used for residential purposes, where there is no storage of combustible material, are held by them to be practically safe. But the lofty steel buildings, where large stocks of valuable merchandise are kept, they consider to be too much of a risk. This view is shared by the Fire Department authorities, whose opinion of so-called fire proof structures does not appear to be very favorable. Chief Bonner of the New York Fire Department points out that in the case of fire in one of the modern steel business buildings, the application of water is apt to add to rather than detract from the danger, as in coming into contact with the heated metal it forms so dense a steam as to make it impossible for the firemen to come anywhere near the building. He is also quoted as saying that he would not in any case permit his men to operate in the upper stories of a very lofty building when the flames had secured control of the lower stories, as there is so little possibility of escape in these cases. Besides, it is not an improbability that when the lower portion of a modern "sky scraper" is burned out, the upper part will fall over into the street. Altogether the fire risk in these new fashioned structures is a subject of considerable moment. It is likely that underwriters will in future inspect these risks much more thoroughly than heretofore, and will carefully watch new business buildings while they are in course of erection, in order to secure their being, as far as possible, actually fire proof.

Trade Schools.

The report of the Committee on Trade Schools to the ninth convention of the National Association of Builders presented two interesting conditions relative to the progress of trade training. One was the fact that the wisdom of teaching trades is impressing itself more and more upon those in charge of the public education of the youth of our country, and the demonstration of the confidence in the wisdom of such education by the addition of manual training to the public schools of a large number of cities. The other was the fact that the builders, as a class, are least active in prosecuting plans for the education of the future mechanic in the various branches of their trade. One of the excuses offered for lack of activity in this direction by builders is that the labor unions are opposed to trade schools. No excuse could be weaker, even if such was the condition, and the report rightly attributes the cause to "lukewarmness" on the part of the builders. It is a fact that in some of the larger cities labor unions have been opposed to the establishment of trade schools, but if it is right to give young men an education in craftsmanship this fact should not be permitted to operate as an obstacle to the exercise of their right. Up to the present time, however, with very few exceptions, a disposition to fairness on the part of the employers, and an explanation of the purposes and functions of a trade school to the trade union has resulted in the disappearance of opposition and the substitution of hearty co-operation in its support. The experience of the Philadelphia school, which has been referred to repeatedly in these columns, has been the experience in other cities where the same opposition existed, and there is little room for doubt that the same course being adopted by builders elsewhere would secure the establishment of trade schools, not only without opposition from the unions, but, on the contrary, with their hearty assistance.

Sanitary Engineering at Pompeii.

In the course of an interesting lecture delivered by Professor Goodman at the Yorkshire College, Leeds, England, the lecturer, in describing a recent visit to the ruins of Pompeii, mentioned some details regarding evidences there offered pointing to a high state of sanitary and civil engineering knowledge having been possessed by the ancient Pompeiians. After explaining the situation and destruction of Pompeii by a shower of ashes and mud in the year 79 A.D., and describing the general appearance of the streets and public buildings of the disinterred city, Professor Goodman stated that the streets were used as waterways to carry off the surface water and perhaps the sewage from the houses. The sidewalks were raised about a foot above the streets, and stepping stones were provided at intervals for foot passengers. The water of Pompeii was distributed by means of lead pipes under the streets. There were many public drinking fountains, and most of the large houses were provided with fountains, many of them being very beautiful in design. The bronze work found at Pompeii revealed great skill and artistic talent. The bronze braziers and kitcheners were provided with boilers at the side and taps for running off the hot water. Ewers and urns have been discovered with internal tubes and furnaces precisely similar to the arrangement used in modern steam boilers. On looking at the tools found in Pompeii the Professor said he could almost imagine that he was gazing into a modern tool shop, except for the fact that the ancient representatives had suffered severely from rust. The hammers, blacksmiths' tongs, soldering irons, shovels, &c., to be seen there were remarkably like those used to-day.

Commercial Cable Company's Building.

Another imposing office building is soon to be added to the number of those which have either lately been completed or are now in process of construction in the lower portion of this city. The new building is to be put up by the Commercial Cable Company and will rise 21 stories in hight, above which will be two towers surmounted by domes representing the Eastern and Western hemispheres. The towers will be connected by a mansard roof, and on the domes the Old and New Worlds, joined by cables, will be shown in relief. The plans of the building have been prepared by Harding & Gooch, who also designed the Postal Telegraph Building, on Broadway. The site of the new structure is adjoining the New York Stock Exchange, on Broad and New streets. The foundations will be sunk to solid rock by means of caissons, and the superstructure will be of skeleton frame construction incased in masonry. The general style of architecture will be Italian Renaissance, the exterior being worked out in light molded and plain brick, with terra cotta ornaments. With a view to making the building fire proof the architects have eliminated from their specifications wood and other combustible material. The window frames will be of copper or other metal, and the inside trim will be fire proofed. The roof will be covered with fire proof tile and the cornices and cupolas of the domes will be of copper. There will be two handsome entrances giving access to the first floor, which will be of unusual hight and will be occupied exclusively by the Commercial Cable Company. The new structure, with its site, will represent an outlay approximating $2,000,000. There will be six fast electric elevators to the upper stories, which will be devoted to offices, and there will be lavatories and retiring rooms on each floor. It is thought probable that the top floor, which commands a fine view of the city and New York Harbor, will be leased for club purposes.

Philadelphia's Presbyterian Building.

Operations have just been commenced upon a structure which, when completed, will be an architectural ornament to the Quaker City. It is the new building for the Presbyterian Board of Education and Sabbath school work, located at the corner of Juniper and Walnut streets, Philadelphia, Pa. The hight of the building will be ten stories, and it will cover an area of 75 x 235 feet. The exterior will be composed of a polished granite base, above which will be terra cotta of a light gray color. The building will be erected under the supervision of Architect Joseph M. Huston, whose drawings call for a structure costing about $525,000 when completed. There will be something like 150 offices for rental in the building, with toilet accommodations on each floor. The machinery plant will occupy the sub basement, while in the basement will be the packing department, toilet rooms and vaults for a safe deposit company. The first floor will be devoted to a store, a general business department, periodical department and room for trust company or bank. On the second floor will be the main auditorium with seating capacity for 1200 people; dressing rooms, committee rooms, library, superintendent's room, &c. On the third floor will be found the secretary's rooms, Sabbath School Missionary department, board room, editorial and educational departments. On the fourth floor will be located the rooms of the various boards, library, committee and storage rooms, &c. The fifth, sixth, seventh, eighth and ninth floors will be devoted to offices, and the tenth floor to the banquet hall, reception and cloak rooms and the Woman's Foreign Missionary Society.

Purpose in Organization.

Members of builders' exchanges, and builders throughout the country contemplating organization, will do well to consider carefully the forms of constitution for State and local associations printed in the last issue in connection with the report of the recent convention of the National Association of Builders in the city of Baltimore. These constitutions contain the essence of the experience of the nine years of existence of this association, and should appeal to builders everywhere as containing the qualities necessary to bring about a greater unity and solidarity of the fraternity than has been possible heretofore. Builders everywhere owe the same duty to their business that they do to any of the other component parts of the society they help to form. Their obligation to aid in its improvement is as great as that to assist in the improvement of the administration of politics, public education, &c., of the respective cities in which they reside. Every builder who has sons is directly and vitally interested in their education in the field covered by the public schools, and is anxious to contribute his share toward the maintenance of the necessary institutions for such education, and yet, in the majority of cases, little or no thought is given to the need of defining what shall be honorable and profitable methods of conducting their business. Builders have so long submitted to abuse and dishonorable practices from architects, owners, general or sub-contractors, as the case may be, that they have come to tacitly, if not openly, admit that they are necessary conditions to the transaction of business. The whole purpose of the National Association of Builders, its local exchanges and proposed State organizations, is to demonstrate that such is not the case, and by associated effort to so combine and strengthen the whole fraternity that the evil effects of human cupidity, as expressed in existing business methods, shall be reduced to a minimum. The whole effort is educational, both in intent and operation, and deserves the earnest support of every builder who desires the welfare of the business community and who wishes to leave it better for his effort than he found it, rather than worse, through his neglect.

"Pitting" of Plaster.

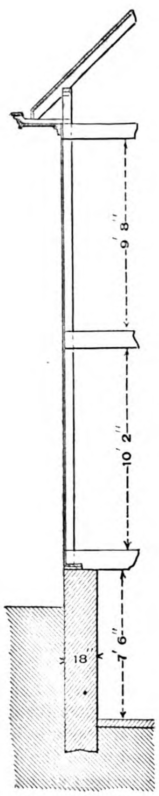
A correspondent signing himself "A Country Architect" tells in a recent issue of the *Engineering Record* how to prevent plaster from pitting or blistering. The trouble is one which many of our readers may have experienced and we therefore present herewith the letter of the writer in question: "In several cases where lime was used for plastering, I had trouble with the surface being injured by the slacking of small particles of lime in the wall instead of in the mortar bed, even after the mortar had been made and lain four to six weeks before being put on the walls. I then tried the expedient of making my plstering mortar by a new method, which succeeded beyond my expectation in remedying the defects and also improving the quality of the plastering.

I had all lime to be used run out of the lime box through a small sieve into a large putty box and kept well covered with water for about two weeks, then mixed with the sand and the hair. To get the ingredients well mixed the mortar had to be well tamped or you would see the streaks of lime and sand. The mason at first objected strongly to making the mortar by this method because of the increased cost of mixing, but he afterward said it was offset by the less labor required by the mason to make a good wall, and it certainly made a stronger and harder wall than by the old method on account of the increased labor or better tempering which the mortar received."

Preparations are being actively prosecuted for the International Industrial Exhibition to be held in Berlin next year. Notwithstanding that the time fixed for exhibits to be sent in has already elapsed, so many applications are still being received that the administration have found it necessary to enlarge the plans and make a number of necessary alterations. The principal building, for which a space of 40,000 square yards had originally been allotted, will now cover an area of 53,000 square yards; and, in addition, some of the exhibits which were intended to be housed in the main building will now be located in a separate hall. In the principal building the textile industry will cover 2100 square yards; cloth industry, 6300 square yards; building and engineering, 4000 square yards; wood industry, 5000 square yards; porcelain and glassware, 1100 square yards; metal industries, 7600 square yards, and machinery and electrical appliances, 10,100 square yards.

RESIDENCE IN A CINCINNATI SUBURB.

IN one of the beautiful suburbs of the city of Cincinnati, known as Avondale, is located the residence which we illustrate in this issue of the paper. The general appearance of the dwelling is indicated by one of the half-tone supplemental plates which constitute a feature of this number, the picture being a direct reproduction of a photograph taken specially for the purpose. The elevations, and details presented upon the following pages show the constructive features, while the floor plans indicate in an unmistakable manner the conveniences of the interior arrangement. It will be seen that on the first floor there are three principal rooms, a large hall designed for reception purposes, and a stair hall, besides closets, pantry, &c. The second floor is divided into four sleeping rooms, bathroom and numerous closets, while the attic contains a servant's room and a completely furnished cedar room.



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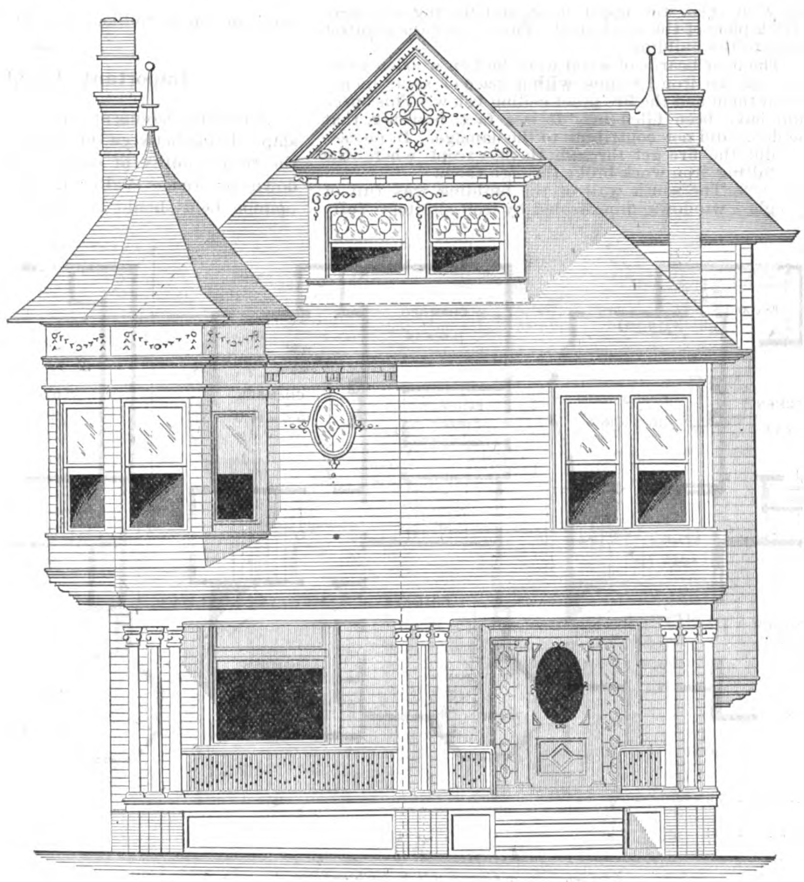


Front Elevation.—Scale, ⅛ Inch to the Foot.

Residence in a Cincinnati Suburb.—Giannini & Moorman, Architects, Cincinnati, Ohio.

The building here shown was erected not long since on Southern avenue in the suburb named, for Mrs. Joseph Trevor, from drawings prepared by Giannini & Moorman, architects, of Fifth and Race streets, Cincinnati, Ohio. From their specifications we learn that the exposed stone work of the house is of superior rubble masonry, pointed with dark cement mortar, and that all exposed brick work is of first quality pressed brick laid with sunken joints in black cement mortar. The frame of the house is of Norway pine, sheeted with selected white pine and weather boarded with narrow strips of the same material mitered at the corners. Between the sheeting and weather boarding and also under the slate of the roof is water proof paper. The main roofs are covered with Virginia black slate and the flat surfaces with tin, of which are also composed the gutter linings and flashings. The porch floors are of 1⅛-inch white pine, while the porch ceilings are of beaded yellow pine, varnished. The entire basement has a cemented floor and the walls of the laundry are also cemented. The floors throughout the house are of standard narrow yellow pine, while the stairs, including the rails, newels, balusters, steps, risers and strings, are of quartered oak. The inside finish is of selected yellow pine, varnished three coats. The hardware throughout the house is of bronze. The plumbing is first class, and includes enameled bathtub, marble wash stand, siphon water closet, enameled sink and wash trays, with hot and cold water to the various fixtures. The principal rooms throughout the house are furnished with hardwood mantels, bronze gas fixtures, and there are also speaking tubes and electric bells. The glass in front is American plate, while the balance is American double strength glass. The cost of the structure complete is stated by the architects to have been $4800. The exterior wood work of the dwelling is treated with three coats of white lead and oil, finished buff, with white trimmings. All rear windows are fitted with outside Venetian slat blinds.

It is stated that the buildings projected for the French exposition of 1900 will cost at least $20,000,000. The expenses of the last exposition were $8,000,000, the receipts $10,000,000, including the contributions of city and State.

Defects in Some "Fire Proof" Buildings.

The disastrous fire which visited New York City early in November, destroying the handsome structure of the Manhattan Savings Bank, which was regarded as fire proof, has excited a great deal of comment among builders and fire underwriters. President F. C. Moore of the Continental Insurance Company, and a member of the Board of Examiners of the Building Department of New York City, in commenting on what he regarded as the chief defects in the building, expressed the following opinion:

1. The floors of iron I-beams rested on flanges of large, riveted iron "box" girders, with a span of the entire width of the building, over 40 feet, unsupported between terminal bearings. These box girders were not covered with non-conducting material and sagged when hot, carrying with them the upper floors and tearing out, also, the brick piers of the south wall. This caused the greatest damage to the building.

2. The floor boards of wood were laid on wooden joists resting on the iron I-beams, with a space of some inches between them and the fire proof ceiling below. This space should have been filled in. It is a fact, however, that these floors did not contribute to the damage. In no case did the fire get through them, except where the falling iron work broke through them.

3. The south wall of the building was full of glass windows, unprotected by iron shutters; fully 60 per cent. of this wall was, therefore, glass in wooden frames, and not "fire proof."

4. The staircases were of iron frames, stringers and risers, with stone treads. Stone treads, especially of slate or marble, quickly yield to the combination of heat and cold water and are easily punched out by falling weights, as they were in this building and in the Temple Court Building, damaged in 1893.

The truth of some important theories regarding so-called fire proof construction advocated by underwriters has been demonstrated by this fire, viz.:

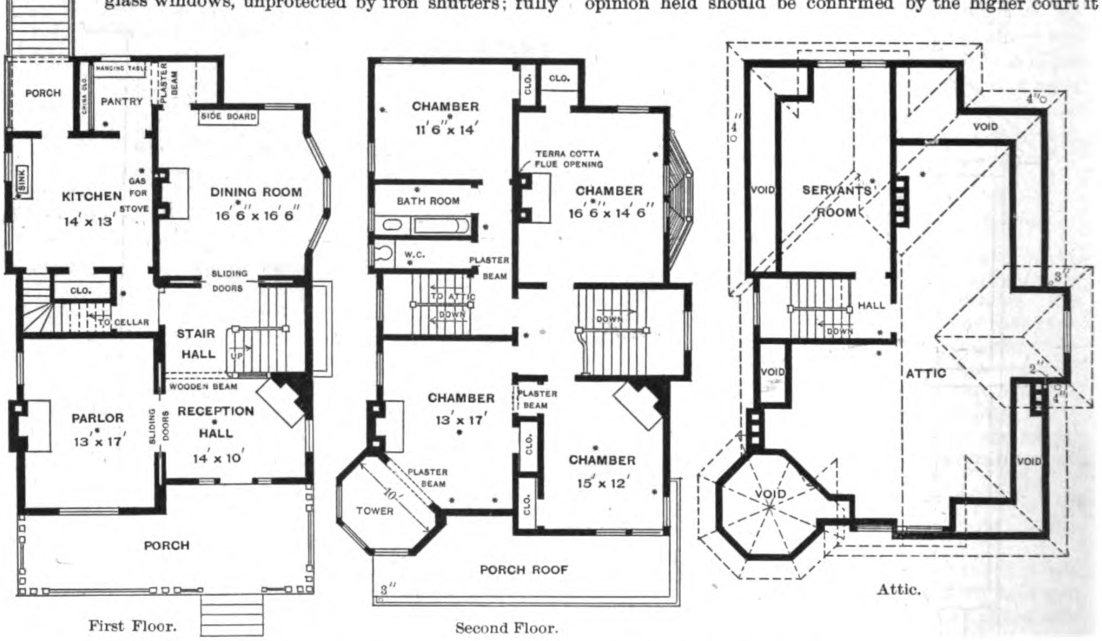
1. All iron beams, girders and columns should be thoroughly protected by coverings of incombustible, non-conducting material, especially in mercantile buildings.

2. The staircases should be cut off in a fire proof hallway, and stone treads should not be allowed in mercantile buildings, nor should water tanks or other heavy weights be allowed over stairway or elevator shafts where the falling would tear out the staircases and endanger the lives of the firemen. Wooden treads of 2-inch oak, with metal facing on the under side, or cast iron treads, are infinitely preferable to stone where heat can reach the stone.

3. Merchandise, especially of a character affording fuel for intense combustion, should not be stored at a greater hight than seven stories, or, say, at the most, 80 feet above the grade. Mr. Swenie, the Chicago Fire Marshal, says 125 feet, and this is certainly high enough.

4. Merchandise between two fire proof floors and surrounded by brick walls can be destroyed as thoroughly as if in a stove. I would prefer to insure merchandise on the grade floor of a good brick and wooden beam building rather than on the eighth story of a "fire proof."

5. The danger of exposure to fire proof buildings, as well as to all other kinds of buildings, especially with many window openings, from burning neighboring buildings is usually underestimated. Such "fire proof" buildings may virtually be three-sided boxes with one side open. Owners of fire proof buildings are making a mistake in excluding the values of foundations from the protection of insurance. Fires often start in cellars and such fires are dangerous. Injury to foundation walls and iron work may be serious, if not vital. No mercantile building should exceed 125 feet in hight. A fire in the waist of some of our high buildings of so-called "skeleton" construction (a construction which has not yet been tested) would, in the words of one of our most practical and experienced builders, "double it up like a jack knife."



Residence in a Cincinnati Suburb.—Floor Plans.—Scale, 1-16 Inch to the Foot.

Important Legal Decision.

A decision having an important bearing on the relationship existing between the employer and his employee, and the responsibility of each to the other, has been handed down by Judge Walter Lloyd Smith of Ithaca. If the opinion held should be confirmed by the higher court it will establish and define accurately the liability of an employer for damages in case of injury to his workman. Further, it will define when the employer ceases to be accountable for hurt to his workman, and when the latter, by his own action or the action of a co-laborer, has forfeited all right to recompense for such hurt.

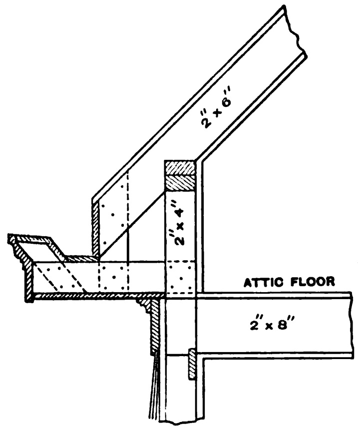
The case in question was a suit for damages brought against the Groton Bridge Company by C. L. Ludlow, who had been injured while in the employ of the company. It was claimed that the foreman of the shop was negligent and had caused the plaintiff to sustain a broken leg. In his decision Judge Smith cited several cases which had a direct bearing upon the point at issue. In one, while blasting was being carried on, one of the fuses did not go off, and the foreman in charge directed his men to work near the unexploded charge. Afterward the charge did explode and the men were injured. Although they were working directly under a foreman who had sole charge of the work, and although it was the duty of the master to provide a safe place to work in, it was held that where the place was rendered unsafe by the negligence of a fellow-servant—the foreman—that was not the act of the master, and he could not be made accountable. Another case was where a foreman directed his men to work under an embankment which he had reason to believe was unsafe because it had been made so by his own acts. It was held that the act of the foreman was that of a fellow servant and not that of the master. The decision states that "the later cases have all established the rule that it matters not what may be the position of the servant, whether high or low, whether a foreman or a mere day laborer, his act is not to be judged by the position as representing the master or representing a co-servant; but whether he be the master or a co-servant, whether he be the *alter ego* of the master or a co-servant, is to be determined by the acts done."

But, so far as furnishing safe apparatus is concerned, the decision holds that the act of the humblest mechanic who furnishes the apparatus is the act of the master. Further, "It has become settled, however, now, that if a master has furnished competent servants and safe machinery, the use of that machinery, however negligent, and by whomsoever used, is not attributable to the master." In this case trucks provided with the proper stakes or side bars had been provided. But these stakes had not been used, and hence the accident.

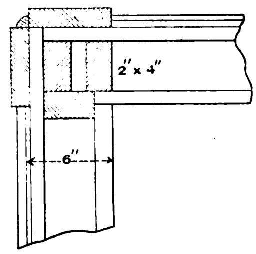
In the foregoing cases cited in the decision it was held that the master was not liable for injury resulting from the acts of a laborer, no matter of what degree. He is responsible for the apparatus provided, but—and the following clause appears to be one of the most essential in the opinion—"It is impossible that a master himself can control the detail work of any corporation or any private business of any size." This injury arose from negligence which was connected with the detail work, and the negligence of the foreman in failure to use a certain part of the apparatus was "not the negligence of the master. but is purely the negligence of a co-servant."

The fire loss of the United States and Canada for the month of October, as compiled by the *Journal of Commerce*, shows a total of $13,411,500, or over $5,000,000 more than the total credited to October 1894. The 1895 fire loss for the first ten months of the year aggregates $109,-689,400, or about $4,000,000 more than the total for the same period of last year. During October there was an unusual number of fires of great destructiveness, including the heavy losses entailed by the burning of the cotton mills at Warren, R. I., and the rice mills at New Orleans, La. The imperfect protection of the Warren cotton mills against fire was at the time sharply criticised by the underwriters, who suffered severe losses in connection with that disaster. The large fire which occurred a few weeks ago in New York, destroying two highly insured modern business buildings on Broadway, will add a further heavy loss in the insurance companies' November accounts.

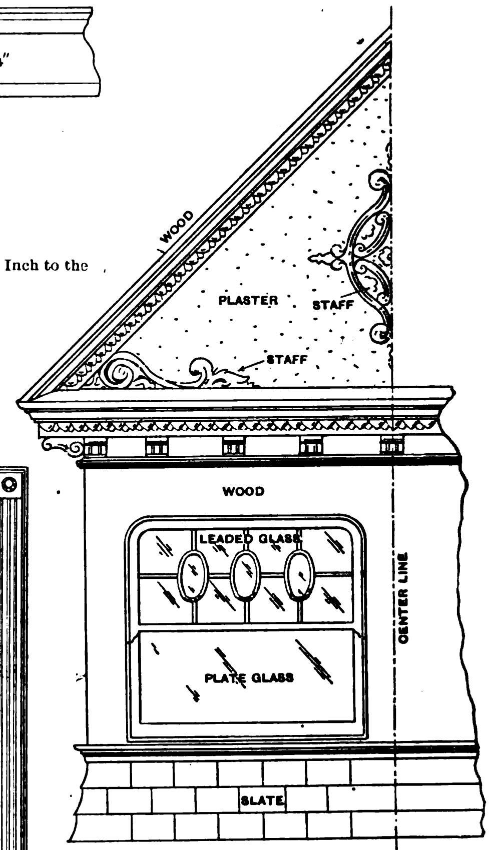
Residence in a Cincinnati Suburb.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.



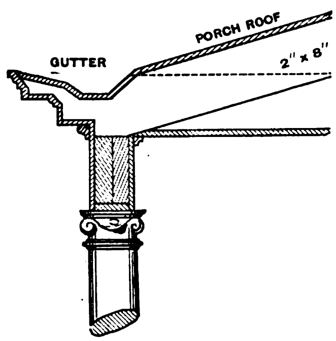
Detail of Main Cornice.—Scale, ½ Inch to the Foot.



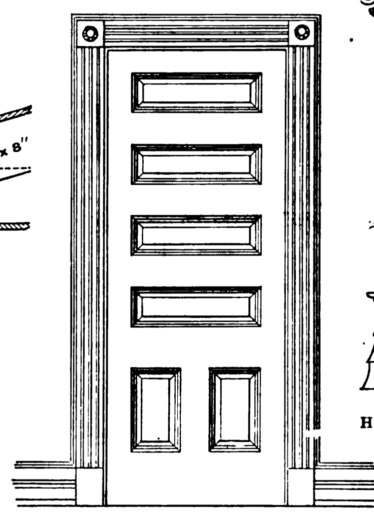
Detail of Corner Post.—Scale, 1 Inch to the Foot.

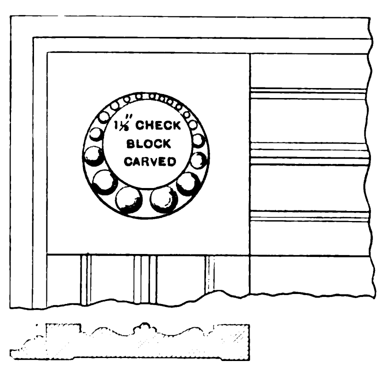


Half Elevation of Front Dormer.—Scale, ⅜ Inch to the Foot.

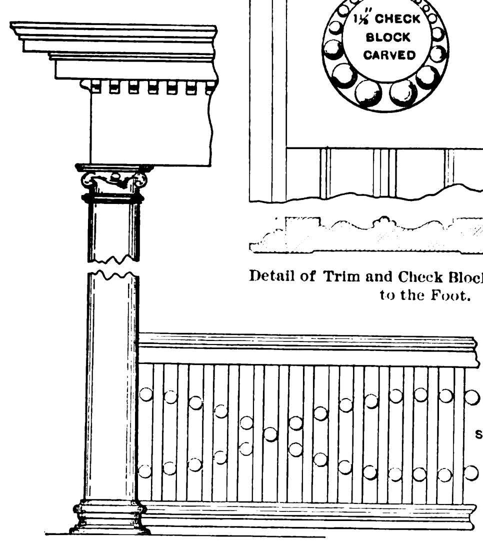


Detail of Porch Cornice.—Scale, ½ Inch to the Foot.

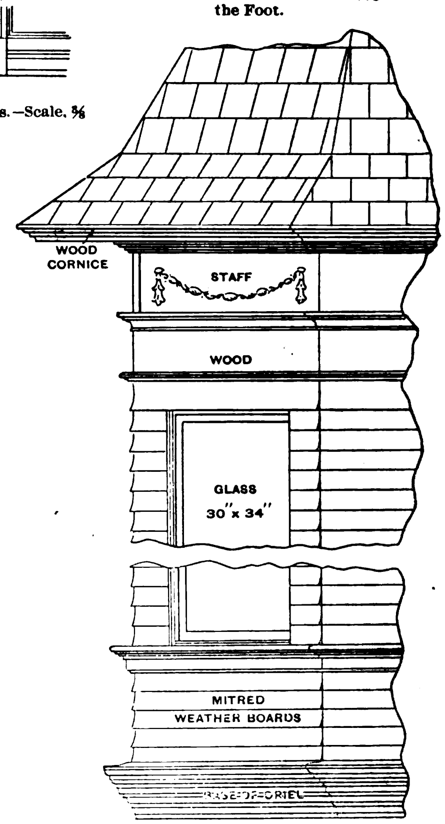

Elevation, Showing Style of Doors.—Scale, ⅜ Inch to the Foot.



Detail of Trim and Check Block.—Scale, 3 Inches to the Foot.



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



Partial Elevation of Corner Oriel.—Scale, ⅜ Inch to the Foot.

Miscellaneous Details of a Residence in a Cincinnati Suburb.

STEEL FRAME CONSTRUCTION FOR CHURCHES.

(FOR ILLUSTRATION SEE SUPPLEMENT PLATE.)

THE employment of iron and steel in the erection of the modern office buildings and business blocks has become so common in the larger cities of the country that what is known as "skeleton frame" construction is now to be found in connection with almost every kind of building of importance which may be designed. The skeleton system has been found so well adapted for tall structures by reason of the saving in the thickness of the foundation walls necessary to support the loads placed upon them, thereby increasing the ground space available for use, while at the same time adding to the fire proof qualities of the building, that it is being employed in the construction of some of the more palatial city residences, and also in the erection of church edifices. Not long since we illustrated in these columns a private dwelling which was the first example of the application of the skeleton frame construction to that class of buildings, and in this number of the paper we call attention to what is undoubtedly the first application of the system in the erection of churches. One of the supplemental plates will be found to carry a view of the skeleton frame of the new church of St. Mary the Virgin, reproduced from a photograph taken during the process of construction and before the masonry work had been much more than commenced. The building, located on a plot of ground fronting 125 feet on West Forty-sixth street and about 94 feet on West Forty-seventh street, New York City, has just been completed, and will be dedicated with imposing ceremonies on December 8. In the erection of this edifice the employment of the skeleton system is said to have brought the cost to a figure somewhat less than would have been that of a building of equal size constructed entirely of brick or stone, while occupying less time in the execution of the work.

The frame of the church is of rolled steel throughout. The main columns, resting on masonry piers, and made in two sections, rise to a hight of 90 feet. The main frame is 46 feet wide, its greatest length 180 feet, while its hight from the basement is about 115 feet. The hight to the top of the cross over the main gable is 180 feet and the vaulted roof is 80 feet. Probably one of the most interesting features in connection with this edifice is the groined ceiling, which is composite in construction, being of cement stiffened with iron bars supported on the diagonal and transverse steel ribs, which also serve as braces for the columns. The ceiling consists essentially of a series of dormer windows on each side of the building, and connecting them are other arches. The principle is that of a French groined arch, and it is believed that this is the first example of the kind ever executed in iron. The arches are formed of curved angles, attached to which are round bars, these, in turn, having fastened to them the wire cloth employed as lathing, to which the plaster is directly applied. The iron work was supplied and erected by Edward Corning & Co., of 88 Broadway, New York City, while the architects of the building were N. Le Brun & Sons of the same city. The style of architecture is thirteenth century French gothic, and the front and all visible walls are of Indiana limestone. There is an ambulatory a little more than 7 feet in width extending entirely around the church, making the width of the building up to the hight of the ambulatory walk about 60 feet. The ambulatory walks are 28 feet high, and above that hight the walls of the clerestory, built in between the steel columns with brick and faced with stone, rise 52 feet more, or to a hight of 80 feet above the floor beams.

In the supplemental plate which we give in this issue only the skeleton frame work of the church is shown. The buildings which appear to the left of the church have been torn down to make room for a four-story clergy house, which will constitute one of the group of church buildings, while on the right of the main edifice is the mission house. The view which we present is taken from Forty-sixth street, the farther end of the building facing on Forty-seventh street. Fronting on this thoroughfare, and built around the rear of the church, which is apsidal in form, is a chapel on one side and a rectory on the other. The lower portion of the clergy and mission houses are intended to be used as chapels, of which there will be five altogether. The seating capacity of the church is 720 and that of the chapels 350. In other buildings connected with the church are three vestries, and there will also be a baptistry. The buildings surrounding the church edifice employ the ordinary methods in their construction and their exteriors are faced with light Roman bricks and terra cotta. The clergy house, the mission house and rectory are of French gothic architecture of the fourteenth century.

English Trade Unions.

The annual report by the Chief Labor Correspondent to the British Board of Trade on the trade unions of the United Kingdom in 1893, which has just been issued, contains particulars with regard to a much larger number of such associations than were included in any of the previous reports. Full statistics were received from 687 unions, as compared with less than 600 in the previous year. In addition, partial information was obtained with regard to 118 other unions. Thus it is believed that the vast majority of persons belonging to trade unions in the United Kingdom are included in the returns dealt with, and that the report forms the most complete record of this class of organization hitherto compiled. According to the report, the membership to the end of 1893 for 677 unions was 1,270,789. The total income for the unions for the year was $9,131,506; the total expenditure for the year, $10,783,272, and the total funds on hand at the end of the year, $7,934,726. The year 1893 was a particularly bad one for certain of the organizations. The diminution in the amount of the funds was caused by bad trade, causing a greatly increased outlay to the unemployed members. The exceptionally large number of industrial disputes, including the great struggle in the coal trade, caused a considerably enlarged expenditure, the aggregate outlay under this head being $3,518,616, paid by 331 unions. Funeral benefits were paid by 387 unions, unemployed benefit by 378 unions, sick benefit by 228 unions and accident benefit by 99 unions. Superannuation is paid by only 89 unions. A comparison of the figures of 534 unions for 1893 with those of 1892 shows a decrease of membership of 2910, and a decrease of $1,068,500 in the total funds at the end of the year. The unions which suffered most heavily in the falling off of members were the unions of unskilled labor.

The new Masonic temple at Bridgeport, Conn., is probably one of the finest structures of its kind in that State. It stands at the head of Broad street, opposite the City Hall, and has a frontage of 80 feet with a depth of 106 feet. It is five stories in hight and constructed in the Greek Renaissance style of architecture. The front walls are of mottled Pompeiian brick trimmed with Windsor Hill red stone and buff terra cotta. The frieze of the first story is relieved with red stone carvings consisting of the heads of wild animals, the most elaborate carving being a double headed eagle over the central pier of the temple. The first floor will be occupied as stores, while the front of the second will be used for offices. Back of these is the banquet hall. The lodge room is 101 x 40 feet in size, with a 24 foot ceiling. The top floor is to be used by the Commandery for drilling and also by the Scottish Rite bodies and the Mystic Shrine. The wood work throughout is quartered oak, and the heating and ventilating appliances are of the most approved type.

A SCHEME FOR COUNTRY PLUMBING.

THE plumbing literature of to-day is somewhat scarce, so far as it relates to country plumbing, unless it be a mansion costing thousands of dollars, and people of moderate or small means are left, as it were, "in the cold," and to the ingenuity of the country tinner, who often meets with no little difficulty in the erection of small jobs, says a correspondent in writing to a late issue of *The Metal Worker*. The owner, in such cases, is either unable or unwilling to go to the expense of sending a long distance and paying $4 a day for a plumber, and as a consequence a lot of work is done in such a way that, to say the least, it is very unhealthy.

A glance at the conditions that are met with in the country may not be amiss, and among the first questions that arise for solution will be how to dispose of the waste water or soil, having no sewers. It is true that many houses are built an on elevated position, and may be adjacent to a creek, or river, or lake, affording excellent facilities for its disposal, but it is also true that many others have no such advantages, and in these cases one or two methods are applicable. 1. Provide a receptacle known as a cesspool to hold such a quantity of sewage as will not need to be removed except at periodical intervals, and at such a distance from the house as not to be a menace to health; 2, a reservoir is provided to hold such a quantity that it will discharge itself by means of a siphon at frequent intervals into a system of small porous tiles buried comparatively near the surface and so arranged that the earth will absorb all the impurities.

How a supply of water can be secured suitable for the purpose, having no water works system as in the city, is another inquiry, and here again nature sometimes comes to man's assistance by furnishing a spring or some other good supply of water at a higher level than the house, and all that is necessary will be the pipes to conduct it thither. What better could be desired? Or, it may be a spring in a gully 20 or 50 feet below the house. In this event a hydraulic ram might be in order, and this also would furnish automatically a water supply. Still the house may be surrounded by comparatively level country, where it might be necessary to either drive or drill a well in order to obtain water that will be desirable for drinking purposes. In this case a windmill might be used which would elevate the water into a large tank, to be distributed where needed. Another system provides an air tight tank into which the water is pumped through a check valve, compressing the air sufficiently to force the water up into the upper floors of the house, if desired. If any of these methods are found to be too expensive, a hand lift and force pump could be used to elevate the water into a tank in the attic, or, if the well is too far from the house to be thus utilized, the rain water from the roof may be conveyed to the tank or raised there by the kitchen pump from the large cistern, which is in the cellar or buried outside the house, according to circumstances.

The use of soft water stored in this way is doubtless the least expensive of any system that can be devised for the country, to operate a water closet, supply a wash basin, range boiler, bath or sink, and by the use of a filter furnish a supply of drinking water that is not to be despised; in fact, there are people who drink nothing else, and who claim immunity from certain diseases on account of its use.

In order to convey a better idea of the manner in which a few simple plumbing fixtures may be placd so ase to combine sanitary measures with the strictest economy, the sketch shown in Fig. 1 has been prepared. These fixtures are shown located on the ground floor of a one-story annex in the rear of a two-story farmhouse, and, as seen by the plan, Fig. 2, the bathroom is immediately off the kitchen and is thoroughly heated by a large drum connected to the kitchen range. The small room to the left is 5 x 7 feet, and contains a cast iron sink 14 x 220 inches, 6 inches deep, with a rim about ¾ inch wide all around the upper edge, and a lift and force pump, which can be used to fill the tank in the attic in case it should run dry in the summer during a drought. To support this sink a strip of wood 4 inches wide and 1½ inches thick is nailed well to the wall, the top edge being 2 feet 4½ inches from the floor. Other pieces are nailed at the ends and across the front, thus forming a frame into which the rim of the sink is let in flush, so that the hardwood top has a level bearing. A thin layer of white lead is placed beneath it to prevent any water from getting in between. Fig. 2 shows how grooves may be cut in this board with a gouge, which makes a splendid draining board to set dishes upon after being washed. Fig. 3 shows how the wooden frame

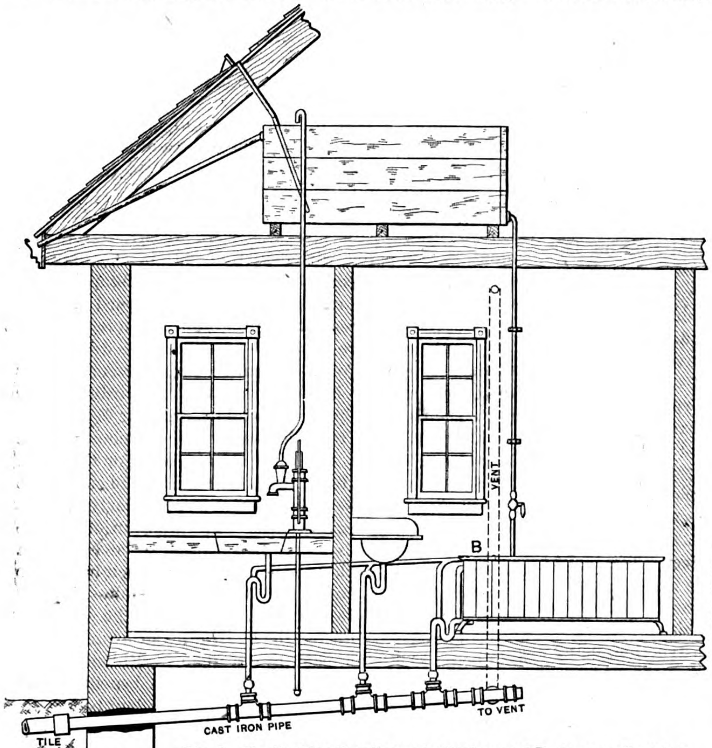


Fig. 1.—Vertical Section through Kitchen and Bathroom, Showing General Arrangement of Plumbing Fixtures.

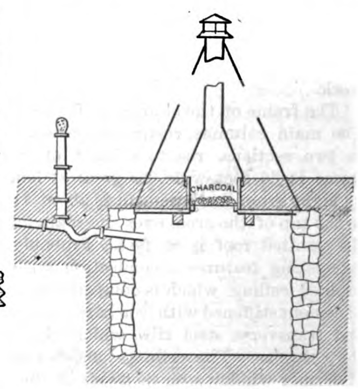


Fig. 4.—Section through Cesspool.

A Scheme for Country Plumbing.

is built to support the sink, 1 foot of space to the right providing ample room for the pump, the front of sink being left open, as shown.

The bathroom adjoining contains a 14-inch round wash basin and a 5½-foot copper lined bathtub, 18 inches deep and 2 feet wide, sheeted on the side and end that are exposed with matched lumber 1 inch thick and 3 inches wide, with a V joint. It has also a hardwood rim 3 inches wide and projecting inside the tub ¼ inch. Four stove legs are drilled with two holes in each, painted and bronzed, and when secured to the under side of tub give it quite a respectable appearance. This plan is much preferable to having the tub entirely closed in. The basin is supported after the manner of the sink on two sides, except that a circle is cut out of a rough board 22 inches square, into which the rim of the basin is countersunk, a little white lead being placed around the flange, and the hardwood top screwed firmly down. A turned leg supports the outer corner. The tops of these fixtures are well oiled and finished with hard oil finish. A splash board 6 inches high is placed on the two sides next the wall. If a marble top was used, white lead or putty should never be placed beneath it, as it will discolor the marble; but it should be set in plaster of paris instead. A better plan, however, when a marble slab is used is to secure the basin to it by brass clamps, with a little plaster of paris between them.

The tank in the attic is built from sound lumber 1½ inches thick, 72 x 36 inches, and 28 inches deep, the sides of which project past the ends 1½ inches, thus forming a recess, into which a triangular strip of wood is nailed for additional strength. It is lined with No. 26 galvanized vanized pipe is run down to near the bottom of cistern, which acts both as a trap and overflow; another piece of the same extends full size to roof for ventilation. An air entrance is provided at hand hole of trap at cesspool by means of a pipe made sufficiently high for that purpose.

The cesspool is to be avoided where there is any other method available for the disposal of sewage. It should be, within reason, as far away from the house as the owner's purse will put it; but, as a rule, that isn't very far. Great care should be taken that it is not placed in the vicinity of any well the water from which is used for drinking purposes, and if any danger of contamination exists the cesspool should be cemented over the interior, or some other means taken to make it water tight. If in a position where the liquid will soak away without doing any harm, a "leaching" cesspool, as it is sometimes called, may be built, as in Fig. 4, about 8 feet in diameter and 7 feet deep, in which the bottom is of gravel, the sides being lined up with "hardheads," or rough stone without mortar. The cesspool illustrated was made large enough to admit of the addition of a water closet at some future time, and so is larger than it otherwise would have been. It is trapped, and a piece of pipe is run from the hand hole up about 3 feet above the ground, and covered with a wire guard, so as to act both as a fresh air inlet and as a cleanout hole for trap. Two wooden sills about 6 inches square are laid across, and at right angles across these are laid strong planks, an opening being left near the center 2 feet square, having sides nailed around it about 20 inches high, forming a box, at the bottom of which is nailed a piece of wire netting which supports about a bushel of charcoal, the idea being to absorb to some extent foul gases, &c. A sheet iron base is made to fit over this box, tapering

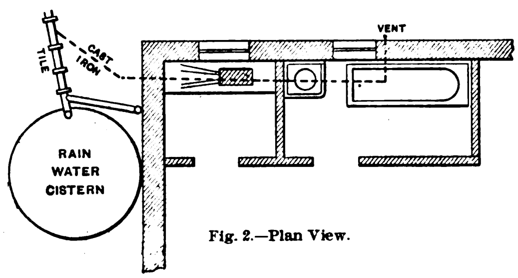


Fig. 2.—Plan View.

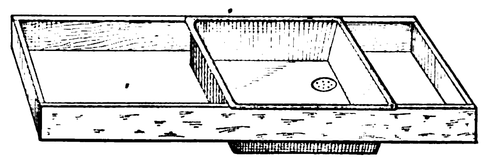


Fig. 3.—Frame to Support Sink.

A Scheme for Country Plumbing.

iron, well soldered, and provided with a strainer across the outlet, and supported by three 2 x 4 inch scantlings, as shown in Fig. 1. When filled to bottom of overflow it holds about 275 gallons, and weighs approximately 2200 pounds.

Being set directly over a partition there is no danger of weakening or cracking the ceiling by its weight. It is also provided with a tight cover. Much description will not be necessary as to the sizes and arrangement of pipes, as the sketch shows clearly how the fixtures are connected. No matter how poor a man may be, if he can afford plumbing fixtures at all he can afford to trap them properly, and a failure to do so may cause unnecessary sickness and doctors' bills. A 2-inch cast iron pipe is run beneath the joists, as shown, giving it all the fall possible, and providing four Y branches, the outlet on one being turned sideways, so as to run full size through the wall, as in Fig. 2, taking in on its way the trap vents or back air pipe which passes through at B, Fig. 1, continuing thence to a point 3 feet above the eaves, with galvanized iron pipe. The sink and the bath wastes are each 1½ inches in diameter, the basin waste 1¼ inches, all of which are of lead. The pump suction and discharge are of 1-inch iron, the soft water supply for bath and basin being ¾-inch iron pipe connected to tank by means of a lock nut on both sides, and at its lower extremity a three-quarter globe valve reduced to take a ½-inch nipple, to which is attached a piece of rubber tubing, which will easily reach either bath or basin, as desired.

The soft water supply to tank from roof and the overflow from same are each 2-inch galvanized pipe, and the pipe in the ground is 4-inch tile. A piece of 4-inch gal- upward to a 10 inch pipe, 12 feet high, and a ventilator at the top. About 18 inches of earth covers the cedar top of cesspool, which keeps out the frost. It is well to lay the drain to cesspool with all the fall that circumstances will admit of, 1½ inches in 10 feet being generally considered sufficient.

The Artist-Artisan Institute, 140 West Twenty-third street, New York, commenced its eighth season on October 1, to continue until the end of May next. The course of work is largely confined to the artistic side of the institute's field of operations. It is to be regretted that very few of the artisan class, pure and simple, appear to take advantage of the excellent opportunity for elementary art training offered by this institution. Almost every branch of decorative and applied design is taught in the school. Among the studies are designs for wall papers, carpets, metal and jewelry work. In addition, instruction is given in architecture, sculpture, painting, wood carving, &c., some of the leading authorities in these lines of art giving their time to the work of the school free of cost. The cost of instruction is placed at so low a figure as to be within the reach of every one. To young artisans who have any ambition to excel in the crafts which they have taken up the Artist-Artisan Institute seems to offer a remarkably favorable opportunity for obtaining a sound grounding in the first principles of art. Knowledge of this kind could not fail to have its effect in the subsequent work of the mechanic, in whatever line of manual labor he may be engaged. Entrance to the school is still open to those who have not already put down their names as candidates for instruction.

THE USE OF DOWELS.

THE method of putting things together by means of dowels, or doweling, as it is termed, is one of the utmost importance, and is required in some part or other of nearly all articles of furniture. For making dowels a strong and tough wood must be selected, the best being beech, although oak or walnut will answer very well for some purposes. It must be as straight grained as possible and thoroughly dry. The dowels are made in various sizes, says a writer in an English architectural paper. Those most generally in use are ⅛, ¼, ⅜ and ½ inch diameter, according to requirements, a size very nearly ¼ inch diameter (about that of an ordinary lead pencil) being very useful. You must purchase or make a dowel plate. They are sold with holes in them for making three or four different sizes, but it is not a very difficult matter to make one out of a piece of iron ⅛ inch or so thick by punching a hole in it and enlarging it to the size you require. You will want a brace and the necessary bits to correspond with the plate holes. Now mark your wood out; about 10 or 11 inch lengths are the most handy to work and the width should be rather more than the diameter you intend the dowel to be. Having cut out the lengths, plane them up square, then take off each corner of the square with the plane, so as to get them to correspond nearly with the holes. The best way to do this, which is rather an awkward job, is the following: Get a piece of pine ¾ inch thick, 2½ or 3 inches wide, and about 2 inches longer than your dowel lengths; straighten one edge of it, and mark a ¼-inch margin each side upon it; from this cut inwardly on the bevel to a depth of ¼ or ⅜ inch. This will give you a V-shaped groove. You may cut it out throughout its length and put a screw or pin in one end to form a stop; but it is better to leave ½ inch square at one end and to cut the groove the remainder of length. This placed in the screw bench, and you will find your length will lie in it while you plane off the corners; you can then reverse and proceed until all are completed. It is necessary to take a little more—about two or three shavings—off one corner—it is immaterial which—than off the remainder. I shall explain the reason for this presently. Having done this, take the dowel plate—you will notice that the holes on one side of it are larger around the apertures than the others—rest it, with this side upward, upon the bench over a hole, underneath the one you intend using and drive the lengths steadily through. You must commence carefully, holding the length with the left hand near the bottom, while you tap it gently with the hammer with the right until you get it fairly entered. Then go on more firmly. When you have driven it through rather more than the thickness of the bench you will find it better to hold the length from the underneath side, as this will prevent the plate from jarring. The lengths should not go through without a moderate amount of driving force, but, on the other hand, they must not require too much, or they will be likely to break without going through. A little practice will familiarize you with this; but it is better at first to use your lengths a little shorter than previously recommended and you will be less likely to break them. You must take care to keep them as upright as possible and hit them fairly on the top. When made they should, when looked at endways, or in section anywhere, be circular in appearance, and fit the plate hole tightly, with the exception of that portion where the additional amount was taken off the square corner, which should now appear a trifle off.

Before doweling anything, it is necessary that the various parts intended to be secured by this method should first be fitted exactly in the position they are ultimately to remain in. Suppose, for example, we have the head of a desk, the top of a cabinet, or anything of a similar nature we wish to dowel. It is first accurately fitted and placed in position. Now, take a marking awl and mark lightly —a small mark ⅛ inch long is sufficient—on the outside edge of the carcase, one or two, or as many points as you require dowels. You must, of course, be guided by the requirements of your work. A distance of from 4 to 6 inches apart answers generally very well, but use sufficient to make it quite secure. When marking these points on the carcase mark the top to correspond at the same time by simply drawing the awl upward and marking it on its underneath side, taking care that it does not move or shift at all while marking. Then gauge on each, setting the gauge so that it will mark in such a position that you can bore with safety—not too near the edge or where there is any likelihood of splitting anything. From the previous markings draw a line at right angles to the gauged mark until it meets it. This is done by running a square along it. The points where these two lines meet will be those for the center of the dowel and its corresponding hole. In some cases examples will easily be found. We can obtain the position in this way: Take the piece of work to be doweled and consider the most suitable place for them. Mark this and bore a hole in it with a fine bradawl. Now get a needle point, or a tack with the head knocked off, insert it in this hole and give it a gentle tap; carefully press it home and it will mark the required spot. This method is more applicable where some part of the work acts as a support to the other and you merely want a dowel or so to steady it, like a piece of carving or fretwork.

All the points now being marked, bore the holes with a center bit the size of dowel it is intended to employ. Do not use them too large. If you are doweling into ¾ or 1 inch stuff use edgeways. A ¼ or ⅜ inch is quite large enough. If you have not one the same size use a smaller and then enlarge with a quill bit and remove the core produced by boring with a nose bit. Bore them perfectly upright. The depth will vary according to circumstances, from ⅜ to 1 inch. In some cases, it is immaterial how deep you bore; in others, this must be carefully attended to, because a hole bored right through might disfigure the work. It is best to drive the dowels first into that part of the work where you can bore deepest. Glue the holes well with good hot glue. A piece of iron wire will be found very useful for this, and it can be used repeatedly, as the dried glue left on it after using will not adhere to the metallic surface. Now take the dowel length and drive it into the hole until it is home and will go no further. It will be noticed while driving in that the glue and air will escape from that portion of the hole where the dowel, as previously described, does not quite fit. If this were not so the driving force necessary would, in all probability, split the wood around. Now saw off the lengths, leaving sufficient to fill the other holes bored. If you cannot judge the requisite length sufficiently accurate with the eye measure it and do not get them too long. After sawing off remove all the edges and round the top of the dowel with a rasp. It is best just to try that the holes are right and the work in right position by knocking it on temporarily. If so, glue the holes and put the parts together, press them firmly down to each other and get a close join. If you have any difficulty in this it is better to apply gentle pressure by using a hand screw or cramp to force them together than to strike them with a hammer.

A bronze figure of Moses, 6 feet 6 inches in hight, modeled by C. M. Niebaus, was recently cast at the works of the Gorham Mfg. Company, Providence, R. I., for the rotunda of the new Congressional Library Building at Washington.

An illustrated German technical journal shows a method of fastening to stone that may be of interest to members of the trade. The illustrations presented are of insulators for electric wires, knobs, &c., but the principle may, perhaps, have a wider application. The hole in the stone is filled with plaster of paris, and in the center of the hole is a double wire coil. The coil consists of two wires, wound right and left, and when this is placed in the middle of the plaster of paris it forms a rough thread for the screw end of the bolt or fixture that is to be fastened.

HINTS ON WOOD CARVING.*

BY CHAS. J. WOODSEND.

WE will next proceed to find and delineate the lines of the leaves, volutes and helices, or in shop parlance, "block them out." Referring to Fig. 90, take a radius of 25 minutes and strike the semicircle A G B, which divide into two equal parts. From the center C carry a line through the point found, continuing it indefinitely. This line will be the center of a volute.

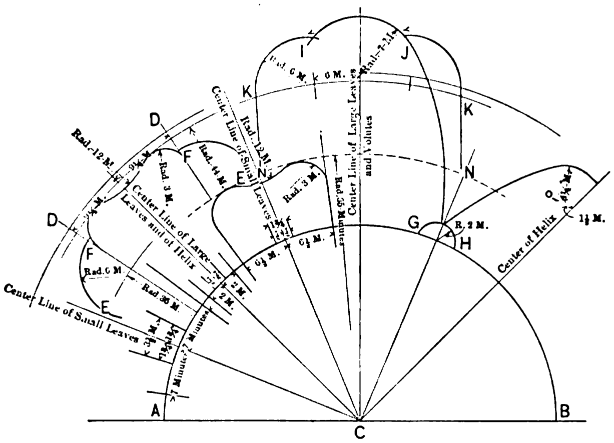


Fig. 90 —Inverted Plan View of Uncompleted Half of the Capital.

Subdivide these parts again, as shown, at the right and left of the center and from C carry lines through the points found, continuing them indefinitely, which will give the center lines of the helices. Again subdivide the spaces upon the semicircle and from the center C radiate lines indefinitely through the points found, which will be the center lines for the short leaves. Next from the intersection of the semicircular line A B and the center lines of the short leaves on both sides of the center line, mark the semicircle A B 6½ minutes. From the center C through the points found extend lines indefinitely. Then with C as a center and with a radius of 35 minutes, which is the extreme line of the overhang, connect the lines mentioned, which will give the outer extension of the short leaves. Now, with a radius of 8 minutes draw quarter circles as shown, rounding the corners. Now, from a point on the center line extended, and with a radius of 12 minutes, describe the arc connecting the quarter circles, which gives the line of the hollow upon the outside of the overhang. Now on the semicircular line A B set off on both sides of this center line ½ minute, which gives the size at the bottom of the hollow extending up the center of the leaves. Again set off on both sides of the center line 1¾ minutes, which represents the extreme width of the string of small leaves running up the centers. This completes for the present the outlines for the short leaves.

We will now turn our attention to the long leaves, the extreme overhang of which, according to Fig. 89, measuring from the center line across is 44 minutes. From C as a center, Fig. 90, and with a radius of 44 minutes, describe the arcs cutting the center lines of the long leaves, extending them indefinitely on both sides. Upon these arcs and from the center lines measure 9½ minutes. From these points draw the lines D D radiating toward the center C. Round the corners and hollow the center portions with the same radii and from similiar centers as for the short leaves, thus completing the lines for the overhang. Upon the semicircle A B and at the intersection of the center line measure ½ minute on both sides, this representing the width at the bottom of the hollow running up the centers. Next, upon the same line and from the same centers, mark 2 minutes, which gives the extreme width of the band of leaves running up the centers and completes for the present the outlines for the long leaves.

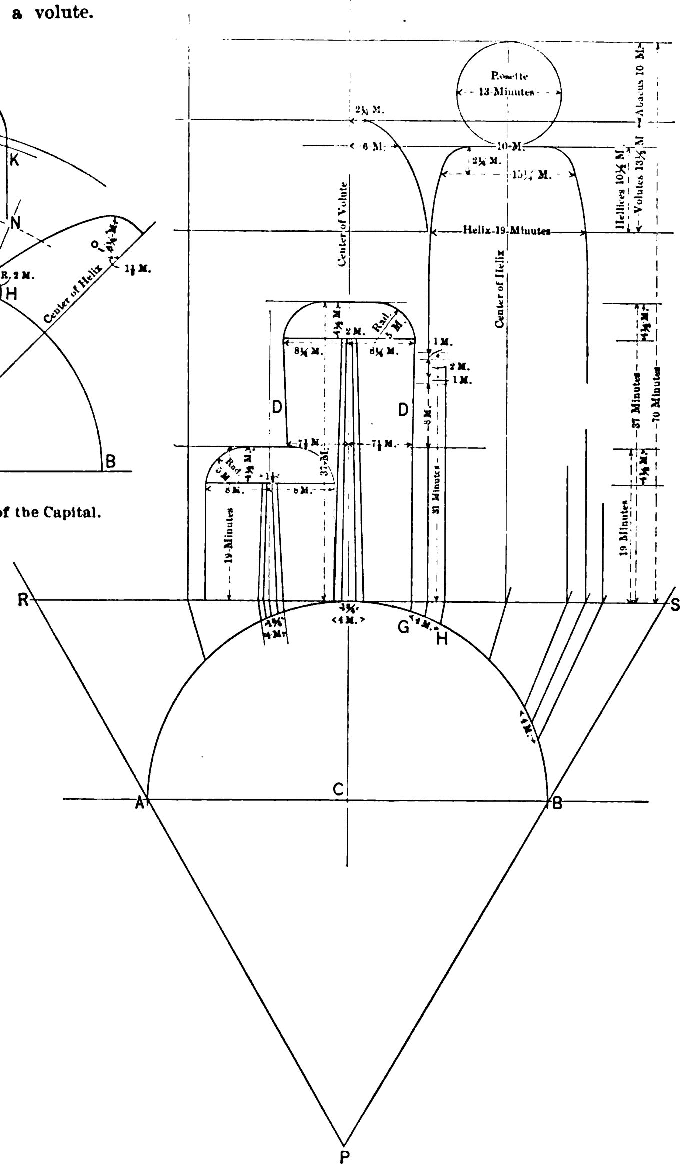


Fig. 91.—Partial View of the Capital as it would Appear Unfolded.

Hints on Wood Carving.

Now from the center C and with a radius of 36 minutes cut the lines D D, and, with the points found as centers and with radii of 6 minutes, describe the quarter circles E F and F E. These give the lines for the leaves terminating just under the helices. Taking as a center the

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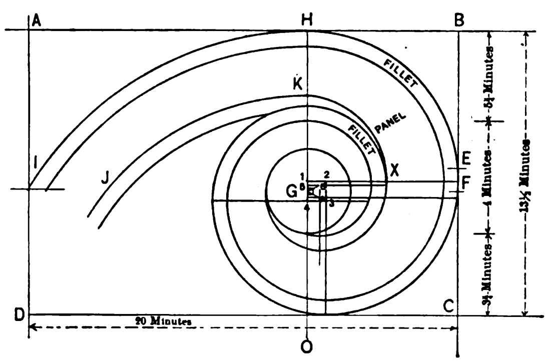
intersection of the semicircular line A B with that of the center line for the short leaves, and with a radius of 2 minutes, strike the semicircle G H, which is the extreme size of the small shafts from which start the leaves which finish in the volutes and helices. Next, upon the center lines of the helices and distant 48 minutes from the center C erect perpendiculars, extending them indefinitely. From the point O, distant from the center line 1¼ minutes and with a radius of 4½ minutes, draw an arc touching the perpendiculars. Then from a point on the line C B draw as a center, distant from C 35 minutes, draw the arc to connect with the one last mentioned and terminating on the line G H. This completes one side of a helix. Upon the center line of the volutes at a point to be used as a center, distant from C 45 minutes and with a radius of 7 minutes, draw the arc I J. Now, with a point upon the center line of the helices as a center describe the arc continued from J and terminating on the line G H. This gives the outline of the sides and projection of the volutes. Again, with a center situated at a distance of 44 minutes from C and 6 minutes from the center line of the volutes, and with a radius of 6 minutes, draw the arcs K I and J K. From K K draw parallel with the central line of the volutes, the lines K N and K N connecting with the arcs K I and J K. These lines give the general shape of leaves and volutes as seen from below.

In Fig. 91 is represented a partial view of the capital unfolded, that is, as it would appear if drawn out



Hints on Wood Carving.—Fig. 92.—Diagram Showing Method of Drawing a Volute.

instead of its plan being circular. On the line A C B, with C as center and with a radius of 25 minutes, draw the semicircle A G H B. Divide this in the same manner as in connection with the previous figure, except that the widths of the leaves be omitted. Upon the line A B C erect an equilateral triangle, continuing the line P A and P B indefinitely. Draw the line R S parallel with A B and at a distance from it of 25 minutes. It is desirable to mention at this point that any irregularities which may seem apparent are accounted for in the first place by the change of views and consequently by the changes in diameter of the different parts. The changes in diameter are small, but frequently make errors seem apparent. All that is desirable at this point is to obtain a general view of the outlines. From P radiate lines through the points found upon A B so as to cut the line R S as indicated. At the right erect a perpendicular upon the line R S and mark upon it the different hights as given in Fig. 87. Square these lines across to their proper positions. Taking the short leaves first it will be noticed that the hollows up their centers are 1¾ minutes across at the bottom. At a line representing the bottom of the overhang, these reduce to ¾ minute. The leaves taper from 8¼ minutes to 1½ minutes at the overhang. The full width of the short leaves is 16 minutes. Square this width to R S. Next with a radius of 5 minutes around the corners as shown. This finishes the general outline of the short leaves as they would appear. Turning next to the large leaves the center hollow tapers from 1¾ minutes at the bottom to ¾ minute at the bottom of the overhang and the string of small leaves tapers from 4 minutes at the bottom to 2 minutes at the overhang. The width of the large leaves at the overhang is 16¼ minutes and at the top of the short leaves the measurement across is 15 minutes. Draw the lines D D and with a radius of 5 minutes describe the quarter circles, rounding the corners.

We will now take up the small shaft marked in Fig. 90 by the line G H and represented in Fig. 91 by the same letters. The full hight of this shaft is 31 minutes. The upper bead is 1 minute, the panel 2 minutes and the lower band 1 minute. The volutes at the bottom of the abacus show 4½ minutes of straight, while 3 minutes below they are 12 minutes across. Through these points draw the curved line, striking the center line of the small shaft at its intersection with the line at the bottom of the volutes. The helix shows 10 minutes of straight at the bottom and 2¼ minutes below it is 15¼ minutes across. At the bottom of the scroll it is 19 minutes. Draw a curved line through the points thus found and continue until it strikes the center of the small shafts. The rosette upon the abacus over the helices is 13 minutes across, but at the present time this is immaterial.

We will next proceed to draw the volutes as indicated in Fig. 92. The outside dimensions of the volute is 20 minutes in length by 13¼ minutes in hight. Draw a parallelogram, A B C D, 20 minutes long by 13¼ minutes in hight. Divide the hight B C into two equal parts as at E. Divide E B into eight equal parts and then set down one of these parts as E F. Draw a line indefinitely from F toward G and parallel to both A B and D C. On both sides of the line F G set off one-half the distance from E to F which are the lines 1 2 and 4 3 continued. Now with F as a center and E F as radius mark the line F G. Erect a perpendicular at the point thus found and from G H set off the distance E F, making the small square 1 2 3 4. Next from the center G draw the diverging lines G 2 and G 3. Divide these lines into three equal parts and connect them as shown. From the center G draw the eye of the volute, which in this case is 4 minutes across; then with 1 as a center and 1 H as a radius draw the quarter circle 1 H to 1 2 extended. Again, with 2 as a center and 2 E F as a radius draw the quarter circle cutting the line 2 3 extended, and so on, using the points 1 2 3 4 5 6 7 as centers in the way indicated. Now upon the continued line G H and below the line C D set off half the width of the eye to O. With O as a center and O H as radius describe the arc H I. Space off 3 minutes from I to J and with O as center draw the arc J K. Now with a point on the line G H as a center and 1 X as radius continue J K to the point X. The fillet is 1¼ minutes wide and is struck from the same center as the other lines.*

(To be continued.)

What is said to be one of the finest school buildings in the Empire State has recently been completed at Millbrook, N. Y. It is a memorial structure in the Colonial style of architecture and cost in the neighborhood of $100,000. It is cross shaped, with dimensions of nearly 100 x 200 feet. The material of which it is built is straw colored brick and white marble, the structure being fire proof and handsomely finished in oak. In the basement is a large playroom for use in stormy weather, with a partition through the center, providing separate divisions for boys and girls. The first floor is devoted to the main hall with a seating capacity for several hundred people, a ticket office in one section of the hall, and at one end of the auditorium is a stage with dressing rooms reached through special street entrances. There are also several classrooms on the side of the hall opposite the auditorium. On the second floor is a large assembly room, ladies' reception room, &c. The attic contains apartments for the janitor, who will live in the building as care taker.

* [It is possible that some of the readers may desire to ask questions about wood carving, and if such will send their letters to the Editor he will forward them to the author for answer, to the end that the question and reply may be published together. It is stipulated, however, that all questions shall relate to the subject in hand, and shall be of such a nature that with the answers they will prove interesting and instructive.—EDITOR.]

WHAT BUILDERS ARE DOING.

THE present condition of the building business throughout the country, considered as a whole, is better than it has been at any time during the year. It is too early to make specific statement of the amount of work done in the several sections of the country as compared with that of previous years; but the remark offered from time to time, in these columns, that the volume of business was steadily increasing is borne out by facts. The total amount of work on hand has steadily increased since the opening of the season in all localities, particularly east of the Rocky Mountains. In some sections the recovery from the depression of the past few years has been more rapid than in others, but with the difference of degree the condition stated has been almost universal. In many cities the opening of the building season of 1895 found the builders with relatively nothing to do; in others there was a moderate amount of business to be done, but in all cases, confidence seemed to grow and work came straggling into the market until the end of the year finds the volume of business greatly in excess of what was thought possible at the beginning of the year. The area of smallest relative activity seems to lie west of the Rocky Mountains, although some of the cities in that locality appear to have had a fair business. The conditions in the middle West, in the vicinity of the Mississippi River, are more hopeful than they have been for several years. St. Louis is the only city in this section to which this condition does not apply, for generally speaking the St. Louis builders have not felt the depression equally with their nearby brethren, a fair average amount of work having been in the market most of the time. The condition in the large cities of the East has not changed from that previously reported.

Relations between employers and workmen are, with the exception of the disturbance in New York City, in a tranquil condition, with little prospect of serious trouble occurring during the remainder of the year.

Baltimore, Md.

The most important event of the year for the builders of Baltimore, particularly those connected with the exchange, was the ninth convention of the National Association of Builders. The beneficial effect upon the members of the exchange has already been noted, in the increase of interest in its affairs, and the added effort to increase the usefulness and efficiency of the organization. The fraternal feeling among all who participated in the convention was strengthened and extended by the hospitality of the members of the exchange and the ladies, who did everything in their power to make the visit an enjoyable one to all. The entertainment was officially in the hands of the gentlemen and ladies whose names are given below, although many others not mentioned contributed their full share to the pleasure of the meeting. The general Committee on Entertainment, from which nearly all the special committees were made up, was as follows: Edward L. Bartlett, chairman; Samuel B. Sexton, Jr., Isaac S. Filbert, P. M. Womble, Jr., Edward D. Miller, Noble H. Creager, George W. Starr, John B. Sisson, Henry H. Seim, E. Hall Haswell, Wm. C. Wellener, Wm. Ferguson, Benjamin F. Bennett, James A. Smyser, Wm. V. Wilson, Jr., Herman H. Duker, John Trainor, Edward D. Preston, John Hiltz, Jeff. J. Walsh, Israel Griffith, Alex. J. Denson, Wm. F. Bevan, J. Fred Adams, John P. Brady, George Mann, Theo. F. Krug.

The ladies' committee was in six sections, as follows:

No. 1.—Mrs. S. B. Sexton, Jr., Mrs. George Mann, Mrs. W. F. Bevan, Miss M. M. Miller, Miss Mabel Filbert. Mr. S. Frank Bennett in charge.

No. 2.—Mrs. E. L. Bartlett, Mrs. W. H. Anderson, Mrs. Theo. F. Krug, Mrs. John H. Short, Mrs. Chas. L. Carson. Mr. W. C. Stewart in charge.

No. 3.—Mrs. Isaac S. Filbert, Mrs. J. L. Gilbert, Mrs. J. J. Walsh, Miss Catherine Walsh. Mr. Joseph T. Lawton in charge.

No. 4.—Mrs. E. Hall Haswell, Mrs. J. T. Buckley, Mrs. F. E. Graham, Mrs. George J. Roche. Mr. George J Roche in charge.

No 5.—Mrs. Joseph H. Hellen, Mrs. J. Theo. Oster, Mrs. W.C. Stewart, Mrs. Noble H. Creager, Mrs. Henry A. Seim. Mr. Joseph H. Hellen in charge.

No. 6.—Mrs. F. H. Davidson, Mrs. John Trainor, Mrs. George W. Starr, Mrs. Wm. Ferguson. Mr. F. H. Davidson in charge.

Auxiliary.—Mrs. E. D. Miller, Mrs. S. Frank Bennett, Mrs. Joseph T. Lawton, Miss Emma E. Sexton, Miss Emma Anderson, Mr. John H. Short, Mr. B. F. Bennett, Mr. Theodore Mottu.

Business among the builders was reported as being in good condition, the year having proved satisfactory as a whole. There were no labor disturbances of importance; and there is no indication, at the present time, of any unfavorable change in the general relations between employers and workmen.

Boston, Mass.

Nearly all the builders of Boston are busy and a general feeling of satisfaction prevails over the amount of building done during the season and at present on hand. The only difference between employers and workmen that threatened at any time to be serious was the strike of steam fitters; and although the strike was in official existence for about two months, and previously mentioned in this department, it was officially ended on October 23 by the adoption of the following agreement between the Master Steam Fitters' Association and the Steam Fitters' Union:

1. On and after May 1, 1896, eight hours shall constitute a day's work without reduction of wages now paid for nine hours.
2. On out of town work nine hours shall constitute a day's work, where board and expenses are paid, except in cities and towns where eight hours are recognized as a day's labor by the Master Steam Fitters and the Steam Fitters' Union.
3. In hiring steam fitters in the future members of the Boston Steam Fitters' Union shall have the preference when of equal ability and capacity with others.

After this agreement was signed the Master Steam Fitters submitted to the State Board the following recommendation:

In case of any dispute arising between the Master Steam Fitters and the Steam Fitters' Union which the parties are unable to settle by agreement, the dispute shall be submitted to the State Board without strike or lock out, and the decision of said board shall be final.

This recommendation was adopted by the union with the following proviso:

Provided, however, that in case of a sympathetic strike or suspension of work being ordered by the Building Trades' Council of Boston and vicinity on any building on which members of the Steam Fitters' Union are at work, a compliance with the order of said Building Trades Council shall not be considered a violation of the agreement between the Master Steam Fitters and the Steam Fitters' Union.

The Master Steam Fitters agreed to the proviso, and the controversy of eight weeks was finally settled. By the adoption of this agreement the workmen secure an eight-hour day without reduction of wages, which was the principal feature of the contention.

The bricklayers of the State, through various unions, have combined for the purpose of securing the adoption of the eight-hour day. At a meeting held in Boston for the formation of an organziation to prosecute the work, the following officers were elected:

President, C. J. Buckley.
Vice-president, H. H. Paine.
Corresponding secretary, Patrick Lally.
Treasurer, George T. Thornton.
Organizers, Jeremiah Harrington, John Scully and Joseph Goodspeed.

It was voted to hold quarterly meetings in various parts of the State, and a committee was appointed to prepare a constitution and rules of government.

Bridgeport, Conn.

President Zalmon Goodsell, at a recent meeting of the Builders' Exchange, presented an exhaustive report on his visit to the National Convention of Builders recently held at Baltimore. Among other matters touched upon was the need of a wide adoption of the system of trade schools for the training of mechanics connected with the building trades. He pointed out that in a progressive country like ours, in every trade more proficiency and education in the workmen are absolutely imperative. Equally with the so-called learned professions, such as law and medicine, tradesmen need careful preparation by hard study to properly work out mechanical problems, and then practice to make them skillful in their various avocations. Common sense, he argued, teaches us that we must have better craftsmen for the future development of building in our prosperous cities, and he demanded that generous and enlightened citizens should act liberally, in connection with the members of the building trades, in assisting those young men who wish to push forward by giving them every facility to do so. Mr. Goodsell's remarks in this connection were, we understand, received with much interest by his hearers; and it is likely that a movement toward the establishment of a trade school in accordance with his ideas may be the outcome in his own city of Bridgeport.

Buffalo, N. Y.

Buffalo builders are very well satisfied with the present condition of the building business in their city and are encouraged at the prospect for future business. The present amount of work being done far exceeds the amount on hand last year at this time, and the prospects for the winter and early spring are excellent. An unusual amount of figuring is being done; a considerable part of which, it is expected, will bear fruit within the next six months.

The only trouble between employers and workmen occurring during the past two months was a strike of carpenters and plasterers against the employment of two non-union carpenters on the Guaranty Building. It was reported that 75 men quit work, the plasterers in sympathy with the carpenters, and that the progress of the work was greatly obstructed by the action of the workmen. The contractor, it is stated, declined to take action in the matter as the men objectionable to the union were doing good work. The matter was finally settled by the two carpenters joining the union, and the men went back to work.

The members of the Builders' Association Exchange who attended the National Convention in Baltimore, Md., returned home greatly pleased with the treatment they received, and elated at the prospect of being the hosts of the National Association of Builders at its tenth convention next September. The succession of Chas. A. Rupp of Buffalo to the office of president of the National Association was the cause of much congratulation among the members of the exchange, by whom Mr. Rupp is held in high esteem. A number of the delegates visited the Atlanta Exposition before returning home, and a party consisting of Mr. and Mrs. Rupp, Mr. and Mrs. John Feist, Mr. and Mrs. Lannen and Mr. J. C. Almendinger went to Washington to call upon President Cleveland, by whom, it is stated, they were cordially received. Mr. Rupp was a member of the City Government at the time Mr. Cleveland was Mayor of Buffalo.

Chicago, Ill.

The Building Trades Council of Chicago is urging the consolidation of all labor unions of the city into one organiation. The subject has been agitated for some time, but without effect other than the consideration of such a project by the various separate unions. Investigation into the methods of organization existing in some of the English cities has been made, and the conclusions reached seem to warrant the attempt. It is reported that the majority of the unions are in favor of the proposition and that the prospect for consolidation is favorable. The *Chronicle*, referring to the matter in a recent issue, states that "It is the universal opinion (among the labor organizations of the city) that the complete organization of the labor bodies of Chicago would be a good thing, and the matter has been talked of for some time, but up to the present time no action has been taken outside the new move of the Building Trades Council. The new body will do away with the existing central labor bodies, such as the Trade and Labor Assembly, Chicago Labor Congress, Central Labor Union (German), Bohemian Central Labor Union and others, and the affiliated organizations of these bodies would have to become affiliated with the Council of their branch of trade. Thus the entire field will be upon a purely business basis and almost run itself. Disputes will have to be referred to a committee especially appointed for the purpose of settling them, and the decision of the committee is to be final. The purpose of the body, from the constitutional standpoint, will be the transactions of business to be submitted to it by the subordinate central bodies, to transact such business of a general nature as may be considered of interest to the labor unions of Chicago and vicinity, to prepare and present to the proper legislative bodies for adoption such legislation as may be demanded in the interest of the masses and to perform such work as may tend to promote the peace and welfare of the community and the preservation of the rights of all citizens."

The carpenters' unions are already in the midst of the work of consolidating into one organization, which shall include all union carpenters in the city, and which, it is hoped, will secure harmony among tne carpenters ; a thing that has not existed for some time past.

There are at present 22 local carpenters' unions in Chicago, and considering the pecuniary advantages of consolidation the secretary of the district council is quoted as having said :

At present, according to a rough estimate, the expenses of the council and the 22 locals amount to $429 salary a year for that many recording secretaries, $3965 for financial secretaries, $5990 for six business agents, $624 for their incidental expenses, $2004 for hall and office rentals, $962 for expenses of delegates to the council and about $500 for stationery and postage. This makes a total of $14,474, and shows how enormously it costs to run 23 distinct organizations each with its set of salaried officials and rolls of red tape.

With a single organization we can cut down our expenses by two-thirds at least. All the salaried officials we would then need would be a secretary, a treasurer, a sick steward, and three business agents at a yearly salary of $998 each, which, with an allowance of about $840 for hall and office rent, will limit our necessary expenditures for a year to $5831. When the delegates consider these figures seriously I think they will almost unanimously favor an amalgamation of our memberships. The only serious objectors to this plan would be the salaried and unsalaried office holders who thirst for honor and power. Of course seven positions in the new organization will not accommodate the 150 odd officials whom we now have, but the business of our 4000 members in this city can then be conducted with more simplicity and economy.

General building interests in Chicago are reported as being in better condition than they were two months ago, and no strike of a serious nature has occurred since the last report.

Cleveland, Ohio.

The members of the Builders' Exchange of Cleveland have decided to assist an effort to secure from the court of last resort a precedent in lien law. There has been considerable discussion among contractors, sub-contractors and material men for the last few weeks concerning a recent ruling. In a case entitled Gimbert *vs.* Madden the judge ruled that material men, laborers and sub-contractors had no claims against the owners of a new building not founded on the contract of the principal contractor. Gimbert had a lien upon Madden's property for roofing, and sued to recover under its provisions. The court decided against him substantially on the grounds just recited. The decision is construed as a declaration that the mechanics' lien law is unconstitutional, and the sub-contractors desire to have the case sent to an issue so as to know just where they stand.

At a meeting of the exchange held on November 6 the members decided to support an appeal to the Supreme Court for a ruling on the question at issue, and pledged their aid in money and such other ways as they may be able to assist in having the law finally defined.

Lowell, Mass

The present condition of the building business in Lowell, is tersely outlined in a clipping from the *Mail* of November 5. It says: "Every brick mason in Lowell who has applied for work and is able to lay brick in a satisfactory manner has been able to secure employment. One of the largest employers of out door skilled labor said within a week that he has work enough on hand for next season to employ half the brick masons now in Lowell.

"It is estimated by one builder that the new building of brick being erected by the Hamilton Company will take 3,000,000 brick to complete it. The building will be temporarily used as a storehouse. Last year when the demand for goods was not so large as it is at present, the company had stock stored in about 30 different locations. The estimated cost of this building is $100,000.

"The building being erected by the Appleton Company will cost $40,000. The lower stories of the building will be used as cloth and wrapping rooms, and the upper portion for a storehouse. Additional operatives will be needed by both companies.

"It has been the general report that 400 additional operatives will have to be employed in the additional rooms of the Tremont and Suffolk Company. Carding, spinning and weaving machinery will be placed in the addition. One builder estimates the cost of this addition at $70,000."

New York City.

At the time of this writing the building trades of New York City are seriously disturbed by a strike of the Housesmiths and Bridgemen's Union on the builders' work being done by two prominent structural iron concerns. The cause of the strike is a demand by the housesmiths for higher wages, and thus far something like 18 buildings and several thousand men are involved. Nearly all the employers are members of the Iron League, an organization of iron manufacturers formed during the late general eight-hour strike of the Housesmiths' Union. This strike was lost by the men through the formation of the league, and the union, which had then a membership of about 4000, including outside and inside housesmiths, was disrupted. The strike was formally declared off at a mass meeting of the strikers in Clarendon Hall, the leaders of the union frankly telling the men that they were beaten, and counseled them to return to work on the best terms they could obtain. Since then the housesmiths have been quietly reorganizing, but in two bodies, the Housesmiths and Bridgemen's Union, composed of men who do work on buildings, and the Housesmiths' Union, made up of inside men, who work in the shops.

The league has not been aggressively active since that time and last spring it sent out a notice to its employees granting the eight-hour work day. What the housesmiths want now, however, is the recognition of the union, and in addition have asked for the signing by the employers of a new agreement. The wages demanded in the agreement are an increase of from 25 cents to $1 per day of eight hours, all around, as follows : Setters, $3.50 ; derrickmen and good all around men, $3 ; helpers on derrick, $2.50 ; riveters, $3 ; heaters, $2.25 ; foremen finishers, $3.50 ; finishers, $3 ; finishers' helpers, $2.25 ; blacksmiths, $3.25 ; blacksmiths' helpers, $2.25.

The agreement provides that double time shall be paid for overtime and work done on Sundays and legal holidays; that no work be done on Labor Day, and that no man shall be discharged for refusing to work overtime. It also provides that if members of the Housesmiths' Union are kept waiting for their pay they are to be paid overtime for the time they have been waiting. No one is to be discharged without cause, one of the causes specified being intoxication.

The workmen claim to have the support of the Board of Walking Delegates, which represents unions in over 40 trades, and the Central Labor Union. It is thought that if the trouble is not soon settled, strong efforts to accomplish which are being put forth, sympathetic strikes may result, which would involve the following trades : Housesmiths, plumbers, plasterers, carpenters, tile layers, marble workers, stone workers, steam fitters, masons, stone setters, derrickmen, engineers, laborers, cement workers, stair builders, elevator constructors, painters, framers, varnishers and mosaic layers.

At a recent meeting of the District Council of the United Brotherhood of Carpenters and Joiners, it was resolved to begin a contest against the use of non-union-made "trim," consisting of moldings, door and window casings, baseboards and flooring turned out by country saw mills and brought in from other States.

Late in September the derrickmen's unions ordered a strike for higher wages, and it is stated that about 8000 men were thrown out of employment thereby. It was agreed by both employers and workmen to refer the matter to Bishop Potter and to abide by his decision. The result was a compromise. The men, who were receiving $2.75 a day, demanded $3. By the terms of the decision, which was pronounced satisfactory by both sides, the derrickmen were to receive $2.90 a day. The derrickmen and the men in other trades who struck in sympathy are now at work. In addition to those mentioned there have been several strikes of minor importance, one on the Hoffman House, affecting about 200 men, including elevator constructors, electric wiremen, plasterers and helpers, steam fitters and helpers, mosaic workers and helpers, marble cutters, varnishers, architectural iron workers, and members of three separate organizations of carpenters and the same number of organizations of painters.

The amount of building going on in New York City at the present time compares favorably with the record of former years, and it is expected from the amount now projected that the coming year will be a profitable one for builders.

The members of the Mechanics and Traders' Exchange who attended the ninth convention of the National Association of Builders were very cordial in the expression of their appreciation of the hospitality with which they were entertained by the Baltimore builders, and have evidenced their opinion of the principal business of the meeting by indorsing, officially, the establishment of a State Association of Builders, and lending their aid to its successful organization. The date of the meeting for permanent organization is December 11 and the place the Building Trades Club, 117 East Twenty-third street, New York City.

On November 18 a dinner was given at the Hotel Brunswick, to celebrate the 110th year of the founding of the General Society of Mechanics and Tradesmen of New York City. Nearly 250 members and their friends were present to partake of the banquet, which was served on tables decorated with flowers, ferns, fruits and palms. A number of addresses were made by the president of the society, Warren A. Conover, and other well known men who sat at his table, dealing with the history of the society and the course of usefulness it has pursued during its long life. The occasion was a success in every way.

Philadelphia, Pa.

The builders of Philadelphia report a gratifying condition of business during the past two months, the amount of work on hand at present being in excess of that being done at the same period of 1894. It is anticipated that the total of the year will compare favorably with the more prosperous years of the past. No differences between employers and workmen have occurred, since the last report, of sufficient importance to seriously interfere with the progress ; and taken as a whole, the year has, thus far, been very free from labor troubles of any kind.

The delegates and others from the Master Builders' Exchange who attended the Baltimore meeting of the National Association of Builders are unanimous in their praise of the delightful manner in which they were entertained by their brother builders of the convention city. As testimonials of their appreciation of the hospitality of the Baltimore Exchange and its members, on November 6, a delegation from the Philadelphia Exchange, consisting of President Charles Gillingham, John S. Stevens, Franklin M. Harris, W. S. P. Shields, D. H. Watts, Peter Gray, William Harkness and others, visited Baltimore and presented the exchange in that city a beautiful silver loving cup. The Philadelphians also presented a silver coffee service to John B. Sisson, who was chairman of the special committee appointed to entertain the visitors from the Quaker city. The presentations were made on behalf of all the members of the Philadelphia Exchange who attended the convention and were accompanied with appropriate ceremonies. The occasion was a most enjoyable one to all who participated.

The Operative Builders' Exchange, of which William T. B. Roberts is president, has been removed to room 402 Bourse Building, Fifth street, entrance north side.

Pittsburgh, Pa.

The Builders' Exchange is opposed to the lien system and is working for the full recognition of the law passed by the last Legislature, by which contractors are required to file with the prothonotary the terms of contracts. Instead of depending upon liens to recover payment for work done, the exchange insists upon a bond when a building is turned over "free of liens" to the owner. The lien law, leading members of the exchange state, encouraged irresponsible builders, as the sub-contractors and supply dealers could fall back upon the building for their compensation in case the contractor failed to pay his obligations.

The clerk of the exchange obtains a copy each day of the list of contracts filed with the prothonotary, which is kept for reference. It is proposed by this means to weed out irresponsible contractors, who are finding it more difficult to get work done or materials supplied by dealers. The exchange expects to have all its contractors operating under the "no lien" system before the beginning of the next building season.

Providence, R. I.

General conditions in the building business in Providence continue as favorable as reported for September, and the builders are looking forward to an unusualy busy year in 1896. It is reported that building is especially active in the smaller cities near Providence, and that during the month of October the demand for workmen was greater than the supply. No trouble of any kind has occurred between employers and workmen for several months, and there is nothing to indicate that the present amicable relations will be disturbed in the near future.

St. Louis, Mo.

Building is reported as being in excellent condition in St. Louis, there being a large amount of work on hand and a promising outlook for 1896. Among the projected work is a tobacco factory to cost $1,200,000, to be begun at once. None but union laborers will be employed in the construction of this building. The following is an extract from the specifications which are now in the hands of the Building Commissioner :

> None but organized labor must be employed in or for the construction of these buildings, in or for any and all branches of the different mechanical trades in which labor is organized into unions.

This will disappoint the hopes of many who were expecting work on the building. It is also probable that it will cause many non-union men who expected work on the building to join some labor organization.

Late in September the St. Louis Chapter of the American Institute of Architects held its annual meeting and dinner. The following officers were elected : President, Robert Walsh ; vice-president, Louis Mullgardt ; treasurer, J. L. Weis ; secretary, F. Rosenheim. These gentlemen also constitute the Executive Board.

San Francisco, Cal.

The difference between the carpenters and mason contractors of San Francisco, referred to in previous issues, appears further from an adjustment than at any time since its beginning, and the two are drifting further apart, to the evident detriment of all concerned. One hundred and sixty contracting carpenters of the city have bound themselves by an iron clad agreement not to submit estimates for contracts under conditions which separate the mason work from the general or entire contract ; or in other words, where the mason is made either a direct contractor with the owner, or the principal contractor to whom the carpenter would be a sub-contractor.

The action of the contracting carpenters is based upon resolutions adopted June 1 by the brickmasons' and plumbers' associations. These two bodies then pledged themseleves not to do any work on buildings where the cost exceeded $500 except by direct and separate contracts, and so notified the architects. The object is to have the work segregated and to do away with supervision by the contracting carpenter. According to an old-time custom the carpenter had been regarded as the master builder and handled the money. So many jobs have, however, resulted in unfortunate *pro rata* settlements that the other classes of builders concluded it would be advisable to do business independently of the carpenters.

The carpenters' agreement is very full and explicit. It is in effect that from September 15 none of those who signed it will submit any estimate to any owner, agent or architect who segregates any portion of the work, or omits any portion from his specifications; the purpose being to force the building business back into the control of the carpenters. The kinds of buildings to which the agreement is to apply are frame, brick dwellings, and any brick, stone or iron building the cubic capacity of which is not over 150,000 cubic feet. For larger buildings than those of 150,000 feet capacity, no estimates are to be submitted when more than three separate contracts are to be let. State, municipal and Federal buildings are exempted. The agreement also pledges its signers not to handle any materials unless they are supplied through themselves, save where the owner is a *bona fide* dealer in such materials.

As a result of the trouble there is considerable discord among the members of the Builders' Exchange, and the outcome of the fight is awaited with great interest. The exchange recently adopted a form of contract for building work, and the members were forbidden to use any other on pain of being disciplined. The architects of the city have not taken kindly to the new form in many cases and have declined to permit its use in work under their control. The result has been that for yielding to the architects' demand for another form of contract the exchange has been compelled to expel one member, suspend another and fine another. Secretary Larsen of the exchange states that there is no good reason why the architects should object to the regular form of contract, since it was formulated by a committee composed jointly of builders and architects.

Building generally is reported as being slack as compared with the more favorable seasons of the past, notwithstanding the fact that there is a considerable amount of work on hand.

San Jose, Cal.

The members of the Builders' Exchange of San Jose, Cal., celebrated the first anniversary of their organization on the evening of November 4 by a banquet in the rooms of the association, 36 South Second street. The exchange now numbers about 100 members and has passed the first year of its existence prosperously and firmly established itself as one of the solid institutions of the city's business men. The officers are as follows :

President, A. J. McIlvain.
Vice-president, W. S. Boyles.
Secretary, Thomas Doyle.
Assistant secretary, L. H. Lewis.
Treasurer, R. L. Stock.
Financial secretary, J. G. Cherrie.
Trustees, M. Campbell, W. F. Ellis, P. R. Wells.
Membership Committee, F. F. Hebble, James M. Thorpe, W. E. Mann, J. C. Thorpe, W. M. Herman, F. Stock, E. A. Van Dalsen.

The principal guest of the evening was Oscar Lewis, president of the Builders' Exchange of San Francisco, and the whole affair was one of the most enjoyable occasions in the history of the builders of the city.

Springfield, Mass.

There has been recently established in Springfield, Mass., a concern known as the Contractors' Estimating Company, which proposes to furnish contractors with guaranteed estimates of the cost of work based upon the specifications and drawings of the architect. The company have been incorporated and have established themselves in permanent quarters, and are reported as supplying an actual demand. The methods of the company are to take from the contractor the plans loaned to him by the architect and upon which he has been invited to bid and to return him a guaranteed estimate of the cost of all portions of the work. The company propose to protect the contractor using their figures against loss in the event of the cost of materials, as specified by the architect, exceeding the companys' estimate. E. B. Jennings is the originator of the scheme and the office force at present consists of A. P. Stockwell, civil engineer, of the University of Pennsylvania, A. G. Mayo, recently of the Thomson Houston School of Electrical Engineering and George H. Johnson.

This company perform that part of the preliminary work of building that is done in England by the "quantity surveyor," a functionary that does not exist in this country owing to the fact that contractors generally prefer to figure the work themselves. The Springfield builders are reported as considering the formation of a builders' exchange, that shall, in some way be connected with the estimating company.

Notes.

The Builders' Exchange of Bloomington, Ill., is considering a project to erect a building for its own use. If it is decided to build, a building of sufficient size to insure a profitable investment will be built.

Building interests at the head of Lake Superior are reported as being in better condition than for years past. It is stated that there is more building being done in Superior, Wis., than has been done any time since the palmy days of 1882.

The amount of fall building in Troy, N. Y., has exceeded all expectations and contractors are said to have difficulty in securing all the men they need. During the month of October there was a scarcity of carpenters and plumbers and many of the contractors were forced to work overtime.

The assurance of good crops in Iowa has done much to restore building to a more nearly normal condition, and the builders of Des Moines are reported as being busier than they have been for several years at this season. The prospect for work in 1896 is excellent and all are looking forward to a profitable season. During September and October there was more work than workmen, but the supply is now about equal to the demand.

Minneapolis builders are looking forward to an improvement in business in 1896, and are of the opinion that the present conditions warrant the belief that the coming year will be a much better year than the one just past. There is an unusual amount of building going on for this season in the residence parts of the city. The *Tribune* for November 10 says :

> The better class of residence builders are complaining about the scarcity of skilled mechanics. It is impossible to get first-class carpenters and stonemasons, and as cold weather advances the demand for the same seems to increase.

The following officers have been elected by the Sacramento, Cal., Builders' Exchange, which includes builders, plumbers, lumbermen and other branches of building in its membership: President, W. D. Stalker ; vice-president, John E. Harris ; treasurer, John Carlow ; secretary, C. W. Dailey. The directors consist of the foregoing, G. A. Wendt, James Kennealy, Charles Palm and Frank Lyman.

THE National Association of Manufacturers have issued an announcement to the effect that the organization of a constituency having developed a work of greater magnitude than was originally anticipated, it is resolved that the time for holding the annual convention be postponed until Tuesday, January 21, 1896, at Chicago, Ill.

SEALED proposals will be received at the office of the Supervising Architect, Washington, D. C., until December 21, 1895, for all labor and materials required for the steel and iron work (about 11,600,000 pounds) of the fourth, fifth, sixth, seventh, eighth, ninth and tenth floors, and the roof, also the steel columns above third floor and the framing of iron stairs, &c., of the United States Appraiser's Warehouse, at New York City, in accordance with the drawings and specification, copies of which may be had at the office of the Supervising Architect, Washington, or of the superintendent, at New York City.

CORRESPONDENCE.

Design for a Store Front.

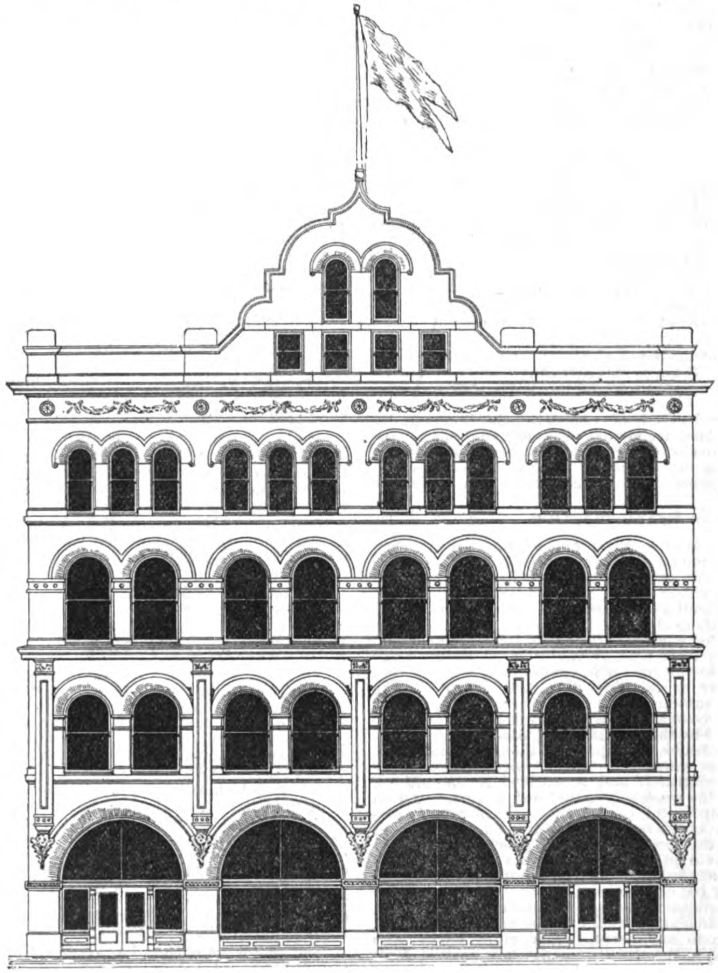
From George Barkman, *Hamilton, Ohio.*—In one of the late issues of *Carpentry and Building* I saw a request from a correspondent for designs for business blocks or store fronts. I take pleasure in sending a design of this character, which I hope may meet with the approval of the correspondent making the inquiry as well as of others who may be interested.

Cut Vs. Wire Nails.

From J. J D., *Cornwall, Cal.*—I have noticed a great deal about wire nails in *Carpentry and Building,* and I am inclined to give expression to my views on the subject. A short time ago I was called upon to repair a house which was erected in 1861 and in the construction of which steel cut nails were employed. I found upon examination that some of the nails were slightly eaten away by rust while some were not affected at all. I twisted them in the claw of my hammer and found it hard work to break them. Wire nails are difficult to draw and hard to cut, while they are not easy to drive. In shingling I have no use for the wire nail, as I prefer steel cut nails every time.

From W. H. A., *Profile House, N. H.*—In most of the articles written upon the subject above indicated the authors seem to be rather in favor of the cut nail. When the wire nail first made its appearance in this vicinity I, in common with other carpenters of my acquaintance, was prejudiced against it, and particularly did I deplore the fact that I could no longer procure the small cut brads such as were put up and sold in pound papers. Circumstances, however, compelled us to use the wire nail and to day I should dislike to return entirely to the cut nail and what I was loth to give up—namely, the brad. This I would not now use if I could get wire nails at any price. One great argument made in favor of the cut nail is that it will stand greater strain before withdrawing than the wire, but I contend that the strength of work put together with nails does not depend entirely, or to any great extent, upon the power of resistance of the nail in that direction. Wire nails are cheaper by reason of the greater number to the pound and less waste. They can be driven faster, are more apt to drive straight, and the men who say that they split worse than the cut nail simply do not know what they are talking about. As to the relative durability of the two kinds I have nothing to say, for I do not know anything about it. I do not believe, however, that there is the difference claimed.

If the cut nail manufacturers want to run the others out let them make their nails better. Let them invent some better cutting machine so as to get rid of 5 per cent. or more of waste in the shape of sharp splinters, split nails, nails with no heads and others that are all heads, besides various other irregularities. Let them cut the points off square instead of at a slight bevel causing them to vary from a straight line in driving; and lastly, let them be made of a quality of iron that will not fly into three pieces when struck with a hammer.



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

Design of a Store Building.—George Barkman, Architect, Hamilton, Ohio.

The correspondent with whom I come nearest agreeing is the one who says it is advisable to use both kinds of nails. I admit that if I wanted to draw a crooked or twisted board or joist into shape I would prefer the cut nail, although the wire one, by carefully driving it with light blows, will do this work better than I at first supposed. I believe the wire nail has come to stay, but the cut nail manufacturers will certainly stand a little better show by adopting the suggestions I have offered. I hope some one else will put in his oar and give more solid reasons than simple individual preference why the cut is superior to the wire nail.

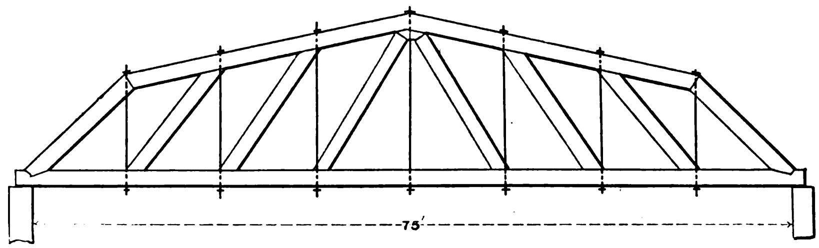


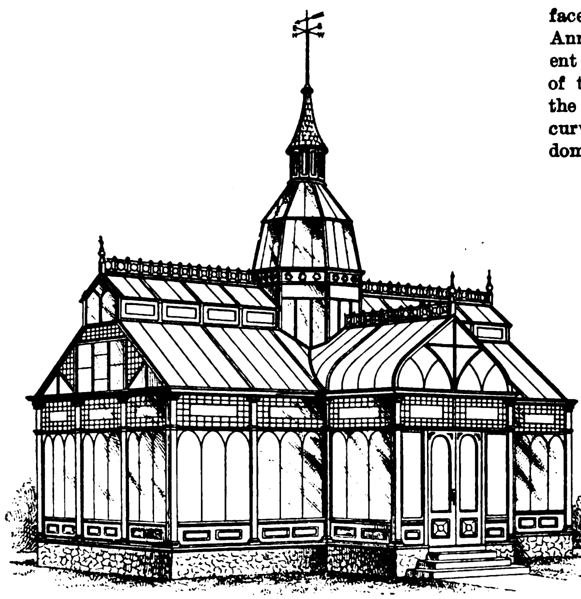
Diagram of a Wooden Truss of 75 Feet Span.—Submitted by "C. A. P."

Design for a Seventy-five Foot Wooden Truss.

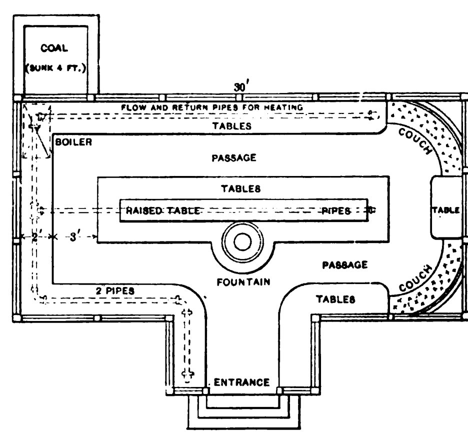
From C A. P., *Omaha, Neb.*—In looking over some old copies of *Carpentry and Building* I notice, on page 121 of the issue for May, 1895, an illustration of a design for a 75 foot wooden truss. A singular error has been made in the design, and I fail to find any mention of it. As it would prove fatal if it occurred in actual practice, I beg to call attention to it. The verticals are all marked "rods," varying in size from ½ to 1 inch in diameter. If they are rods they are evidently intended for tension members. If they are tension members the diagonals must be intended for compression; but they incline in the wrong direction. As represented the inclined members are only counter braces and are powerless without main braces. I inclose a corrected sketch.

Design for a Greenhouse.

From WILLIAM MACDONALD, *Stapleton, Staten Island.*—In reply to "E. P.," Gloversville, N. Y., I would refer him to the issue of *Carpentry and Building* for June, 1892, wherein is published the design for a range of greenhouses, together with details, &c. As the correspondent, however, asks for a modern greenhouse he, no doubt, wishes one with more architectural finish than the one referred to, and I herewith send a sketch of what I consider an up-to-date structure. The first thing to be desired in such a building is all the light and sunshine possible, and this of course precludes heavy details, as in classic architecture. The plan shows a house 30 feet long by 15 feet wide, a vestibule 10 x 5 feet, and a 2-foot table carried around the sides. There is a passageway 3 feet wide, leaving room for a center table 4 feet wide. The various tables are composed of turned supports with cross pieces and have planed slats running longitudinally across them. An article usually conspicuous by its absence is a seat, so I have placed couches in two of the corners, as will be seen from an inspection of the plan. Another feature which adds very much to the beauty of a house of this kind is a fountain. This is intended to be of light cast iron, the basin coming to the level of the table. The posts of the main structure are square, having a half round, with cap, base and neck molding planted on the face. The circles are made of light T iron and the Queen Anne work above them is intended to be filled with different colored glass, giving a pleasing effect. The curved roof of the vestibule is intended to be made of T-iron except the front rafter, which is required to be of wood. As curved work in glass is very expensive, I have made the dome on the mansard principle—that is, given it two pitches. The ridges are ornamented with cresting in cast iron, or it might be executed in zinc. The floor of the building is of cement, or it may be of tile, as preferred. The walls are intended to be of brick or stone, as may be most convenient, facing brick giving the neatest finish. The glass is the ordinary material, except in the sash, which on account of the opening and shutting requires to be of rough plate glass. The sash are provided at the lowest and highest points for a continual change of air necessary for the healthy growth of plant and flower life. The heating is done by means of a boiler built in and rising to about a foot from the level of the floor, the firing being done from the outside. From the boiler flow and return pipes, with



Perspective View.



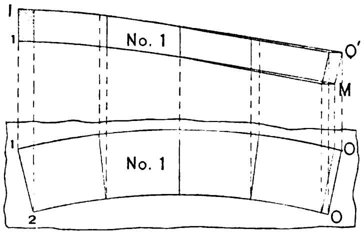
Floor Plan.—Scale, 3-32 Inch to the Foot.

Design for a Greenhouse.

stand pipes at the ends, are carried as shown on the plan, giving sufficient heating surface to keep the house at an even temperature in all kinds of weather.

Pattern and Working Lines for a Ramped Coping.

From D. F., *Philadelphia, Pa.*—In answer to "Scottie," who desires to learn a method of obtaining the patterns and working lines for a ramped coping shown in the June issue of the paper, I present the following explanation, which I trust will prove of interest and value: As the coping is very large it is necessary to divide it into convenient lengths. In the present example I have taken five, each of which will require a stone about 8 feet long. The length could be divided into six parts and then not be too small to seriously affect the appearance of the coping. The more parts, however, in which the length is divided, the operation at A and P. Connect T U and S V. Draw a curve tangential to E T and T I'; also parallel to it at F S I. Repeat the operation at the bottom P U G and A V H. The convex pattern is then complete. At the several divisions on the line A 1 erect perpendiculars, as shown. These are the plumb lines used as a guide in applying the patterns and must correspond with the lines on the plan pattern. The next work is to find the exact size of the convex and plan patterns for the several stones. Now from the several points marked O' at the top line of the convex pattern square lines to the bottom so as to touch at M W Y and X. From these points drop lines to touch the line A 1 at the points M', W', Y' and X'. Take the several distances O M', O W', O Y' and O X' from A 1 of Fig. 2 and carry them to the convex side of the plan, as O M'', O W'', &c. From these new points draw lines to



Fsg. 3.—Stone No. 1.

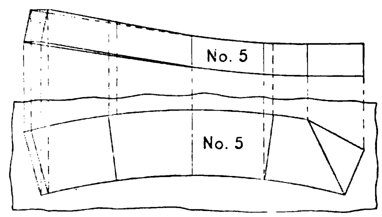


Fig. 5.—Stone No. 5.

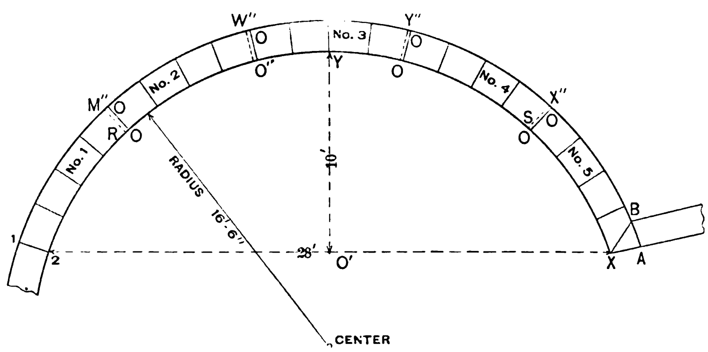


Fig. 1.—Plan View.

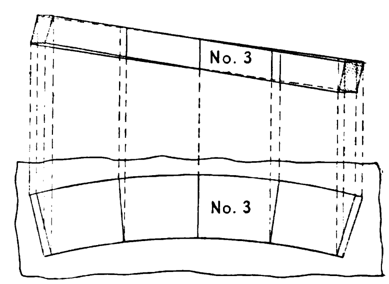


Fig. 4.—Stone No. 3.

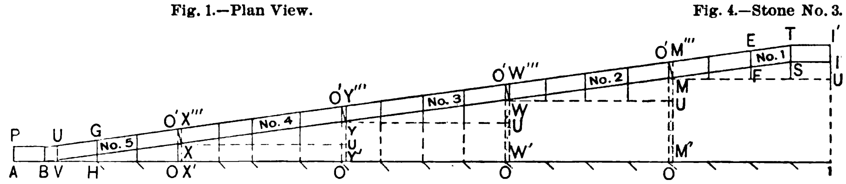


Fig. 2.—Stretchout of Convex Side of Previous Figure.

Pattern and Working Lines for a Ramped Coping.—Diagrams Accompanying Letter of "D. F."

the less stone will be required, as I will endeavor to show. The method of working this coping is from plan patterns and a developed side pattern, which, in my estimation, is the easiest and quickest way of doing the work, there being only 5 feet of drop in the entire length. Another method would be to find the back mold of each division, the pattern of the side and a raking templet for the purpose of finding the plumb lines, but this requires more care in working the several stones. Referring to the sketches which I send, Fig. 1 represents the plan drawn with a radius of 16 feet 6 inches. The chord is 28 feet and the sine O' Y is 10 feet. Divide the plan into five parts, as represented by Nos. 1, 2, 3, 4 and 5; then divide each one into four parts, the reason for which is that we can then step off with the compasses in order to find the approximate length of the convex side 1 B and at the same time be able to draw plumb lines on the convex pattern. Make A 1 of Fig. 2 equal to the convex side of the plan 1 A. From I drop a perpendicular equal to 5 feet, as 1 I, and make I I' equal to the thickness of the rail. Do the same at A P and then square lines from I and I', as I S and I' T, equal to the length of one of the divisions. Repeat radiate to the center of the plan. These will be the lines for the bottom of the joints. The pattern for the plan of stone No. 1 will be 1 2, O O. Patterns for Nos. 2, 3 and 4 will each equal M'' R, O'' O. The pattern for No. 5 will equal X'' S, X A. The size of the several stones will equal their plan pattern and the hights taken from Fig. 2, as X' X''' for No. 5, U Y''' for Nos. 4, 3 and 2 and U I' for No. 1. If the rail was divided into more parts it would require less stone. In Fig. 3 stone No. 1 is represented. For finding the size of the material required work a surface tooth chiseled, even and out of wind. Apply the plan pattern, after which work the concave and convex sides. From the different points on the plan draw plumb lines as shown. Take the convex pattern No. 1 and apply it, taking care that the plumb lines on it correspond with the lines on the stone. Next work the top by drafts in the direction of the lines on the plan pattern. Hold the blade of the square on the plumb lines with the small one in the direction explained above. If desired one can make a concave pattern to apply which will be more nearly true and give at once the line to which to cut away the surplus stone. It also saves time, and there is no excuse for errors. The next thing to do is to work the joints and finish by working the bottom of the rail. This can be done by trammeling from the top to the required thickness. The lines for the section mold can be trammeled and the stone finished. The other stones are cut the same way and the work does not require to be explained in detail. Stone No. 5 stops at B X, which will be a joint. The square section or joint mold can be applied the same as in the case of the other joints, and the point where the mold intersects at B X will be the miter. The piece between A B and the pillar will be straight. I would state that all that is required to work the stone is a plan and convex pattern and the steel square.

Strength of Beams.

From C. B., *Norfolk, Va.*—I inclose herewith sketches which may be of interest to the readers of the paper. What I would like to ask is this: What will be the sustaining capacity of a gallows beam set diagonally, as indicated in Fig. 1, compared with the same beam placed as shown in Fig. 2; the sustained weight to be suspended at the center. Would there be a tendency to split the post at A? In Fig. 3 is shown a girder plate stiffened with two pieces gained into the posts. I want to know which is the better practice, one having the plate at P or two at X X?

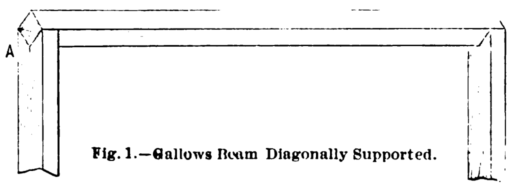


Fig. 1.—Gallows Beam Diagonally Supported.

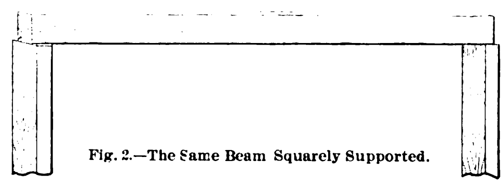


Fig. 2.—The Same Beam Squarely Supported.

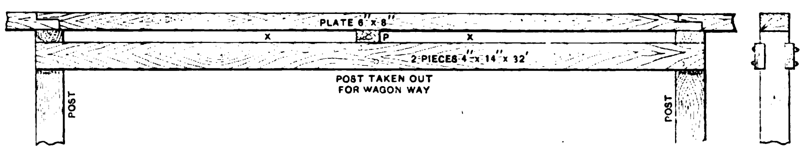


Fig. 3.—Views of Girder Plate Stiffened with Two Pieces Gained Into the Posts.

Strength of Beams.—Illustrations Made from Sketches Submitted by "C. B."

The Architect and the Builder.

From J. N. B., *Siloam Springs, Ark.*—I wish to ask a few questions with regard to the law in building operations which I think will prove of interest to many readers of the paper. My first question is as follows:

1. When the specifications state that under no circumstances shall any change be made in the design without first consulting and obtaining the consent of the architect, and the proprietor changes the design, thereby making extra work, without consulting the architect, is he liable for more than just the amount of the extra work without allowing the contractor any percentage?

2. When a man comes into an office and orders an architect to prepare plans for a building, and after seeing that they are what he wants tells the architect to go ahead and receive bids on the work; and it is talked over between the proprietor and contractors, the proprietor telling the contractors to give their bids to the architect, and afterward he fails to erect the building, can he escape paying regular rates for the plans and specifications, even if they are not figured upon; could he get out of paying for them when he has ordered them made?

3. Does the architect have to prove that he has been ordered to make the plans when it has been the general talk over the town, and the proprietor has never denied it, but on the other hand has given his assent?

4. When a contractor calls for a set of plans for a building for a third party with a view to getting the contract for the erection of that building, and the plans when made are acceptable to the person for whom the building is to be erected, he stating that he will build as soon as he settles up certain business he has on hand, is the architect entitled to pay for them, even though the plans are kept for three months or more with a view to building and then not returned?

5. Does either proprietor or contractor lay himself liable for changing the design without first consulting the architect when the specification reads as in the first question?

Note.—The answer to the first question depends upon the terms of the contract between the owner and the contractor. If the agreement is that the owner shall pay the contractor, in addition to the actual cost of the work, a certain percentage, based on that cost or contract price, then that sum must be added to the amount the contractor is entitled to receive. It would seem to follow, as a matter of common sense as well as law, that if the cost or contract price of the work was increased by an alteration of the plans and specifications made at the instance of the owner, the percentage of profit to be paid to the contractor should be calculated not only on the original sum but on the increased amount as well. It does not appear that it is material whether the architect is consulted or not, or whether or not his consent is obtained, so far as the obligation between the owner and contractor is concerned. It might perhaps change the amount of the architect's commission if there was a similar agreement between him and the owner, but that is all. If the contractor consents to the change of the specifications and a price is agreed upon, the architect cannot interfere, nor can his consent or refusal to consent affect anything except his own compensation. With all this said, however, everything depends upon the exact and specific terms of the written contract or verbal agreement between the parties in interest.

With regard to the second question it may be stated that if the man who orders the plans made expressly promises to pay for them, he would, of course, be liable for the amount of the reasonable value of the work. If he does not expressly, or in words, make that agreement, there may be an implied promise to pay for them. Any one who requests another to work for him, as a general rule, impliedly promises to pay the reasonable value or price of the work. This is true even though no promise to pay is made and nothing said about payment; but the general custom of the trade may and does affect this general rule. In the present instance if the custom in the locality be that the architect takes the risk that the house will be built and that his payment depends upon the fact whether or not his plans are used, he will not be entitled to compensation. Under the circumstances stated, however, and in the absence of a well established custom to the contrary, it would appear that the architect was entitled to the reasonable value of his work. In this connection it may be interesting to state that the schedule of minimum charges of architects adopted by the American Institute of Architects, upon the consolidation with them of the Western Association of Architects, show that for full professional services, including supervision, the architect is entitled to 5 per cent. upon the cost of the work. In case of the abandonment of the work the charge for partial services is 1 per cent. for preliminary studies, 2½ per cent. for preliminary studies, general drawings and specifications and 3½ per cent. for preliminary studies, general drawings, specifications and details. For work that costs less than $10,000 a special rate in excess of the above is made. An additional charge is also made for surveys and measurements in the case of alterations and additions.

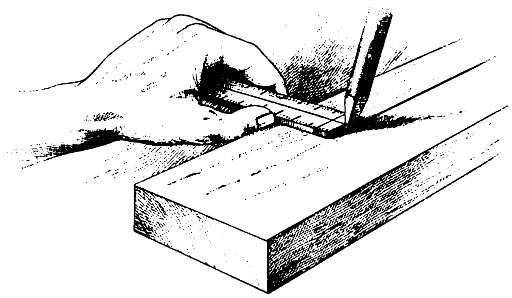
With regard to the third question, it is reasonable to expect that the architect must prove that he has been ordered to make the plans. If he cannot prove a direct order he must show *facto*, which clearly demonstrates that the other party intended to give the order, and that it was so understood by both parties. The fact of acquiescence after the plans were made is a strong point, but we do not know that it is covered by the statement that the "proprietor has given his assent." This is a little indefinite, and would not be legal testimony nor evidence. In the event of a lawsuit, if the giving of the order was denied by the proprietor it would not be a question of law, but a question of fact for a jury.

In the matter of the fourth question it would seem that, under the circumstances, the architect was entitled to payment for the plans. It will, however, depend largely upon the question of local custom as stated above. If it is the custom in the locality in which our correspondent resides for an architect to submit plans and take the chances of having them accepted before he can collect payment, then, of course, he has no claim. The fact of the plans having been kept so long is significant and tends to show that they were acceptable, although not necessarily conclusive. Very often there is either an express or implied agreement that if the plans are not accepted, and if the building is not commenced or constructed, the architect shall receive nothing. There would be a serious question of law here as to whether the architect could hold liable the person who wanted to build. There is no contract between them, and the architect would have to prove that the contractor was authorized to incur the liability for the other person. The contractor would be the only person liable in the absence of proof that he was the authorized agent of the third party This is very clear, because a person desiring to build might call for an estimate and plans from a contractor and make his acceptance of them the test of whether he should pay for the plans or not. This, we think, would usually and naturally be the case. The architect must look to the contractor for his money.

The true solution of the fifth question is involved in what has previously been said. For any violation of contract the party in the wrong is liable for any damage the other party may suffer. We fail, however, to see what damage either proprietor, architect or contractor would suffer by an alteration in the plans when the proprietor and contractor agree to it, except in so far as it may affect the fees of the architect. Nothing that either the proprietor or contractor can do after the contract is made can reduce the amount of his compensation, and, as already explained, a change increasing the cost under the circumstances stated in connection with the first question would increase the amount the architect would be entitled to receive.

Carpenters' Gauge.

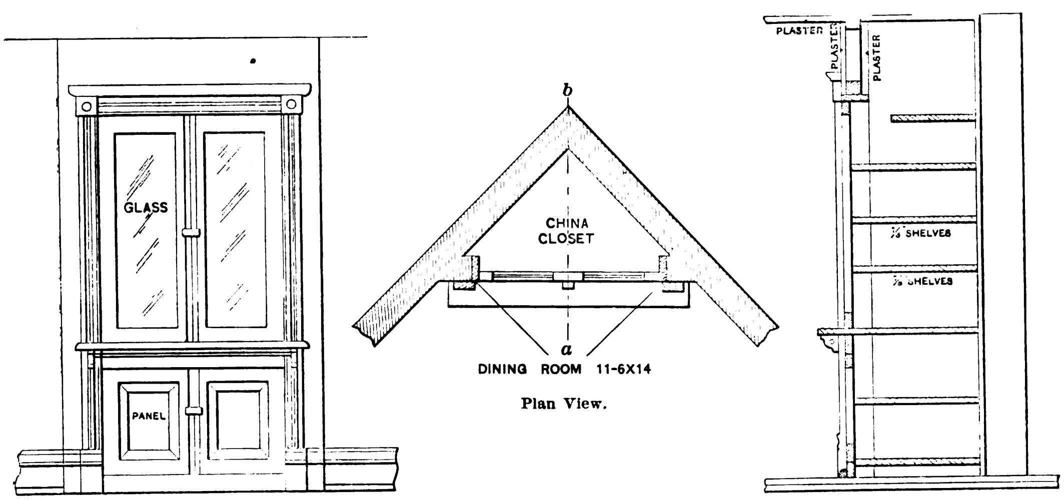
From E. L. E., *Wilmington, Ohio.*—In one of the issues of the paper a correspondent signing himself "I. D. A." has a short article descriptive of a carpenters' gauge. In regard to this device permit me to say that the thumb nail should be used against the wood instead of the finger, which obviates all danger from splinters. The drawing motion should be toward the person, and with a little practice the results will be pleasing. The sketch which I inclose indicates the manner in which the hand should be placed. I regard this method fully as efficient as the plan of "I. D. A.," besides it saves time.



Sketch Showing Proper Way to Use a Carpenters' Gauge, as Submitted by "E. L. E."

Design of a China Closet.

From J. H. B., *St. Paul, Minn.*—In reply to the question of "C. O. G." of East Hampton, N. Y., published in the April issue of *Carpentry and Building*, I send the inclosed sketches to show the design of a china closet which I recently put in Mr. Blank's dining room. The interior walls are plastered, the lower doors are paneled and the upper are glazed. The shelving is made wide in order to gain room and also to form door stops. The casing is of the same pattern as the balance of the finish.



Elevation of Closet. Plan View. Section Taken on Line *a b* of the Plan.

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

Strains in an Iron Roof Truss.

From C. A. P., *Omaha, Neb.*—In the October issue of the paper for this year I notice a small error in the strain diagram presented on page 252. The direction of the force acting in the tension members A J and C J are represented as coincident, but as the members themselves are not parallel this would not be strictly true. The same is applicable to the members I J and G J.

Method of Attaching Wind Mill to Pump.

From M. V. S., *Macon City, Iowa.*—I notice the inquiry of "J. G. S.," of Norristown, Pa., and submit herewith a plan for pumping water from a well at a distance from the mill. I have followed this plan myself in a number of cases, and in one case the mill is operating at a distance of half a mile from the pump. Referring to the sketches: A, Fig. 1, is the standard, which is fastened to the frame of the mill, B is the standard fastened to the rafters on the roof with three braces to steady it. It can, however, be set in the pump room on a post if it would not be in the way there. C C are the angle woods which act as levers on the plunger. They are made from 2 x 4 hardwood, the long bar being 4 feet and the short bar 2 feet, while the shaft at E, Fig. 2, is a 1-inch bolt. A large view

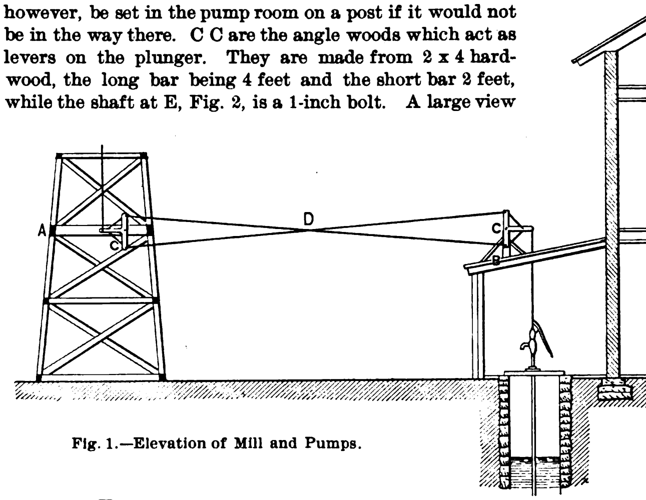


Fig. 1.—Elevation of Mill and Pumps.

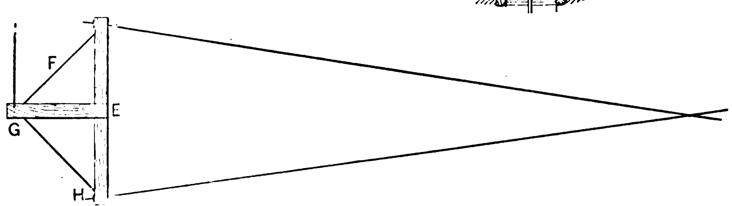


Fig. 2.—Angle Wood and Wires.

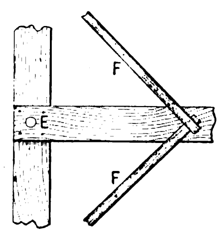


Fig. 3.—Details of Angle Wood.

Method of Attaching Wind Mill to Pump.

of the angle wood—that is, the joint and the bearing E—is shown in Fig. 3, F F being the braces, which should be at least as heavy as 1 x ¼ inch bar iron. The joints G on an angle wood must be directly over the pump and under the wind mill shaft. H, Fig. 2, is a ½-inch bolt with a link which passes through the angle wood and has at least 6 inches in threads, with two burrs to tighten up the wires and adjust the stroke of the pump. The wind mill, as I have said, can be set at any distance from the house, but must have guide posts with pulleys on for the wires if it is located more than 100 feet away. The method I have described is very cheap, and I have a good many of them in successful operation. The angle wood on the wind mill can be put anywhere on the tower or on a post underneath the mill, and the plan will operate just as well even if the two angle woods are not on a level.

Problem in Board Measure.

From A. H. H., *Kalamazoo, Mich.*—If "A. P. McL.," Roslindale, Mass., will measure 6 feet 5.115 inches from the narrow end, he will divide his board into equal parts. The rule for obtaining this result is to the following effect: First, find the length of the board as if it ran to a point, this being done by multiplying the length by the widest end and then dividing the product by the difference between the two ends. Then multiply this length by two and square the product. From this square subtract the square of two times the extra length; then divide the remainder by two, and to this half add the square of two times the extra length. Extract the square root of this sum and divide the root found by two. From this quotient subtract the extra length and the remainder will be the distance to measure from the narrow end in order to divide the board into equal parts.

Carpenters' Pocket Rule.

From S. F. B., *Wellington, Ohio.*—In answer to "J. J. D.," Cornwall, Cal., whose inquiry appears in the last issue of the paper, I would say that I have used a one-joint 2-foot slide rule for more than 25 years and never have seen anything better. In obtaining lengths between 2 and 3 feet the slide is quick and sure. The rule is made by the Stanley Rule & Level Company of New Britain, Conn., and cost me 25 cents. When I purchase a pair of pants I have my "other half" put in a pocket 2 inches wide and 11 inches long, just back of the seam in the left leg and about 4 inches below the other pocket. I carry the rule in my pocket all the time and can take measurements either day or evening, as it is always handy and not in the way. Most men here use three-joint affairs, but I can use mine and get it back in my pocket before they get theirs unwound.

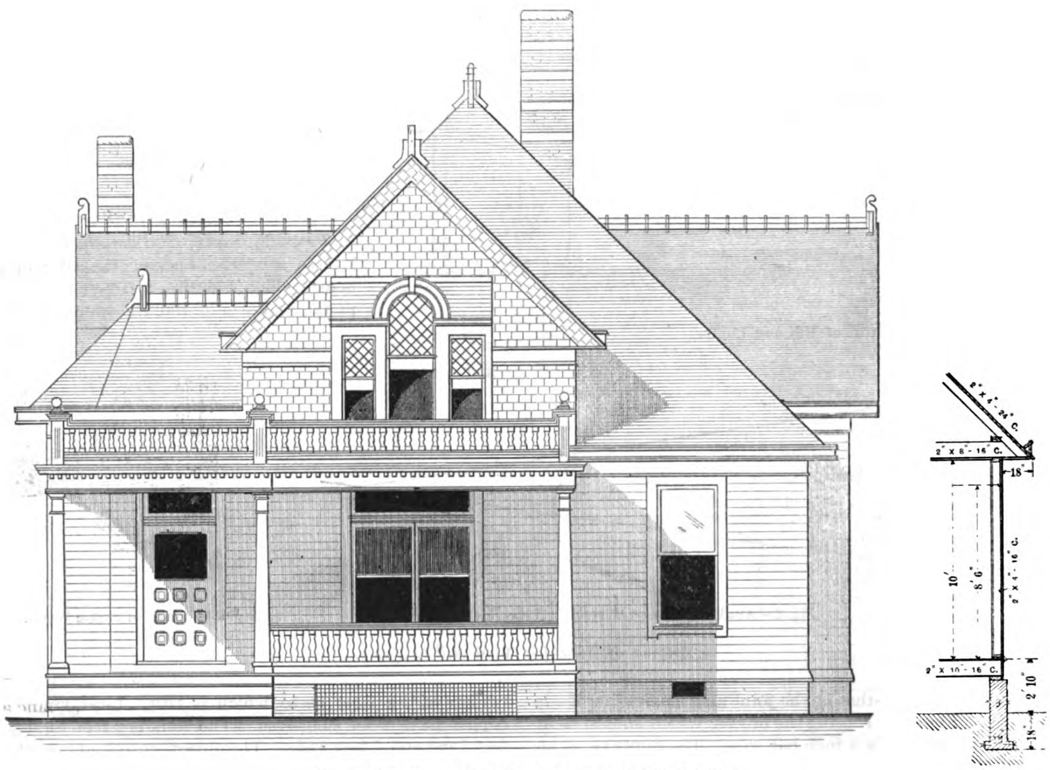
Lining for a Tank.

From F. S. L., *Marshalltown, Pa.*—I have a wooden tank in the attic of a house which I desire to line with some metal, and would like the opinion of the readers of the paper as to which is best. Lead, zinc and copper have been suggested. The tank is 2 feet high, 12 feet long and 4 feet wide. The objection to lead is that it is apt to sag on the sides of the tank; besides, the idea of drinking water from a lead lining is not inviting. It is said that zinc will pit or go into small holes under the action of some water. The water which will be used in it is soft well water. Would not a coat or two of oxide of iron and oil stop the pitting of the zinc, or would it be objectionable? The objection to copper is that it is too expensive.

Note.—If the tank is to be used for drinking water, doubtless a tinned copper lining is the most desirable. As expense is objected to, either of the other linings painted might be used. If the lead lining is properly supported on the sides of the tank there is no need for it to sag. The best way to fasten the lead is to hollow out a place in the wood 2 or 3 inches in diameter and 1 inch deep. The lead can be gently tapped until it fills this space, and be secured by a wood screw. On the inside of the tank the surface of the lead in the hollow space should be carefully cleaned with a scraper and the space around the circle covered with soil, after which the plumber can wipe in a quantity of solder, which will make the sides of the tank flush. This is usually termed by the plumber a bull's-eye, and if they are placed with sufficient frequency about the sides of the tank there is no reason why the lead should sag. We shall be glad to have our readers give their ideas as to which of the linings is more desirable.

A Cottage at Princeton, Ind.

A neat cottage, embodying an arrangement of rooms which is rather unique in its way, was erected last summer for H. E. Wolf of Princeton, Ind., from drawings prepared by C. A. Brehmer and Clifford Shopbell, architects, of Evansville, Ind. The illustrations, which we present herewith, afford the reader a good idea of the arrangement employed as well as the principal features of construction. As the cottage is only a story and a half, practically all the rooms are on the main floor, which is divided into parlor, reception hall, sitting room, dining room, kitchen, two sleeping rooms and bathroom, together with several closets, pantry, &c. A feature which will perhaps strike many as somewhat out of the ordinary is the location of the main stairs leading to the floor above. As nearly all the rooms, however, are on the main floor, this feature is not as objectionable as would be the case if all the sleeping rooms and a bathroom were on the second floor. It will be seen from an inspection of the plan of the second floor that the space is divided into a large sleeping room, a storeroom and a servant's room. From the architects' specifications we learn that the foundation of the house consists of a 9-inch brick wall, with the cellar 7 feet 6 inches in the clear. The timber employed in the framing is pine covered with clapboards mitered at the angles. The roof of the main house is covered with cedar shingles laid 4½ inches to the weather. The exterior finish is of poplar and has three coats of white lead and oil. The interior has a hard oil finish, with the exception of the servant's room in the attic, which is finished plain and oiled. The first story is 10 feet in the clear, and the attic where finished 8 feet 6 inches. The house was built for $2000, exclusive of furnace, mantels and art glass.



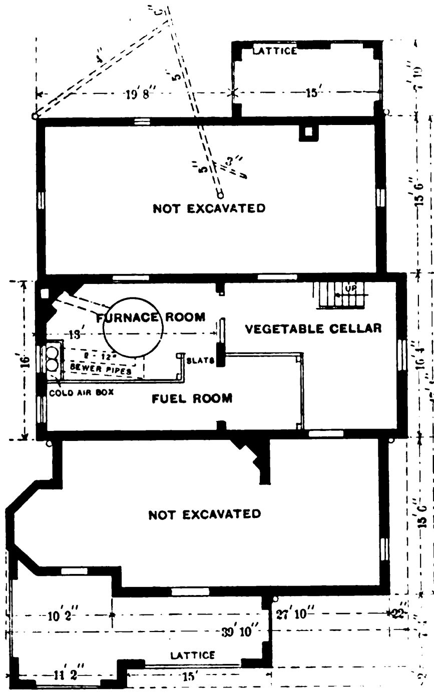
Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

A Cottage at Princeton, Ind.—Brehmer & Shopbell, Architects, Evansville, Ind.

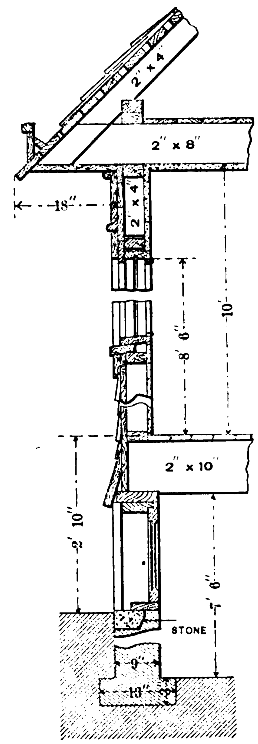
The Free Class in Architectural and Mechanical Drawing at the Senior Evening School on West Fifty-second street, near Eighth avenue, New York City, resumed work on Monday, October 7. The class is in charge of Emil Ginsburger and Frederick J. Foster, and students of architecture, machinists, stone cutters, masons, carpenters, cabinet makers and those working at the trades generally may apply on any school evening between the hours of 7 and 9.

Covering a Slate Roof.

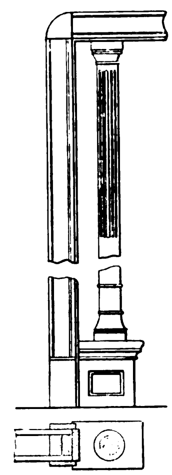
When the National Fire Insurance Company, Hartford, Conn., built their home office a slate roof was put on the building. The slate were laid in cement on iron purlins resting on iron rafters. By this method a fire proof construction was secured. On the under side the slate and cement at the joints were plainly visible, as well as the iron rafters, as the attic was not ceiled or finished. On one side the roof had a good strong pitch, but on the other side, about half way down, a much flatter pitch began as the building widened, and this arrangement of the roof was adopted to cover it. The roof has proven unsatisfactory for two reasons, one the excessive heat experienced, the other bad leaks developing along the line where the steep pitch joined the flatter pitch. Although windows in the attic were opened, a thermometer placed there registered as high as 120 degrees for several hours on hot days, and the rooms beneath were affected by the heat to such an extent that there was no hesitation, on the development of the leaks, to change the character of the roof. Owing to the rigidity of the iron work and the expansion resulting from the heat numerous leaks at other places than at the joining of the two pitches were also found. As a result of this unsatisfactory experience a new roof is being put on over the present slate roof. Timbers 3 x 4 inches are being secured to the iron rafters on top of the slate, running from the ridge to the gutter, and standing 4 inches high. These are sheathed with seasoned 1¼-inch boards, on which roofing felt will be laid, and a standing seam tin roof, pointed on the under side, will be put on and painted on the top. Ventilators are being placed at the ridge and the timbers so arranged that air currents will pass from the eaves up under the roof and out through the ventilators at the top. The roof when finished should overcome all



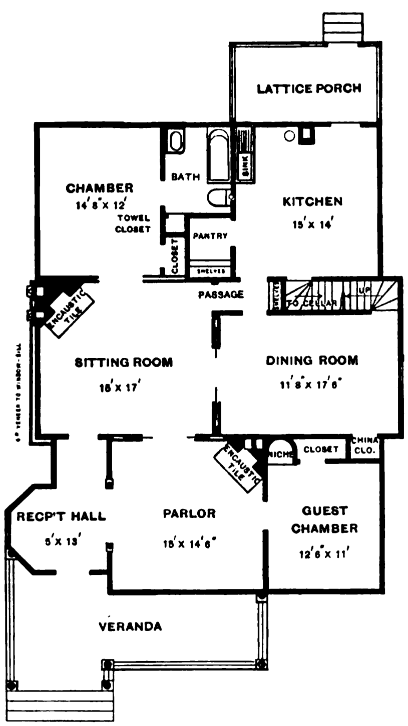
Foundation.



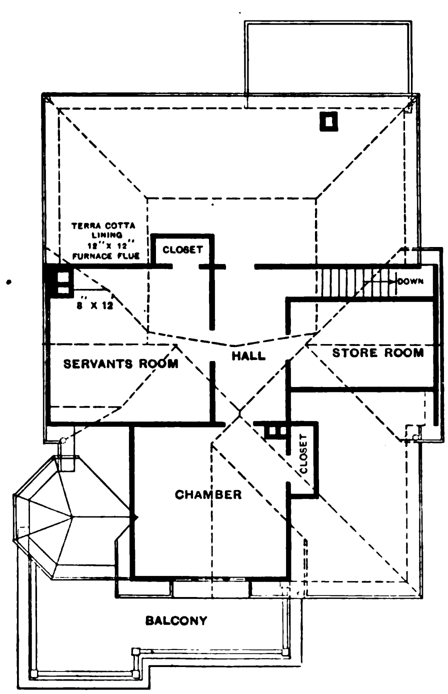
Section through Wall, Showing Detail of Main Cornice.



Detail of Trim in Reception Hall.



First Floor.

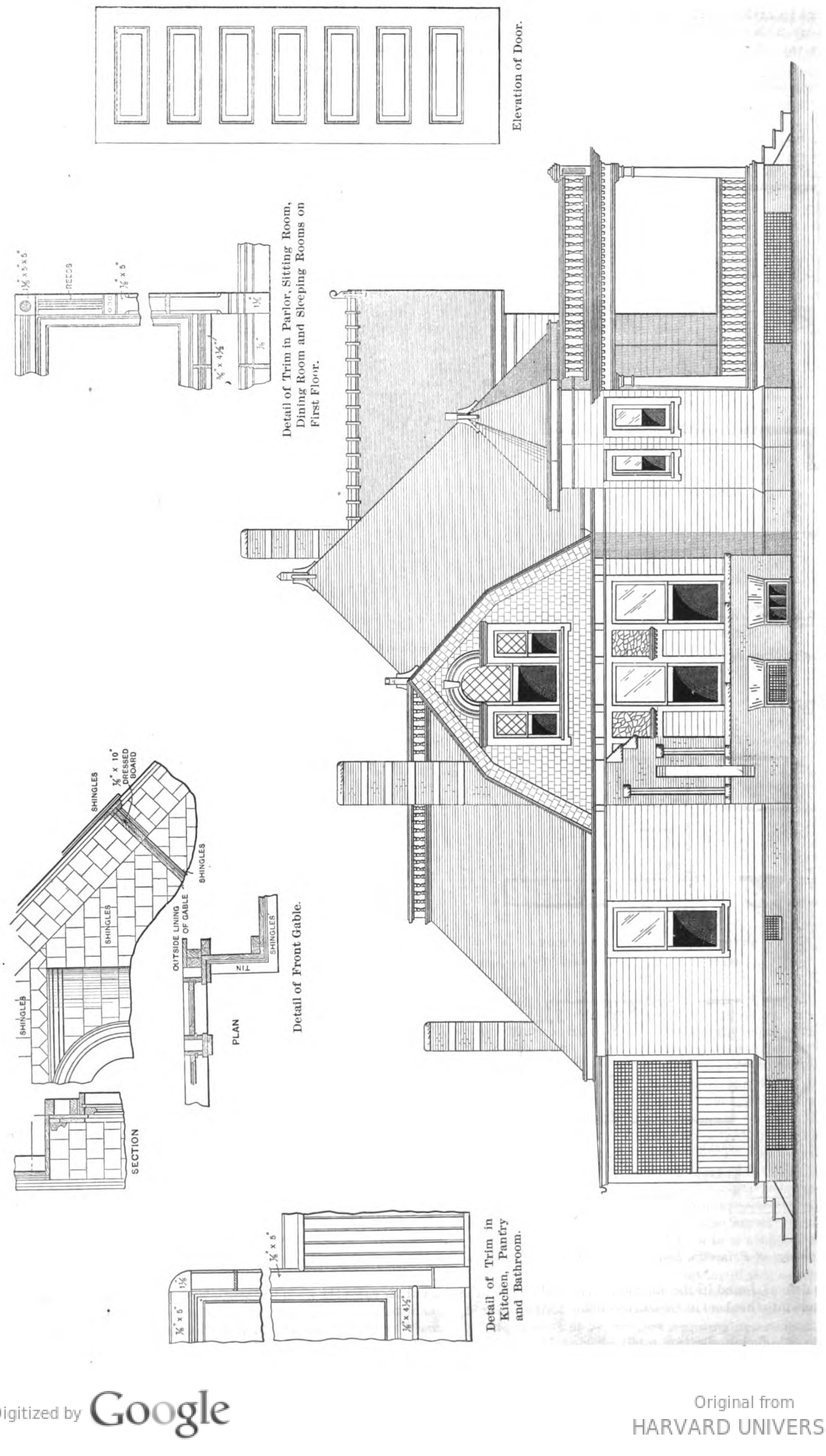


Second Floor.

A Cottage at Princeton, Ind.—Floor Plans.—Scale, 1-16 *Inch to the Foot.—Miscellaneous Details.—Scale,* ⅜ *Inch to the Foot.*

of the defects found in the old roof. The water from the roof runs into the sheet metal gutters made for the old roof.

A recent official report on profit sharing by employees in Great Britain shows that during the past year eleven firms who had adopted the system have now relinquished it. In five of these cases, this result was come to through dissatisfaction of the employers with the result of the plan. In other cases the abandonment was due to changes in the companies. According to the latest information there were 83 establishments in the United Kingdom working under the profit sharing system, the number of workmen involved being about 25,000.



Elevation of Door.

Detail of Trim in Parlor, Sitting Room, Dining Room and Sleeping Rooms on First Floor.

Detail of Front Gable.

Detail of Trim in Kitchen, Pantry and Bathroom.

Side (Left) Elevation.

A Cottage at Princeton, Ind.—Side Elevation.—Scale, 1/8 Inch to the Foot.—Miscellaneous Details.—Scale, 3/8 Inch to the Foot.

ARCHITECTURAL DRAWING FOR MECHANICS.*

By I. P. HICKS.

WE will next touch upon the subject of planning, laying out and drawing stairs. Everybody knows that many a time too little room is left for the stairs, and the result is steep and awkward stairways in what are supposed to be the better class of houses. Much of this is due to ignorance or carelessness on the part of the designer to make a few figures. It is too often left in this way: "I guess so much for stairs will be plenty." The best way is to figure it and make sure that there is plenty of room. For the benefit of those who are young in the work of planning we will show by sketches how to determine the amount of room required, and also give an easy method by which to solve the problem by figures.

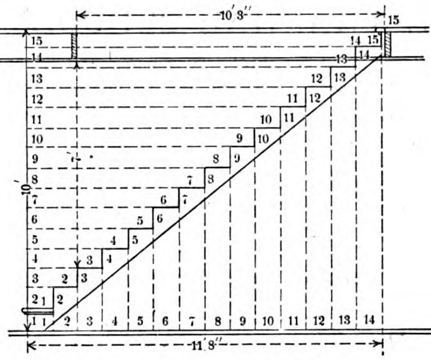


Fig. 44.—Diagram Showing Method of Drawing and Calculating for Stairs.—Scale, 3-16 Inch to the Foot.

will hold good in any case. The sketch shows an easy pitch. Stairs are frequently run much steeper, but for good work we advise plenty of room for easy stairs. If it is desired to figure it without a draft, commence at the foot of the stairs, proceeding as follows: First find the number of risers required, then decide upon the amount of head room wanted and see how many risers can be deducted from the hight of the ceiling and leave this room. The space required for steps up to this point will be one step less than the number of risers, and all that is necessary is to count the steps, lay them off on the floor and start the header plumb over the back edge of the last step, or as nearly so as practical. Fig. 45 shows the method of laying out and drawing the plan of winding and platform stairs with a portion of the framing for the floor joists, headers, &c. To find the exact floor space required for the stairs, lay off the run of each step according to actual scale measurement, as shown. It is customary to place three steps as winders in stairs of the average width; sometimes four steps are placed in the winders, but we

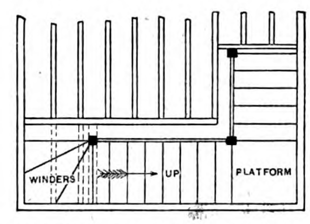


Fig. 45.—Method of Drawing, Calculating and Framing for Winding Stairs.—Scale, 1-16 Inch to the Foot.

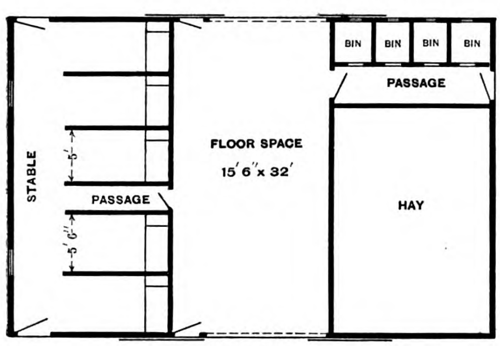


Fig. 46.—Floor Plan of Barn.—Scale, 1-16 Inch to the Foot.

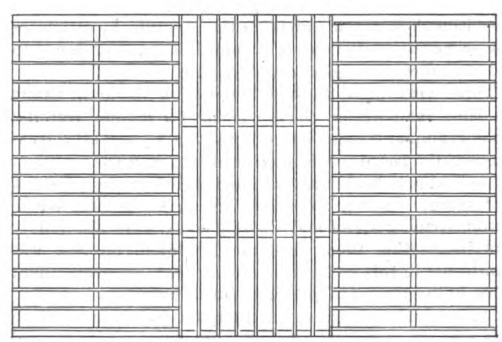


Fig. 47.—Method of Drawing Floor Framing Plan.—Scale, 1-16 Inch to the Foot.

Architectural Drawing for Mechanics.—Stair Work and Barn Framing.

Referring to Fig. 44, which represents a straight flight of stairs, we find the rise as given from floor to floor to be 10 feet. By computing the risers at 8 inches we find that it takes 15 to reach the top floor. It will be seen that we calculate space for only 14 steps, as the fifteenth lands on the floor. Next we calculate the run required for 14 steps. These we have estimated at 10 inches each, making the run 11 feet 8 inches, as shown. The rise and run of stairs are always taken as laid out on the string board, the projection of the step for nosing and molding, as shown at the bottom step, not being counted. From the top of the third riser to the ceiling is 7 feet. Plumb over the third riser, and facing it, we have located the header, giving 7 feet head room for the stairs. From this header we count the number of steps back, allow for thickness of riser, an inch or so for work room, and we have the distance between headers, or the length of the well hole, as it is sometimes called. In this case it is 10 feet 3 inches. The sketch shows very plainly how to figure the stairs with a certainty as to the room required, and the same general plan

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would not recommend more than three and never more than four steps in the winders. The space required for the winders is usually taken as a square, the sides of which equal the width of the stairs. For example, if the stairs are 3½ feet wide, the space required for the winders will be 3½ feet square. The same rule holds good in regard to platforms. As regards the framing for the headers, it is safe to say that a header could be placed flush with the side of the square and third winder, and leave plenty of head room in ordinary dwellings having 9 to 10 foot ceilings, as shown by dotted lines extending across flush with the first post. This would leave room enough on the floor above for a small closet. If this was not desired, or if for any reason this arrangement should not give head room enough, the short header and joists indicated by the dotted lines may be omitted and the frame work put in as shown. From 6 to 10 inches is usually allowed between the string board and the headers for stairs with a rail, or "open stairs," as they are frequently called. At the landing it is only necessary to allow two or three inches between the header and the last riser. This sketch is given to impress upon the mind of the draftsman the importance of good calculation in connection with drawing plans, and that a scale drawing is the best and most effective way to show the calculations.

We will now turn to a few drawings showing the method of indicating framing plans. Fig. 46 represents the plan of a farm barn with large floor space, driveway running through the building, stable room for five horses, granary and passageways. This plan is well arranged for an addition or an annex to the right, such as a cow stable, for example, which would be handy to both hay and grain, and would be considerably removed from the horse stable, which is a feature generally desired. It is hardly necessary to show in detail the manner of drawing the sketches presented on this subject. The drawings are plain and easily understood and will serve as good examples for practice, particularly Fig. 47, which shows just where to start and stop the pen without crossing lines which should not be crossed in representing the work properly. This figure shows the general framing plan of the sills and floor joists. It is desirable in stables to have the floor run lengthwise behind the horses with a double floor in the stalls, the top floor running lengthwise of them. In the driveway it is desirable for the floor to run crosswise, as it is not as slippery to the horses' feet when pulling in loads. It also makes a stronger floor. This we trust will be sufficient reason for the plan of the joists presented in Fig. 47. The plan shows the joists resting on top of the sills and girders, which is a better and stronger method than framing them in, besides being easier and quicker. A little study of the framing plan, Fig 47, will be sufficient to show the draftsman just how to proceed to draw a similar plan.

(To be continued.)

CHICAGO'S NEW MANUAL TRAINING SCHOOLS.

It is stated that just as soon as the necessary equipment can be provided, ten manual training departments, in addition to those already in operation, will be established in as many grammar schools of Chicago. This will bring the number of manual training schools, aside from the English High and Manual Training School, up to 15, and it is the intention of those who have given the matter thought and observation to provide opportunity for the development of the inventive genius of the school children as speedily as occasion may require it.

These ten schools, together with the five already doing successful work, warranting the extension of the manual training department, will accommodate the pupils of exactly 90 schools, more than half of the grammar grades. Over $30,000 has been set apart for this development of the Chicago public school system to be expended in 1896, and if men of wealth live up to their expressed desires other localities not included in the preliminary estimates may share the advantages of a course of study designed to lead the pupils to originate and execute.

Three years ago Richard T. Crane of the great Crane Company inaugurated the movement for manual training in the grammar grades by volunteering to pay all the expenses if the board would permit him to fit up a workshop at the Tilden School. Seventh and eighth grade pupils of the Skinner, Brown, Emerson, Hayes, Carpenter, Washington, Armour street and Wells schools were allowed to take instruction there also, and so much interest was manifested in this and other schools that Superintendent Lane, in his annual report just issued, says:

"The work continues to attract and greatly interest all boys who are permitted to receive instruction. In several instances requests have been received to permit boys in sixth grade classes to take the shop practice also. Boys are surprised to find they can handle tools, make working drawings, and then execute work in accordance with them. They discover their power to do things, to make things. The discipline of continuous, interesting and effective work is very valuable."

In this report Mr. Lane advocated the purchase of an outfit of benches and tools for the Humboldt, La Salle, Graham and Kershaw schools, making each of them a center for the instruction of the boys in the seventh and eighth grades of the five nearest grammar schools. The committee, therefore, has gone further than Mr. Lane's recommendations, and that the board will concur is certain, since it is known certain leading citizens may lend their co-operation in a substantial manner.

At the English High and Manual Training School alone last year 389 pupils were enrolled, an increase of 121 over the preceding year, and the quarters became so crowded an outside room capable of seating one class for academic work had to be secured. A large number of others have applied for admission, and the Committee on English High and Manual Training, in its annual report, in view of all this, recommended "that manual training of a suitable kind be made a part of the course of study in all the grammar schools of the city of Chicago." In doing this the committee asserted it did not feel as though it overstepped its rights, because every pupil should have "an opportunity to bring himself into touch with the world of industry."

The manual training features at the Hammond School are maintained by Cyrus McCormick, the harvester manufacturer, and will continue undisturbed.

Building Regulations in Stockholm

The building laws which prevail in Stockholm, Sweden, are decidedly interesting reading when regarded in the light of existing regulations in the more important cities of this country. A brief summary shows that: 1. First-class houses must be constructed of either stone or brick. 2. The stairs of all such houses must be either of stone or iron, and fixed in stone walls from cellar to attic, having a thickness of at least one foot. 3. Cellars must be constructed of massive stone arches, founded in mortar or cement, and must support the ground or basement floor. This floor should be constructed of iron beams, and the spaces between filled with broken brick, gravel, mortar or clay, rendering it fire proof. 4. The attic must be constructed of fire proof masonry filled in between the beams of the upper surface, constructed of bricks, or tiles sunk in mortar or cement, forming a continuous solid floor over the beams. 5. Iron doors sunk in stone doorways shall be fixed for the closing of attic as well as cellar, and these doors locked at night to arrest draft in case of fire. 6. Where elevators are permitted, the shaft must be constructed of solid masonry, and all doors opening upon the shaft must be of iron, and close automatically. 7. Roofs must be covered with tiles, slates or sheets of metal. 8. The external walls of the house must be fire proof, and at least a foot in thickness. 9. The hight of a building should, in general, not exceed the width of the street, and in no case exceed 68 feet. 10. Only two-thirds of a plot of land must be built upon, leaving one-third for open spaces, but in the case of corner plots the houses may cover three-fourths of the area. 11. All flues and chimneys must be of ample size. 12. They must be regularly swept and regularly inspected officially.

The chimney of the new Edison electric plant, at Paterson, N. J., which has just been completed, is one of the most massive structures of its kind in the country. It stands 230 feet in hight and has a diameter of 21 feet at the bottom, tapering to 18 feet near the top, which is crowned by an iron cap 16 feet 6 inches in diameter and weighing 6000 pounds. The chimney is built of brick, and is braced at intervals of 15 feet by iron bands. The construction of the work was carried out in six weeks and was greatly facilitated by the employment of an electric hoist, whereby the materials were raised in remarkably quick time. Nearly 1,000,000 bricks were used in the structure.

The Builders' Exchange

Directory and Official Announcements of the National Association of Builders.

Officers for 1896.

President.
Charles A Rupp of Buffalo.
First Vice-President,
H. J. Sullivan of Milwaukee.
Secretary,
William H. Sayward of Boston.
Treasurer,
George Tapper of Chicago.

Directors.

Noble H. Creager	Baltimore.
E. Noyes Whitcomb	Boston.
John Feist	Buffalo.
William Grace	Chicago.
Frank L. Weaver	Lowell.
Louis A. Clas	Milwaukee.
Stephen M. Wright	New York.
Stacy Reeves	Philadelphia.
Thomas B. Ross	Providence.
Justus Herbert Grant	Rochester.
Thomas J. Ward	St. Louis.
George J. Grant	St. Paul.
A. S. Reed	Wilmington.
George H. Cutting	Worcester.

The New York State Association.

The temporary officers of the New York State Association of Builders have been busily prosecuting the formation of a permanent organization since the close of the ninth convention of the National Association of Builders. A system of correspondence has been undertaken by the secretary, J. C. Almendinger of Buffalo, N. Y., whereby all the builders' exchanges already in existence and all prominent builders in cities having no organization have been informed of the proposed State Association and its objects. Returns in hand up to the present time indicate that the movement is meeting with substantial encouragement, and that the attendance at the meeting for permanent organization will be well attended.

The first letters issued by Secretary Almendinger consisted of an announcement to individual builders and to unaffiliated exchanges within the State of the project, its purposes and benefits to the following effect, the letters to each being practically the same :

Temporary Organization, Master Builders' Association, State of New York.

We desire to call to your attention the fact that representatives of the builders' exchanges of the cities of New York, Rochester and Buffalo, in meeting assembled, have resolved that it is deemed for the best interests of those engaged in the building crafts in the State of New York that a State Association of Master Builders should be formed. At said meeting it was decided to issue a call to the builders of the State to attend a convention to be held at the Building Trades Club, 117 East Twenty-third street, in the City of New York, on December 11, 1895, at 10 a. m., the object being to start a permanent State Association.

One builders' exchange or association of contracting builders from each city is eligible to membership, and is entitled to representation as follows :

The president, secretary and treasurer of each organization, by virtue of their office, and two delegates at large, making five in all.

In sending this notice to you of above meeting, we have in view the desirability of forming an association of contracting builders in your city who shall also receive the benefits of the State Association, and assist in the work, if worthy, for which it is to be organized.

It must, however, be obvious to any one actively engaged in the building line that a State organization is absolutely necessary for the betterment of the conditions existing in the various trades, as by such a body, careful scrutiny can be better maintained upon legislation, so much of which is growing yearly more and more inimical to the interests of the contracting builder, while through its united efforts reaching out from every section of the State, pernicious bills can best be defeated. At the same time it must be conceded that through this means of assembling the State Association, the builders in the various parts of the State will come to know each other more intimately, and be, thereby, better enabled,

1. To improve the mode and method of doing business.
2. To adopt proper rules to govern the opening of bids and letting of contracts.
3. To see that safe and protective lien laws are placed upon the statute books.
4. To acquire and disseminate valuable information.
5. To consider and adopt more complete and practicable apprenticeship system.

As can be readily seen, an almost endless variety of subjects can thus be considered, upon which advice may be asked, and counsel given, thereby making the organization one of almost unlimited benefit to the master builders.

Thus briefly placing this matter before you, we respectfully request that you consult with some of your leading contractors in your city in regard to same, and, if possible, arrange for a meeting to form a local association at an early date, so that your city can be represented at the convention in New York City, December 11.

We believe that you can readily see the practical benefit such an association can give, and sincerely trust that you will assist this movement, to place contracting builders in the position that they should occupy in the business world.

Please inform the secretary at the earliest practical moment of your decison in the premises. If you deem it desirable, we will arrange for some one to be present at your meeting, or any further information will be promptly furnished upon request. We remain,

Respectully yours,
JOHN L. HAMILTON,
Chairman Temporary Organization.
347 West Twenty-sixth street, New York.
J. C ALMENDINGER, Secretary.
Builders' Exchange, Buffalo, N. Y.

Report of Committee on Trade Schools.

The report of the Committee on Trade Schools to the ninth convention was significant in many respects and is substantially as follows :

But little practical progress in the establishment of trade schools has occurred since the last convention ; the general depression in business of the past few years and the opposition of trades unions being assigned by builders in various parts of the country as the cause for lack of result. While recognizing that these causes have existed, the report stated that the lukewarmness of builders generally was the more potent cause for lack of progress, especially among the different filial bodies belonging to the National Association. The inauguration of manual training in a large number of public schools was noted as a hopeful sign that the value of technical education is being more widely recognized than heretofore, and as an indication of greater benefits that must follow specific instruction in each separate trade over general instruction in the rudiments of all manual arts. The New York Trades School founded by Colonel Auchmuty was reported as being successfully conducted on the original lines by the trustees ; and the addition of classes in horseshoeing, metal cornice making and steam and hot water fitting was mentioned. The plan adopted by the Philadelphia Trades School, through which the employers' associations in the various branches of the building trades appoint committees to inspect the work of the pupils at regular intervals, has also been adopted by the New York school, and is proving beneficial. The condition of the Philadelphia school was shown to be excellent, and the Baron De Hirsch Trade School, whose particular work is to educate Russian exiles as American mechanics, was also shown to be in good condition. As an evidence of the practical nature of public interest in trade training, gifts of $400,000 to the University of California and $100,000 to the Spring Garden Institute of Philadelphia, to be devoted to trade teaching, were reported. Conditions of the trade schools movement among the builders of several of the large cities were recited, showing but little advance since the last convention.

The report closed with an expression of confidence in the great good that must follow the establishment of trade schools, and an earnest appeal to builders in behalf of the cause.

To All Organizations of Builders.

Under the new constitution of the National Association of Builders the filial bodies or body in any given State have been constituted the State Association of Builders, or branch of the National Association for that State. Where there is only one filial body in a State that exchange should immediately proceed to form a State Association, as provided in the form of constitution prescribed by the National Association, in order that applications for membership may be entertained, and in order that the National Secretary may know to whom to refer such applicants as may apply to him. Inquiries are already being received by unaffiliated exchanges for information regarding State associations, and while it is the purpose of the National Association of Builders to furnish to such all requisite information, it is necessary that where a State Association already exists it should at once proceed to elect its officers and otherwise prepare for the transaction of the business pertaining to its particular functions.

Where two or more filial exchanges exist in a given State, they should, in the same manner, proceed to the election of officers and the adoption of the constitution prescribed. The exchanges in New York State have already set an example in this direction ; a reference to which is made in this number of *Carpentry and Building.*

The National Secretary will gladly afford every assistance in his power to exchanges needing help in the organization of their State associations. Information will be gladly supplied to all builders' exchanges not yet affiliated with the National Association regarding purposes, methods, benefits, &c., of organizations, and the relationship between members of State associations, between the State associations and the national, and between the local exchange and the national body.

Builders are urged to apply to the National Secretary for printed matter in relation to the formation of State and local associations, and to consider the benefits that must follow the establishment of greater unity of purpose and action throughout the fraternity by binding the whole together in harmonious organization.

The Rights of the Lowest Bidder.

The Minnesota courts have recently defined the rights of the lowest invited bidder in a case similiar in principal to the "McNeil" case, but involving general and subcontractor instead of owner and general contractor.

A full description of the cause of action was given in *Carpentry and Building* for June, 1894, in a public letter from the sub-contractor to the general contractor, and was substantially as follows : John Wonder, general contractor, invited the Brown & Haywood Company to furnish a bid for certain work, with the stipulation that the subcontract should be given to the lowest bidder, provided that the entire contract was awarded to the general contractor in question. Upon being awarded the contract Mr. Wonder failed to give the sub-contract to the Brown & Haywood Company, after having used their bid, which was the lowest, in estimating the cost of that portion of the work. The Brown & Haywood Company claimed the contract as their moral and legal right, and went so far in the interests of justice as to offer to submit the case to arbitration, and if awarded damages to devote the sum awarded to charity.

The general contractor failed to accept the privilege of arbitration and the sub-contractor proceeded to try the case at law. In the first court the plaintiff was prevented from recovering damages by a technicality, the judge deciding that the case should have been tried under the "Statute of Frauds," under which oral testimony was not permitted. The second trial resulted in an award to the sub-contractor of costs and damages to the amount of $325, being 10 per cent. of the amount of the bid.

The precedent thus established is one of great value to contractors generally, and the Brown & Haywood Company are to be congratulated upon having defined the legal right of a situation that too frequently confronts the subcontractor, for it is evident that the damages were totally inadequate to two years of litigation, and that the establishing of the principle was the main object in view.

The extent of the influence of the National Association of Builders is manifest in this case, for the publication of the rights of the lowest bidder, as evidenced by the "McNeil Case," encouraged the Brown & Haywood Company to bring an action, and enabled Charles W. Brown of the firm mentioned to refer to the papers relating to the "McNeil Case," loaned by the National Secretary, as having been of "great assistance."

American Institute of Architects.

In presenting in our last issue a brief summary of the proceedings of the twenty-ninth annual convention of the American Institute of Architects, the name of the city where the convention was held was misstated. It should have read St. Louis, Mo., instead of Baltimore, Md.

CONTENTS.

RESIDENCE OF MR. JOSEPH TREVOR, SOUTHERN AVENUE, AVONDALE, CINCINNATI, OHIO.

GIANNINI & MOORMAN, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1895.

STEEL FRAME OF THE NEW CHURCH OF ST. MARY THE VIRGIN, NEW YORK CITY.

FROM A PHOTOGRAPH TAKEN DURING PROCESS OF ERECTION.

N. LE BRUN & SONS, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, DECEMBER, 1895.