Why ask for the moon
When we have the stars?

AS

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Design for a Village School-House.

This is not the "old school house under the hill," as the song has it, but is one arranged in a modern manner, and somewhat after the fashion of our city schools, so far as the heating and ventilating and the disposition of the seats are concerned. The exterior, however, remains true to its rural surroundings, and has here and there a few touches of the old fashion about it.

The school-room is planned to accommodate 56 scholars, seated separately, which we think is the best method, although a larger number might be accommodated by the use of double desks and fewer aisles. Separate porches and entrances are provided for the boys and girls, and a hat and cloak room for each. The cloak rooms are reached from the school-room, instead of from the entry, so that the teacher, from her position on the platform, can see who enters. The stairs to the cellar open into the school-room for the same reason, while the outside cellar entrance is kept locked, and used only for getting in fuel, &c.

Near the platform is a small room for the teacher's use, which may serve occasionally as a recitation room. It is provided with a closet for her hat and shawl and lunch basket. Another closet is reached from the platform.

The school-room is intended to be sheathed up 4½ feet high with matched and beaded ash, with cap and base molding. The wall spaces at either side of the platform are intended for blackboards, and here the sheathing should extend not more than 2 feet 8 inches from the floor, and should have a chalk tray instead of the cap molding before mentioned. At the rear of the school-house a brick ventilating chimney is built, inside of which is placed a cast-iron smoke flue, to which the smoke-pipe of the furnace is connected. The heat from the smoke-pipe is intended to assist in producing a draft in the chimney, but there is also provided room enough at the base of the chimney to place a small heater, that will accelerate the perhaps otherwise too sluggish movement of the foul air, which is taken from the school-room at the floor in front of the teacher's platform direct to the chimney. The hot-air registers are placed near the outside doors, where the greatest amount of cold air is liable to enter, and as far apart as possible, in order to accommodate the classes which usually stand for recitation in that part of the room.

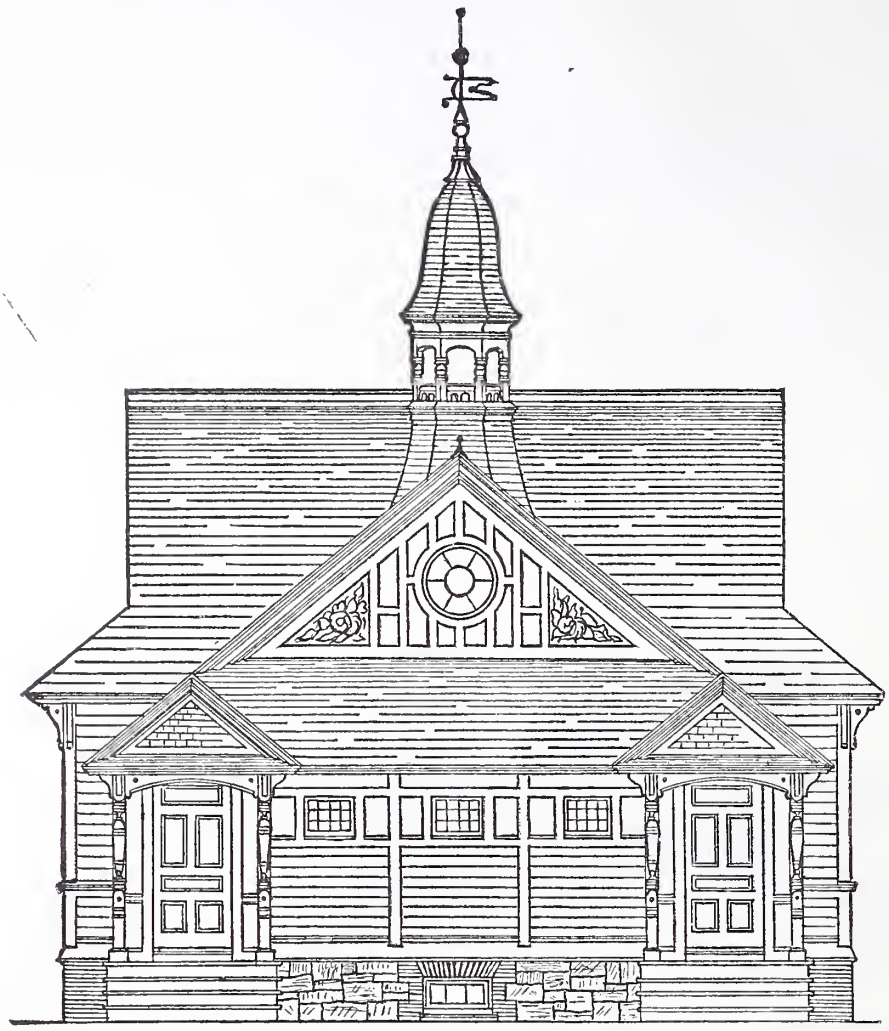
The cost of this building, not including the furniture of the school-room and the heating apparatus, would not greatly exceed $2000, and if very simply specified, would probably come within that sum.

If we were to offer any unfavorable criticisms upon this design, they would be based upon the bell-shaped form of pinnacle or spire which is used on the belfry. The lower portion of the spire is decidedly good, but the reverse curve in the upper part cuts down its hight, and, to our eye, adds weight where lightness and grace would be more desirable. If a straight rafter should be used tangent to the lower curve and terminated at a point about as high as the highest ball upon the rod, putting vane balls, rod, &c., above, we think that the effect would be much lighter and more graceful, and very much more in harmony with the body of the belfry, which, taken all in all, is one of the most graceful that we remember to have seen. Whether we examine the perspective view or the two elevations, the same idea strikes us; and, though the character of the building is somewhat broad and sturdy, yet we should prefer a taller and more simple spire to the one shown.

In the location of a school-house, and particularly such an one as is here shown, we believe it is best to follow the practice of old New England builders, who placed their houses with more regard to the points of the compass than the direction of streets or the shape of the lot. In such buildings as this, where two of the sides consist almost entirely of windows and

Design for a Village School-House.—Fig. 1.—Perspective View. Thos. J. Gould, Architect, Providence, R. I.

where light is one of the essentials, more regard should be had to getting the building in the best position for warmth and light than for uniformity with other buildings or with the street. Economy would also dictate such a course, for with either of the sides filled with windows exposed to the north or northwest winds, the expense of heating during the winter would be very nearly doubled.



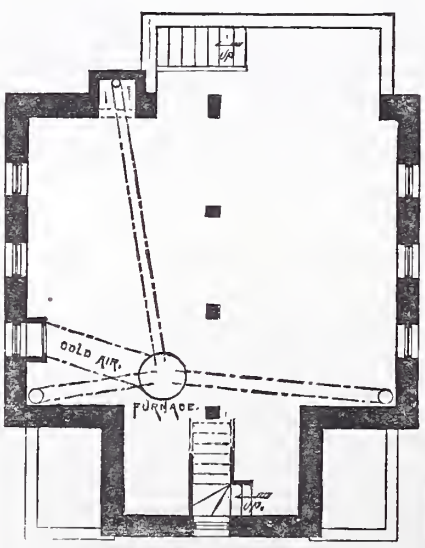
Design for a Village School-House.—Fig. 2.—Front Elevation.—Scale, ⅛ Inch to the Foot.

The large and solid chimney, which is a prominent feature of this design, is not a fashion merely: it means good ventilation and ample power to do the work required of it. For it must be remembered that in addition to carrying off the smoke from the furnace, it ought to be large enough to furnish ample ventilating flues for the school room. The internal arrangement of this building is very satisfactory, much more so than is usually found in plans of this character.

Staining Wood.

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

At the present time, naturally, woods are in great demand, and it is often convenient to imitate the color of some precious wood upon one less costly. Thus we may, upon cherry or maple, imitate rosewood or ebony. Ebony, in fact, can be imitated upon a great variety of woods, the method of producing the color, however, must be varied for the different kinds. The books are filled with instructions for producing black walnut stains and dying woods to imitate black walnut. A more useless or senseless practice could hardly be imagined, for black walnut is really the last wood in the world which one would wish to imitate. Its color is bad, and its only recommendation is that it is easily worked and is considerably harder than pine.

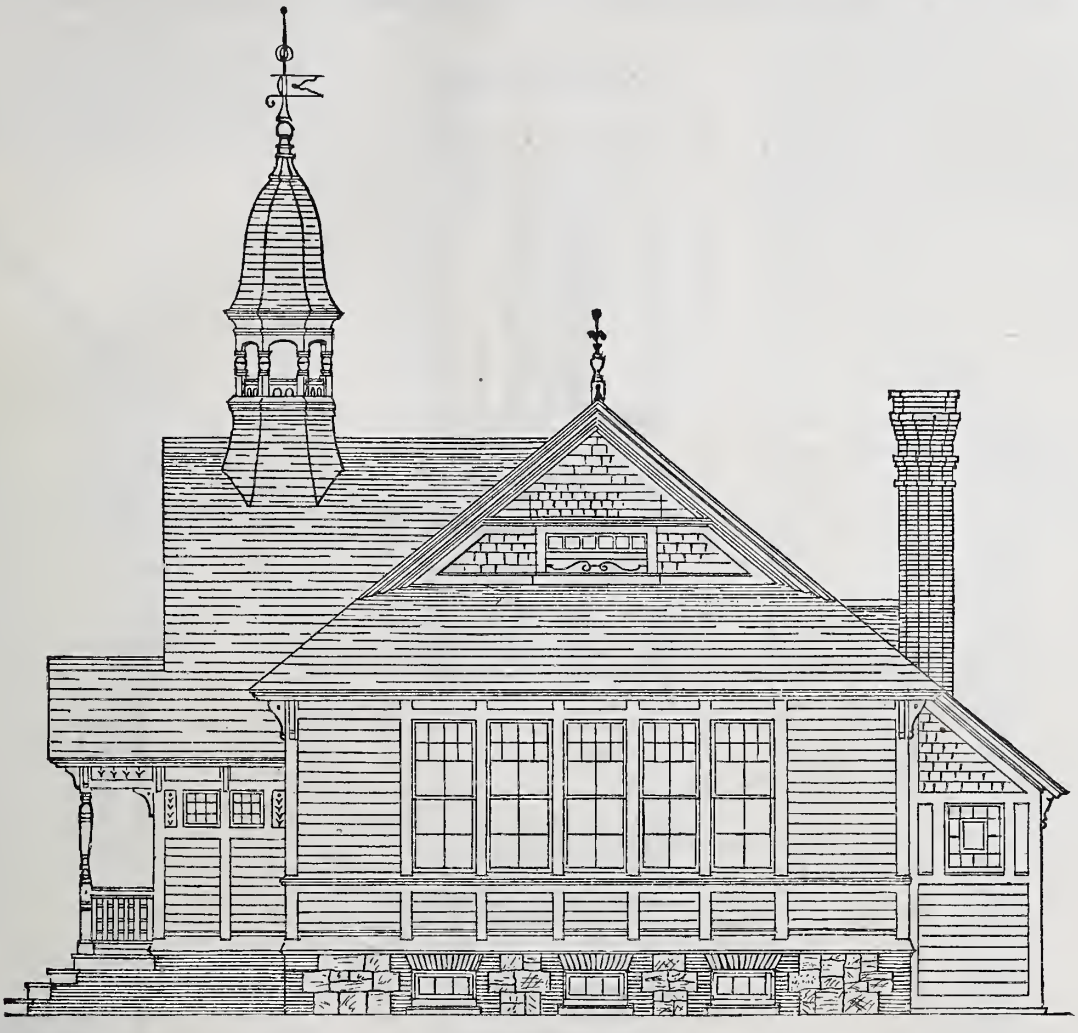


Design for a Village School-House.—Fig. 3.—Plan of Cellar.—Scale, 1-16th Inch to the Foot.

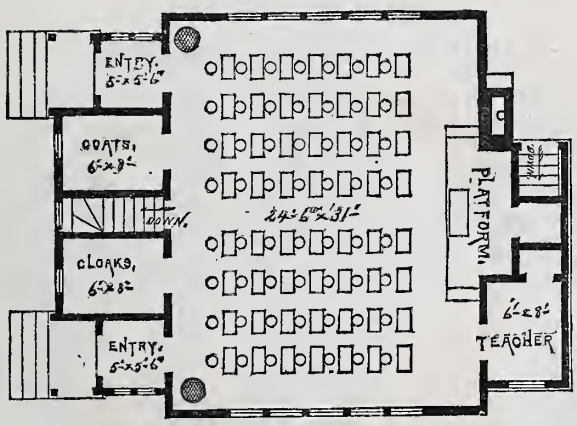
At the present time mahogany is somewhat difficult to get, and it is fashionable to use substitutes for it which are mahoganized. Cherry is one of the most commonly used woods for this purpose. If properly treated, cherry is one of the finest cabinet woods which we have, and it seems almost a pity to use it for imitating anything else, even though it be mahogany. A great number of recipes are given in the books for mahoganizing, but the workman in using them is usually in the dark, because no explanations of the reasons for the directions are given. One of the English recipes says, after getting the surface of the wood smooth, rub with a solution of nitric acid and then apply a solution of dragon's blood. The solution is made by dissolving one ounce in a pint of alcohol and adding one third of an ounce of carbonate of soda or common washing soda. Sulphuric acid will answer just as well. Its office is to darken the wood and prepare it for receiving the dye, which is the dragon's blood. Our own experiments lead us to believe that the only advantage of the washing soda is to neutralize any of the acid which may remain behind. Another recipe calls for the acid treatment of the wood first, which is then followed by a liquid made with two ounces of logwood, eight ounces of madder, one ounce of fustic and one gallon of water. This is boiled two hours and then applied to the wood. Unfortunately, there are no

recipes, so far as we know which give directions for using logwood, dragon's blood, &c , in the shape in which they are found in the stores. For example, instead of logwood in chips, it is much more convenient to buy a little 4-ounce box of the extract of logwood, and instead of the madder coming in the old form, it can now be obtained in the form of a solid, which is all ready to be dissolved in boiling water. By dissolving separately the logwood, dragon's blood and madder in water, and then, after getting them of good strength, mixing a little of each and drying on a waste piece of wood, the proper proportions necessary to get just the color desired are easily found. It must be borne in mind that the logwood gives a purplish tone to the mixture, and that the others, if kept to themselves, will only produce a yellow. The stain, when put upon cherry without an acid being previously applied, will give a sort of dirty yellowish brown. If the acid is added afterward, the red will speedily make its appearance. Besides producing the red color, the acid has another effect, which is valuable in imitating old and dark mahogany—it darkens the wood very materially. The greatest amount of darkening can be obtained by brushing the wood with the weak acid and then warming it. The heat intensifies the action of the acid, but if too long continued it is possible to scorch the surface, making it look as though a hot iron had passed over it. Indeed, acid may be used for staining almost any wood a dark brown. It would be possible, by a combination of yellow and red stains, to produce the color of mahogany on almost any of our common woods. In Dick's Encyclopedia we find the following directions for producing a dark mahogany color: "Boil half a pound of madder and two ounces of logwood in a gallon of water; apply with a brush while the liquid is hot; when dry, go over the whole with a solution of pearlash made of two drams of pearlash to a quart of water." We have some doubts as to the action of this solution on cherry, though it might act well enough on other woods. Permanganate of potash is often mentioned as being a good material for imitating certain kinds of wood. It comes in the form of crystals, which are readily dissolved in water. When put upon the wood it penetrates deeply and produces a pink color at first, but this, by the decomposition of the permanganate of potash itself, soon changes to a dark brown. This is a durable color, consisting of a metal oxide distributed wherever the liquid has penetrated.

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



Design for a Village School-House.—Fig. 4.—Side Elevation.—Scale, ⅛ Inch to the Foot.



Design for a Village School-House.—Fig. 5.—Principal Floor Plan.—Scale, 1-16th Inch to the Foot.

Importance of Finishing Wood.

There is one thing that distinguishes in a marked manner the work of the carpenter from that of the cabinet maker, even though the execution in one case is as good as that of the other; and that is the finish of the wood itself. In first-class cabinet work, the surface is smooth and the wood appears to have no traces of pores or grains. A piece of mahogany or even ash seems as dense and solid as ivory.

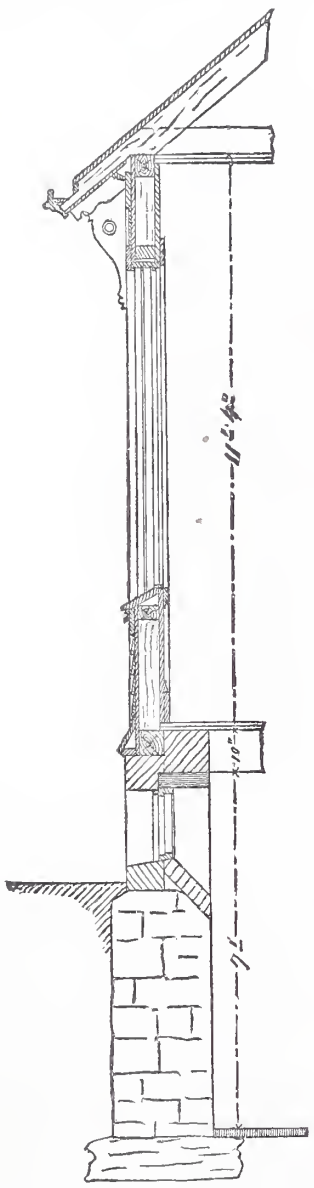
The carpenter, when he has finished a fine job of any kind, is usually satisfied with giving it a couple of coats of oil, which are carefully rubbed in. Sometimes a coating of French polish is given and an attempt made to rub it smooth. There is, however, not the least apparent closing up or filling of the pores. On hand-rails and similar regular work the carpenter is usually content to put on a coat of oil, and leave the work to be filled by the dirt and perspiration from the numberless hands which pass over it. Unless the painter takes the work in hand, the wood is never properly filled, the pores showing everywhere except in those spots where the wear is great.

Aside from the beauty of appearance, it is a great deal better to have the pores of wood perfectly closed. If they are left open they become dust and dirt traps, and are partly filled with substances which no

cleanly person would care to have about. While the pores are open the wood is much more liable to be affected by atmospheric influences than if its pores were closed and its surface rendered smooth and compact by proper means.

The value of a table in which the wood has been carefully filled and brought down to a smooth surface, is very much greater than it would be if left in its natural state or given a single coat of shellac varnish. A pine table or shelf, carefully filled and polished, acquires an unexpected value. The color may be made almost equal to that of mahogany or oak, while the varnishes or rosins which are rubbed into it, support the fibers of the wood and give them a hardiness and strength almost equal to that of black walnut or some other moderately hard wood.

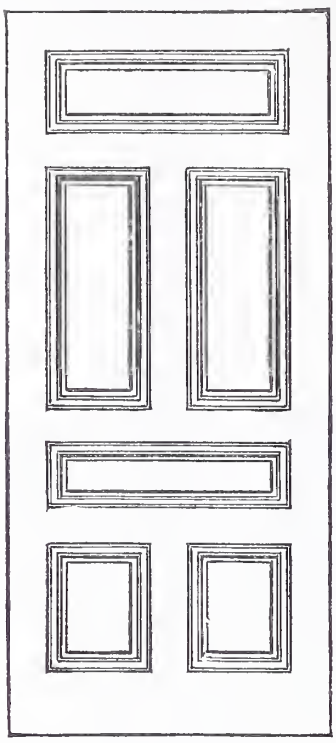
The beauty of a carving or molding, when neatly filled so that not a single trace of



Design for a Village School-House.—Fig. 6. —Vertical Section through Side of Building.—Scale, ¼ Inch to the Foot.

porousness is visible, is greatly increased. This is, in fact, the great difference between a cheap and an expensive natural wood picture frame. The subject is one of great interest to our readers, and we shall take an early opportunity of giving practical directions upon the subject.

Balloon Frames.—According to the paragraphs which we find in some of the California papers, balloon frames are not proving durable in the West, the houses showing signs of age and being hard to rent before they are 10 years old. Balloon frames in the Eastern States are sometimes well along in life before they have reached that condition. Ignorance, scamping and carelessness, rather than any particular form of construction, are among the chief causes for this. There is no reason why our modern houses should not last as long as those built a generation ago, except for the three things that we have named. Many seem to think a wooden building is something which is to last, like a fashionable coat, till the style changes. Others are brought to

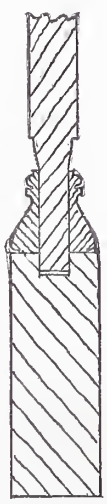


Design for a Village School-House.—Fig. 7. —Elevation of Entrance Doors.—Scale, ½ Inch to the Foot.

think that a wooden house is but a poor article at best, and is not intended to last. Honest workmanship and sound knowledge will make a balloon frame house durable, and scamping or ignorance will bring down even a brick structure about one's ears before the house has seen its second decade.

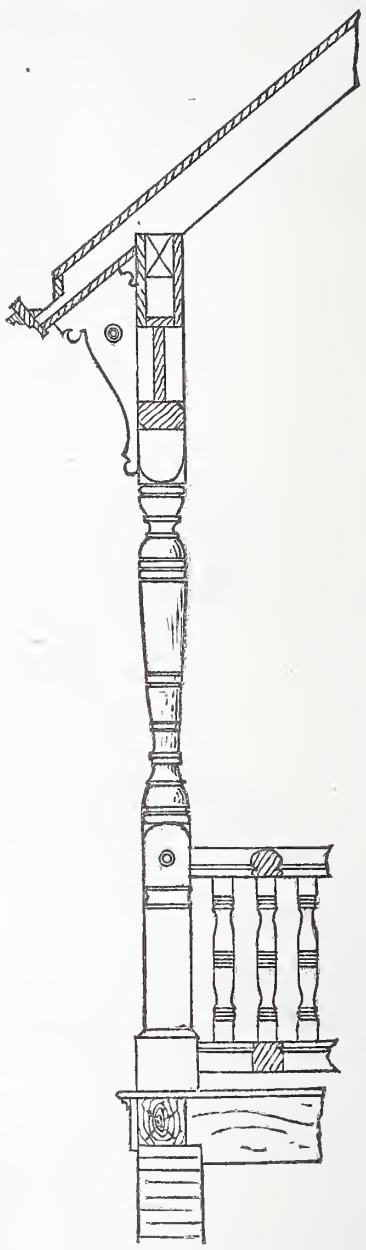
Continuity of Purpose.

True, indeed, is it that "a rolling stone gathers no moss," and equally true that a purpose unstable as water, changing with every shifting tide of circumstances or



Design for a Village School-House.—Fig. 8. —Section through Stile of Entrance Doors. —Scale, 3 Inches to the Foot.

opinion, shall not excel. The cry with which the world is always ringing; the desire either expressed or unexpressed of every human being is "success in life.' And to secure this success nothing is more needful than a continuity of purpose—a fixity of aim. Men's notions of that which constitutes success are, to be sure, strangely varied and widely different, but whether it be the amassing of a fortune or the winning of fame and position, the education of the mind or the development of the body, nothing will ever be achieved unless the purpose, the aim of the man is clearly formed at the outset and steadfastly held to throughout all the succeeding years of struggle and strife. His life purpose must shine before him like a signal light, his far-distant but yet attainable goal, and toward it he must press, overcoming all obstacles and allowing nothing to turn him aside. It is curious to note how such a continuity of purpose will serve as ballast to a vacillating and even a

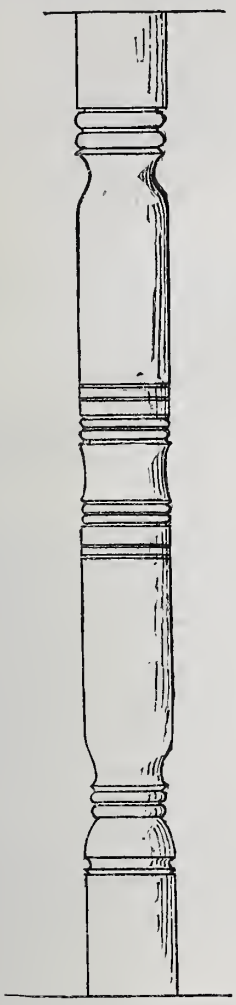


Design for a Village School-House.—Fig. 9. —Details of Porches.—Scale, ½ Inch to the Foot.

weak nature. If once a great desire takes possession of a man; if, heart and brain and will agreeing, he works to attain that which he desires with all the powers of his being, there can be but little doubt of the result of such efforts. Holding thus firmly to his purpose, the weak man becomes the strong, and the uncertain becomes the sure.

But the difficulty lies mainly in the fact that most men never thus fix their roving desires. They wish for the good things of life, but in a listless, aimless sort of way. They envy those whom they see pushing onward and grasping the prize, and they call such "favored beings," "fortunate mortals," &c., seeming to attribute their success rather to mysterious power outside of the men themselves than to the forces of that great motive power within—the will. Daily we read and hear and see the wonders achieved by a fixed purpose. Its first dawn

in a man's mind may be hardly recognized by even those nearest to him; but the leaven having entered, in time will leaven the whole lump. At first we hope. The purpose lies lost under other interests and



Design for a Village School-House.—Fig. 10. *—Detail of Baluster in Porches.—Scale, 3 Inches to the Foot.*

cares; yet all the while its silent work is progressing, till gradually all else becomes subservient to it. It grows, develops, matures, until flowering out into completion we stand amazed at the mighty result, and call our friend a successful man. We need to have more sureness of belief in ourselves —more earnest devotion to our self-chosen purposes. Let others make or mar their lives as they will, hold we firmly to that which we have set before us as the thing most to be desired, and it will be strange if success does not in the end crown our efforts.

Measuring Logs.

A writer in the *Lumberman's Gazette* thus comments on the rules and practices current in measuring logs, a matter not wholly devoid of interest to our readers:

By any and all log rules, the diameter of a log should be taken at the small end, the small way across. It is customary with some scalers, where a log is quite flat, to divide, measuring midway between the smallest and largest diameter, but we know of no warrant for so doing. Some flat logs will yield a larger percentage of lumber than is called for by the smallest diameter, but as a rule there is no such difference as to render it unjust for the buyer to adhere to the well-established customs of scaling. If there is a gain to the buyer, it is no more than will be fully offset by unseen defects in logs apparently round. All log rules are figured upon the basis of a straight log. If a log has a 4-inch crook, the scaler should take the diameter upon a line drawn from the butt to the top, touching the sap in the bottom of the bend. If we were illustrating this upon the saw-carriage, we should run the saw through the log so as to straighten the hollow side, and so that the next cut would give a piece which would be exactly as thick in the middle as at the two ends. If the log is a bow, the cut upon the other side would be nothing at each end and thick in the middle. The diameter of a crooked log should always be taken between two such straight lines, and if a log is 24 inches diameter at the ends and it takes 18 inches to square it, it should be measured as a 6-inch log. Of course if this was in walnut or some valuable wood where short lengths have a market value, the rule may be modified under a mutual agreement, but the rule is as stated. To allow for crooks and other defects in a log, no set rule can be established which may not under certain circumstances be varied from. It is purely a matter for the good judgment of the scaler. All written rules of measurement are predicated upon a perfectly straight log, and any variation from this condition brings in play the scaler's judgment in determining what effect the defect has upon the ability of a sawyer to take the given number of feet of manufactured and marketable lumber from the log. We are aware that in cases of rot, some scalers claim to take the diameter of the defect from the diameter of the log, but this is not just, for 1 inch in the outer circle of a log is vastly greater in amount than 1 inch from the inner circle; and while a 10-inch rot in the end of a 36-inch log 12 foot long should properly subject the log to a deduction of 12 inches square, or 144 feet, a deduction of 12 inches from the diameter, reducing the log from 692 feet down to 303 feet, a loss of 389 feet, is manifestly an injustice to the seller. The proper rule for scaling out defects is, in crooks, to straighten the log; in rots, add 2 inches to the diameter of the rot, to allow for the damaged timber which is contiguous to the decayed wood, square it, and deduct from the gross measurement of the log.

Design for a Village School-House.—Fig. 11.—*Gable and Belfry.—Scale, ¼ Inch to the Foot.*

A Talk on Mathematical Signs and the Rules of Arithmetic.

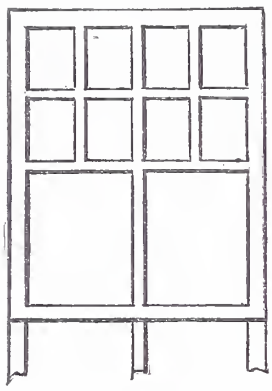
There are few things spoken of with more dislike by the boys, by journeymen, and, indeed, by workmen generally, than a rule with a mathematical sign or a letter that appears like algebra. As soon as their attention is called to such a rule, they at once attempt to stop conversation by saying, "We do not understand algebra." The very appearance of anything resembling algebra, even though it be only one's own name in italics and mathematical signs—say in the following fashion—

$$\sqrt{t\,o\,m} = \left[S + \left(m \frac{i}{T \times h}\right)\right] \frac{1}{2}$$

will give an uncomfortable feeling, and make him turn over the page, although no operation may be indicated by those signs that Tom Smith is not performing every day of his life.

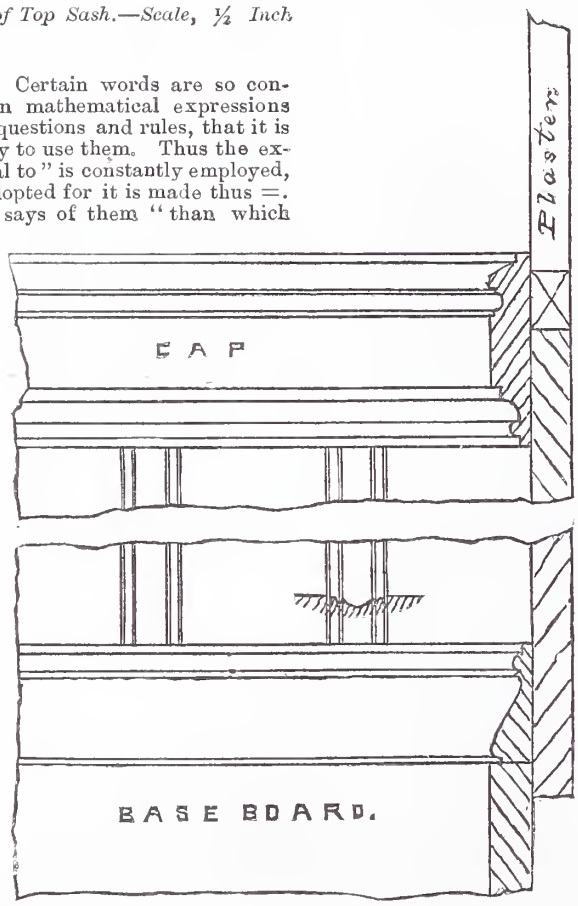
Now, we wish to have a plain talk with the boys about some of these mathematical bugbears and scarecrows. We hope we shall be able to show that many of these things are so easy to be understood that even the dullest one in the shop need not be troubled by them. More than this, it may be shown that these same signs can be used by them with advantage, and without necessitating any hard study or the purchase of a new school book.

The mathematicians use signs to save space and make rules and statements shorter than they would be if written out



Design for a Village School-House.—Fig. 12. *—Elevation of Top Sash.—Scale, ½ Inch to the Foot.*

at full length. Certain words are so constantly used in mathematical expressions and in stating questions and rules, that it is really necessary to use them. Thus the expression "equal to" is constantly employed, and the sign adopted for it is made thus =. One old author says of them "than which



Design for a Village School-House.—Fig. 13.—*Detail of Wainscoting.—Scale, 3 Inches to the Foot.*

noe two things can be more equall." As an example, we write 12 inches = 1 foot, or 6 = 6. For addition we have the sign +, or "plus," as it is sometimes called. Thus 2 + 2 = 4, which, expressed in words, is 2 added to 2 equals 4. In this case the use of the signs makes a great saving of space, and they are more easily read. Subtraction is indicated by the sign —, as 6 — 3 = 3. This is usually called the minus sign, and the figures would read 6 less 3 equals 3. Multiplication is indicated by the sign ×, as 3 × 2 = 6. There are two methods for indicating division; the most common is ÷, as, for example, 6 ÷ 3 = 2. Another way is to put the numbers in the form of a fraction, thus: $\frac{6}{3} = 2$.

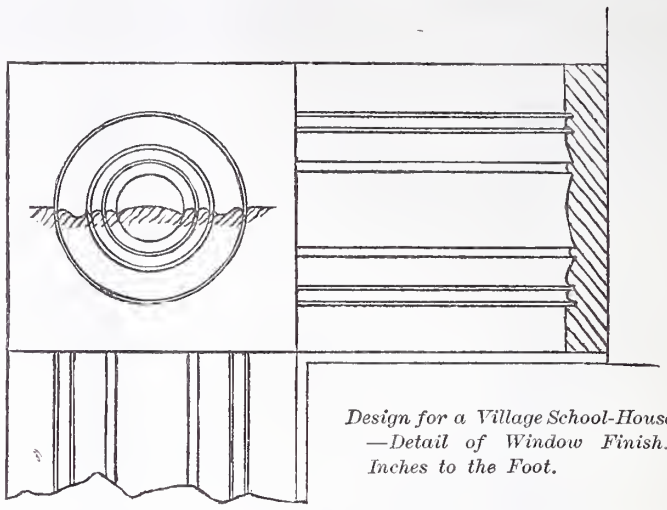
These are the signs in common use, and they save an immense amount of labor in stating questions, &c. For the sake of convenience, let us put them in the form of a table.

TABLE.

= signifies equality; 6 = 6, or 6 is equal to 6.
+ Addition; 6 + 6, or 6 added to 6.
— Subtraction; 4 — 2, or 4 less 2.
× Multiplication; 7 × 3, or 7 multiplied by 3.
÷ Division; 8 ÷ 4, or 8 divided by 4, or $\frac{8}{4}$

Some, no doubt, will say, "We learned all that at school." That is true, but more than half of the boys and men seem to have forgotten it since they left school. As soon as we begin to state a question without using the figures, confusion arises, and the fact that the signs are forgotten becomes evident. This we have had illustrated among our readers repeatedly.

Now, as we have taken pains to put these signs in the form of a table, we shall take it for granted that all the boys, at least, have cut it out and pasted it on a card, which they keep in some convenient place for reference. If, after this, we use signs, we shall expect that they will know what we



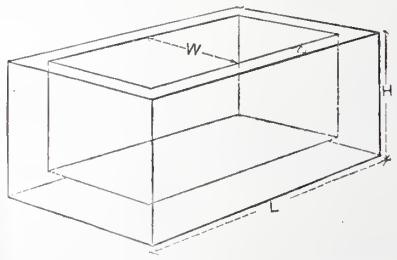
Design for a Village School-House.—Fig. 14. *—Detail of Window Finish.—Scale, 3 Inches to the Foot.*

mean by taking a sly glance at the table, which will be just as good a method as any other of committing them to memory.

In the engraving we have a sketch of a box of which we wish to find the cubic contents in feet; that is, we wish to find how many cubic feet it will hold. We will suppose the following dimensions: Length outside, 6 feet 4 inches; hight, 2 feet 2 inches; width inside, 2 feet; thickness of sides, 2 inches. If we put this in shape in words so that all that has to be done is to multiply, &c., it will be a pretty long rule.

Rule.—The length outside, less double the thickness, multiplied by the inside width, multiplied by the hight, less the thickness, will equal the number of cubic feet.

This supposes that all the dimensions are in feet. Let us put this question in shape,



A Talk on Mathematical Signs and the Rules of Arithmetic.—Finding the Contents of a Box.

using the dimensions. It will then take the following form:

6 ft. 4 in. — 2 × 2 in. × 2 ft. × 2 ft. 2 in. — 2 in. = the cubic contents.

Here we at once find we are in trouble. There is no punctuation, as it may be called. There is no way to indicate the whole operation without stopping to do a portion of it. Thus, we do not know whether the 6 ft. 4 in. is to have 2 × 2 in. × 2 ft. × 2 ft. 2 in. subtracted from it, or whether the 2 × 4 in. is to be taken out and the multiplying done afterward. To separate those portions of such a statement as belong together, we put them in brackets or parenthesis marks. Sometimes we draw a line over those which belong together. It is an advantage to use the sign ′ for feet and the sign ″ for inches. Substituting these characters in the statement just made, if we write it as follows it becomes very much plainer. Thus, (6′ 4″ — 2 × 2″), &c., shows that the 2 × 2″ are to be taken from the 6′ 4″ before any other operation is performed. In other words, the numbers within the parenthesis are taken together, and the operations shown by the signs are to be performed independently of any other portions of the work. Now we are ready to go on with the statement of the question: (6′ 4″ — 2 × 2″) × 2′ × (2′ 2″ — 2″). Here we have another parenthesis at the close of the statement where, before we multiply, we must subtract 2″. Of course, this is a statement in figures of the old, well-known

rule that to get the contents we must multiply together the length, breadth and thickness. But our question supposed that we did not have the length nor the depth exactly, and that there were some additional calculations to be made, and that the whole operation was to be stated.

All this, no doubt, seems simple enough now that it is understood. There are in use, however, still other expressions which seem bewildering at first glance, but which we think we can make equally clear to our young readers. We shall give these attention at another time.

Door Decoration.

Fashion has at last taken up what art and artists have been preaching for the past 20 years—namely, that almost everything in and about a house may be made beautiful, or at least pleasing. Accordingly, the woodwork of houses generally, as well as their furniture, is at present receiving a great deal of attention from both artists and architects.

The accompanying illustration shows a design by Mr. Lewis F. Day, an English architect, of a series of decorated panels for a door. As a rule, doors in most houses are somewhat unornamental, and their bad effect is increased by the fact that they are usually painted a dead white. The illustration shows how a single design can be applied to all the panels of a door without altering the general form of decoration. The design, as a whole, has a somewhat peculiar "motive," as the artists would call it. The panels of the door seem to be removed, and we are looking at a tree in full flower through the openings. This, of course, unites all the panels naturally in one design.

The pattern is intended to be drawn either directly upon the wood or upon a prepared ground, and the design painted in colors. Where a door is to be decorated in this way, the most desirable method is to design it so that the panels can be easily removed for convenience of the artist. The moldings should be small and somewhat simple in their section.

In almost every village or town there are amateurs or artists who would be glad to do decoration of this kind. The great difficulty which they meet, however, is the fact that the door itself cannot be worked upon directly. It is almost impossible, with any reasonable amount of labor, to design upon cloth or paper and then fasten it neatly upon the panels. The carpenter, therefore, will find it quite desirable to design doors for the special use of the decorators, or else to remove panels from doors already in use and supply others in their place. In doing this the panels should all be prepared beforehand to proper size and thickness, and carefully dressed ready for the painter, who then proceeds to finish them. The carpenter can then cut out the old panels and put in the new. In doing this it will always be necessary to determine the width which the designs will cover on the panel. When this scheme is to be carried out there should be no beveling of the panel at any part that is to be exposed. The "sight" should be flat throughout.

The design, as executed by Mr. Lewis Day, consisted of a ground of gray, somewhat inclining toward green. The leaves and branches were painted in greenish gray and white, and the flowers were white and pale yellow. A variety of other tints have been used for the same design, but it is hardly necessary for us to go into a description of them here, as our readers are more interested in the construction of the door than in the particular methods employed for the decoration. The wood used for these panels should, if possible, be old and well seasoned.

Artists often prefer to paint directly upon the surface of the wood, and when this is done, warping is likely to take place if the other side of the panels is painted. If the decoration is in oil color, the artist may desire to have the panel dressed with a "tooth;" that is, made rough like twilled canvas. This can be done after the panel is finished, by means of a rasp. In giving the rough surface, as little fuzz as possible should be made, and the strokes ought to cross each other, so that no one set of lines is very long. If the whole ground is to be painted over, a coat of what is known as permanent wood filler, a preparation sold by Valentine & Co., of New York, can be applied to the panels with advantage. The light-colored kind should be used, and it should be warmed before it is applied. Put it on in good quantity with a brush, and then rub off the fuzz which the liquid throws up with a piece of well-worn sand paper. Then take a piece of clean rag and wipe all the liquid from the panel. This will form as good and cheap a foundation for painting as the carpenter can make, and will be a great deal better than the artist can make for himself.

Color Applied to House Decoration.

An English writer on art topics discourses as follows, in a recent London paper, upon the subject of dining-room decorations:

Our present mode of dining being a

Example of Door Decoration.—Lewis F. Day, Architect.

lengthy affair, an impression of cosy comfort should be conveyed in the decoration. The colors most suited for this purpose are those described as warm, or the allies of red and brown. To be in unison with this impression it would not do to employ light material for curtains, as a lively, instead of a cosy, effect would be thus produced.

Neither should the eye of the person dining be disturbed by irritating patterns on the wall, nor glaring masses of gilt picture frames. Gilt frames for pictures are a perfect abomination, both as regards the effect on the picture and the difficulty of harmonizing so much glitter with the mural and other decorations. Pictures should not be too numerous, because too much glitter is discomforting and monotonous, and likewise because no one thing contributing to the harmony of the whole should predominate, else perfect harmony is destroyed. In a room set apart as a picture gallery, or even in halls or corriders, the number may be unlimited, because the above objection would not hold good, the fitness of the place obviating it.

In place of paper, the walls may very appropriately be paneled—the panels being divided, not by simple plane strips, but the wood-carver's aid being brought into use. Herein a patron of the arts would find a fresh field for the employment of his wealth, and one, too, that would not only help to raise the decaying art of wood carving out of its present indigence, but likewise be of more lasting benefit and a greater source of comfort than spending his hundreds in purchasing the most notable picture in the last academy or other picture exhibition, simply because it was "greatly admired," or in buying a whole roomful of blue china, because "it is the fashion." Should paneling be adopted, the size of the panels must be kept in proportion to the size of the room; so likewise should the carved molding. Again, another field for the art patron lies before him. Let him search out some truly gifted, talented young artists, and give them a lift in their career by having the panels painted with representations of the animal subjects, as birds, fishes, &c. Such subjects would be suitable to the room; the color in them would afford relief to the prevalent hue of the wood. The talent employed would be adequate for the purpose—such paintings by the greatest painters of the day being out of place, since their valuable time would entitle them to be better employed, and their work would deserve to be preserved from the occasional damaging influences such positions would now and again present. Talent would thus be encouraged, for none but those possessing such should be employed. Moreover, the thoughts of the guests would not be disturbed, as they are almost necessarily when opposite a picture representing some lake in Italy, or some well-known and pleasantly-remembered spot. At the same time the hole-in-the-wall appearance presented by such pictures is obviated. For it is a fact any one can satisfy himself upon that such scenes or landscapes, representing perspective views, produce the impression of portions of the wall having been cut out—an impression that is anything but comfortable The panels not painted on (for all should not be covered with paint) could have a small bracket affixed thereto, to hold a piece of china, antique metal work, a vase of flowers, or whatsoever may please the fancy; or such things as china plates, &c., could be affixed to the panel without the support of a bracket. The color of the woodwork need not necessarily be dark, as we imagine many think it should be. It need not even be of oak, for charming effects could be produced by deep-colored, polished pine, which might also have a narrow band or two of cerulean blue painted as a fillet, to relieve the panels, or different-toned pieces of mahogany. If paneling be thus employed the light through the windows need not be excluded by drapery, for a greater elaboration of the recesses than is now to be met with would render them sufficiently interesting and attractive to the eye for it to derive as much comfort from the absence of curtains as from their presence.

With such curtainless windows at nighttime, when the shutters are closed, cosiness need not be sacrificed, if the following simple plan be adopted: The shutters are boxed up either side of the window frame; if now one of these recesses for the shutter be made deeper, and a curtain or *portière* be hung behind the shutter, it could easily be drawn along a rod, or hooked to the opposite side of the window, after the shutters are closed; by this means the same air of warmth and comfort would still pervade the room as is now experienced with the heavy drapery so much in use for dining rooms. Another advantage arises from the adoption of this plan, besides that of gaining light; the curtains are not exposed to the dusty atmosphere of the room during the day, and thus we should avoid that uncomfortable feeling conjured up by having always before our eyes heavy, expensive and luxurious material hanging stiffly and harsh to the touch

from the accumulation of dirt and dust; moreover, from non-exposure to the sun, curtains would not fade so soon.

Another point to consider in the adoption of this plan of a window without curtains is the effect observed from outside. Considering the little thought bestowed by house owners on the outside public in the decoration of their house fronts, such a thing as a window without curtains is of little moment.

To break what might in some cases appear a harsh contrast formed by the wide, colorless sheet of plain glass, a narrow border of colored, etched, or stenciled glass might be represented by the bordering panes.

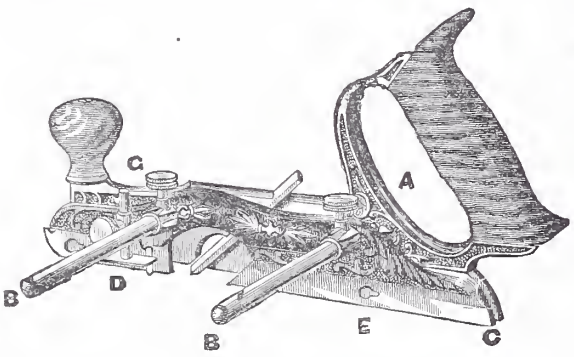
Novelties.

We are enabled to present a number of attractive articles this month to the attention of our readers, some of which, although old enough to have been thoroughly tried, are yet quite unknown to the great majority of mechanics and builders.

ADJUSTABLE DADO, FILLETSTER, PLOW, ETC.

This tool embraces in small space an ingenious combination of several tools, which in the old form would nearly fill a carpenter's chest. The parts being made of iron or steel, no change in form can result to them from weather or other cause, and no amount of use can wear them out. The tool, which is represented in Fig 1, consists of two sections—a main stock, A, with two bars or arms, B, and a sliding section, C, having its bottom or face level with that of the main stock.

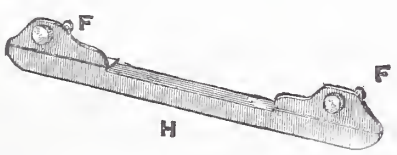
It can be used as a dado of any required width by inserting the suitable bit into the



Novelties.—Fig. 1.—Traut's Adjustable Dado, Filletster, Plow, &c.

main stock A, and bringing the outside edge of the sliding section C into line with the bit. The two steel spurs, one on each section of the plane, will thus be exactly in line with and in front of the two edges of the bit. The gauge D on the sliding section regulates the depth to which the tool will cut.

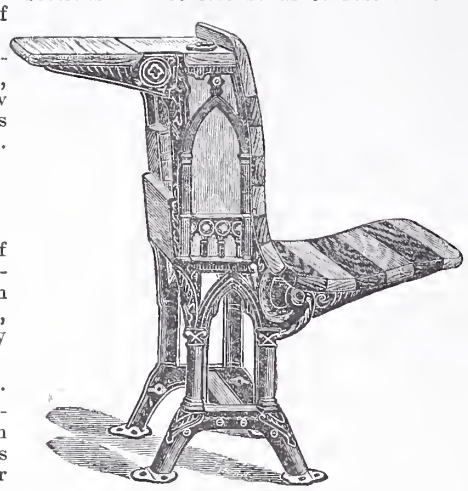
If the tool is to be used as a plow, remove the gauge D, for regulating the depth of cut, to the socket on the right-hand side of the main stock A at G. The guard-plate H (Fig. 2) should be attached to the sliding section C by means of the thumb-screws F. The flanged ends of the thumb-screws F are



Novelties.—Fig. 2.—Guard Plate to Traut's Adjustable Dado, &c.

passed from the outside through the slots E in the sliding section C, and by giving these screws a turn to the left, the two parts will be firmly secured together, and their inside faces be exactly flush with each other, thus forming a fence for the plow. Insert such bit as is needed in the main stock A, and secure the fence at any desired point on the bars, by use of the brass thumb-screws above.

A filletster may be had by detaching the guard-plate H (Fig 2) and turning it end for end. The thumb-screws F must be reversed, so as to bring their heads on the outside of the sliding section C, and the flanged end of each screw will then have its bearing in the recess on the inside of the slots E. Then tighten up the screws, and a fence will be formed for regulating the width of cut, while the parallel bottoms or faces of both sections will be left so as to rest on the

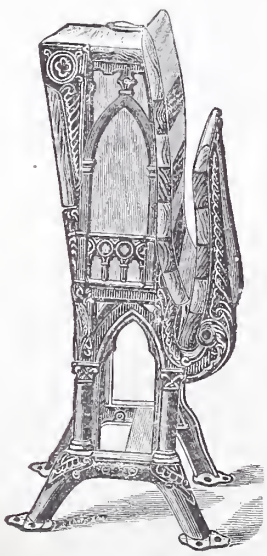


Novelties.—Fig. 3.—The Triumph Study Desk, Open.

work. With the 1½-inch cutter inserted in the main stock, the fence may be moved and secured so as to give any required width of cut, from 1½ to 5-16ths inch.

As a matching plane, the fence is used in exactly the same form as on the filletster; the heads of the thumb-screws F are on the outside, and the parallel bottoms or faces of both sections rest on the work. Insert the tonguing tool in the main stock A, and slip the extra iron gauge, which accompanies each tool, on to the upper end of the spindle of the ordinary gauge D, when inserted in the socket on the right-hand side of the main stock at G. The hooked form of the iron gauge will give it a bearing directly on top of the tongue when the full depth is reached, and the required depth for tonguing may be regulated by means of the set-screw, which will secure the iron gauge at any point on the upper part of the spindle of the ordinary gauge D. The grooving may be done with the regular ¼-inch plow bit.

Enough of these tools have already gone into the hands of mechanics to make full

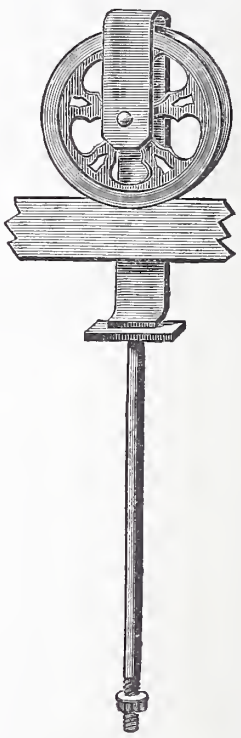


Novelties.—Fig. 4.—The Triumph Study Desk, Closed.

test of their merits, and they gain the approval of all who try them. The price of the tool entire, ready for use, is $7. They are manufactured by the Stanley Rule and Level Company, of New Britain, Conn., and are sold by all hardware dealers.

THE TRIUMPH STUDY DESK.

Messrs. Baker, Pratt & Co., of No. 9 Bond street, New York city, who make a specialty of school merchandise and educational supplies, have recently introduced what they call the Triumph Study Desk, views of which are afforded in Figs. 3 and 4. Fig. 3 shows the desk open, while Fig. 4 shows into how compact a shape it may be put when closed. The style of the desk is exceedingly neat, and the design is one to be commended for many valuable features. In the position shown in Fig. 3 it gives a comfortable and serviceable desk for a scholar and a seat which is easy. The book rack or case beneath the desk could scarcely be bettered, as the books are kept upright, and are all of them easily accessible without disturbing others than those which may be wanted. The arrangement which allows this portion of the desk to be closed by the lid is doubly valuable, as it not only keeps the books securely, but it gives the scholar ample room when standing in his place. Another advantage, which those who remember their school days will appreciate, is the lifting of the seat into a vertical position, which gives the scholar so much room upon the floor that a large number of exercises become possible in the school room which heretofore have been necessarily practiced in other apartments, or with the scholars crowded in the aisles or distributed along the walls of the room. The framing is strong, and, to judge from the cuts, of pleasing design to the eye. The provision in the casting for a foot-rail shows that the designer understood some of the annoyances of teachers and discomforts of scholars, arising from lack of this important feature. We notice one defect in the design which, however, can easily be remedied if those who furnish school-houses are willing to incur the little extra expense. We think that no seat should be connected in any way with a desk. In other words, we would have the seat of the scholar in front separated by at least 2 inches from the desk of the scholar in his rear. No matter how firmly the desk and seat combined may be screwed to the floor, there will always be more or less annoyance arising from the movement of the scholar occupying the seat. Economy, of course, demands that the desk for one scholar shall form the seat for the other, but we think in comfort to both teacher and pupil the extra cost of separating the two will be amply repaid. The method of putting together the woodwork of this desk

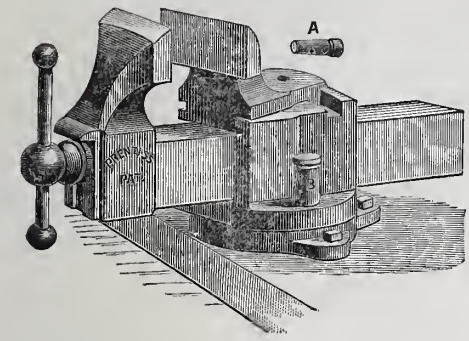


Novelties.—Fig. 5.—Improved Door Hanger.

strikes us as beyond all praise, being not only novel, but exceedingly cheap, simple and durable.

IMPROVED DOOR HANGER.

The correspondents of *Carpentry and Building* have already discussed, to a certain extent, the devices in use and the construction suitable for hanging sliding doors. Contrivances for hanging doors of this character from above, instead of placing the rail on the floor and having sheaves or rollers



Novelties.—Fig. 6.—The Prentiss Vise for Wood-Workers' Use.

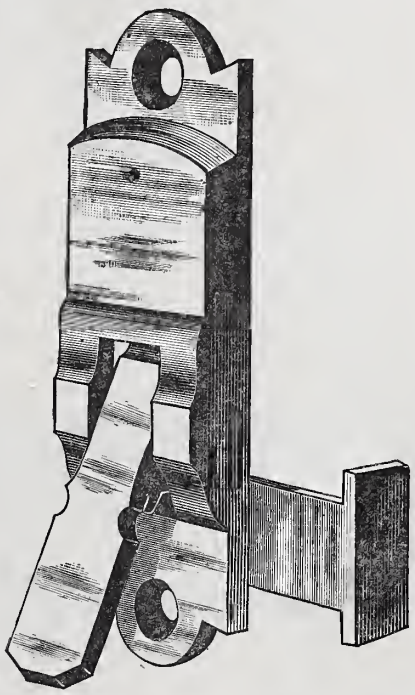
mortised into the lower rail, are distinctively American, and, if we mistake not, had their origin in the City of Philadelphia. The advantages of hanging a door from above are several. There is required less guiding fixtures, and, accordingly, less friction is encountered and less force is required to operate the door. Hanging a door from the top saves any obstruction in the shape of rail or guide on the floor, and therefore permits the carpet to extend through from one room to the other without break. The sheave illustrated in Fig. 5 shows one style of an improvement in articles of this kind introduced by J. B. Shannon & Sons, of 1009 Market street, Philadelphia. The parts are so clearly shown in the engraving that an extended description is unnecessary. The method of attaching the door is similar to that employed in connection with hand rails. The support on which the sheave runs is a wrought-iron bar 2 inches wide and one-quarter of an inch thick, dressed to a half-round on the upper edge, in order to fit the groove in the sheave, and drilled for screws to fasten it on a horizontal piece of timber which is attached to the studding. From this description it will be seen that the method of using this shave is of the simplest kind, and there is no doubt the article will recommend itself to our practical readers without further words from us.

IMPROVED SWIVEL BOTTOM VISE.

Fig. 6 represents the Prentiss patent adjustable jaw vise, which is sold by the Hall Manufacturing Company, of 23 Dey street, New York City. The back jaw of this vise is adjustable to suit it to any angle, thus making it possible to hold an object, whether straight, beveled or wedge shape, very firmly. By insertion of the pin A, the jaw becomes fixed and immovable, thus making a parallel or solid jaw vise. The adjustable jaw rests and works against the solid body of the vise. By means of the swivel on the bottom, this vise may be instantly adjusted to any angle.

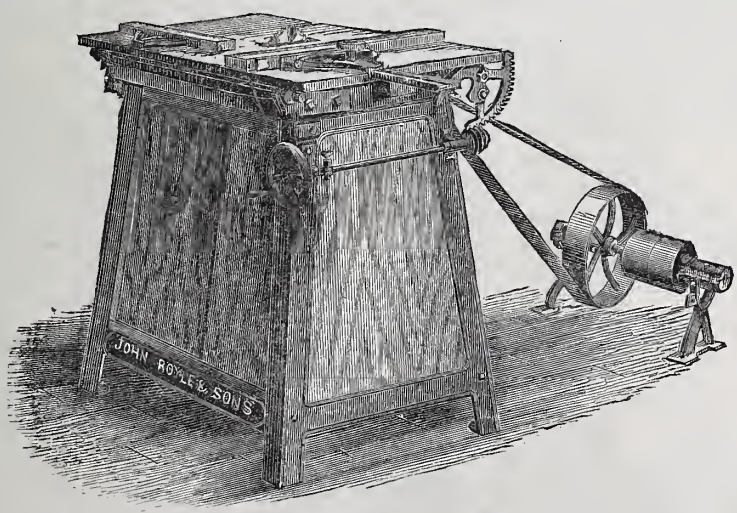
THE UNIVERSAL SASH LOCK.

Fig. 8 represents what is known as Strong's Universal Sash Lock, which is being furnished to the trade by the Universal Sash Lock Co., of Albany, N. Y. The finger-piece, which is shown deflected in the engraving, acts as a lever for moving the clamp, which is shown at the right. The shank of this clamp is provided with a groove, a projecting portion of the finger-piece working in it after the manner of a cam, thus forcing the clamp outward when the finger-piece is depressed, and withdrawing it when the finger-piece is raised. There is sufficient play to the clamp to overcome any ordinary looseness of fit in windows. The particular application of this sash lock



Novelties.—Fig. 8.—The Universal Sash Lock.

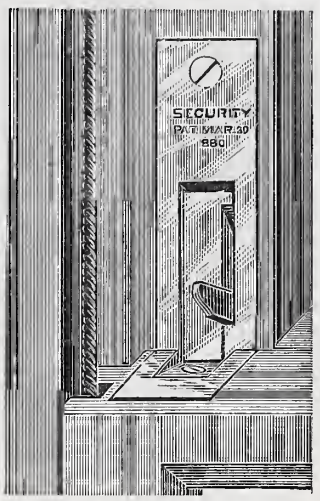
is, of course, with sashes not provided with weights, although it might be used with the latter in case it were desired to fasten the sash at any particular elevation. The parts of this lock are so simple that it would be somewhat difficult for it to get out of order, a feature which recommends it for general use.



Novelties.—Fig. 7.—Improved Circular Sawing Machine.

IMPROVED CIRCULAR SAWING MACHINE.

Fig. 7 of the accompanying engravings represents an improved circular sawing machine being manufactured by John Royle & Sons, Paterson, N. J. This machine is provided with some very convenient devices, which render it specially desirable for jobbing purposes and fine accurate sawing. The top, which is 3 x 2 feet, is attached to the front of the machine by adjustable hinges. This admits of the table being raised for the purpose of changing saws, throat pieces, &c. The table may also be raised and lowered for sawing purposes by means of the worm and wheel shown at the side of the machine. In the top are planed V grooves for guiding the cross slide and

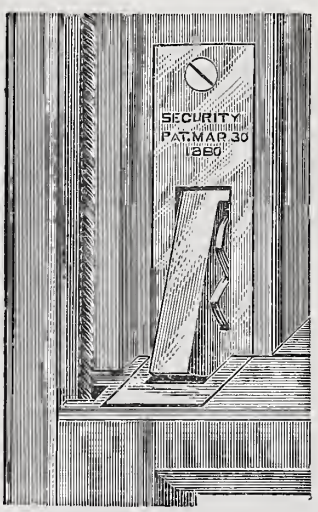


Novelties.—Fig. 9.—The Security Sash Lock. Released for Raising the Sash.

ripping gauge. The ripping gauge is furnished with an adjustable iron fence in which is arranged a convenient attachable device for securing gauges of various shapes and for special work. The top is also provided with a brace so arranged that it is securely held in position after being raised. The machine is fitted up in what may be described as cabinet style, with a spacious closely-fitting sawdust drawer, which constitutes a neat and cleanly arrangement. There are a number of other good features about this machine which will be at once recognized upon examination.

THE SECURITY SELF-LOCKING SASH LOCK.

We show in Figs. 9 and 10 of the engravings views of the security sash lock—the first showing a lock released for raising the



Novelties.—Fig. 10.—The Security Sash Lock. The Lower Sash Fastened.

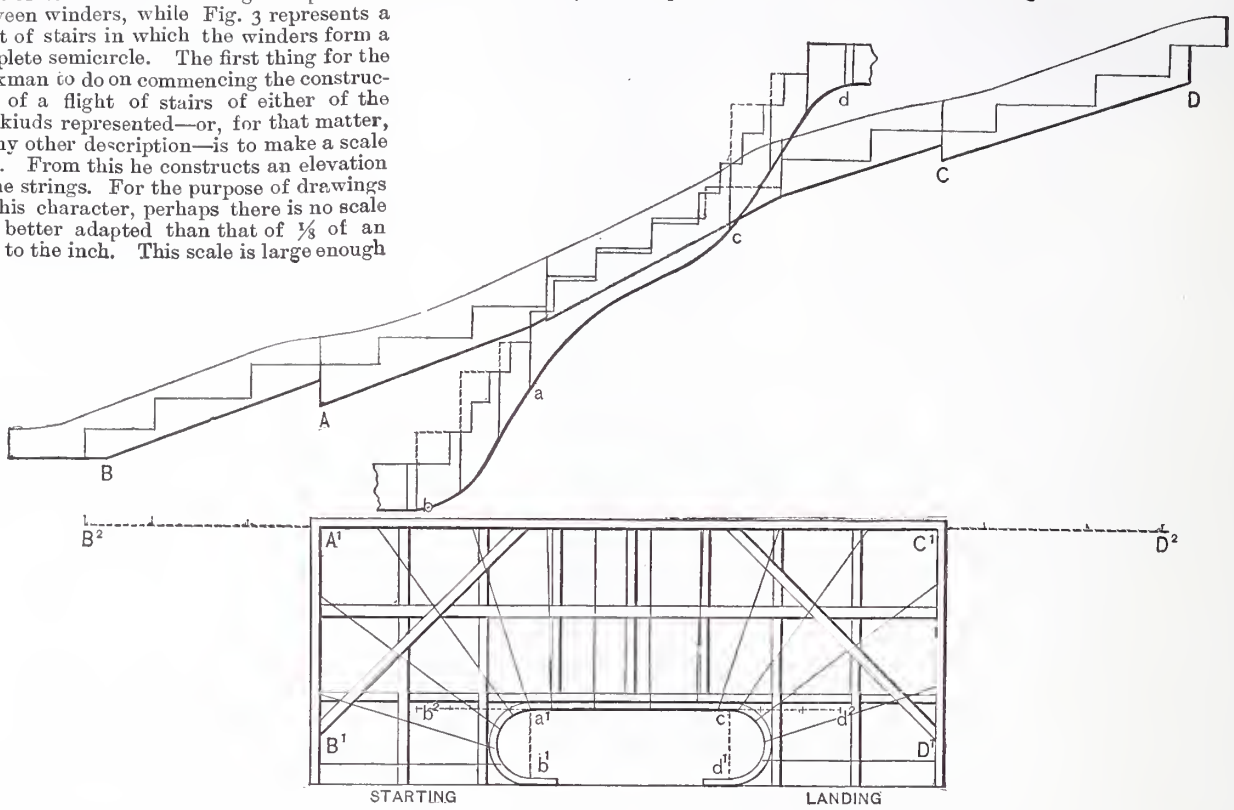
sash, and the latter showing the lower sash fastened. This locking device is manufactured by J. B. Shannon & Sons, Philadelphia, and is brought forward with the intention of superseding the old-fashioned turning contrivance. As may be seen by the engravings, the lock is mortised into the side, or, if wide enough, into the center mullion of the upper sash, and the small plate on the top of rail of the lower sash. The special advantage of this sash lock is that, with its use, the sashes are always locked fast. In order to raise the sash the catch must be pressed in so that the small tumbler falls out. This allows the lower sash to be raised, which tilts the tumblers, and the catch is thereby released and is

ready to lock the sash again so soon as it is brought down past it. The construction of this lock makes it impossible to open it from the outside. It can also be so placed as to allow the lower or upper sash to be partially raised or lowered for ventilation, and yet securely fastened in position.

Practical Stair Building.—VI.

WINDING STAIRS.

Having in our last issue given some attention to the construction of a straight flight of stairs with a cylinder, the next division of the subject which comes in natural order is that of winding stairs. Fig. 1 of the accompanying engravings represents the plan and the elevations of the strings, of a flight of stairs in which straight steps occur between winders, while Fig. 3 represents a flight of stairs in which the winders form a complete semicircle. The first thing for the workman to do on commencing the construction of a flight of stairs of either of the two kinds represented—or, for that matter, of any other description—is to make a scale plan. From this he constructs an elevation of the strings. For the purpose of drawings of this character, perhaps there is no scale any better adapted than that of ⅛ of an inch to the inch. This scale is large enough

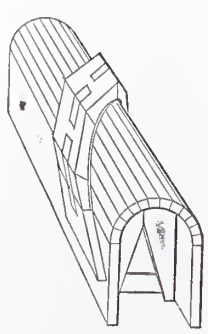


Winding Stairs.—Fig. 1.—Plan of a Flight of Stairs with Both Winders and Flyers, with Elevation of the Strings.

for convenience in use, and is of a character to be easily read from a common pocket rule or from a steel square. It is hardly necessary for us in this connection to call attention to the advantages of drawings of this kind. There are very few mechanics at the present time who would think of attempting to build such a piece of work as a flight of stairs, however simple they might be, without first making a drawing of their work. The labor of representing the work upon paper is more than compensated in the saving in other particulars. A drawing of the strings affords a convenient means by which to select the proper width of boards or planks for the various parts. Without such a guide, the mechanic would be compelled to pursue what may be described as a cut-and-try method. By means of the drawing, also, he is able to make all necessary calculations for working around defects in his timber, &c. Referring now to Fig. 1, the line b^2 d^2 on the plan is the stretchout of the front string, including the cylinders. The dotted lines a^1 b^2 and c^1 d^2 represent the stretchout of the cylinders.

In our chapters on the geometrical principles involved in stair-building, we described different methods by which the stretchout of the arc of a circle may be obtained. By reference to page 189 of the November number, the reader will find the rules to which we refer. In obtaining the stretchout of the cylinders shown in Fig. 1, the workman has the choice of employing one of these rules or of measuring with his dividers direct upon the plan. Either method will only be approximately correct in the length obtained, but so closely do they approach the actual result that for all practical purposes either may be regarded as satisfactory in this particular.

On the lines a^1 b^2 and c^1 d^2 are marked the width of the treads. From the line b^2 d^2 in the plan the elevation of the front string is constructed; b a is the stretchout of the starting cylinder, a c is the straight part of the string and c d the stretchout of the landing cylinder. After laying out the steps and risers in the elevation, the curved line representing the lower edge of the string is drawn. This line should be so located as to maintain the width of the string about alike at all points measuring square across. Easements are required at top and bottom, and must be obtained in such a manner as to preserve the average width of the string. It would be a matter of some difficulty, in the space at our command, at this time to lay down definite rules for drawing easements of this character. We shall probably give special attention to this part of our subject at some future time. Suffice it to say for the present, therefore, that such rules are to be followed as have been determined by experience to produce shapes which look best when the string is in position. It would be foolish indeed to adopt any other standard by which to determine the advisability of rules which



Winding Stairs.—Fig. 2.—Form over which Veneer Cylinders are Bent for the Reception of Staves at the Back.

may be given. In order to complete the easement within the string itself, it is often necessary, as shown in this figure at d, to glue 2 or 3 inches of straight wood on to the cylinder where it joins the facia. This may be avoided by making a part of the easement on the straight facia. Among mechanics both of these methods are employed, some giving preference to one and some to the other—some using them interchangeably, depending upon the particular circumstances of the case. The dotted lines shown in the elevation of the front string, in those portions corresponding to the cylinders in the plan, show the lengths of the several pieces of cylinder stuff before the steps and risers are cut out. In making the string-piece, the line of its lower edge is drawn partly by hand, as shown at b and d, partly by marking with a flexible straight-edge bent into the cylinder, and on the straight part by bending a strip of wood to suit the curve required and marking along the side of it.

Referring again to the plan in Fig. 1, B^2 D^2 is the stretchout of the wall string, and from this line in the plan the elevation of the wall string is to be constructed, as shown in the engraving. B A is the first, corresponding with B^1 A^1 in the plan. From A to C is the second piece (spliced in two places, as indicated in the engraving), corresponding with A^1 C^1 in the plan. The easements run to a level at the corners A and C; likewise at the top and bottom, where they join the base.

In Fig. 3 the dotted line a^1 c^1 is the stretchout of the circular part of the front string. The distance a^1 d^1 on this line is the length from a to d on the circular plan. The width of the treads is marked on the stretchout line in the same way as in the plan above described. From this ground line the elevation of the front string is constructed. In this elevation the distance from a^2 to c^2 represents the circular part of the striug, the straight part being shown complete in a^2. The dotted line B^1 A^1 in the plan is the stretchout of the wall string from A to B. In the elevation constructed from this line the space A^2 to B^2 is the circular part of the wall string, the straight part at the top being shown complete and the straight part at the bottom being shown only in part.

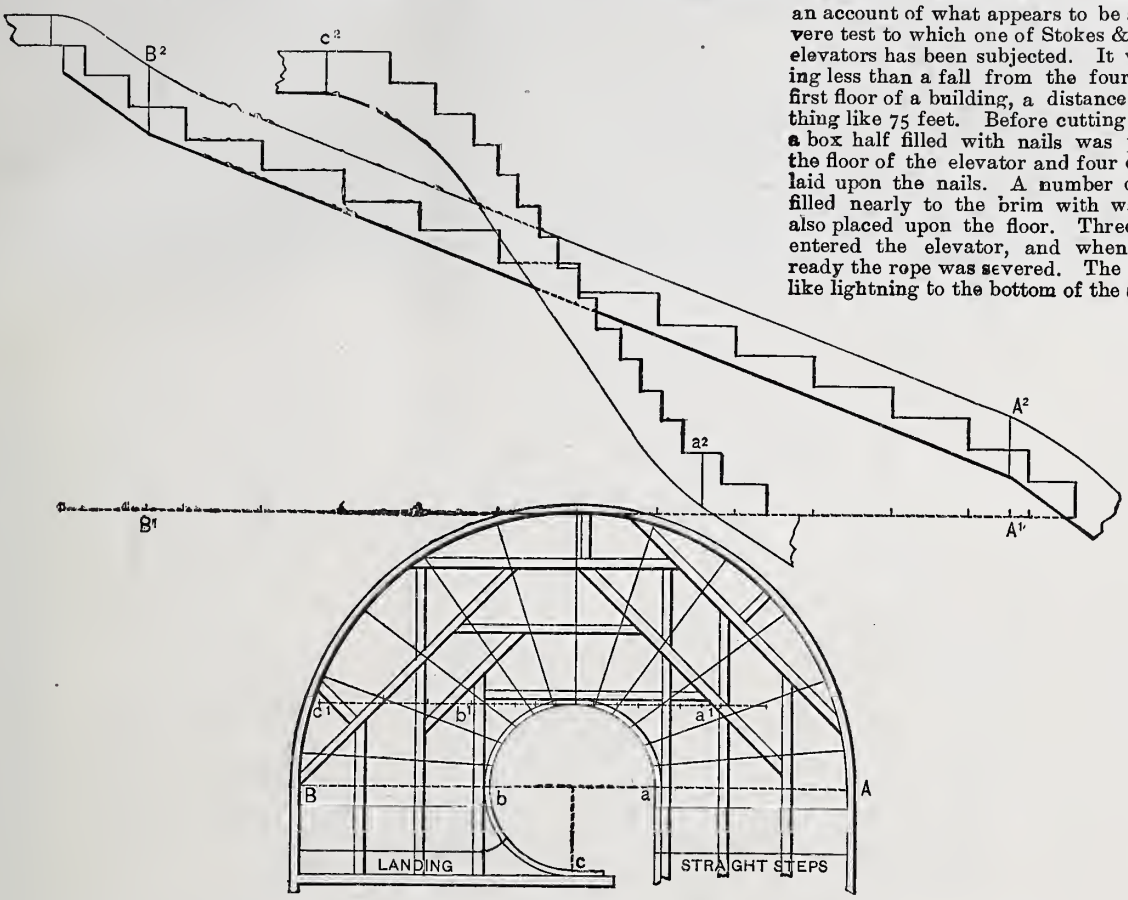
Small cylinders are generally made of staves, with the grain of the wood running vertically, in the same manner as described in our last paper. When, however, it is desired to have the grain of the wood parallel with the striug, it may be done as follows: The front strings are first made according to the elevation, as shown in Figs. 1 and 3. The steps and risers are not cut out, however, until after the string is otherwise fluished. The circular part is then bent over a form by cutting away sufficient

wood from the back, leaving the front so thin as to bend easily. After the back has been bent, as shown in Fig. 2, it is filled with vertical staves, all nicely fitted and glued to prevent the cylinder from springing back by the shrinkage of the staves. Common staves are afterward cut in crosswise of the joints, in which keys are fastened, as shown in the engraving. Staves, in the construction of a small cylinder as we have just described, are always made long enough to extend over the width of the spring itself for the reception of screws, by which the entire work is held in place upon the form. After these ends have served their proper purpose, they are trimmed off to the proper shape.

Circular wall strings may be steamed and bent over a form. This method makes the best work. The common way, however, is to cut the back of the string vertically with a dado plane, making the cuts from 1 to 1½ inches apart. These cuts are afterward filled up with keys in the manner shown in Fig. 4. After the keys are glued in and trimmed off, then strips of wood are glued and nailed on to each edge of the string, as also shown in the engraving. These strips serve to strengthen it very much, and also prevent its springing back when it is taken off the form.

Steps and risers may be laid out upon the strings with a pencil before bending, but they must not be marked with a knife until the string is taken off the form. The reason for this is manifest. The least parting of the fiber on the surface of the board when it comes to be bent would cause a very considerable rupture in the material of the string, thus unfitting it for use, if not breaking it outright.

In cutting the step and riser housings of the wall string, a margin of 1 or 2 inches on the lower edge of the string should be left uncut until after it is placed upon the wall. The reason for this is also apparent when the nature and shape of the work are taken into consideration. After the strings are in position, the housings may be easily completed by sawing from the margin into the cut already made and removing the material with a chisel.

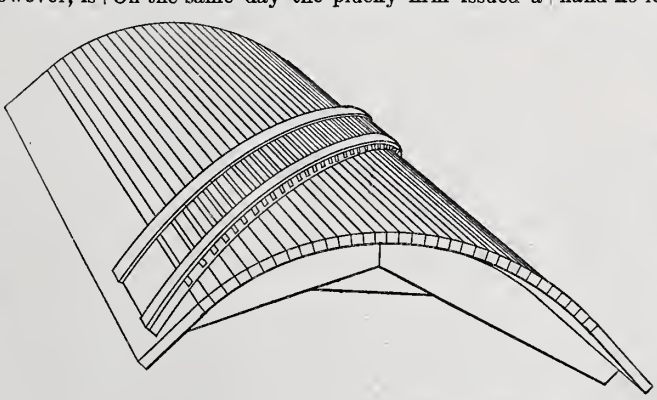


Winding Stairs.—Fig. 3.—Plan of a Flight of Stairs in which the Winders Form a Semicircle, with Elevation of the Strings.

NOTES AND COMMENTS.

The Design Competitions.—Even at the early day at which we are obliged to go to press, we have begun to be in receipt of designs coming in on the first of the three competitions advertised. From present indications the reponse is likely to be a very favorable one, and one from which our readers will derive many plans of a very desirable character.

Richardson's Saw Works, of Newark, N. J., were burned on the 11th of December. On the same day the plucky firm issued a card to their patrons saying that their tempering department and a large stock of seasoned wood for handles were uninjured; that their engines and grinding department were but slightly damaged, and that in a week or two they would be in operation. All their account books, save only their order books, are safe. They ask their customers to send them duplicates of orders. They intend to increase their capacity when rebuilding. The fire occurred early in the morning on one of the coldest days which we have had this winter, and on this account great difficulty was found in handling the fire apparatus, the amount of loss being thereby greatly increased. They were peculiarly fortunate, however, in saving their seasoned wood, as a stock of this kind destroyed takes considerable time to replace. The firm make a good saw, and we are glad to see that they are not at all dismayed by their misfortune.



Winding Stairs.—Fig. 4.—Form Over which to Bend the Strings.

Testing an Elevator.—We recently read an account of what appears to be a very severe test to which one of Stokes & Parrish's elevators has been subjected. It was nothing less than a fall from the fourth to the first floor of a building, a distance of something like 75 feet. Before cutting the rope, a box half filled with nails was placed on the floor of the elevator and four eggs were laid upon the nails. A number of glasses filled nearly to the brim with water were also placed upon the floor. Three persons entered the elevator, and when all was ready the rope was severed. The cage shot like lightning to the bottom of the shaft, but without injury or jar to those inside. The eggs were not cracked, and not a drop of water in the glasses was spilled. This result was accomplished by the use of what is called the Ellithorpe Safety Air Cushion, which consists simply of the elevator shaft made air-tight for 20 feet from the bottom. We learn that Messrs. Stokes & Parrish are at present very busy on orders, having in hand no less than nine elevators for Detroit alone. Several large orders are in progress also for Philadelphia and other cities.

Millionaires' Houses.—It is said that the four dwellings now going up for the Vanderbilts in New York are to be the finest houses in the country. Although the architect has had six draftsmen at work on the plans for W. H. Vanderbilt's house for a year, the details for the inside have not yet been considered. A plaster model 10 feet high for the Fifth avenue side of this house was prepared before a single stone was laid. The tiling of the ground floor is to be made by the poet decorator Morris, of England, at an expense of $30,000. The *Crockery Trade Journal* says: "We have thought seriously of building some such habitation as the above described, and will do it when we collect enough wampum. We have decided, however, that the architect who draws the plans this side of A. D. 1900 loses the job. The floor must be tiled with brickbats that were made without straw by the children of Israel; and if we can't have the under lip of the Sphinx for a mantelpiece, we shall end our days in the oven of an eight-day stove." This, we think, all things considered, is a pretty fair architectural criticism.

Saw mills were first used in Europe in the fifteenth century, but so late as 1555 an English ambassador, seeing a saw mill in France, thought it a novelty worthy of special description. It is amusing to note how aversion to labor-saving machinery has sometimes hindered industrial progress. The original method of making boards was to split up a log with wedges. Inconvenient as the practice was, it was no easy matter to persuade English mechanics that it could be done in a better way. The first saw mill was established by a Dutchman in 1663, but the public outcry against the new fangled machine was so violent that the proprietor was forced to decamp with greater expedition than ever did Dutchman before. The evil was thus kept out of England for several years—or, rather, generations—but in 1768 an unlucky timber merchant, hoping that after so long a time the public would be less watchful of its own interests, made a rash attempt to construct another mill. The guardians of the public welfare, however, were on the alert, and a conscientious mob at once collected and pulled the mill to pieces.

Natural Forms in Wall Paper Designs.—The task of producing a good wall paper pattern is not an easy one, and the labor is greatly increased when an attempt is made to copy natural forms, and it is especially difficult to design natural flower and leaf patterns, to be repeated on a large surface, without having them, when a large surface is covered, develop lines either straight or curved which are altogether unexpected and not always desirable. Sometimes otherwise desirable patterns are ruined in this way. The faults are not usually discovered until the blocks are made and the paper printed. In spite of the fact that flowers and vines do not give, in all respects, the best results when used as wall decorations, it is true that the best designs of the day are largely composed of flowers and vines. They are not, however, strictly imitations of nature. They have the characteristics, but are not slavish copies. Many of the best papers show them upon backgrounds formed of regular geometric patterns. These are often the most successful of all papers, because, while giving the regular background to support the whole, as we may say, the vine climbing about the other ornament relieves what might otherwise become monotonous.

The seating capacity of churches in America is small compared with that common in Europe. St. Peter's Church at Rome will hold 54,000 persons; St. Paul's at Rome, 32,000; St. Paul's at London, 35,600; St. Petronio at Bologna, 24,000; Florence Cathedral, 24,300; Antwerp Cathedral, 24,000; St. Sophia's, Constantinople, 23,000; St. John Lateran, 22,000; Notre Dame at Paris, 20,000; Pisa Cathedral, 13,000; St. Stephen's at Vienna, 12,400; St. Dominic's at Bologna, 12,000; St. Peter's at Bologna, 11,500; Cathedral of Vienna, 11,000; St. Mark's, Venice, 7000; Spurgeon's Tabernacle, 7000.

NEW PUBLICATIONS.

Practical Hints for Furniture Men. Published by the *Furniture Trade Journal*. 108 pages. Price $1.

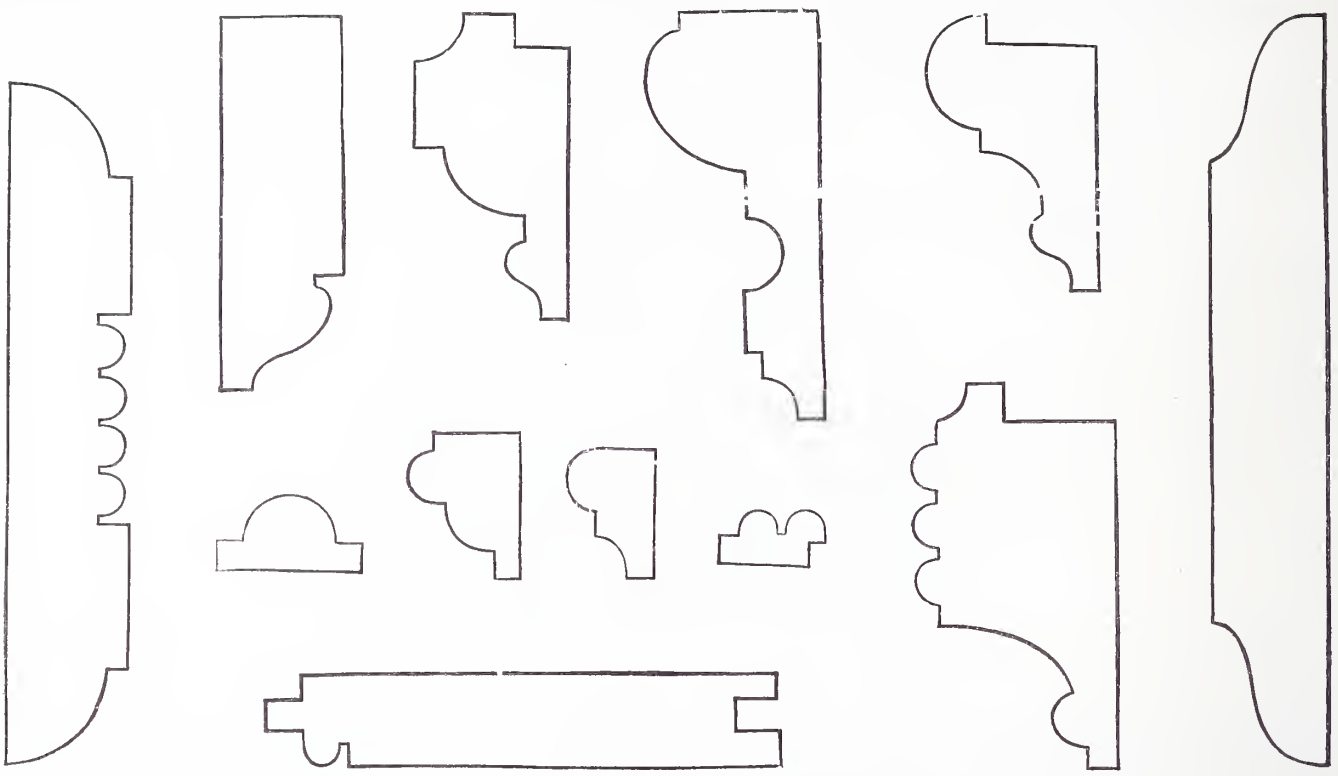
This little work is filled with useful information concerning the finishing and filling of wood, the application of varnish, staining and dying, gilding, graining and glue. Though nominally intended for furniture men, it is valuable to all carpenters and cabinet makers—in fact, to any one who has anything to do with the finishing of wood. It was evidently compiled and published with the intention of putting as much matter as possible into the smallest practicable space. It is not padded in any particular, and at first sight is liable to deceive on this account. So far as we have looked over the recipes and directions given, they are all of a practical character and are apparently from the note books of men who are in the habit of using them.

The Carpenter's Steel Square. By Fred. T. Hodgson. New York: Industrial Publication Co. Price, 75 cents.

This little work of 68 pages is a compilation of various articles written from time to time by the author, together with two articles which appeared in the *Scientific American Supplement* from Mr. John O'Connel and Wm. E. Hill. Fifty pages of memorandum paper are bound in the back of the book, for the purpose of making notes and pasting in any scraps that may bear upon the carpenter's work. The work is especially intended for all those who have to use the carpenter's steel square in any form. In the first half dozen pages the author has made liberal extracts from the columns of *Carpentry and Building*, which in the minds of our readers will probably be a sufficient recommendation of the book. Although the amount of matter is small, yet the number of cuts and the conciseness of language make it equal to many works of much larger proportions. In the 68 pages of letter press we find no less than 42 rules laid down and explained. In doing this more than 50 woodcuts are used.

Modern Architectural Designs and Details. To contain 80 lithograph plates, showing new and original designs of dwellings of moderate cost in the Queen Anne, Eastlake, Elizabethan and other modern styles. Complete in 10 parts. Part Third. New York: Bicknell & Comstock. Price, $1.00 per part.

The third number of this work reaches us just as we go to press. A hasty examination of its pages indicates that the standard of excellence established in the first two numbers is being fully sustained. The principal contents of this part are as follows: Six elevations and three plans of cottages in Queen Anne style, costing from $500 to $1500 and upward, according to locality; two designs and details of summer houses; perspective view, three elevations and plans, together with framing plans and details of a house suitable for the seaside, a summer resort or a Southern residence; and nine designs of window sash, Queen Anne style.



Examples of Cabinet Moldings, from the New Catalogue of Messrs. C. Graham & Sons, New York.

The Open Fire-place in All Ages. By J. Pickering Putnam, Architect. Written for the *American Architect and Building News*. Illustrated by 269 cuts, including 36 full-page plates; 202 pages. Boston: James R. Osgood & Co. Price, $2.

Of the 202 pages, 72 are occupied by the full-page cuts, while the remaining 230 illustrations are distributed through the reading matter. Taken altogether the book is an exceedingly handsome one. The plates are from a variety of sources, and are, without exception, well printed. Many of them are beautiful reproductions of larger engravings. Mr. Putnam's own drawings are very beautiful, and as a draftsman he certainly ranks easily in the first-class. Several of the cuts we note are reduced from those which appeared in the *American Architect and Building News*. The historical examples collected and put in convenient form are very valuable, and no one interested in this subject can go through the book carefully without gaining much information of what has been done in the past.

When we come to the reason for making the book, we are somewhat disappointed to find that it is largely dependent upon a passing fashion. At the present time, it is the whim of fashion to have fire-places in nice houses; hence this work. As a means for heating, the fire-place may be classed as a

barbarism, unscientific in principle, defective in method and operation. To combine heating with ventilation as a part of the same system, is certainly a grave mistake in any case where there are means available to do the work in a proper manner. If we would have comfortable and healthy houses, we must, during the cold weather, keep floors and walls warm, while the air which we breathe remains comparatively cool. To attempt to heat, by means of the fire-place, the walls and floors of a room, is a thing so wasteful that even our richest people shrink from the task. When warming or heating by means of warm air is undertaken, it is vastly easier and more economical to resort to some of the thousands of different kinds of heaters to be found in our markets, than to use any kind of fire-place. When the walls and floors of a room are kept at the same temperature as the human body, the question of warming the air necessary for thorough ventilation is an easy problem to solve. Ventilation then may become both extensive and thorough in its character. To gravely propose the introduction of a fire-place into every room in a house, making it a part of the heating apparatus, seems to be a most unscientific thing, if we consider the infinite amount of dirt, annoyance and waste which it occasions. Of the fire-places illustrated in this book, it would seem that there are scarcely half a dozen which are safe to place in a room containing fine works of art. Most of the fire-places shown are of such a design as to make smoking inevitable. The author has several plans of his own for converting an open fire-place into a kind of heating furnace and pouring hot air into the room, or warmed air, as he would call it. We think we should hardly wish to adopt the apparatus under any circumstances when any other means for heating could be employed.

The use of the metric system in all calculations and experiments, as well as in making many, if not all of the sketches, prevents the work from being of any real value to practical men whose measures are all divided into feet and inches, and whose tables and books of reference are intended for use of feet and inches. The inch divided into tenths would have given greater facility for calculation, and made the work of some value to the workman.

In the numerous drawings and sketches from Mr. Putnam's own hand, we find a number of most delightful suggestions for interiors, methods of treating rooms, and the construction of mantels and mantel shelves. In these Mr. Putnam is, without doubt, deservedly successful, and we hope that he will find time, in the future, to give the world something more elaborate in this line.

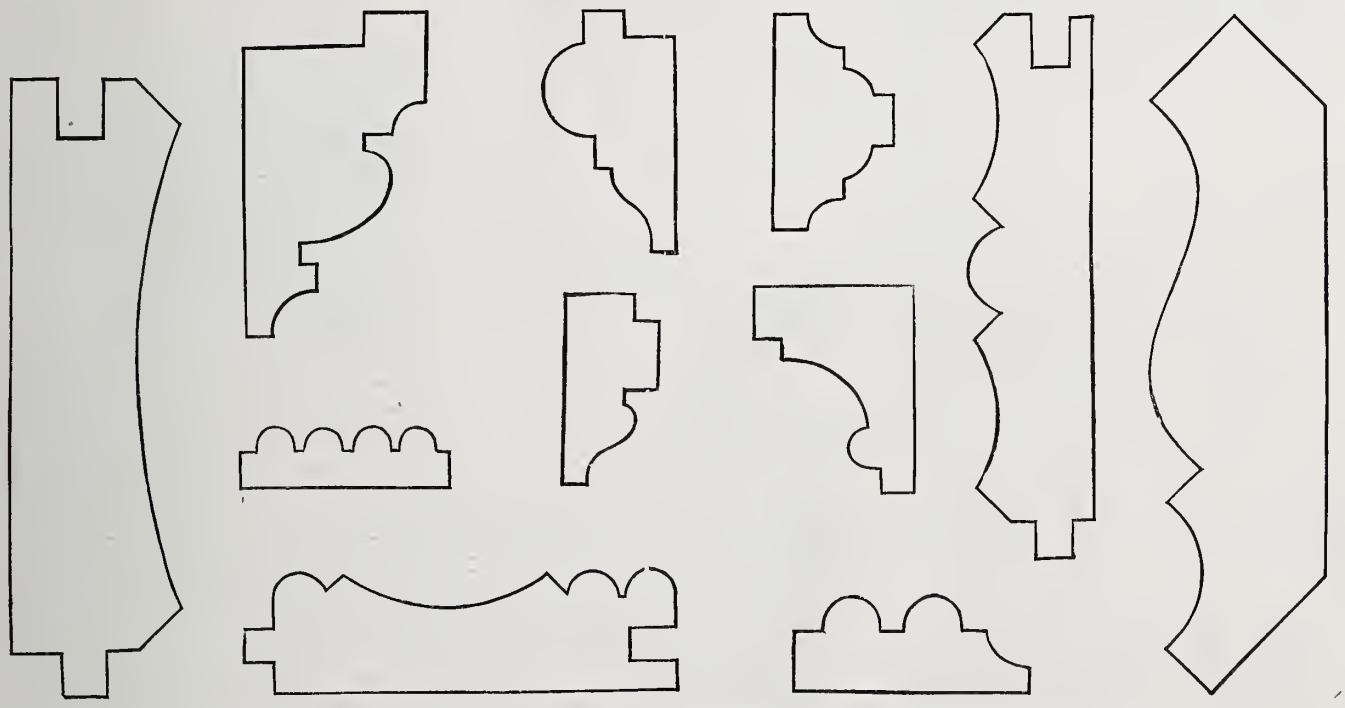
The Workshop Companion. By Dr. John Phin. 160 pages. New York: Industrial Publication Co. Price, 35 cents.

This is a collection of useful and reliable recipes, rules, processes, methods, wrinkles, and practical hints intended for the shop and the household. It is, in fact, a miniature cyclopedia. The work has been prepared with very great care, and the chief aim of the compiler has been to give recipes which would not disappoint those who attempted to use them. There is a short section on wood polishing, in which there are many practical directions for finishing wood by the method known as the French polish. There are three or four pages devoted to the staining of wood, in which we find some excellent recipes and some directions which are valuable to those wishing to produce imitations of various woods. Had the object of the publisher been to make as large a book as possible, it might easily have been expanded to twice or three times its present size. A very complete index makes the information easily accessible.

Historical Studies of Church Building in the Middle Ages. By Charles Eliot Norton. New York: Harper & Brothers. Price, $3.

In one sense this book may be described as a study of architecture from a historical standpoint. It is true that architecture in general is not under consideration—only church edifices are taken into account—but when it is remembered that the earliest development of the art of building, in all countries and under all conditions of civilization, is in the direction of more imposing temples, it becomes evident how important a division of the subject this author has undertaken. The development and progress of architecture in the Middle Ages is particularly one of church building. At the commencement of the first chapter of the work before us the author says: "The completeness of the wreck of ancient civilization in Western Europe during the centuries that followed the fall of the Roman Empire, is indicated by the degradation of all the arts of expression. As one light of ancient civilization after another was extinguished, the habits of culture, of which these arts are the manifestation, disappeared." Further on we read: "But this period of disintegration and dissolution was one of preparation for the reorganization of society upon new foundations. The old structure must be destroyed that the new might come into existence. * * * No precise date can be fixed for the awakening of the arts in the Middle Ages. The dawn was gradual, and broke earlier in one region than another. * * * It was especially in the building of churches that the impulse for expression in architecture displayed itself, for it was in the church that the faith of the community took visible form."

From an introduction, some idea of which may be derived from the above extracts, the author proceeds to a consideration of his subject, dividing it into three general parts—Venice, Siena and Florence. To the student of history this work is of great interest, while to those who are familiar with architecture—especially to those who have heretofore studied it merely from the scientific or mechanical side, and who yet are interested in historical matters—it is especially interesting. The book is without illustrations, and in this particular we think an opportunity of making a remarkably handsome book, as well as an unusually valuable one, has been lost. The style in which it is written is calculated to make the work very entertaining. We have no doubt that many among our readers will find this book a desirable addition to their libraries.



Examples of Cabinet Moldings, from the New Catalogue of Messrs. C. Graham & Sons, New York.

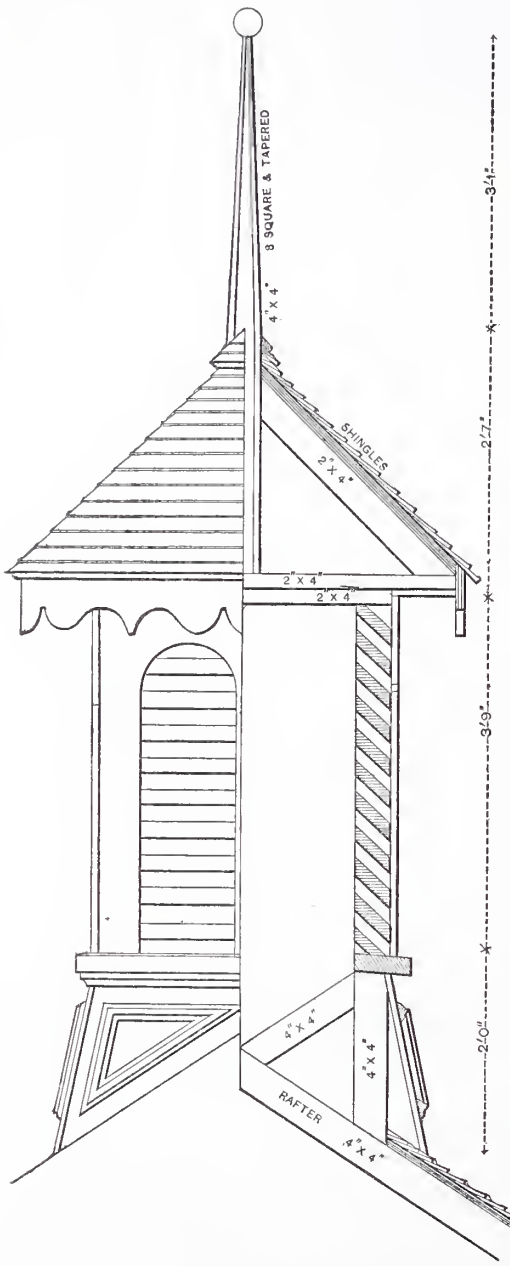
CORRESPONDENCE.

Carpentry and Building in the present number enters upon its third annual tour among the workshops, offices and homes of its readers. It begins its long journey in the best of spirits. It is flattered with its success at pleasing in the past, and feels sure, therefore, of a cordial welcome wherever it may call in the future. It presses forward with the avowed determination of being still more attractive, and, if possible, still more useful to all those with whom it may stop while on its travels. But in the future, as in the past, it will not be able to attain its full measure of usefulness without the hearty co-operation of all those whom it visits. At the outset, therefore, it asks every one to be ready and willing to lend a helping hand whenever occasion presents. The "Correspondence" department is a most important feature, and should be fostered and encouraged over the signature of every reader. Your assistance is earnestly solicited. With its best bow, *Carpentry and Building* wishes its readers, one and all, a prosperous and happy New Year.

We have no doubt our readers generally will enjoy what has been facetiously called

"Wood Butcher's" oyster supper, to an account of which considerable space in this number is devoted. A little fun at this season of the year is quite enjoyable, even to the readers of a practical journal like this, and more particularly so when there are mechanical allusions in many of the jokes, as in this instance. The poet of the occasion, after his remarkable effusion, is still able to present a very interesting exposition of the principles which underlie "Hopper Bevels," as may be seen by his letter on page 18.

We omit all letters and communications with reference to the steel square in this number of the paper, on account of pressure of other matters. We have no doubt that many of our readers have looked forward to further letters on this subject in this issue



Cupola for Small Barn.—Fig. 1.—Elevation.—Scale, ½ Inch to the Foot.

To all such we desire to say—possess your souls in patience until future numbers, in which the discussion of this most useful instrument will be continued. Meanwhile, we still solicit letters from our practical readers on this topic.

Design for Cupola.

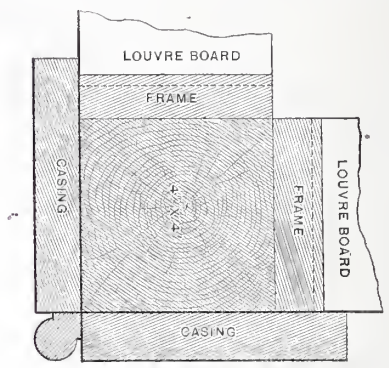
From J. R. R., *Raymore, Mo.*—I send you herewith a sketch of a cupola suitable for a small frame barn or stable, and which in construction is adapted to using the same materials as employed in the erection of the building. A description of the design is unnecessary, as everything is clearly shown in the drawings. Fig. 1 shows the external appearance of the cupola, together with the framing. Fig. 2 shows details of the corners.

Calculating the Bearing Strength of Timbers.

From G. M. ALVES, *Henderson, Ky.*—Concerning the strength of ordinary building woods, Mr. Kidder, in the October issue, claims that there is a very great difference, and, in proof, offers a table of constants of woods compiled partly from his own experiments and partly from the results of others, and believes the table "to be as correct as our present knowledge of the strengths of woods will permit." The act of offering a list of constants in these terms naturally implies the claim of authority. Now, it is no discourtesy to Mr. Kidder, but proper under the circumstances, before accepting him as such, to compare his constants with those of other writers who have investigated the subject, and who have been commonly looked upon as authority. Just here I wish to say, in answer to Mr. Kidder's complaint, that yellow pine occupies as prominent a place in the common tables as any other wood, with probably the exception of oak. Mr. Kidder makes in his letters two constants more prominent than the rest, viz.: yellow pine and hemlock; to the former he gives 720 pounds transverse strength, and to the latter 380.

It is safe to say that Trautwine, Haupt and Vose have been more accepted as authority by American engineers than all other writers combined. Trautwine gives to yellow pine 500 pounds transverse strength, and to hemlock 400. Haupt, in his work on "Bridge Construction," says: "The writer found, in the course of experiments already referred to, that when white pine, yellow pine and hemlock were subjected to 1500 to 1800 pounds continued for 16 days, the pieces did not recover their shape upon the removal of the weights; and, in practice, he has not considered it safe to assign more than 800 pounds as a permanent load, and 1000 pounds as an accidental load." Thus, it will be seen that, in practice, he gave equal values to the constants for white pine, yellow pine and hemlock, and this, too, under the guidance of what he considered very careful experiments. The above strains of 800 and 1000 pounds, when referred to the usual unit of 1 square inch section and 1 foot between supports, with the load in the middle, would give respectively about 44½ and 55½ pounds weight.

Vose, in his "Handbook of Railroad Construction," uses only one constant for the transverse strength for all woods. This I consider too general and not approximating as close to precision as the case will admit of, and yet Vose has been our standard authority in railroad construction.



Cupola for Small Barn.—Fig. 2.—Detail of Corner.—Scale, 3 Inches to the Foot.

Tredgold, in his treatise on cast iron, makes the constants, within the elastic limits, for white fir, yellow pine and oak, to vary not more than 10 per cent. Barlow gives, in his report to the Commissioners of the Navy, Canadian oak about 600 pounds transverse strength, and his constants for English oak, pitch pine, red pine, Christiania deal and Memel deal do not vary from this amount more than 10 or 12 per cent.

No well-informed civil engineer or architect will question the respectability of the names cited above. The foregoing citations from them would not induce one to make a great difference in the constants for the woods commonly used in engineering and architectural construction. I infer from Mr. Kidder's letters, if he does not say so, that he selected superior yellow pine for his experiments. Trautwine tells us that his constant of 400 for hemlock is but an average, for he says: "The variation in the strength of equal beams of the same material is so great that it is necessary to experiment with several pieces in order to find an average for a constant. The actual strength of any particular specimen, if of superior quality, may be considerably greater than the average, or, on the other hand, if of very poor quality, may fall as much below. We should always have this in mind when referring to a table of constants." Had Mr. Kidder experimented with hemlock, and in so doing used as superior specimens as he did of yellow pine, it is probable he would not have made so great a difference.

There is another consideration more important than the mere breaking strengths of material that should govern our assigning the constants, viz., the resistance of the material within the elastic limits. In fact, when these limits are reached, the real strength of the material is reached, for should they be passed, the beam may be said to be slowly breaking and will in time rupture. Now, we have no assurance that the elastic limits for all woods are in exact ratio to their immediate breaking strength; indeed, experiments would seem to teach us otherwise. Trautwine's experiments within the elastic limits give the same constant for white pine, ordinary yellow pine, spruce,

good straight-grained hemlock and ordinary oaks. I have already referred to Tredgold's and Haupt's constants, which show but slight variation for different woods, and which were obtained within the elastic limits. It will thus be seen that the constants for woods within the elastic limits are even more nearly uniform than the constants for breaking strength.

In view of all the foregoing references and considerations, and others not here mentioned, in an article on the strength of woods in the June issue, page 109 of *Carpentry and Building*, I made two divisions of the ordinary building woods—hard wood and soft wood. These were again subdivided into good and superior, and values were then given to the four subdivisions. In my humble judgment, a more extended and particular division for ordinary practice would savor of a valueless and affected nicety. For unusual practice and bold designs, as I before said in one of my letters, constants should be obtained from the material in hand. Should it be asked in regard to the soft woods, for instance, and for ordinary practice, why not take a constant for each wood and then estimate for quality? it may be answered that the different average constants do not differ sufficiently to account for them, and that if we take their average strength and make the proper allowance for safety it will be sufficiently safe for the weaker woods, and the little excessive material in the stronger will be too slight to be of consequence.

All of the foregoing evidently leads to the conclusion that there is less difference in the strength of woods used in construction than is frequently supposed. This should be taken, however, for the average of different varieties, and not for different qualities even of the same variety. Of two trees of distinct species, but of the same size as to trunk and hight, and growing side by side on an exposed situation, and consequently made to offer the same resistance to the elements, it is reasonable to suppose that in that perfect economy of nature which we continually see around us, both of these trees have in their growth assumed such a texture as to effectually resist the elements, and by that same law of economy, that neither will attain a much greater strength than was necessary for this purpose. To some, such reflections may seem to border too much on theoretical philosophy to apply to the pursuits of practical industry, but our best ideas in mechanism have been drawn from suggestions of nature—at any rate, the suggestion is of service in confirming experimental facts. Again, of two trees of the same variety, the one growing as above, and the other in a low and sheltered situation, it is reasonable to conclude from the same law that, comparitively, the wood of the first would be strong and the other weak. Indeed, this is a well-established fact, and accounts in a great measure for the large difference made by different experimenters on the same variety of woods. We henco may conclude that the quality of the wood has more to do with its strength than its variety.

Concerning the term "modulus of rupture," I frankly confess I mistook its meaning. If, through my ignorance, I thought Mr. Kidder was using a big word when a little one would have been better, I ask his forgiveness. The term, "modulus of elasticity," is one very frequently employed, but if I had ever seen the term "modulus of rupture," I had forgotten it. I find, upon reference, that some authors use it to find the transverse strength of beams other than rectangular. Take the usual form of the equation for the strains in a rectangular beam supported at each end and loaded in the middle:

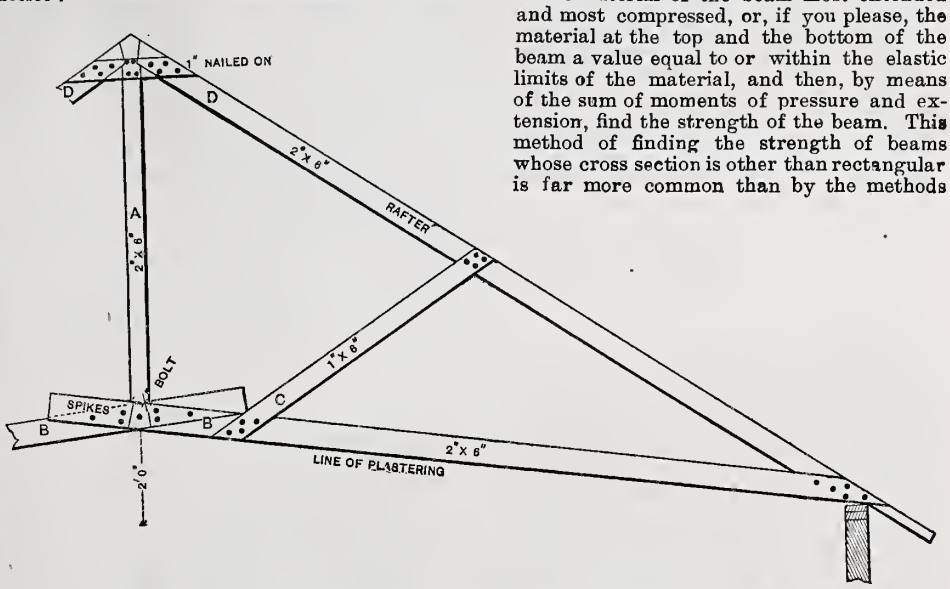
$$R = \frac{3\ l\ W}{2\ b\ d^2}$$

In which R represents the strain per square inch at the top and bottom of the beam, due to the weight W, and l, b and d respectively the length, breadth and depth of the beam in inches. Make $l = 1$ foot, b and $d = 1$ inch and W = the breaking weight, and we will have

$$R = 18\ W.$$

in which R is Mr. Kidder's modulus of rupture. I was partly led into my misunderstanding from the fact that Silliman and some others estimate the transverse strength from the tensile strength; and partly from Mr. Kidder's easy and familiar manner of presenting the subject to the uninitiated, and could not suppose he would use a term that would be as foreign to their comprehension as it is was foreign to rectangular beams—a term in which connection means in substance: 1. Find by experiment the transverse strength of the wood. 2. Multiply this transverse strength by 18 and we have the modulus of rupture. 3. Divide this modulus of rupture by 18 and we have the transverse strength. *Mirabile dictu!* This *modus operandi*, I admit, is somewhat circular, but Mr. Kidder's modulus of rupture would best have been thus translated, that everbody could understand him. At the risk of being thought a little captious, I would further suggest that the whole thing could have been somewhat simplified if Mr. Kidder had said that the way "different persons, prominent among whom are Barlow, Tredgold and Hatfield," found the transverso strength of wood was by—breaking it.

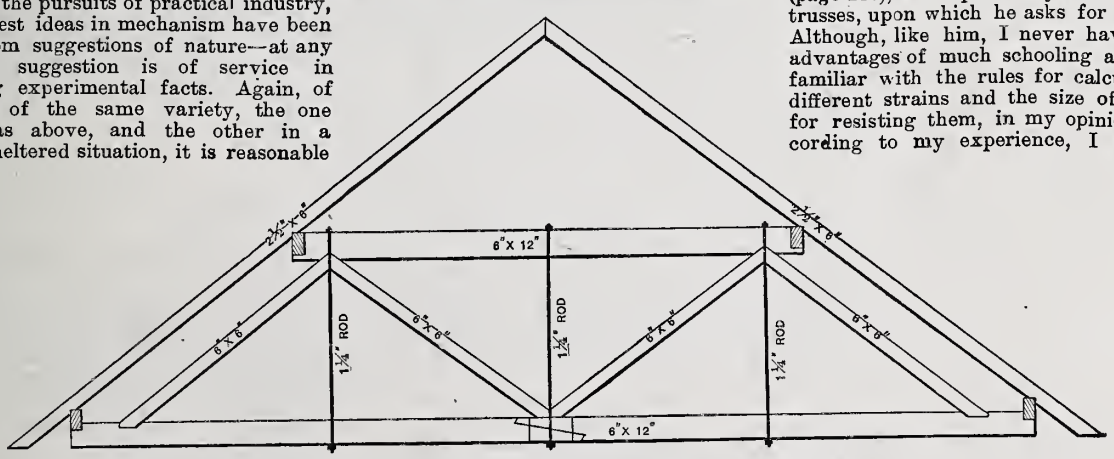
The modulus of rupture would be useless and unknown were it not for the fact that beams are used other than rectangular. Its use, even in this respect, has the same objection that the mere breaking strength presents for rectangular beams. It is a well-known fact that within the elastic limits the resistance of any given material to extension is equal to its resistance to compression. It is also agreed that no material should be subjected to loads that will cause the strain to pass the elastic limits of the material. Hence it follows that, in order to find the strength within these limits of any beam of whatever cross section, all we need to do is to give to that portion of the material of the beam most extended and most compressed, or, if you please, the material at the top and the bottom of the beam a value equal to or within the elastic limits of the material, and then, by means of the sum of moments of pressure and extension, find the strength of the beam. This method of finding the strength of beams whose cross section is other than rectangular is far more common than by the methods of the modulus of rupture, and, in my judgment, for the reasons given above, much more philosophical.



Roof Truss Contributed by J. R. R.—Scale, ¼ Inch to the Foot.

Roof Trusses.

From J. R. R., *Raymore, Mo.*—As an interested reader of *Carpentry and Building* I have noticed a communication of W. A. W. in the November number of the paper (page 216), accompanied by sketches of roof trusses, upon which he asks for comments. Although, like him, I never have had the advantages of much schooling and am not familiar with the rules for calculating the different strains and the size of materials for resisting them, in my opinion and according to my experience, I would say that it seems to me there is a weak point where the splice is made in the center, as indicated in Fig. 1 of his sketches. The truss does not seem to me to be strong enough to resist the tensile strain that would come upon it in carrying the load that other parts are sufficiently strong to sustain. My improvement on this truss would be to make a splice of a different kind, using longer timbers and bolting them together. Accompanying this letter I send you a sketch of my way of framing church and other roofs where the span is not over 50 feet, which I should like to have criticised by practical and experienced builders. It will be noticed



Roof Truss Contributed by W. V. H.—Scale, ⅛ Inch to the Foot.

that each set of rafters and ceiling joists constitute a truss in themselves. They are placed 2 feet between centers. In the accompanying sketch A is the upright post, dovetailed at each end, the rafters D D being cut to fit against each side at top, and the ceiling joist B to lap past each other at the bottom. The ceiling joists are halved out to fit the dovetail below the brace. The brace C is made of 1½-inch stuff nailed on. By this construction it will be seen that the ceiling can be made level across or give any desired raise in the center. I think the sketch will make the plan of the construction sufficiently plain without further particulars.

From W. V. H., *Sandy Grove, N. C.*—I inclose you herewith a diagram (see preceding page) representing a roof truss, which you may publish if you think it of sufficient merit. This truss has been quite extensively employed in this locality, and has given entire satisfaction. The top purlins are mortised on the ends of the cross cap. The lower purlins are bolted to the tie beam. The rafters are notched against the purlins and thoroughly nailed. I don't think it necessary to particularize further, for the sketch is self-explanatory.

W. B.'s Fellow Contributors Meet Him on the Level Part of the Square.

When we published "Wood Butcher's" invitation to the contributors of *Carpentry and Building* to a Christmas oyster supper at his house, it was to be supposed, of course, that both the supper and the speeches which would naturally follow were to be genuine. At least, such would be a fair presumption under the circumstances. Long before Christmas, however, the mail began to bring letters from our friends containing reports of the sayings and doings at "Wood Butcher's" house, and at this writing, with Christmas more than ten days off, we find ourselves in possession of materials for a complete report of an oyster supper which has not yet taken place, including the oratorical efforts of those who were invited to be present. The whole matter, we must say, wears an exceedingly unreal character. However, it is all much too good to be lost, and accordingly we give below a connected account of the affair, as we have gathered it from the letters we have received. To our readers it will, no doubt, be even a greater surprise than it was to us, and their comment, like our own, will no doubt be, "too good to be true."

THE ADDRESS OF WELCOME.

The following comes to us unsigned, but we recognize the handwriting as being the same we have learned to credit to the little granddaughter. So we suppose she must have helped the old gentleman in the preparation of an address for the occasion.

My Friends: In the heartiness with which I welcome you beneath my roof there is no "backing" I assure you. I welcome you not only with my heart, but with "awl" that is within my "chest." It is "plane" that I must "gauge" my remarks very fine to keep within the "compass" of the time "chalked" out for me, so I will come "square" up to the "line" and do my "level" best. The oyster, the subject I propose to discuss, is one that lies very near my heart. In fact, I may now be properly said to be full of it, and it is in this condition that I find myself best "braced" when I attempt to make a "bit" of a speech. The oyster is an article which I think should be in all correct "board" bills, and I never feel the necessity of guarding my temper more than when there is a prospect of my being "chiseled" out of my share of him. No such "gouging" will ever be submitted to by me. The oyster in his native condition has no "vise," but after his bed has been "ploughed," and he has been raised and had his "frame" "wrenched" apart by an instrument which is neither a "screw driver" nor a "cold chisel," but a cross between the two, he loses his power of resistance, and whether surrounded by good or bad persons sinks to a depth from which he rarely rises; and if he does rise, he receives the contempt of all mankind. Unlike the little busy bee, he is not much of a "builder," though I have heard the old "saw"—as dumb as an oyster—applied to a number of builders. His shell is sometimes made into lime and used in making plaster. After having their "roofs" so unceremoniously taken off by a "cutting thrust," the oysters are thrown on a "bench" and they then "file" down to the "filletster," who drops them "plumb" into one of the products of the "drawing knife"—that is, a little "shave" keg. Though the oyster is not a wild animal, he is frequently a table companion of the "rabbet." The authorities have not yet agreed whether the oyster is an animal or a fowl. I do not believe he is a fowl, for they cannot "hatchet." It "augers" well for the future of natural history that naturalists have recently come to the conclusion that he is not a vegetable. When first taken and "punched" the price "set" on him is low, but as every one who handles him must make a profit, these "adze" make him sufficiently expensive to cause him to be looked upon as a luxury. I regard him as a necessity, though the extortionate "ax" of the venders "rasp" my soul. Often in lying words has such a one "spoke—shave" being his desire, but they are the hardest kind of "shavings" to lie on. I have seen oysters advertised for sale in every "stile," but have never seen them sold under the "hammer." In conclusion, I would say that the oyster is neither an oblong nor a "square," yet he is a perfect "jointer."

SOMETHING ABOUT NOSES.

The following comes to us from D. W. K., of Lockport, N. Y.:

Fellow Craftsmen: The delightful sensations which I have experienced to-day, both physically and mentally, are far in excess of what I had anticipated. I had supposed that W. B., who has contributed so much to the reading columns of *Carpentry and Building*, was simply a myth, a conjuration of some imaginative writer; but one glance at that elongated storm splitter shows that I have been laboring under a wrong impression. But I am digressing, so

Here's to the man with the biggest nose;
Long may he live hereafter
To often tell us what he knows
Of backing a hip rafter.

Here's to the man of silv'ry hair,
Whose sands of life are nearly run;
Who is an oracle on the square,
And ever ready with a pun.

THE JOURNEYMAN CARPENTER GIVES AN ACCOUNT OF SOME HISTORICAL RESEARCHES.

We are in receipt of the following from H. McG., Paterson, N. J:

Gentlemen: I presume I am the only journeyman carpenter present, and it is with great embarrassment that I undertake a few remarks. I have no speech prepared, and yet, I would like to propose a toast to the nose of our honored host: "May he live long to wave and wipe it." I think I speak the sentiment of this company when I say to him that he does not know the appreciation all the readers of *Carpentry and Building* have for him, both as a man and as a father, as an instructor, mechanic and leader, and more especially as a giver of the devil to those who do not make their chalk marks straight. I believe there is no one of us who would not sacrifice anything, even his best mother-in-law to protect that honored nose from frost and harm.

Recent letters which have been published in the paper have induced me to make some historical investigations, and perhaps this is as fitting a time as any for making known the results. The first account of division we have is that of the division of light from darkness. The second is when the waters were divided from the waters. These two divisions are the first mathematical operations on record, and it is entirely probable that neither was made with a piece of chalk or a 2-foot rule. The first mechanical operation of any account was when Cain dwelt in the land of Nod and builded a city. Now, I can't see how a city could be builded without a square. A little more than 1500 years after Adam raised Cain, the Egyptians raised the Pyramids, which never could have been completed without a knowledge of the square. We read that Moses, who was one of the first boss builders, took a contract to build a tabernacle, and that a part of the specification read, "the altar shall be four-square." How could Moses comply with his contract if he had no square? This was at least 500 years before the two Hirams; and here appears my criticisms upon the historical correctness of a recently published letter. It is evident that the writer should study his Bible more and his square less. Further, one of the Hirams was a king, and therefore it is evident he did not know any more about the square than I do about bossing a carpenters' shop, or Andrew Doremus about spelling. Continuing my historical search, I find the record of the building of the Temple speaks of stone squares. It was Hiram, the widow's son, of the tribe of Napthali, who bossed the Temple, and he was a square man, according to the Bible account. From these facts, and from numerous others which I might mention, it is clear to me that our worthy host did not invent the square, which he so handsomely disclaimed a month since, nor did either of the two Hirams. I would not intimate that Hiram, in superintending the erection of the Temple, made the necessary details with the latest patent improved steel square—blade 2 inches by 2-feet; tongue, 1½ inches by 16 inches, all nickel-plated. The fact is, I don't believe he used that kind of a square for that purpose at all. After considerable study of his character, I have concluded that he would have had more sense and would have used a T-square like a Christian.

My investigations in the literature of carpentry show that Peter Nicholson was a nice old man in his day, but then he was like some others—a little too scientific—so wrapped up in science, in fact, that he forgot that all the science and study in the world could not joint a 16-foot plank straight and square without practice. Old Peter in some things has gone just out of sight behind the hill of old fogyism, but if we had in our heads the knowledge he had in his, it is barely possible our hats would be entirely too small. As to the geography part of the case, the other Peter didn't recommend going through a hole to China, but Peter Nicholson did condemn a certain method of backing a hip rafter as unscientific. That is just the difference.

Since I have indulged in some personalities and have addressed myself somewhat critically to our worthy host, it is only proper for me to say, in conclusion, that if I have uttered anything offensive in the slightest degree to any one, I forgive you, and hope you won't do so again. If I have said anything worth remembering, charge it to the excellent spirits of our old friend and host, and if anything foolish, charge it to me. I bid you all good night.

THE POET OF THE OCCASION DESCRIBES THE GUESTS.

The following has reached us, post-marked Concord, Mass:

Just glance at the guests that sit down to night,
At the board of our host, "Wood Butcher," the bright.
That worthy himself stands guard at the dish,
And with a broad shingle will dip what you wish,
Whether oysters on toast, or nectar to sip,
Or the very best method of backing a hip.
He's the squarest of men, with that you'll agree
When you've read the last issue of C. and B.
He's as square as a mallet, that's as square as you please;
He's as square, I am certain, as ninety degrees.

He's as square as a plumb line and level combined;
He's square, plumb and true, and taken out of wind.
He's as square as a door, now don't scoff;
He's as square as a brick with its corners knocked off.
Old Nosey cries out, with a smile on his lip,
"That's worse than G. H. H.'s rule for backing a hip;
It's laid down in the books, don't you know it, my son,
A corner-clipped brick is octagon."
The first on our list is who? Why, G. H. H.*
Just pronounce that last letter to jingle with scratch.

He's the Philadelphia philosopher who borrowed from Bell;
But who Bell copied from J. E. W. don't tell,
Then here's the Paterson journeyman, H. McG.,
The only original who writes for C. and B.

* There seems to be a discrepancy between this account and G. H. H.'s letter further on, which we do not attempt to explain.

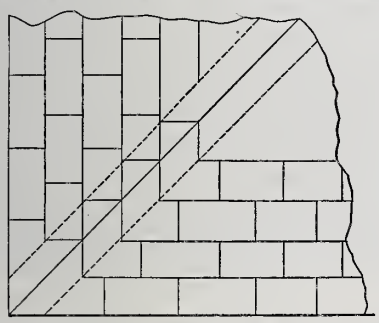
Now Mac, it may or may not be, perhaps,
That originality has killed a great many chaps.
Be that as it may, I'll bet you a dinner,
In a race for your scalp, corn juice is the winner.
So be careful, my boy; mend your ways ere too late,
Or some M. D. will be wanted to mend a hole in your slate.
E. A. C. D., of "clang-lang-slang" fame,
A very short chip, with a very long name.
A. H. T. comes next, of hip and valley renown,
And that phonographer from East Rochester town.
S. D. F. is here, and he thinks, I expect,
That "Wood Butcher's" oysters are "decidedly" correct.
A. M., J. O. B., E W. C., all hopper-bevel men—
They've their hoppers along to scoop the oysters in.
Others are here, whose names I can't tell,
Not to mention myself—the great bore, A. S. L.

We have come from our homes over valley and mountain
To quaff drafts of wisdom at the head of the fountain;
To have a good time and taste "Wood Butcher's" cheer,
But you'll all go to sleep if I don't end this right here.
Then to *Carpentry and Building* let us all wish success:
May the shadow of its subscription list never grow less;
May its well-filled columns go forth through the land
Till every young and old chip has a copy in hand,
And, as Paddy would say, if out on a stave,
"May it live to ate the hen that scratches o'er its grave."

THE DELEGATE FROM NEW JERSEY.

From Andrew Doremus, New Jersey, we have the following:

My Deer Fellough Contributers: It wuz with mutch pleashure that i exepted W. B.'s kine and kordyul invitation 2 this oister sup'r, and I tuk grate kare to be on hand in time and i brot mi mouth with me. Whoever herd of a korrispondent with no mouth. When I fust red the invitation I wuz struk with konsternation, and wuz forsibly reminded of an old serkumstance wich cum very neer preventing me from appeering. Ask ware "Old Nosey" lives? O, no, i deklared i must dekline the invite. That iz a tender spot. Old Nosey, indeed,



Shingling Hips.—Fig. 1.—The Process of Laying.

it rekalled certain rekollecshins, frum which mi sole revolted. No Old Nosey in mine, i wepe yet at the reminisense. Wonce upon a time i was sent to Newerk, Nu Jursey, to see how much bords wuz wurth a 1000 fete, the Boss sed inquire for Old Nosey. i found the bilding akording to plan, and i see an old man comin doun the frunt step with a ten-foot poll on his sholdur and a 2 foot square in his left paw, and like a blasted fool i tuk off mi hat and asked him if he nu where i kould find Mr. Nosey, he didn't tell me, but he immediately insurted the toe of a 15 boot under mi kote tale in a way that razed your humble survent 3 fete, the first bounce. When mi head struk on the kurb stone i saw more of stars, komits, klipses, planets and sich than i had ever dreemed there wuz. Leastwize i never persude any astronomikal studees since. It wuz the brillyuntest site i ever seed or want to. Now it wuz a remindur of this, sugjested bi being directed to inquir fur Old Nosey that kame wel ni preventin mi bein heer with you al this evnin. i feel very greatful indede to our wurthy hoast for the opportunity of makin the akwaintance of awl the people i see around me 2 nite. i am dispozed to do awl in my power to make the ockasion a happy wun, but the time we are to be together is necessarily short, and tho i feel at prezent just as big as i felt when i seed my first letter in print in the C. and B., i feel that i have sed az mutch az i am abel. That i never cood rite and spell you awl could see by mi letter publisht in the papur, but that i am suthin on the speech u wil ol aknoledge hereaftur.

LETTERS OF REGRET.

The following letters of regret from those who could not take part in the Christmas festivities have been received:

From E. W. C., *Randolph, Mass.*—I wish you all a Merry Christmas at Wood Butcher's reception. I regret that I cannot be present.

From J. B. H., *Baltimore, Md.*—I regret very much that I cannot be present at Wood Butcher's oyster supper, for the reason that I might lose something good besides the oysters, which latter would not matter much, as we have oysters here in Baltimore semi-occasionally.

From X. Y. Z., *Springfield, Ill.*—Please convey my regrets to W. B. I know I should enjoy the oysters, and much more the society of those who are to gather there, but time and distance forbid. I shall not be cheated out of the oysters, however. I have invited a few choice spirits, who get their living by butchering wood, to meet me at the same time (allowance being made for difference in longitude) at my house to eat oysters. I therefore hope that in your festivities you will not entirely forget the woodworkers of Springfield, of the Prairie State.

From G. H. H., *Philadelphia.*—I very much regret that I cannot partake of our old friend W. B.'s hospitality. But my time is entirely taken up. I am sorry, for I should be pleased indeed to meet some of my fellow contributors. I am still putting in new teeth to *Carpentry and Building's* saw whenever I get a chance. My best wishes to W. B. and the company.

Shingling Hips.

From S. H. G., *Groton, Conn.*—I have just commenced taking *Carpentry and Building* and am well pleased with all that I have seen. Perhaps some of my brother chips would like my method of shingling regular hips. It is not original with me, but it is the plan which I prefer using. Sometimes it is a real bother to find wide shingles enough, and the old way demands too much cutting. I snap a line 4 inches from each side of the hip, as indicated by the dotted lines in Fig. 1. I bring the corner of the shingle of each course to the line, as shown in the sketch. When all through with the plain shingling, I make a pattern and only cut the top in this manner. The bottoms will break joints every time, and the hip shingles will lay square with the hip, thus making a first-class finish at this important place, with no liability of the shingles curling up. I find that the best plan in using shingles in this way is to shingle the two opposite sides first and then line from one corner to the opposite corner.

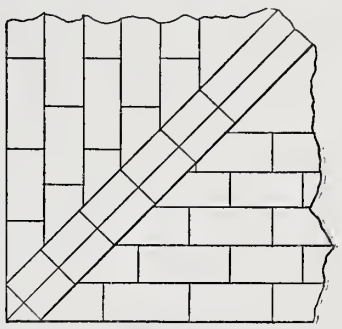
With reference to painting shingles, I would advise that they be painted before they are laid, or else not painted at all. Paint applied to a shingle after it is in position makes a ridge underneath, and water gets under the paint and can't get out, thus rotting the shingles. I have taken off a number of roofs that were destroyed in this way, when other roofs which had been laid quite as long without painting were perfectly sound.

Boys, Study Geometry.

From W. B., *Fort Wayne, Ind.*—From a careful examination of the numbers of *Carpentry and Building* already issued, I notice that some of your numerous readers are posted somewhat on geometry, while others are scarcely at all acquainted with the subject. Geometry is a very important part of a mechanic's education, and should be carefully studied by every one who expects to become master of his trade in all its details. If geometry were better understood there would be no trouble about construoting hip rafters, with all their cuts, bevels and backing. Neither would there be any difficulty about hopper bevels and hand-rail construction; therefore, I advise all who wish to become proficient in carpentry to make a special study of geometry. This should be done, in the first place, during the time of apprenticeship, and then should be followed up as one advances in his trade. If attention is given to this subject from the commencement, it will not be necessary in after years to ask what, to better-informed persons, appear very foolish questions. Should there be any change in this matter of the education of our mechanics—should a majority of them understand geometry—there would soon be a different class of contractors and workmen in the country.

How to Save the Volumes of Carpentry and Building.

From L. E., *Bangor, Pa.*—Take two sheets of pasteboard, such as is desired for cover, 9 x 13½ inches in size; have four strips of paper muslin the length of the boards, and 2 or 3 inches wide; paste one of



Shingling Hips.—Fig. 2.—Appearance of Hip when Finished.

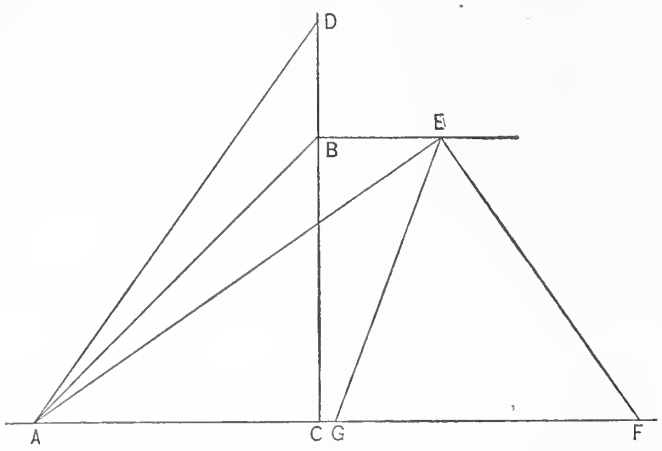
these to each side of one of the long margins of each board, with ¾ of an inch lap. Next take a strip of board a little longer than the paper, and, with the panel plow, make a groove ⅛ inch wide by ½ inch deep. Close one end of this with a nail, and from this measure the length of the proposed book, and divide it for four stitches. At these points make a hole with a small bradawl ¼ inch from the edge and crossing the groove. Insert each number of the paper into the groove with the same end each time resting against the nail; pierce it with the awl through the aforesaid holes. Use one of the papers for a guide, and pierce the pasteboards through the edge covered with the muslin. Have two good waxed threads, each with two needles. Put one pair of needles through the first and second holes, and the other through the third and fourth, all from the outside of the front cover. Equalize the ends and put the needles through the corresponding holes in the first number of the paper. Repeat this until all, including the back cover, are on; drawing the ends will bring each paper to its exact place. Tie each pair in a bow knot. Take two solid strips of wood and place them a little inside the stitches, and put the whole in the vise with all the pressure possible. Draw the ends tight and tie in a hard knot. Cut off the edge of one of the inner pieces of muslin so that it does not quite reach the opposite side of the back, and paste it down on the back edges of the papers; then cut off the other inside one the same way and paste it on the last, and so on alternately until all are down. Then shift the volume in the clamps until one of the edges projects a sufficient distance; screw tight, and with a sharp drawing knife the edges can be cut reasonably clean. I have succeeded well with a good spoke-shave. Repeat this until the three sides are done. If the screw of the vise comes in the way, the clamps may be held by an iron bolt used temporarily for that purpose.

Thanks Returned.

From H. H., *Red Bluff, California.*—I desire to return thanks, through *Carpentry and Building*, to C. H. R. and others of your correspondents for information with regard to the construction of wire screens for doors and windows. I have already put to use the plan shown by C. H. R., and represented by Fig. 3, page 197 of the October number, and find it to be a very neat and very suitable construction.

Hopper Bevels.

From OLD MAHOGANY, *Chicago.*—What brand are you going to put on W. H. C.'s rule for hopper bevels on page 196, October number? I was quite pleased with it at first because it was so simple, but the more I though over it the more I felt that there was a screw loose somewhere. I inclose two sketches drawn by his rule. The first one is drawn to give the side of the hopper an angle of 45 degrees, which is shown by the line A B. According to his formula C D is set off equal to A B, and with A as center and A D as radius an arc is struck cutting B E at E; the line A E is then drawn, and E F at right angles to it. Then the line A F is bisected at G, and the line G E drawn.



Hopper Bevels.—Fig. 1.—O. M.'s Application of W. H. C.'s Rule where the Flare is 45 Degrees.

Now, according to W. H. C. the angles at A G and F are the side, butt, and miter cuts. This looked all right on its face, but in my trade (cabinet making) we frequently use a much less degree of flare in some jobs, so I tried how the thing would work where the angle, in section, of the side was 60 degrees with the horizontal, and you will find the result in sketch No. 2. The lines are all drawn *secundem artem*—of course I mean W. H. C.'s rule—but there I get for the miter joint (the angle at F) an angle much less than 45 degrees, which would leave an ugly joint inside; and for the butt joint I get an acute angle, whereas the corresponding angle on sketch No. 1 is an obtuse one. This set me thinking a little more, and by experimenting a little I found that by giving the side of hopper a flare of about 53 degrees from the horizontal I could construct a figure giving the angle at G—the butt joint—as square, which is a manifest absurdity. If the engraver has done W. H. C. justice, I fear his rule must be branded rotten—shaky would not express it.

From A. S. L., *Concord, Mass.*—In the following notes on hopper bevels, I shall endeavor to show the principles on which some of the rules published in *Carpentry and Building* are founded.

In the first place, I will say that if I were about to make a hopper I should proceed in the manner described in the March number, with the exception of the error noted by your correspondent A. M. I consider this the most practical rule of the many that have been published. That A. M. is right will be seen by Fig. 3, which is an exaggerated elevation of a hopper. On the left side of the diagram, A E is the thickness of the boards and A G is the line of the inner side of the end board. The outer corner of the top edge of the side, as shown in the elevation, will meet this line at G, and the inner corner will intersect A at A, therefore it is evident that the inner corner will require to be as much longer than the outer as A B is longer than G P; and if we erect a perpendicular from H through A to I, making H I equal in length to the thickness of the board and connecting G I and E I, then the angle at G is the butt and that at E is the miter. The dotted lines show the same results obtained as directed on page 57, and as corrected by A. M.

The next rule to consider will be that given by T. S. V. This is a good rule, and if T.S. V. had given the bevel for the miter, would be perfect. However, this has been supplied by A. M. The right-hand side of Fig. 1 shows the application of this rule to a hopper. B F D corresponds to F G E H of the rule by T. S. V. With a radius that will just touch B F, and from P as center, scribe the arc, cutting P F in K. Connect K B, and the angle P K B is the miter; connect K D, and the angle F K D is the butt—both to be used from the outer side of the board. Next, with the radius P O scribe the arc to T. Connect T D for the down cut, or side bevel, at T. With the same radius scribe around to M. Connect M F for the miter again.

T. S. V. says: "This is easy if you can see through it." Let us see if we can see through it. In the first place, the triangle formed by B P F is a portion of the top edge of board, but it lies in an inclined position from us. To get the exact shape of this, take P F and set off P J; connect F J, and the triangle P F J will be the required figure, and of course the angle at F is the miter. This must be evident to any one who has the least idea of the lines in an inclined structure.

Now, if we proceed in the same manner with any right-angled triangle, having the same angles as P F B, the resulting triangles will have the same angles as P F J.

Again, if we draw an arc that will touch a certain line, that line is a tangent to the arc, and at right angles to its radius, as N P and O P.

It is one of the properties of a right-angled triangle that a line drawn from its right angle and perpendicular to its hypothenuse will divide it into two triangles, each having the same angles as the one divided. In Fig. 4 all the triangles have the same angles as the one divided, and may be called similar triangles.

Referring again to Fig. 3, the radius N P divides B P F into two triangles, each having the same angles as B P F. First taking the triangle B P N and making P K equal to P N we have the triangle B P K, equal in angles to P F J, and of course the angle at K is the miter.

Again, O F P is equal to P F N; by setting P O to M, or, in other words, by scribing the arc to M, we have P F M, also equal in angles to P J F, and, consequently, M is the miter.

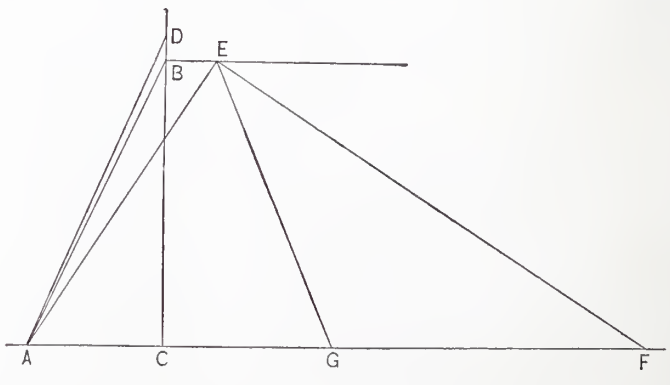
The same process of reasoning will explain the manner of getting the side bevel. And now we have to cousider the butt bevel. When J. L., of Dubuque, beveled his sides in order to get the butt joint cut, he threw away the solution to his difficulty. I refer to the three-cornered strip taken off in process of beveling. In Fig. 3 this strip is represented by E A G. Now, from what has been said about similar triangles, it will be seen that P F D is similar to E A G. Then let us say that P F D represents the strip, and, of course, P D is the thickness of the stock; O F is the distance which a board of this thickness will require to be longer on the inner side than on the outer; P N is equal to O F, as will readily be seen, and by setting P N to K and connecting with D, we have the butt bevel K.

On these principles all the correct rules for hoppers are based, as will be seen by comparison with E. W. C., J. O. B., T. S. V. and A. M.

Before I leave this subject I would like to call attention to the rules given by W. H. C. and W. C. M. I am not mechanic enough to comprehend T. A. B.'s rule, notwithstanding his assertion that it is simple. W. H. C. seems to have very curious ideas of hopper bevels, looking at it from my standpoint. Admitting that a few mechanics can be found willing to use a bevel in the manner described by him—what he calls the backing of a hip rafter is altogether wrong, and, consequently, the butt and miter bevels, to use as he recommends, are wrong. The side bevel in his Fig. 1 is correct, but Fig. 2 has not a single redeeming feature. I do not wish to discourage W. H. C., but I would advise him to study carefully some of the excellent rules already published in *Carpentry and Building.*

W. C. M. gives a verbal rule for the use of the square, which, as printed, does not contain a single correct cut. However, it is but justice to W. C. M. to say that he seems to have met with an error in punctuation. His letter, as I correct it, would read:

"Take the width of the side on the blade of square and run on tongue; then the tongue will give the cut (for side bevel). For the butt joint, take the width of side on blade and half the run on tongue; then the tongue will give the cut across the edge of the board. For a miter, take the width of side of blade and rise on tongue, and the tongue will give the cut."



Hopper Bevels.—Fig. 2.—O. M.'s Application of W. H. C.'s Rule where the Side is 60 Degrees with a Horizontal.

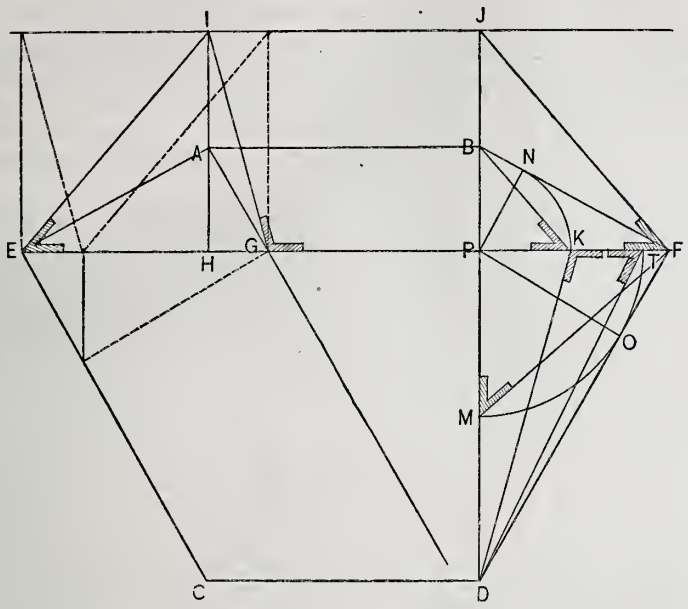
Put in this manner, the first and last propositions are correct; the second is correct only when the run equals half the rise.

I should not consider this letter complete without giving a rule for a hopper having different flares. This will be seen in Fig. 5, where A C represents the flare of the sides, and B C the flare of the ends.

To get the side or draw bevels, take the distance A C, and from O set off M; connect B M, and the angle at B is the bevel for the sides; take the length B C, and set off the same from O, thus obtaining the point N;

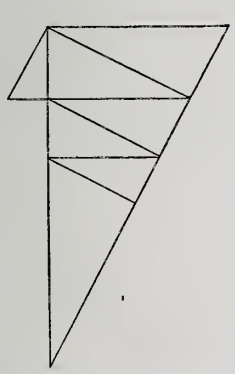
connect A N, and the angle A A is the end bevel.

For the butt and miter cuts draw A E at right angles to A C, and B D at right angles to B C, making both equal in length. From D draw D H parallel to B C. From E draw E I parallel to A C, and extend the same to G. Draw D G parallel to A B, and E F also parallel to A B. Then F is the point where the inner corner of the side will meet the end board, providing that B D is the thickness of that board, and G is the point where the inner corner of the ends will intersect with the plan of the sides. Through F and G erect perpendiculars to A B, and set off K and J equal to D B; connect I K and J K, then the angle at I is the butt, and the angle at A is the miter for the end board. Connect H J and B J, then the angles at H and B are the butt and miter for the side.



Hopper Bevels.—Fig. 3.—A. S. L.'s Exemplification of A. M.'s and T. S. V.'s Rules.

It will be noticed that the square edges of the sides and ends will not intersect, and it might be convenient to make them do so by beveling the ends to correspond to F B. The cuts for the ends in that case would be found in this manner: Set the distance F B from O to Q; connect I L for butt and A L for miter, both shown by dotted lines. The bevels would remain unchanged for the sides.



Hopper Bevels.—Fig. 4.—Properties of Right-Angled Triangles.

Are Decisions Always Desirable?

From G. H. H., *Philadelphia, Pa.*—For some time I have noticed what I consider will ultimately be a wide gap in *Carpentry and Building*. There seems to be no direct decision in the "Correspondence" department calculated to satisfy subscribers. That decisions in some matters are reached is certain, but not in all cases. I know of no less than five within my own circle of acquaintance who assert they will not support the paper in the future unless there is some one who will decide disputes and arguments definitely. I hope the Editor will take this point into consideration before another issue of the paper.

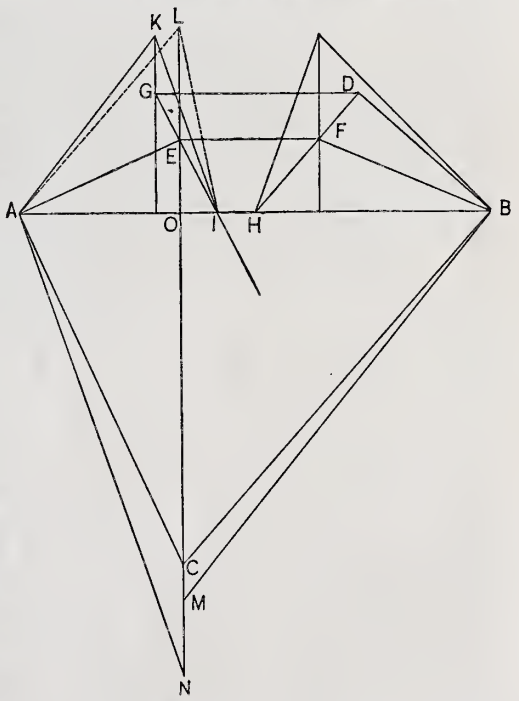
Answer.—All that we can say to this correspondent, in reply to his suggestion, has in reality been anticipated in answer to other correspondents in previous numbers of the paper. We don't think it desirable or appropriate that the Editor or any one else should set himself up to decide definitely, and therefore, in many cases, arbitrarily, points in mechanical and mathematical disputes. If all the readers of the paper were of one uniform type of mind, of like endowments and education, and all working in the same general way, such a thing might be possible. The facts of the case, however, show that the situation is far different from this. No two of our readers, we venture to say, are constituted entirely alike; no two have the same education; no two of them are working in the same direction, or are surrounded by like circumstances. Definite decisions, therefore, in such matters as hip rafters, number of doors to be hung in a day, amount of shingles to be laid in a day's time, and so on to the end of all questions which have been raised in the "Correspondence" department of the paper, become a simple impossibility. What we have always endeavored to do, and what we believe the majority of our readers will sustain us in doing for the future, is to point out principles in such a manner as to enable each one to use his own judgment and to select from that which is set before him such portions as are best adapted to his own individual requirements. Take it in the matter of G. H. H. himself with reference to the rule for backing, which has had so much discussion as to be well known to almost every reader of the paper. Suppose, for the sake of illustration, that we had asserted in the first place that his rule was absolutely correct, or, which will answer just as well, that we had asserted that it was absolutely false, and thereby prevented any discussion of its merits, how much less beneficial to our readers would have been this decision than what has followed the course we have pursued? Instead of our readers having the benefit of a dozen or twenty, or perhaps even more, letters bearing upon this subject, instead of their having the advantage of examining a large number of diagrams prepared by different practical men, instead of their being furnished with a full discussion of the subject of backing hip rafters from the simplest principles up to the application of those principles in complicated cases, they would have been restricted at the most to two or three engravings and a paragraph of less than a half column in length. We might refer to other cases in which we think the general discussion that has followed has been of much greater advantage to our readers than any arbitrary decision upon our part could have been.

Perhaps our correspondent means that after a subject has been pretty thoroughly discussed the Editor should step in and say, "Now, boys, the conclusion is thus and so," thereby establishing a rule whioh should be as unalterable as the laws of the Medes and Persians. We are aware that decisions of this character in matters of law are attained and are respected the world over, regardless of the absolute justice of the case, and regardless of facts, in some cases at least, which, if properly presented, would have changed the decision. There is no appeal beyond the Supreme Court, but we are not aware that anything of this kind has ever been successfully carried out in matters appertaining to science or mechanics. Without further argument, we believe our readers can see wherein it would be manifestly absurd for us to undertake anything of this kind.

To those of our readers who are honestly in doubt, who become bewildered by the talk indulged in upon the part of correspondents concerning topics under discussion, we would say that they always have the opportunity of addressing questions of their own to us, which we always undertake to answer in a manner best calculated to meet their individual requirements, as we understand them. We think we have met the principal points raised by our correspondent What little there is lost by pursuing this plan is, we believe, much more than balanced by the great gain that comes from the free and general discussion of all subjects which may be raised.

Horse Power for Wood Working Machinery.

From H. J. A., *Grater's Ford, Pa.*—I have run a carpenter shop the last five years by a one-horse-power, and have done a vast amount of work. One of my neighbors has a six-horse-power engine which takes from 30 to 40 minutes to get started, and is more expensive. Sometimes there is only one half to two hours' work, which hardly justifies getting up steam. In two minutes, however, I can start with my horse-power. I have been using tread-power with a governor to regulate when machines are not working. I have been running circular saw, small planer and molding machines, turning lathe, grindstone and shaper. I have ripped 3-inch joists. I have worked 5-inch O.



Hopper Bevels.—Fig. 5.—A. S. L.'s Rule for Hoppers having Different Flares.

G. moldings by putting twice through. I can take a ⅛-inch chip off an 8-inch board, making a nice smooth surface. Small moldings, from 2 inches down, can be finished at one cut. I prefer tread-power. I have seen lever-power used, but it is not so satisfactory, as it takes an extra man to drive the horse when heavy work is being done and the most speed is required. The horse will naturally walk slow in fly season. He will sometimes stop, at other times he will run. These difficlties can be overcome with tread-power, by raising or lowering to suit the work. When I want considerable power, I elevate the tread so that the weight of the horse will do as much as he could pull on a lever. When I am doing light work, such as grinding or turning, I lower the power so that the weight of the horse will barely turn it. In a shop where the machines are required to run all the time, I would prefer steam power, as it is hard on the horse to be on the power all day. When it is only required to do a few hours work per day, horse-power is most convenient and economical.

From J. C., *Buffalo, N. Y.*—Your correspondent C. P., of Cleveland, Ohio, desires to know if horse-power can be used to drive wood-working machinery. In reply, I would inform him that I drove, with single-horse-sweep power, for ten or more years, a molding machine, with planer knife 6 inches wide, circular saw, jack saw, turning lathe, boring machine, and many other small labor-saving machines. Each machine was run separately, and in most cases direct from the main shaft. I found them to work well, and the horse-power was an excellent investment for me. I saved money from the day I had it in use. I hope this information may be of use to your correspondent and to other parties who are desirous of starting with small means.

Blue Process Drawings.

From G. H. R., *New York City.*—Will you kindly inform me, through your columns, of the process of reproducing drawings by what is called the "negative process"—that is, blue lines on a white ground instead of white lines on a blue ground?

Answer.—To produce blue lines on a white ground necessitates a double printing, in the first instance. The first operation is to make a blue print, which should be on very thin paper and printed very dark and solidly. This print is then used instead of a tracing in making other copies. We have seen very fair work done by this method of operation, but have not been able to get satisfactory results from any experiments which we have tried. Mr. Albert Levy, of 4 Bond street, New York, makes "blue" paper, and has, in addition, what he calls a "negative" paper. This is the same as that ordinarily used for copying drawings, except that the paper is quite thin. The first print is made on the thin paper, which is then washed and dried in the usual way. Here we may say that this paper needs a great deal of washing; half an hour, at least, should be given to it. When the negative is ready, it is used in the same way as an ordinary drawing and placed above a sheet of the ordinary blue paper. We have found that a very long exposure is necessary, in order to get even readable drawings. We fancy that the best results would be obtained by making the drawing on the blue paper itself. To do this we should take a piece of blue paper and expose it to bright sunlight till the color is well developed, and then wash and dry it in the usual manner. We would then make the drawing directly on the blue paper, and use for ink any of the liquids which bleach the blue color. Fortunately, there are almost numberless fluids which will do this. Common washing soda will do it as well as anything, and may be dissolved in water and used instead of ink. It may be also used to clean up any white line which is too faint.

Mr. Charles L. Moller, of 30 Cortlandt street, New York, is manufacturing a paper, 23 by 36, which we have found works very much better than any other we have tried. Its color is a light yellow, and it is quite sensitive to the action of light and easily washed. This paper, if kept excluded perfectly from the light, keeps remarkably well. We have had samples of it which would produce fair work after having been prepared six months, at least. The lines, however, after the paper has been copied so long, are likely to be a pale blue instead of a white, due to the fact that the paper has had more or less exposure to light.

We believe that, even with the ordinary paper, it is possible to make blue lines on a white ground if a little extra time is employed. The methods of operation are somewhat simple, yet it cannot be out of place to give here some directions in regard to the best methods of producing blue copies. A flat board should be provided as large as the tracing and drawing which is to be copied. On this board two or three thicknesses of common blanket or its equivalent could be laid. This is done in order to give a soft level and elastic backing for the paper on the blanket. The prepared paper is laid with its yellow or sensitive side uppermost on this paper. The tracing is placed and smoothed out as perfectly as possible, in order to secure a contact over the whole surface of the paper beneath. Upon the tracing a plate of clear glass is laid; preferably, this should be heavy enough to press the tracing down upon the paper. Ordinary plate glass, say three-eighths of an inch thick, is quite sufficient. Where this cannot be obtained, 26-ounce glass may be made to answer, if the drawing is not very large, putting weights upon the corners beyond the tracing. The next operation is to expose the whole to a clear sunlight, by pushing it out on a shelf from a window or in any other convenient manner. From 4 to 6 minutes is usually sufficient in the summer time. In the winter from 6 to 10 is necessary. If the drawing cannot be exposed to the sun, but only to the clear sky, the exposure must be continued from 20 to 30 minutes, and if the day is cloudy from 60 to 90 minutes will be needed. The color of the print depends upon the length of time it is exposed to the strength of the light. If the color is pale the exposure has been too short, while if the color is dark it has been too long. After having been exposed for the proper length of time, remove the prepared paper and wash it freely for one or two minutes in clear water. If a large dish is convenient the print may be laid in the water, and after being rinsed or water poured over its surface for a minute or so, may be allowed to soak for 10 or 15 minutes. It should then be hung up by one corner to drain and dry. While the print is wet it should be preserved from contact with anything which is likely to change the color, and, for this reason, it should not be laid down upon a black walnut board, or upon anything where it will come in contact with iron, which is likely to cause slight discolorations. The sheet of paper, if large, may be laid upon a clean pine board and washed by sprinkling it with water from a watering pot. It can then be hung up to dry. In any event, care should be taken to wash all trace of yellow solution off from the paper.

Mr. Moller sells a solution for use in making negative paper at $2.50 per bottle. Each bottle would be sufficient for covering a roll of paper 30 yards long by 36 inches wide. In coating paper with the solution, which, by the way, should be protected from light, a sponge about 4 inches in diameter may be used, going over the paper the first time with sponge quite moist. The solution should be well rubbed into the paper. Going over the second time the sponge should be squeezed dry, and the solution spread over the paper evenly. The sheet should then be laid away to dry in the dark, and must be kept sheltered from the light until it is used. It may not be generally known that ordinary photographic negatives may be used and blue pictures obtained with this paper from them. With a very transparent negative a picture may be taken on blue paper exposed to direct sunlight in from one to two minutes, while darker negatives may require three or even five minutes. With this solution one can coat thinner kinds of paper, such as express cap or bond paper, and thus make what we have described as negative paper of varying grades. It is always better, in making a blue copy, to use a tracing, rather than a drawing, on thick paper, as the work then becomes sharp and is more quickly done.

Proportions of Doors.

From C. C. W., *Kansas City, Mo.*—Referring to various letters which have appeared with reference to the proportion of doors, I would say that C. H. C., Hartford, Wis., has the door too narrow. For inside openings, when finished, the door should be proportioned to the hight of the ceiling. The main inside door, with transoms, when finished, should in width be about four-tenths of the hight.

ACKNOWLEDGMENTS.

J. V., of Canandaigua, sends us a diagram which, he says, further illustrates the rule originally sent in by D. H. J., and which is also identical with one contributed by Gene. Those features of the operation to which his letter and diagram relate have been so thoroughly explained in *Carpentry and Building* that we see no reason for giving it additional attention at the present time.

Our esteemed correspondent, F. E. B., of Los Angeles, California, sends us a method of cutting a corner board for a curved roof or for the angle of a curved Mansard roof; in other words, the finish at the hip of a roof having convex rafters. The communication is carefully illustrated by a neatly drawn diagram, which we regret we are unable to publish, because the principles upon which it is established are fallacious. Our correspondent fails to recognize the fact that the angle, or the stay, as the sheet-iron cornice workers would call it, changes at every point in the entire hip finish; accordingly, developing it in the simple manner which he has followed would produce something which would be far from fitting when applied to the roof itself.

J. F. C., of Wilmington, Delaware, sends us a method for getting the cut of a miter in a segmental bead at the head of a window frame and the jam or pulley stile. This is sent in response to the request of F. A., of Milton, who, in the September number, requested a rule for getting the cut of a stick or bead in a segment and circle. In the first place, our correspondent wholly misunderstands what, we think, the former inquiry was intended to mean, and in the second place, his plan for performing what he has undertaken to show is not the most desirable plan for the purpose; accordingly, we are unable to give space to his letter and diagram. We shall be pleased to have other readers undertake to answer what our correspondent above alluded to first requested.

C. A. D., of Burlington, Iowa, sends us three sketches illustrating a method of backing hip rafters which is almost identical with plans heretofore published, and which, therefore, we must decline, with thanks.

J. A. N., of Pepperell, sends us a communication on the subject of cutting and backing hip rafters, illustrated by a neatly drawn diagram, which, to all intents and purposes, is the same as has already appeared in our columns. We suggest to our correspondents, when getting up anything of this character, that they may sometimes save themselves useless trouble, and also save us the necessity of looking over what they send in only to identify it with what has already been published, if they would carefully look over all that has been published on the same subject in previous numbers. By this means duplications will be avoided.

From J. A. C., Sandy Hill, N. Y., we have received a set of drawings representing a frame house recently completed at that place at a cost of $1200, which are quite creditable in execution, although there are no new features in the design or construction needing comment.

We are in receipt of several letters which continue the discussion of a day's work at shingling, and also a day's work at hanging doors. We think that so much has been said upon the subject already as to practically exhaust it, and until some new features are developed, we shall not be disposed to publish any more letters upon these topics.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME III. NEW YORK = FEBRUARY, 1881. NUMBER 2.

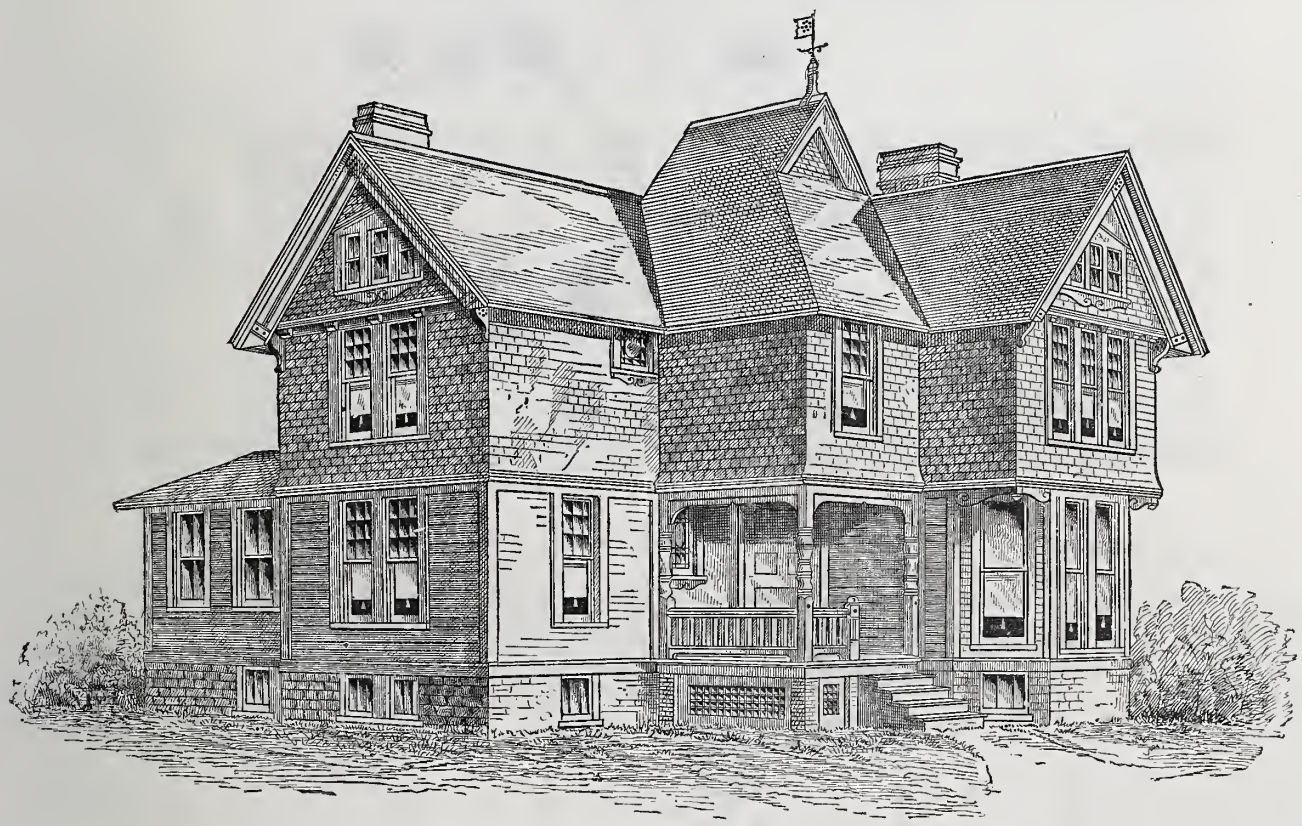
The Competition in $3500 Dwelling Houses.

The committee to whom was intrusted the award of prizes in the second competition, found its duties less simple and easy of performance than would be anticipated from mere inspection of the published conditions and stipulations. A very creditable number of designs were sent it, and some unusually meritorious sets of drawings were before it for examination. Casual inspection of the designs convinced the committee at the outset that there was some hard work before it, in order to reach a decision which should do even-handed justice to all.

By referring to the published stipulations it was found that there were eight items, compliance with each of which was necessary in order to bring the drawings properly before the committee. These items were as follows: Front elevation, side elevation, foundation plan, floor plans, exterior details, interior details, specification, and estimate certified by a responsible builder. Three other conditions, viz, rear elevation, roof plan, and perspective view, it was noticed, were left to the option of the designers. The first work, therefore, was to examine the plans with reference to compliance with these conditions, irrespective of other particulars. This inspection revealed the fact that five of the sets of plans were fatally defective—all of them lacking in some of the conditions relating to the estimate, which at once threw out of the count several very promising designs. Of these, the one submitted by "Comfort" should be mentioned specially. His presentment was regular in all particulars but one; and he had, in addition to stipulations, a roof plan and perspective. Instead, however, of completing the estimate as directed in the published announcement, he sent a note saying it would be done if required. The committee feels disposed to say that this deliberate disregard of conditions lost this designer one or the other of the prizes. "Cross 10" omitted the estimate entirely, but wrote a letter over his real name (not his *nom de plume*) saying the house could be built for $3500. It would be folly to make and publish conditions in a competition of this kind and allow them to be disregarded at the whim and convenience of competitors.

The set of plans submitted by "Square" arrived while the committee was in session, several days after the expiration of the time named in the announcement, and was, of course, thrown out on that account. Examination revealed, further, that it was deficient in both specification and estimate. "Homestead," who submitted probably the most meritorious design received, was late and was also informal in the matter of his estimate, besides being, by his own figures, considerably above the limit of cost stipulated.

Closer inspection of the designs remaining threw out eight sets on general merits, the grounds being, in some cases, poorly-arranged floor plans; in others, lack of originality in the elevations; and in still others, both of these faults, combined with poor draftsmanship and lack of experience in architectural matters generally. Of this class of rejected designs, the competitors, "D. P. C.," "Geneva," "J. A. B.," and perhaps one or two others (the doubt being expressed because particulars were not so fully explained in these cases as those specified), deserve words of encouragement. These men are foremen on buildings and in planing mills, and their efforts in the way of designs for this competition were made after work hours, by lamp-light, and in all cases with poor accommodations. That they produced as good drawings as they did is very creditable indeed. Continued effort in the same direction, although no cash prizes are ever achieved, will eventually bring a reward commensurate with the exertion put forth. Each of these men would, we believe, stand a better chance in the fourth competition, which is still open, than in the one just closed.



$3500 *Dwelling Houses.—First Prize Design.—Fig.* 1.*—Perspective View.—W. L. Morrison, Architect, Rochester, N. Y.*

At this stage of its investigations the committee found itself confronted by a number of handsome designs, every one of which was formal in all particulars, even to the estimate, which, at round $3500, was certified to by a building firm, but all of which seemed to be wonderfully cheap houses for the price. It at once became evident that a builder's certificate to an estimate was worth nothing so far as assisting the committee's decision. In nearly all cases it appeared to be a mere complimentary favor to the architect upon the part of a good natured builder, who certified with a full knowledge that there was no likelihood of his ever being called upon to make his figures good. A number of experts upon estimating—men who are thoroughly acquainted with work of the kind represented—were then sent for, and by their aid the committee commenced a revision of the estimates upon its own account. This investigation revealed important omissions in items of materials and labor, shortages in quantities, and flagrant

disregard of the stipulated prices, which had been so carefully provided for the purpose. The result was the rejection of a large number of designs on this account, prominent among which may be mentioned those submitted by "Morning Star," "Concentric Rings" (device) "Utile Dulci" and "Late."

We have already made this account of the committee's labors longer perhaps than many of our readers will appreciate, and, therefore, without further particulars, we announce the result at which the committee finally arrived. The three prizes, $75, $50 and $25 respectively, were adjudged to belong to the following, in the order of their names :

W. L. Morrison, Rochester, N. Y.
Smith & Howe, New York City.
Rossiter & Wright, New York City.

We publish the drawings receiving the first prize in this number complete, including the specification and estimate. The other designs we shall probably publish hereafter, possibly deferring them for a time in order to give greater prominence to the first prize of one or both of the remaining competitions.

In conclusion, it has been suggested by the committee of award, and we desire to give it special prominence in the interest of this journal, for the benefit of whose readers these contests are arranged, that it is folly for architects to waste their time upon $5000 houses in a competition limited to houses costing only $3500. The cost in this competition was a prime condition, and of necessity the best designs submitted were thrown out, for almost any one can build a handsomer and better house for $4000 or $5000 than for $3500. Concerning the matter of deliberate disregard of published stipulations we have already spoken, but we may refer to it again in this connection as being a piece of folly upon the part of men who undertake work of this kind, and who obtain no remuneration for their time unless they are successful in the contest. Surely they should take care to make it possible for a prize to be awarded to them.

With reference to the wisdom of the committee's verdict we have little to say. As our readers may have inferred already, its decision was narrowed down to very close limits by the acts of the competitors themselves. There were not enough designs submitted, which in all particulars complied with conditions, to give it any great latitude of choice. It distributed the prizes in strict accordance with the advertised conditions of the competition.

$3500 *Dwelling Houses.—First Prize Design.—Fig. 2.—Front Elevation.—Scale, ⅛ Inch to the Foot.*

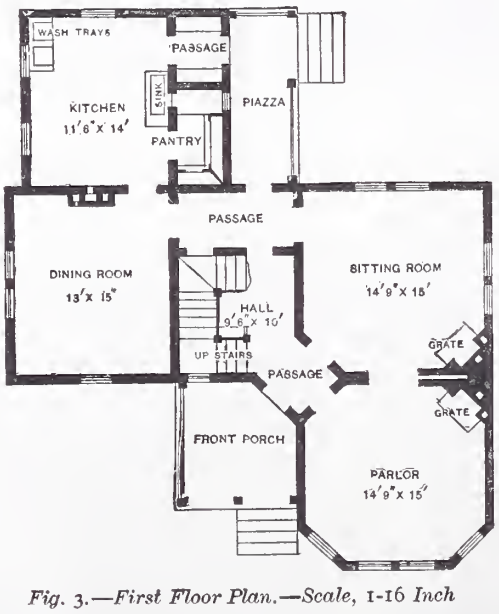


Fig. 3.—First Floor Plan.—Scale, 1-16 Inch the Foot.

Specification Accompanying First Prize Design.

Dimensions and style of building will be obtained from the drawings, the figures upon them being preferred to the scale measurement in all cases, and in case of disagreement between drawings, the full size drawings; or, if no full size is given of the part in doubt, then the drawing to the largest scale will be followed as correct. The carpenter will establish all hights, and set rods for mason to work to.

Hights.— Cellar, 7 feet 4 inches in clear; first story, 8 feet 6 inches in clear; second story, 8 feet in clear; other hights as per drawings.

MASON'S WORK.

Excavation.—Excavate for a cellar under entire house, as per drawings, for trenches, footings, &c., doing all excavating necessary to carry out the entire design in all its parts.

Drains.—Provide and lay on a true grade, with as much fall as the outlet will admit, the system of drains as per foundation plan, all of vitrified burnt clay tile, first quality, of the sizes marked, jointed in hydraulic cement scraped smooth inside. To have all necessary traps, bends and connections, and left in perfect working order.

A 6-inch branch to extend vertically 20 inches in kitchen chimney.

Foundation Walls— Eighteen inches thick, will start 6 inches below finished cellar bottom on large flat stones, extending the full thickness of walls, to be bedded solid in mortar. Footings under brickwork to project 4 inches all around and to be 20 inches deep, except outside footings, which will extend 3 feet 6 inches below grade. Step foundations to be 16 inches thick.

All foundation walls to be laid with large size, first quality quarry building stone, to

line both sides, in good, fresh-burned quick-lime and sharp, coarse sand mortar. Walls to be carried up plumb and true and leveled off for sills. The exterior face exposed above grade to be of large selected stone, tucked with a dark-red joint. Interior surface of walls exposed to view will be neatly flush-pointed, and entire interior surface of cellar walls neatly whitewashed—two coats.

Stone chimney caps, 3 inches thick, to be cut for flues as per drawings. Cellar window jambs neatly splayed.

Brickwork.—All brickwork of good, merchantable brick, laid up in good, fresh-burned quick-lime and sharp sand mortar, and well soaked in water before using.

Chimneys and flues will start at cellar bottom in hard brick; flues to be smoothly plastered the full hight, and left clear and topped out as drawn.

All exterior brickwork exposed to view will be laid plumb bond, stained and tuck-pointed with a black joint.

Turn arches and form breasts for grates where indicated, and connect the same with ash-pits below.

Chimneys to have 6-inch thimbles and tin covers at bottom of each flue (except ventilator to sewer) and in each adjacent room.

Lath and Plaster.—All walls, ceilings and soffit of stairs in first and second stories to be well lathed with sound, sawed, ⅜-inch dry pine lath, ⅜-inch apart, and firmly nailed to each bearing; joints broken once in seven courses. All to be plastered in two-coat work; last coat of white, hard finish of lime, plaster Paris and lake sand, well floated and troweled down to a true and even surface; all angles and arrises to be plumb and true, and entire work left clean and uninjured.

Cellar bottom will be filled in 6 inches deep with stone and brick chips, evened up with gravel.

CARPENTER'S SPECIFICATION.

Timber.—All timber necessary to carry out the entire design in all its parts will be sound hemlock, free from injurious defects and as dry as market affords. Sills, 6 x 8 inches; posts, 4 x 6 inches; studs, 2 x 4 inches, 16-inch centers footed to plates and sills. Sills, posts and plates securely framed together and spiked. Second-floor joists to rest on a 1⅛ x 4 inch dry pine girt, gained into studs and spiked on.

Joists in first and second stories to be 2 x 10 inches, 12-inch centers; third floor, 2 x 8 inches, 16-inch centers, all well cross-bridged in rows, to average 5 feet apart, with 2 x 3 inch dry pieces, well nailed at each end of each piece with two 10d. nails.

Rafters 2 x 8 inches, 18-inch centers, footed to plates and well spiked.

Plates 4 x 4 inches, in two thicknesses, lapped at corners and well spiked.

Framing to be close and workmanlike, and well spiked.

Trimmers and headers for flues and stairways to be formed of three dry joists firmly spiked together, the center joist to be 1 inch narrower than others, to give space for key-ing plaster; 10-inch joists framed with double tenons; 8-inch joists with tusk tenons.

Do in a workmanlike manner any and all framing necessary to carry out the entire design.

Girders, where indicated on plan, 8 x 10 inches, made of four dry joists, firmly spiked together.

Furnish any lintels, centers, wood, brick or rough timber required.

Roofs to be covered with ⅞-inch planed and matched dry pine or hemlock roof boards, firmly nailed to each bearing.

Flashings, gutters on horizontal eaves and valleys, of ample widths, to be of roofing tin. Joints locked and soldered and all absolutely weather-tight.

Conductors of X tin, 3 inches in diameter, to lead to cistern, securely fastened.

Gutters will be formed on horizontal eaves by turning tin over 3-inch rounded dry pine strips, to be properly inclined to and connected with conductors.

All roofs to be covered with dry sawed ⅜-inch pine shingles, laid 5 inches to the weather and well nailed.

Gables to be filled with cut shingles.

Front, rear and sides of house above molding to be shingled (shingles not to be cut), all as per elevations, of even widths, and neatly put on and smoothed for painting.

Finial, as shown on gable, to be wrought and galvanized iron, as per detail.

Materials, all exposed woodwork, unless otherwise specially mentioned, will be clear, dry pine, smoothly finished for painting or oiling.

$3500 *Dwelling Houses.—First Prize Design.—Fig. 4.—Side Elevation (Right).—Scale, ⅛ Inch to the Foot.*

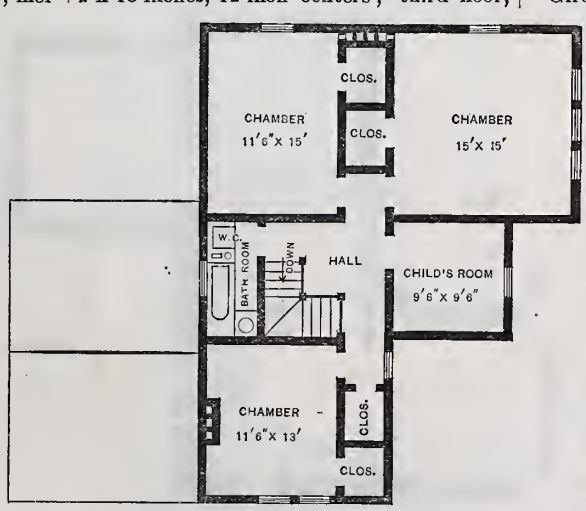


Fig. 5.—Second Floor Plan.—Scale, 1-16 Inch to the Foot.

The entire exterior surface, except as otherwise specified, will be covered on the studs with pine or hemlock sheathing, ⅞-inch, planed and matched dry, firmly nailed to each bearing and clapboarded on heavy, season-tarred felt, laid one-third its width exposed and well nailed; use first quality clear dry pine clapboards, 5½ inches wide, laid 4½ inches to the weather, all true and well nailed.

Corner boards and casings 1⅛ inches thick, 4½ inches wide.

Water table to be 1⅜ inches, beveled.

Door and window sills, 2 inches thick.

Cornice to be built as drawn, with verge-board, &c.

Porch, front and rear, neatly made and erected, all as per elevations and details.

Projecting corners, second story, front gable, will be strongly framed, finished with brackets and ceiled up underneath same as porch.

Front Porch.—Posts turned, round and square, turned balusters, rail, brackets, &c., to be ceiled up on joists above with ⅞-inch planed, matched and beaded clear, dry pine, not over 3 inches wide, firmly blind-nailed to each bearing, and finished with a neat bead in angle. Paneled riser to be 1⅞ inches, panel filled with ⅞-inch stuff, cut as per detail; joists, 2 x 8 inches; sill, 6 x 6 inches, all framed and bridged, securely floored with 1⅜ inch clear, dry, planed and matched pine, not over 3 inches wide, put together with white lead and securely nailed to each bearing. Rear piazza same as front, except that posts and balusters will be beaded and paneled, riser filled with ⅞-inch beaded stuff, 3 inches wide and 1⅜ inches apart.

Outside steps made in the best manner, of 1⅜-inch clear, dry pine, finished with nosings and coves and returns on ends.

String of steps to be 1⅞ inches thick, paneled and filled with lattice, as drawn.

Cut in ornamental braces, &c., as per elevations.

Inside Finish.—Floors for kitchen, dining-room, pantry, and rear passage will be of ⅞-inch kiln-dried, even colored ash, not over 3 inches wide, planed and matched.

All other floors seasoned, sound, ⅞-inch dry pine, free from injurious defects, and not over 6 inches wide.

All driven up to close joints and firmly blind-nailed to each bearing, joints and headings planed smooth. Hard-wood floors to be laid after plastering.

Partitions to be well set to true lines, with 2 x 4-inch studs, 16-inch centers, firmly nailed and blocked between with 2 x 4-inch pieces once in each story. Door studs doubled and blocked between. Partition studs standing directly over partitions below, or over girder, will extend down to them and not rest on joists or floors.

Grounds will be put on for wainscoting casings and base.

$3500 *Dwelling Houses.—First Prize Design.—Fig. 6.—Side Elevation (Left.)—Scale, ⅛ Inch to the Foot.*

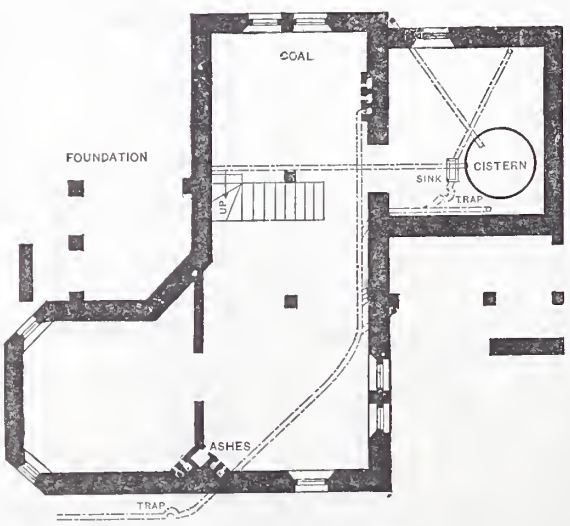


Fig. 7.—Cellar and Foundation Plan.—Scale, 1-16 Inch to the Foot.

Doors.—There will be one front entrance door, 3 feet x 7 feet 8 inches, 2¼ inch in two thicknesses, glued and screwed together, and upper panel filled with polished French plate glass; stiles, panels, &c., as per detail, hung in 2-inch rebated clear, dry pine; frame with three loose joints, black-japanned, acorn-tipped butts, lava knob, and trimmings of common bronze, flush bolts, mortise lock and night latch, with duplicate keys.

Sliding door, as per plan, 2¼ inches thick in two thicknesses, glued and screwed together, paneled and neatly molded on both sides, fitted up complete to slide on over-head track with patent sheaves. Cross face sliding door locks, with spring flush pull, no knobs.

Side door, 2 feet 10 inches wide, glazed with first-quality French sheet glass; door, 1¾ inches thick, trimming same as front door, except night lock. All doors in second story 1⅜ inches thick. Balance of doors of sizes marked in openings, 1¾ inches thick, paneled and neatly flush molded, all hung in 1⅛ inch rebated frames, with three suitable black-japanned, loose-joint, acorn-tipped butts. All except closet doors to have brass face mortise locks (closets, brass face mortise latches), and in kitchen, mineral knobs and japanned furniture. All other doors, white porcelain knobs and plated furniture.

Outside kitchen and side doors to have strong bolt in addition to lock.

All doors finish same hight as windows. All doors not otherwise specified in first and second stories to be 2 feet 8 inches wide, except closet doors, which will be 2 feet 6 inches.

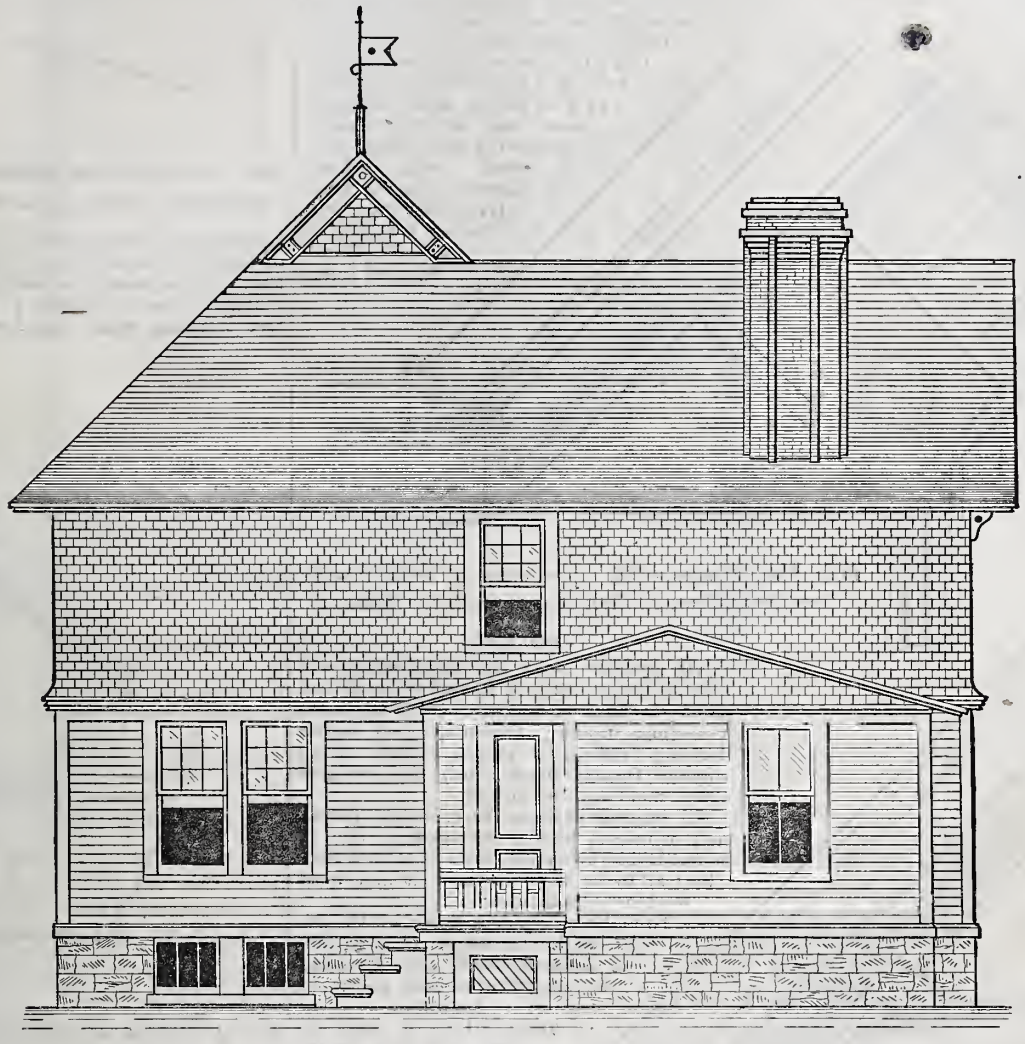
Windows.—Cellar windows to be hung to swing up in 1¼ rebated frames, with 2-inch sills, all filled with half-inch round iron rods, 3-inch centers set in head and sill plumb and even. One window to have iron rods set in movable frame, to be taken out to receive coal.

24 x 24 inches; one round, 16 inches diameter; one stained-glass window, 20 x 30 inches (hall).

Second story: Ten windows, lower sash, 27 x 28 inches, 1 pane; upper sash, 7 x 9 inches, 9 panes; one stained-glass window, 14 x 24 inches.

ing and capped with a suitable molding. In kitchen, 3 feet 6 inches high; in bath room, 5 feet high.

Base.—Neat molded ⅞-inch dry pine base in all rooms, halls, &c., not wainscoted. First story, 9 inches high; second story, 8 inches high; 8-inch plain beveled base in



$3500 *Dwelling Houses.—First Prize Design.—Fig.* 8.—*Rear Elevation.—Scale, ⅛ Inch to the Foot.*

Sash molded 1⅜ inches, glass single thick, American.

Nine windows, 3 panes of glass each, 9 x 20 inches. Balance of windows, except in attic and stained glass, will be double hung in box frames, with cast-iron weights,

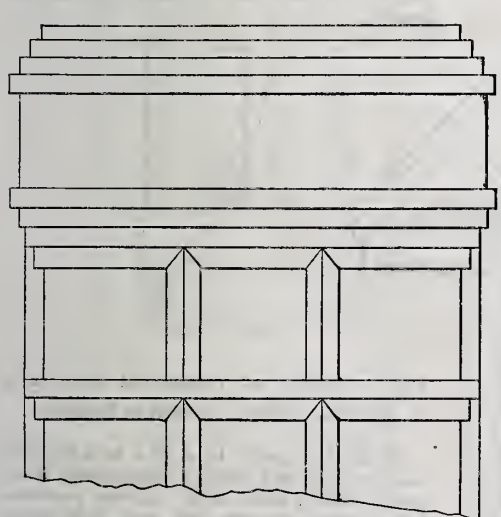


Fig. 9.—*Elevation of Chimney.—Scale, ½ Inch to the Foot.*

pulleys, and cotton sash cord. To have sash locks in first story.

First story: Four windows, 2 panes of glass each, 28 x 42 inches; six windows, lower sash, 7 panes ditto, 28 x 32 inches; upper sash, 9 panes ditto, 9 x 11 inches; three windows, upper sash, 4 panes ditto,

Attic: Six windows, 4 panes each, 8 x 10 inches.

All windows above cellar to be glazed with double-thick French sheet glass.

Glass well puttied and tacked in sash, painted one coat before glazing.

Blinds.—Provide and hang to all windows in first and second stories inside blinds ⅞-inch thick, of even-colored, kiln-dried cherry, neatly beaded in solid of four folds, cut once; four center panels of each opening to be filled with revolving slats and rods, all to be trimmed complete with brass butts, shutter bars and knobs. Balance of windows and doors above cellar to have 1⅛-inch molded casings. Windows which do not extend to floor to have neat molded stools and aprons.

Casings.—Kitchen and closets to have ⅞inch, flat chamfered casings, 5½ inches wide.

Stairs—There will be one flight of main stairs from first to second story, all exposed parts to be of Georgia pine. Newel, at foot of stairs, 6 inches diameter, turned round and square; other newels, 5½ inches square, beaded; balusters, 1¼ inches square and beaded; risers, ⅞ inch; treads, 1⅛ inches, finished with nosings and coves; all glued and blocked together and gained into strings.

One flight of open-riser stairs to cellar; treads, 1⅜, to have 3 x 12 inches hemlock carriages.

Wainscoting.—Kitchen and bath room will be wainscoted with ⅞-inch plain matched and beaded clear-dry pine, not over 3 inches wide, put up vertically, plumb and true, firmly blind-nailed to each bear-

all closets. Kitchen sink, 20x48 inches, inside measurement, will be made of 1⅜-inch clear dry pine; bottom, 2 inches; all put together with white lead and cased up underneath, same as wainscoting, and to have battoned door in same hung and trimmed with spring catch. Fit up wash trays and lids in usual manner.

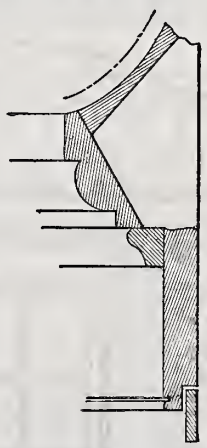
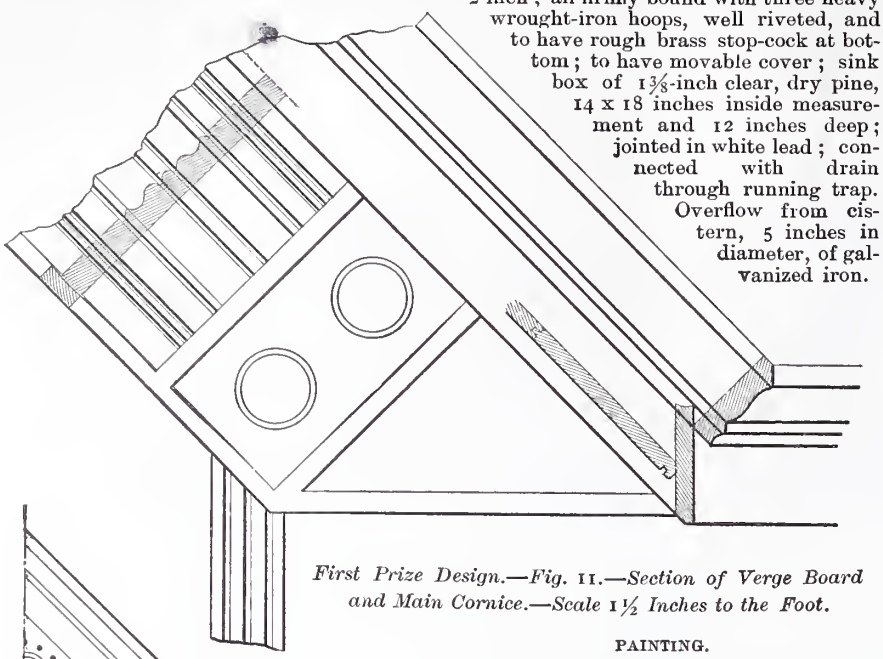


Fig. 10.—*Section through Molding Over First Story Windows.—Scale, 1½ Inches to the Foot.*

Bath Room.—Case up in walnut (even colored) bath tub, water closet and wash basin in bath room. Water-closet to have hinged seat and lid; riser put in in one piece with round-head screws. Top of bath tub to be finished with molding. Inclose wash basin and furnish battoned door, hung and trimmed with spring catch.

Closets and Pantries.—Each closet to have 3 lines of 15-inch dry pine shelving on neat cleats and one dozen clothes hooks screwed to cleats. Pantry will have chests of drawers, as indicated on plan, made of clear dry pine trimmed with screw knobs. China closet to have inclosed shelving, as indicated, with glazed sliding doors in usual manner. Passage from kitchen to piazza to have 4 lines of 15-inch shelving on each side, strongly put to receive pots and kettles. Construct a tank in attic as nearly over bath room as possible (properly supported) 20 inches by 1 foot 6 inches by 6 feet, of clear dry pine.

Cistern.—A wooden cistern, to be 6 feet in diameter by 6 feet deep, to to be placed on 4 x 4-inch scantling in cellar. Staves to be 2-inch; all firmly bound with three heavy wrought-iron hoops, well riveted, and to have rough brass stop-cock at bottom; to have movable cover; sink box of 1⅜-inch clear, dry pine, 14 x 18 inches inside measurement and 12 inches deep; jointed in white lead; connected with drain through running trap. Overflow from cistern, 5 inches in diameter, of galvanized iron.



First Prize Design.—Fig. 11.—Section of Verge Board and Main Cornice.—Scale 1½ Inches to the Foot.

PAINTING.

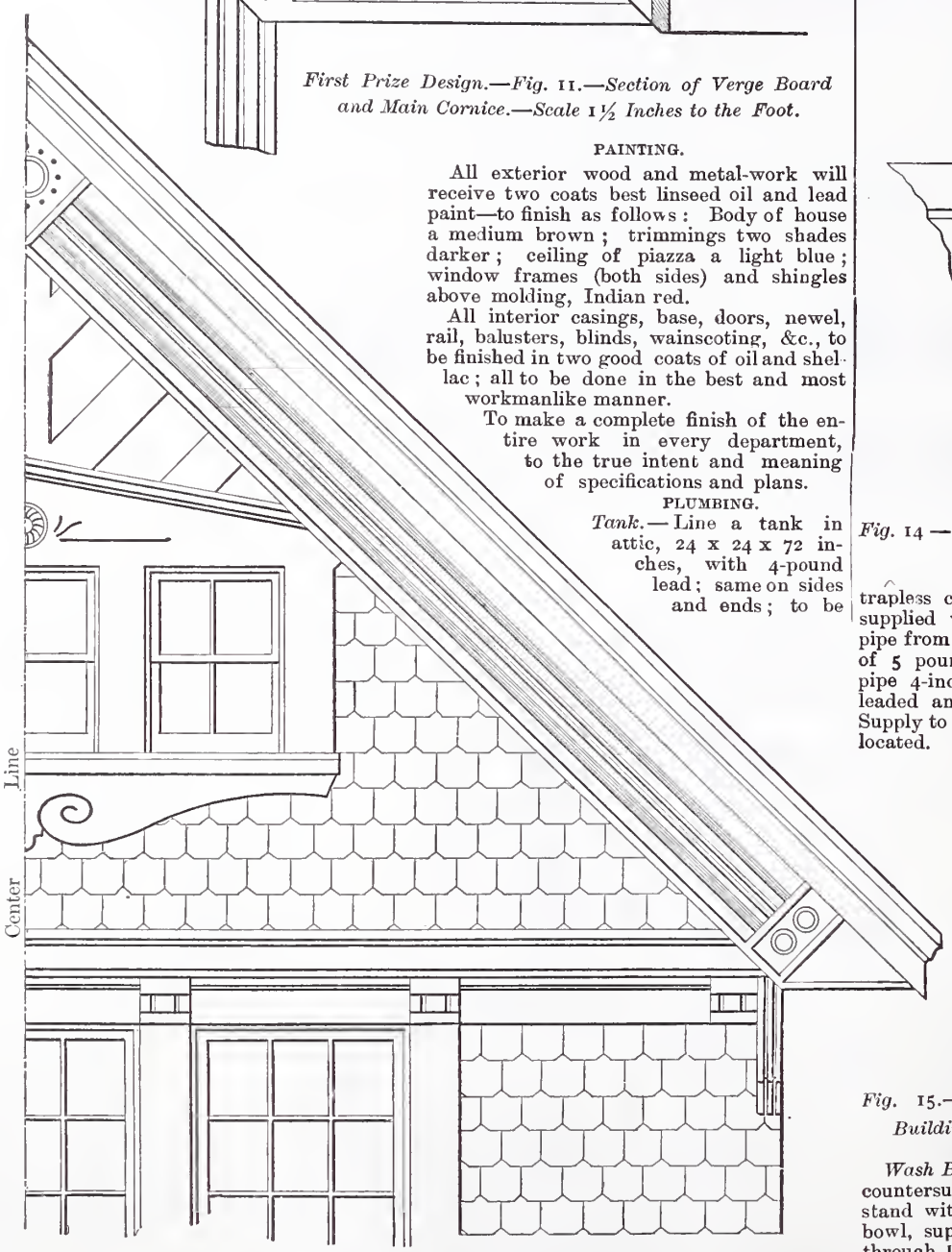
All exterior wood and metal-work will receive two coats best linseed oil and lead paint—to finish as follows: Body of house a medium brown; trimmings two shades darker; ceiling of piazza a light blue; window frames (both sides) and shingles above molding, Indian red.

All interior casings, base, doors, newel, rail, balusters, blinds, wainscoting, &c., to be finished in two good coats of oil and shellac; all to be done in the best and most workmanlike manner.

To make a complete finish of the entire work in every department, to the true intent and meaning of specifications and plans.

PLUMBING.

Tank.—Line a tank in attic, 24 x 24 x 72 inches, with 4-pound lead; same on sides and ends; to be supplied from cistern through 1-inch lead pipe. To be a 1¼-inch standing overflow (trapped) of 4-pound sheet lead, with flaring mouth, to be out 12 inches from sides of tank, the mouth 6 inches below top of tank, connected with waste in bath-room.



First Prize Design.—Fig. 12.—Half Elevation of Front of Gable.—Scale, ½ Inch to the Foot.

Bath Tub.—Furnish and fit up in perfect working order one 6-foot, 16-ounce planished copper bath tub, supplied with hot and cold water through ¾-inch lead pipe and ¾-inch compression bath bibbs, with flanges and thimbles electro-plated; 1-inch overflow to enter 1¼-inch waste (trapped); tub to have electro-plated plug and chain.

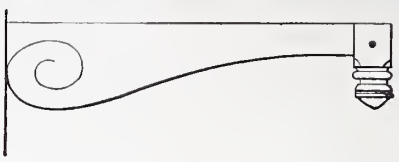


Fig. 13.—Bracket on Octagon Corners of First Story.—Scale, ½ Inch to the Foot.

Water Closet.—Furnish and fit up in perfect working order one Jennings' patent trapless closet, with plated cup and pull, supplied with water through ½-inch lead pipe from tank, 4-inch lead trap and bends of 5 pounds; lead wiped on bottom; soil pipe 4-inch cast iron, joints caulked and leaded and all well connected to sewer. Supply to have brass stop cock conveniently located.

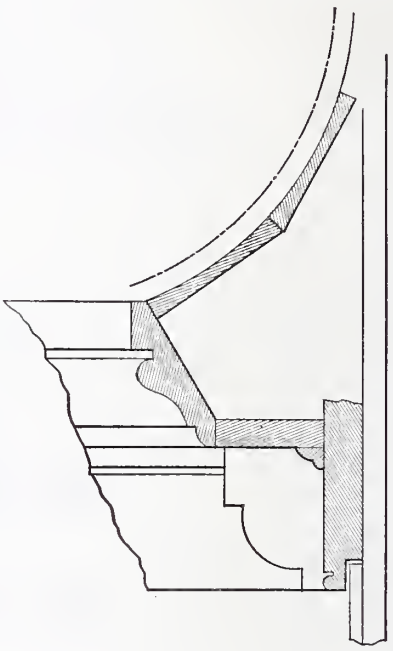


Fig. 14.—Section of Gable Cornice.—Scale, 1½ Inches to the Foot.

Fig. 15.—Side of Bracket at Corners of Building.—Scale, ½ Inch to the Foot.

Wash Basin.—To be a 24 x 24 x 1¼-inch countersunk and molded marble-top washstand with 9-inch back, 14-inch porcelain bowl, supplied with hot and cold water through ½-inch lead pipe, and to have ½-inch handle; compression basin cocks 1-inch overflow, to enter 1¼ inches lead waste; to have plated plug, chain and stay.

Wash Trays.—Supply wash trays with hot and cold water through ¾-inch pipe and ¾-inch brass compression bibb cocks with flanges and thimbles; waste 2-inch lead; to have fittings in usual manner.

Kitchen Sink.—Supplied with water through ¾inch lead pipe and ¾-inch finished brass

compression bibb cock with flanges and thimbles; waste 2-inch lead, trapped.

Pump.—Set in complete working order on board at sink, conveniently located, one 2½-inch steam metal lift and force pump, with 1-inch lead rising main to tank and ¾-inch lead branch to sink, with 1½-inch lead suction extending to bottom of cistern, with holes in sides. Also to be a 1½-inch tell-tale pipe from tank to kitchen sink.

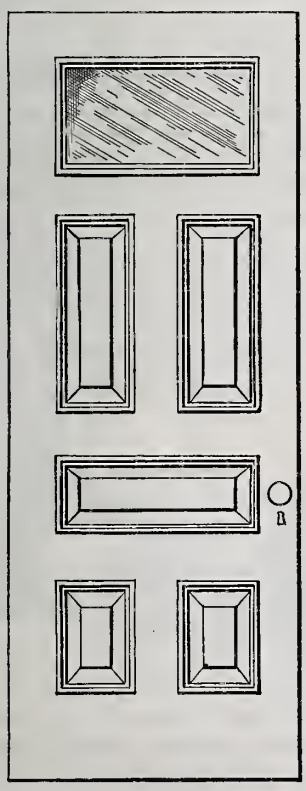
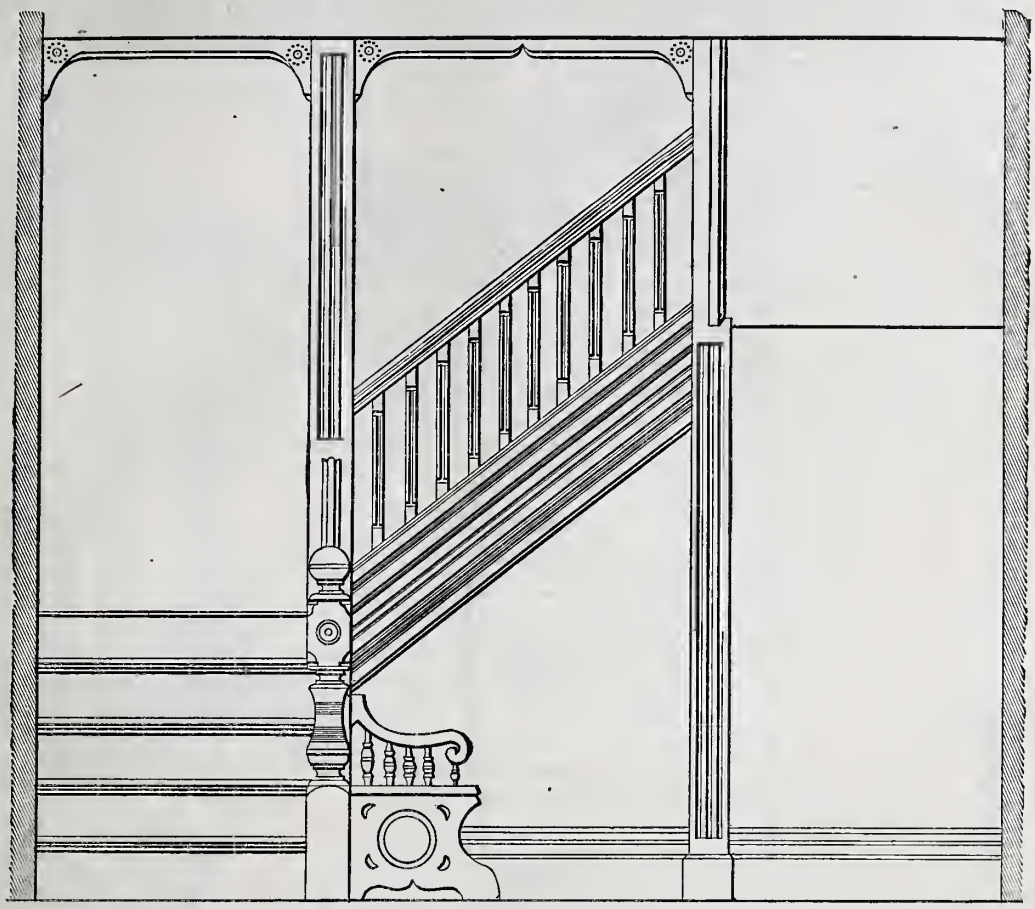


Fig. 17.—Elevation of Front Doors.—Scale, ½ Inch to the Foot.

Boiler.—Furnish and fit up in complete working order, on best cast-iron stand, one 30-gallon, round top, Brooklyn pressure copper boiler, with maker's name stamped in; to have sediment cock and all connections, and brass couplings to water-back. Water-back furnished by owner. To be a ¾-inch pipe from tank to boiler, and a ¾-inch pipe from boiler to each tap, and returned to boiler to form circulation.

Furnish all first-class labor and material to make a complete finish of the entire work; to supply, empty and connect the various works.



$3500 Dwelling Houses.—First Prize Design.—Fig. 16.—Elevation in Lower Hall.—Scale, ½ Inch to the Foot.

Estimate on First Prize Design.

CARPENTER WORK:		
Frame	$235	
Boarding and siding	130	
Roof boards, shingling, gutters, &c	350	
Hardware	186	
Gables, piazza, cornice, &c	250	
Water table, &c	40	
Doors, windows and cellar windows	424	
Blinds	120	
Flooring	145	
Stairs	120	
Wainscoting, casing, &c	220	
Cistern and sink	80	2300
MASON WORK:		
Excavating	70	
Stone wall	200	
Chimney	110	
Plastering	170	550
PLUMBING		250
PAINTING		300
Total cost		$3400

Revised and corrected by
J. B. PIKE, Builder.

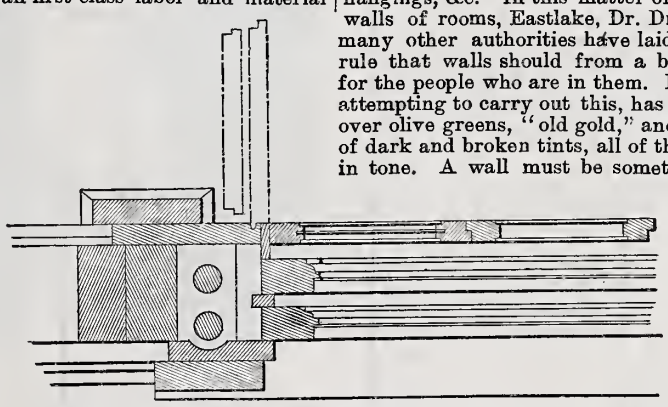


Fig. 18.—Horizontal Section through Windows and Inside Blinds.—Scale, 1½ Inches to the Foot.

Colors for Rooms.

We hear a great deal at the present time in regard to the necessity for harmonizing colors upon the walls of rooms, and of choosing those which are proper for furniture, hangings, &c. In this matter of colors for walls of rooms, Eastlake, Dr. Dresser and many other authorities have laid down the rule that walls should from a background for the people who are in them. Fashion, in attempting to carry out this, has gone mad over olive greens, "old gold," and a variety of dark and broken tints, all of them dismal in tone. A wall must be something more than a background of dark neutral tints. Fashion is changing, and lighter and brighter colors will be used. The dark ones were well enough for these without taste,

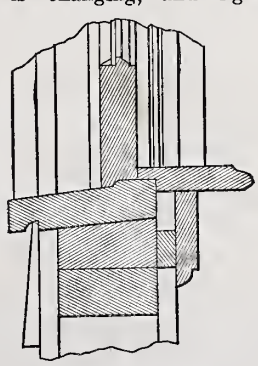


Fig. 19.—Vertical Section through Sills of Windows not coming to the Floor.—Scale, 1½ Inches to the Foot.

because with them they could make fewer mistakes than with brighter shades.

It has long been fashionable in this country to have everything in a room "match," when this is possible, so that people have

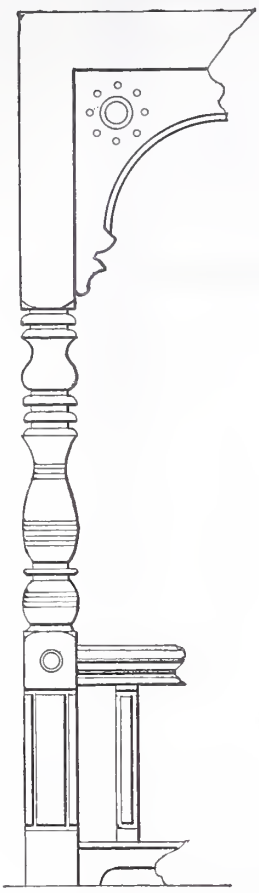


Fig. 20.—Elevation of Post, Rail, Bracket, &c.—Front Piazza.—Scale, ½ Inch to the Foot.

bought light carpets, light window curtains, put light paper on the walls, left the ceilings light, and so made their rooms as cold and colorless as possible. Black walnut furniture, which has been so fashionable, is the

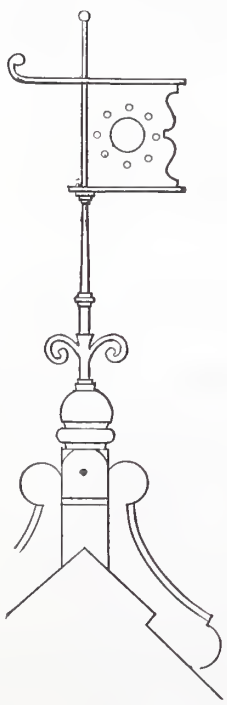


Fig. 21.—Elevation of Finial Surmounting Front Gable.—Scale, ½ Inch to the Foot.

only departure from the prevailing tint. We do not think that the best results can be attained by making a room all light or all dark. Certainly, if the walls are dove color, it is best to have some bright tints to make a contrast and give a more cheerful and brilliant tone to the room.

It may be well to have the parlor, or reception room, of a country house somewhat dark in its general tone. It is commonly used on special occasions only, and upon what might be called state occasions. For this and a variety of other reasons which the housekeeper will appreciate, it may be best to use dark, rich papers and dark carpets, which, however, should not repeat the colors of the walls.

Sitting rooms, and especially those which are used by the family at night, should have light paper and ceilings. Yellows and buffs, which seem quite dark in the daytime, lighten up very much at night, and appear white, or nearly so, by artificial light. A gloomy sitting room in long winter evenings is a thing to be avoided, especially if it is desirable to have the children at home and keep them there. The cost of lighting a dark-walled room is about double that required for one with light walls. The dark

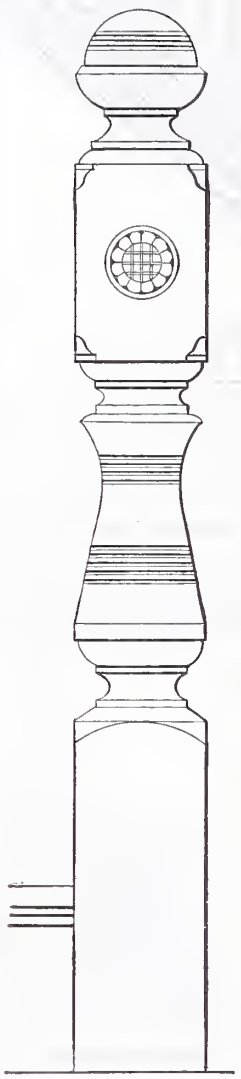


Fig. 22.—Newel at Foot of Stairs.—Scale, 1½ Inches to the Foot.

one will seem gloomy, no matter how much light is used. Blue tints are not usually so pleasant by artificial light as those of a red or yellow cast.

Strength of Yellow Pine.

From a paper read by Prof. R. H. Thurston before the American Association for the Advancement of Science, we find some very interesting facts relative to the strength of yellow pine and other timber. Prof. Thurston made experiments for determining the modulus of elasticity, using a very large number of specimens in his trials. He found that the deflection of timber bearing a load and supported at the extremities is very nearly proportional to the load, even far beyond the customary limits of strain, and that the modulus is very nearly constant for all moderate deflections. When higher loads (as one-fourth or one-eighth the maximum) were imposed for a considerable time, as 10 or 20 minutes, the deflection gradually increased. On removal of the weight it steadily decreased, returning nearly to its original set. Heavy loads, long applied, produce fracture of pieces, the companions to which resisted considera-

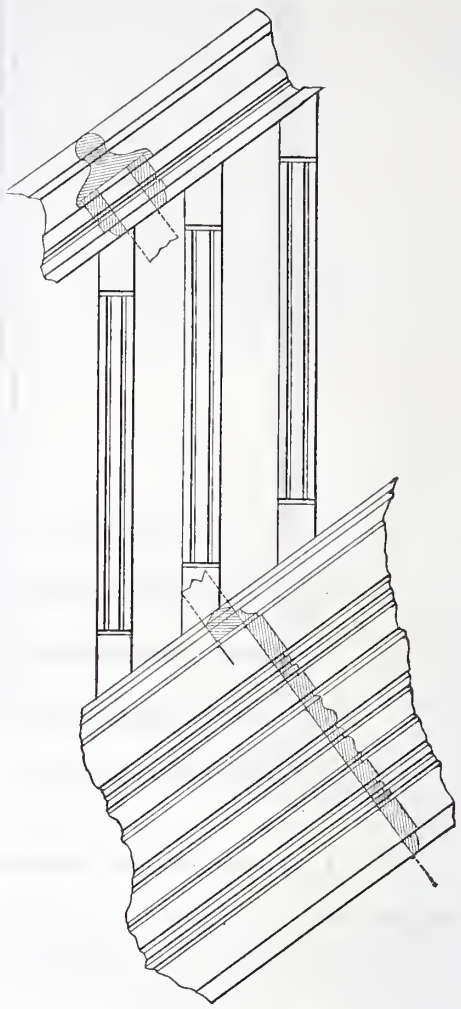


Fig. 23.—Elevation and Section of Rail, Balusters and String of Stairs.—Scale, 1½ Inches to the Foot.

bly more when the load was increased steadily up to the moment of fracture. The maximum permanent load was apparently something less than one-half and greater than one-third the maximum load which could be sustained under ordinary test.

From the whole series of experiments Prof. Thurston drew the following conclusions: The elasticity of yellow pine timber, such as is usually used in construction, is very variable, the modulus varying from 1,000,000 to 3,000,000, the average being about 2,000,000 in small sections, and a little above 1,500,000 in large timber. The

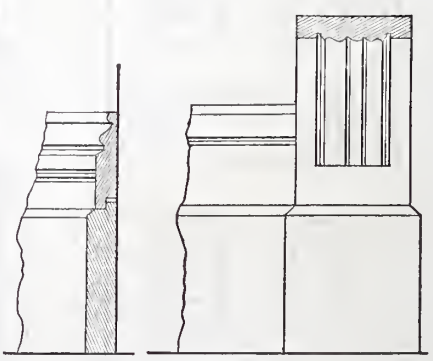


Fig. 24.—Section of Base and Door Casing, with Plinth of Doors.—Scale 1½ Inches to the Foot.

highest values are given as often by green as by seasoned timber; the density of the wood does not determine the modulus, the figure varying sometimes directly and sometimes inversely as the density, even where the amount of seasoning was alike; a high

modulus usually accompanies high tenacity and great transverse strength; the resistance offered to transverse stresses is greatest where the lines of grain are vertical.

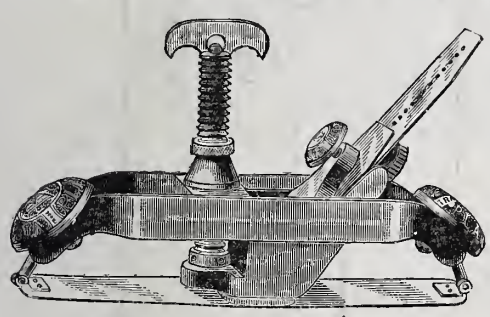
Prof. Thurston recommends the designing and constructing engineer to adopt a moderate value of the modulus in proportioning a work, and by careful inspection and test to secure the rejection of all material which is not of good quality.

NOVELTIES.

Two novelties in the way of adjustable planes have been recently added to the variety already in the hands of mechanics. They are both ingenious, and will commend themselves to the attention of wood-workers.

IMPROVED ADJUSTABLE CIRCULAR PLANE.

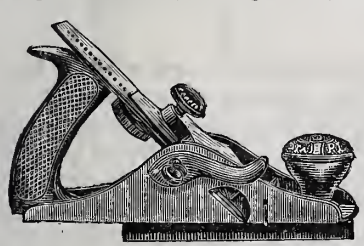
This plane, (Fig. 1) which is the invention of Mr. Leonard Bailey, is adapted to working concave or convex surfaces. The face is flexible, and by means of the screw which passes down through the stock of the plane the face can be raised at the center or depressed, to agree with any outside circle not smaller than 18½ inches, or any inside circle not smaller than 12½ inches. The retail price of the plane is $5. This tool is manufactured by L. Bailey & Co., Hartford, Conn., and the Stanley Rule and Level Co., 29 Chambers street, New York, are general agents for the sale of the same.



Novelties.—Fig. 1.—Improved Adjustable Circular Plane.

COMBINED SMOOTH RABBET AND FILLETSTER PLANE

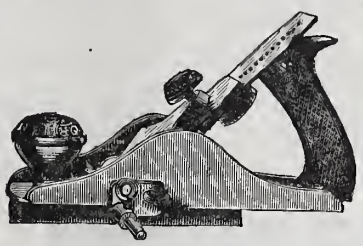
Figs. 2 and 3 represent an adjustable iron smooth plane, capable of being transformed into a rabbet plane or a filletster at the will of the owner. The original form of the plane is that now known in the market as "Victor" Smooth Plane No. 4. It will be observed (Fig. 2) that the cutter on one side of the plane is left flush with the stock, thus adapting it for use as a rabbet. A spur is inserted in the edge of the plane, in front of the cutter, which can be set down when required, or can be drawn up entirely out of the way when not in use. Also an adjustable gauge can be attached to this side of the plane to regulate the depth required. Fig. 3 shows the socket, which can be screwed on to the side of the stock, and through which a bar slides. The fence can thus be moved to any required distance from the edge of the stock, making an adjustable filletster of any desired width up to 2 inches. In this tool wood-workers of all classes will find a practical combination of three useful tools adapted to their needs. The retail price is $5, and it may be found in the hardware stores. The tool is manufactured by L. Bailey & Co., Hartford, Conn., and the Stanley Rule and Level Company, 29 Chambers street, New York, are general agents for its sale.



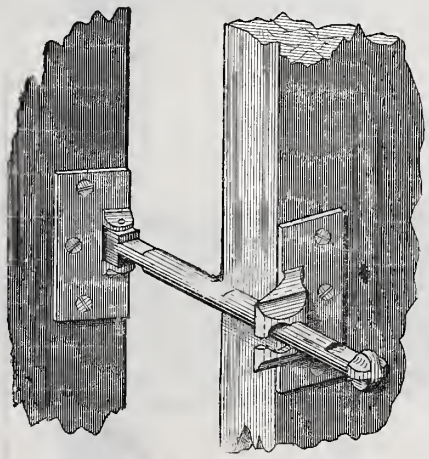
Novelties.—Fig. 2.—Combined Smooth Rabbet and Filletster Plane, Arranged as a Rabbet.

COMBINED DOOR CLAMP, SAFE GUARD AND VENTILATOR.

Fig. 4 of the accompanying engravings shows a very neat improvement, recently brought out by Charles A. H. Bright, of Bridgeport, Conn. The engraving so clearly represents the use of the article and its method of application, that an exhaustive description is not necessary. The knob on the end of the rod prevents the door from swinging clear open. The notches in the rod admit of fastening the door at either of three different points. When the door is shut the rod may be turned inward, thus forming a very strong and substantial fastening, or it may be turned outward, thus permitting the door to open freely. It will readily be seen that this article successfully supersedes the common chain and hook very generally found upon doors of city houses. It has the material advantage over the chain of fastening the door open at some particular point, as well as preventing the door being forced open by any one on the outside. This is a great advantage in the way of ventilation, and should commend its use over the old plan. Another form of the clamp is made which is adapted to use upon doors opening outward, or, in other words, upon the opposite side from that shown in our engraving. Both styles are made of malleable iron, and are handsomely finished in nickel plate.



Novelties.—Fig. 3.—Combined Smooth Rabbet and Filletster Plane, Arranged as an Adjustable Filletster.



Novelties.—Fig. 4.—Bright's Improved Door Clamp.

NEW PUBLICATIONS.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. To contain 80 lithograph plates, showing new and original designs of dwellings of moderate cost in the Queen Anne, Eastlake, Elizabethan and other modern styles. To be completed in 10 parts. Part Four. New York: Bicknell & Comstock. Price, $1 per part.

The fourth part of this serial work has just been issued. It contains two elevations and details of frame store buildings of moderate cost, arranged with dwellings above. The first of these shows a store room 25 feet wide, not deducting the space occupied by the stairway leading to the second story. The building is two stories in hight, and the upper floor is divided into seven rooms—there being a parlor, 12 x 15 feet; dining room, 10 x 13 feet; a kitchen, 12 x 12 feet, and three bedrooms. Each of the rooms, with the exception of the dining room, is accessible from the halls without passing through any other room. All of the rooms are well lighted, with the exception of one of the bedrooms, which has no outside window. The second of these designs is very similar to the first, except that it is of sufficient width for two stores, being a double building. Both designs are provided with a veranda or porch in front, surmounted by a balcony, which is reached from the second-story window. From wants often expressed by our correspondents, we have no doubt these designs will serve a very useful purpose. The second plate in this number is devoted to store fronts and details in the Queen Anne style, and contains a number of valuable suggestions. The five plates following contain the elevations, floor plans, details, &c., of a first-class modern dwelling of an estimated cost of $5000, designed by Messrs. Cabot & Chandler, of Boston. No perspective view of the house accompanies this design, but a perspective of the rear porch is presented, exhibiting a very picturesque arrangement. There is also a perspective view of a flower balcony on the south side. The last plate in this number presents a number of designs of exterior and interior cornices and belt courses. Taken altogether, as viewed somewhat from the standpoint of our practical readers, we consider this number probably the most valuable one of this work that has yet been issued.

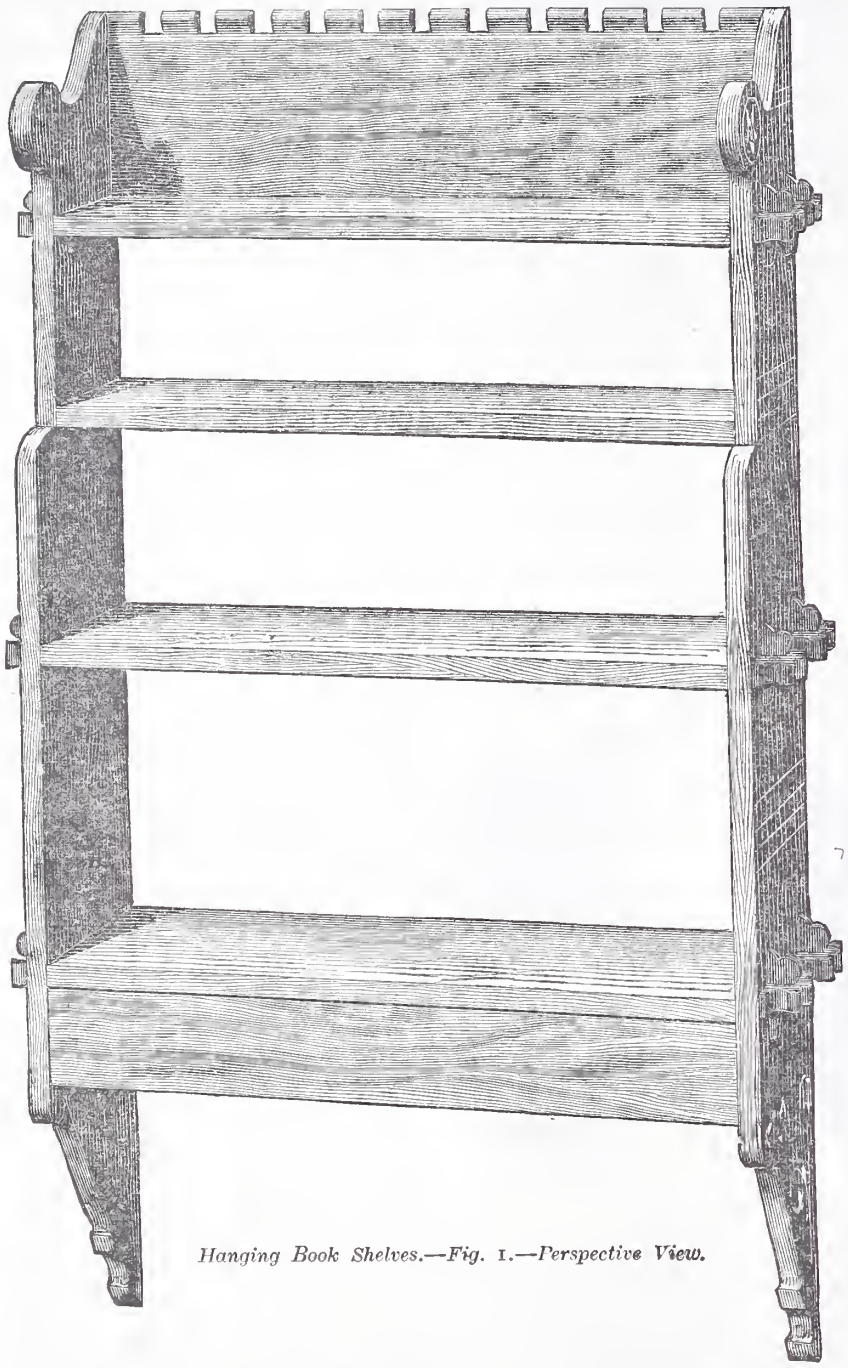
ANGUS' PRACTICAL STAIR RAILING. By Charles Angus, Grand Rapids, Mich. Published by the author. Price, $3.

This in the size of page, which measures 19 x 15, is probably the most pretentious work that has yet appeared upon the subject of stair-building and hand-railing. The book consists of ten plates, prepared by a practical man, who has written for his fellows instead of attempting to make a book after the book-maker's standard. The drawings are to a scale of 3 inches to 1 foot, or quarter full size, which makes everything very clear and distinct, and in many cases much easier of comprehension than when the cuts are reduced to the small scale usual in works of this kind. The text describing each plate is on the page opposite, thus facilitating reference. From casual examination of the work, by which we mean inspection of the problems without having attempted to put any of them to practical test, we are pleased with the author's methods. While it does not cover as much of the subject as some works, so far as it does enter into the discussion of stair-building problems, it treats them in a way calculated to be of the greatest benefit to students of the art.

PALLISER'S PRINTED SPECIFICATIONS, ADAPTED TO USE BY ARCHITECTS, CONTRACTORS, &C., and suitable for all descriptions of buildings, except churches. Bridgeport, Conn.: Palliser Palliser & Co. Price 50 cents each.

Printed specifications have been in the market for a number of years past, and have been quite extensively used by numerous architects and builders. Various editions have been published, and each has, in some respects, improved upon its predecessors. The specification before us is the most complete we have ever examined, and in all respects appears the best adapted to general use of any that has yet been published. There are two points to be gained in the employment of printed specifications. In the first place there is a material saving of labor, and, in the second place, there is less chance of omitting important parts than in the preparation of a written specification. Contractors who make a practice of estimating from drawings know that all architects have a style and habit in these matters peculiar to themselves. By comparing a number of jobs all from one office, there will be found a marked resemblance between them. This arises from the practice of copying each specification from the office model, modifying it only so much as may be necessary to adapt it to the particular work in hand. This custom upon the part of architects makes the use of a printed specification not only possible, but, in many cases, advisable. The only condition necessary is that the printed form shall be standard in all particulars, and that the

present edition seems to be. There is an additional advantage in employing printed specifications—contractors have less difficulty in deciphering them than is the case with many written articles. Their work of estimating is, in a measure, reduced to a definite system by their use also. The specifications above named, which are the work of a thoroughly experienced architect, are logical in their arrangement, complete in their items, and are amply provided with blank spaces for entering additional matter to suit peculiarities of buildings. Two blank forms of contracts accompany each copy,



Hanging Book Shelves.—Fig. 1.—Perspective View.

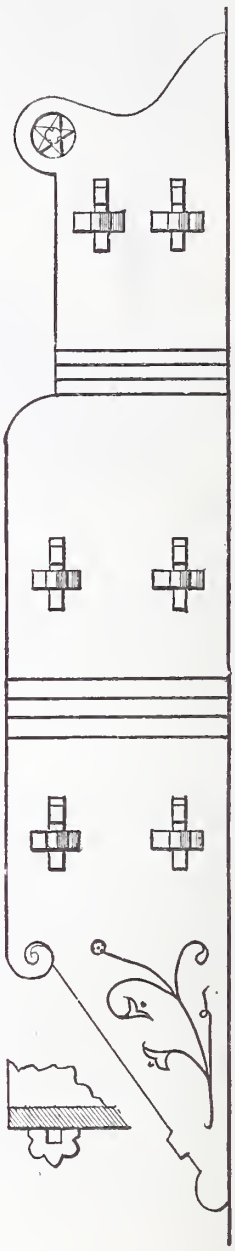
while the price is so low as to make their general employment quite economical.

Hanging Book Shelves.

On this and the opposite page, by means of a perspective view, front and side elevations and sections, we present a neat design for hanging book shelves in such a way as will enable any one who is so disposed to make the article without further drawings. The design is one which will look very well, whether executed in light or dark wood, although probably the latter will be preferred by most persons. The construction indicated is such as to admit of the shelves being taken apart and packed in very small compass for moving. The three principal shelves are secured by dowels and pins, which of course make it a simple matter to take them out. The drawer at the bottom runs upon cleats fastened to the side pieces, as may be seen by examination of Figs. 3 and 5. The second shelf from the top and the back piece above the upper shelf are gained into the side pieces, so that they can be easily removed when taking the shelves apart. In the front elevation (Fig. 3) we have shown the use of cabinet hardware upon articles of this kind. Our readers will no doubt recollect a description of goods of this character which we published a short time since. A neat escutcheon is placed in the middle of the drawer, and dulls are put upon either end, an arrangement which adds very much to the appearance of the shelves, as may be seen by a comparison between the front elevation and the perspective view. There is also shown in Fig. 3 what may be called cabinet hangers, appropriate for an article of this kind. For this particular purpose, however, the hangers used should be somewhat different from those of ordinary construction. More strength is required in a case of book shelves than would be necessary with an ordinary hanging cabinet, on account of the greater weight likely to be put upon them which would be carried by the hangers. In this particular instance the hanger should be longer than it is usually made, and it should extend downward, so that a connection could be made with the upper shelf, thereby giving support directly to the framework. Besides the support given to the shelves by means of these hangers, a cleat or other fastening may be placed under the lower shelf and back of the drawer, thus in a measure dividing the weight between different supports. However, with regard to features of construction of this kind our readers will be able to decide for themselves, and therefore we need do no more than offer the few suggestions here contained.

Another Talk on Mathematical Signs and the Rules of Arithmetic.

With the signs which we explained last month almost any of the ordinary rules may be very easily and clearly stated. Supposing that, instead of knowing the dimensions which we have given, the



Hanging Book Shelves.—Fig. 2.—Side Elevation.—Scale 1½ Inches to the Foot.

sketch only were shown and the letters upon it, and we were asked to state the whole method of working, as we did in the second case. It is evident that we must either go back to the whole thing written out, or else use words and mathematical signs mixed up. Suppose we state it thus: (Outside length — 2 × thickness) × inside width × (outside depth — thickness). This is a pretty long statement, and it is not very clear. Now, boys, don't be afraid, but let us put it into something that looks just like algebra, and use the letters from the cut instead of the words. Here is a list of them:

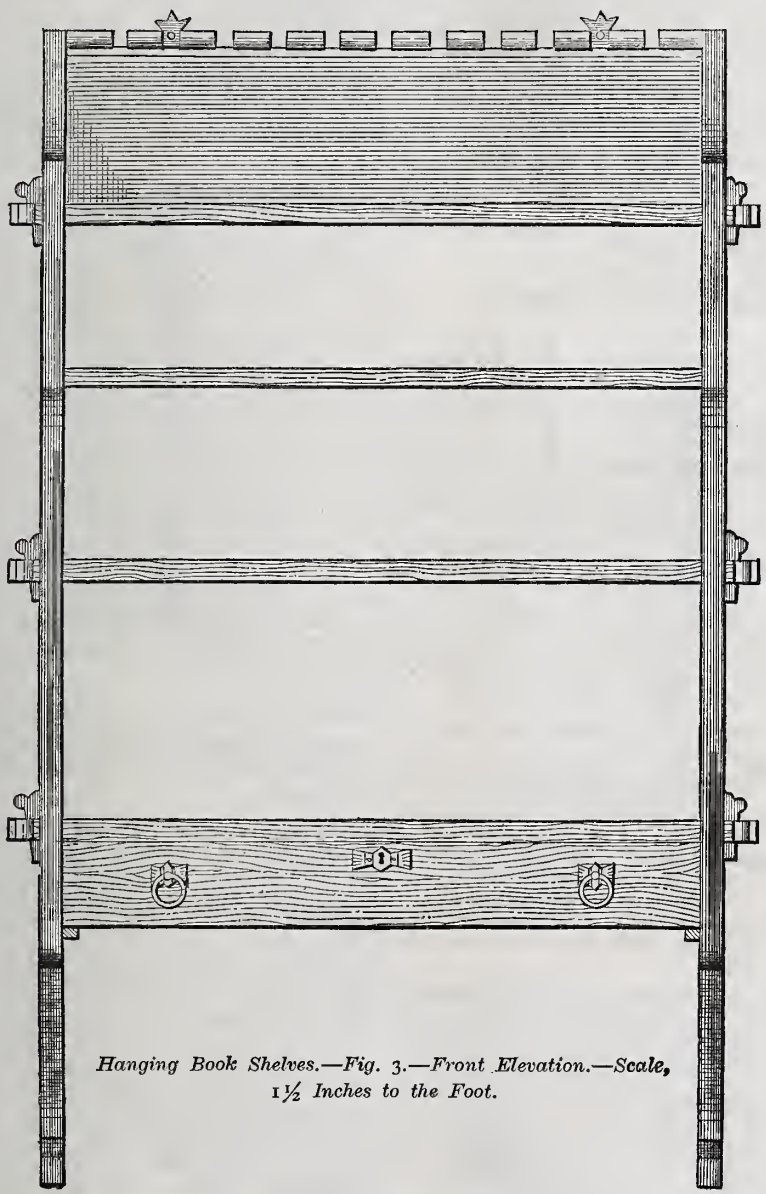
L.—Length outside.
W.—Width inside.
H.—Hight outside.
t.—Thickness of the wood.

$(L - 2 \times t) \times W \times (H - t)$ = contents.

This is a great deal shorter, much plainer and a good deal easier to understand, even

if it does look like algebra. Here the boy who asks the question gets an answer which he can take in at a glance. It is a rule which he can comprehend in a moment and keep before him.

In using the letters we made the letter for the thickness small, because the figure which it represents was small and of less importance than the others. It has been found more convenient, when letters are used, to omit the sign of multiplication; and when two letters are written together, or a figure and a letter, to consider them as multiplied. This would make the first position of the statement read thus: $(L - 2\ t)$. If all the dimensions were given "net," or inside the tank instead of out, the rule could be given thus: L W H = C, where C would stand for the word contents. Now, there is one other modification of the rule which would be needed if all the dimensions were



Hanging Book Shelves.—Fig. 3.—Front Elevation.—Scale, 1½ Inches to the Foot.

taken in inches, and it were desired to have the contents in feet. It would be to divide the result by 1728, the number of cubic inches in a cubic foot. This would be done by putting the whole statement in the form of a fraction:

$$\frac{(L - 2\ t) \times W \times (H - t)}{1728} = \text{contents.}$$

In this last form, if the signs for multiplication were omitted it would be understood that the W must be multiplied by the quantities standing on each side of it.

Let us take the case of finding the contents of an ordinary board in board measure, that is to say, the number of feet it contains, each foot in this instance being supposed to be equal to 144 cubic inches, or one foot square and one inch thick. The length, for convenience, is taken in feet and the width in inches. Let us suppose that we have a piece of board, say 15 feet long and 16 inches wide and 1 inch thick. Putting this in the form of a statement, we have $15 \times 16 \div 12$=the number of feet, board measure. This is much more compact if we make a fraction of it thus:

$$\frac{15' \times 16''}{12''} = \text{feet board measure.}$$

This shows just what the other did—that 15 and 16 were to be multiplied together and the product divided by 12. Now, suppose we make a little table of the principal measurements and put letters in the place of the words. Then

L = the length in feet.
W = the width in inches.
t = the thickness in inches.
F = feet board measure.

If we state the rule so as to apply to all cases, we shall have to multiply by the thickness in inches, so we will give it just as if it were only applied to boards. Then it will read:

$$\frac{L\ W}{12} = F.$$

The L written beside the W shows that they are multiplied together, or that W is to be taken L times. There is nothing very alarming in this; indeed, the rules look rather nice in "algebra."

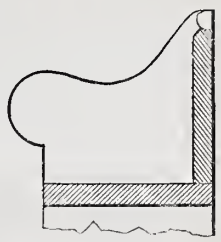
Now, suppose we enlarge it so that it will cover all thicknesses of timber and give the board measurement; it will then become:

$$\frac{L\ W\ t}{144} = F.$$

In this case we multiply by the thickness t in inches and proceed as before.

There are some other signs that should be understood before all the common operations can be put into convenient form by means of letters. The first of these is the sign for extracting the square root. Now, we know that a great many of the boys "never went as far as square and cube roots," and when we begin to talk of them will suddenly remember that they have errands down the street or even on the other side of the town. Now, boys, don't go off. Nobody in these days has to extract roots, because we have in almost every handbook great tables of square roots and cube roots, besides short ways of getting at the figures we want without working out the question. Besides, we are not going to give out any "sums" to puzzle you with, but only want to talk about them.

The square root of a number is some other number which, multiplied by itself, will give the number whose root is wanted. This is, however, not true of 1 (one), which is its own square, cube or any other root. When the square root of a number is to be extracted, it is indicated by the following sign $\sqrt{\ }$ written before it. Sometimes the square root is wanted of a number which itself must be obtained by certain operations;

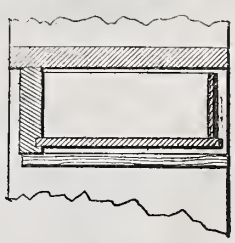


Hanging Book Shelves.—Fig. 4.—Section through Top Shelf.—Scale, 1½ Inches to the Foot.

then the horizontal part of the sign is made to cover the whole statement of the operation, thus: $\sqrt{2 \times 5 + 6}$.

Cube root, or a number which, multiplied by itself twice, will produce the required number, is indicated thus: $\sqrt[3]{\ }$ and so any other root may in the same way be indicated by writing the proper figure before the square-root sign. When an algebraic statement of a question is made which calls for the extraction of a root, all the operations under the root sign are performed and then the root is extracted. In the example just given the 5 is multiplied by the 2 and the 6 added to the product before we are ready to find the root. As 16 is the number, the square root, of course, will be 4, as that number multiplied by itself gives us 16.

Sometimes people are very much puzzled by a small figure written after and just



Hanging Book Shelves.—Fig. 5.—Section through Bottom Shelf and Drawer.—Scale, 1½ Inches to the Foot.

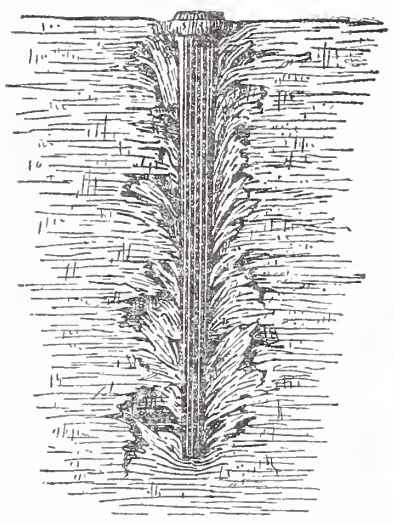
above another figure or letter, thus: 2^2 or L^2. This means that the number is to be squared; that is, it must be multiplied by itself, in which case we should find that $2^2 = 4$, and if L = the side of a square, L^2 would equal the area. The small figure denotes the number of times that the principal figure is to be multiplied into itself, thus: $2^2 = 2 \times 2$, or 4. If it were written 2^3, then we should have $2 \times 2 \times 2$, which is equal to 8. Carrying it still further, we have $2^4 = 2 \times 2 \times 2 \times 2 = 16$. In the last case 16 is called the fourth power of two, and so we may have the second, third, fourth or any other power of a number or of a letter representing a number.

Occasionally the square or cube root is indicated in another way. This is done by writing one-half or one-third above a number, just as if a power were to be indicated. This is sometimes read the one-half power or one-third power. It means, as in the other cases where the sign is used, that the square or cube root is to be taken.

With these signs fairly in mind, the boy will be able to understand almost all of the simple algebraic statements which he is likely to find in *Carpentry and Building*, as well as a very large proportion of those in Mr. Nystrom's or Mr. Haswell's hand books. We hope that we have made them so plain that there will not be a young mechanic among our readers who will not be bold enough to look any algebraic formula he may come across squarely in the face and try to see how much of it he understands. If the boys care for it, we will at some other time try and tell them something about the meaning of that very mystifying word, "equation."

Common vs. Chisel-Pointed Nails.

Some time since a correspondent sent us two samples of wood, in each of which a nail had been driven. The blocks had been split so as to expose the nails and show the condition of the wood fibers. The accompanying illustrations show, as well as engravings can, the condition of the wood and the appearance of the blocks. Fig. 1 r presents an ordinary 10d. fence nail, very slightly reduced in size. The fibers of the wood, it will be seen, are badly broken. In the original sample the crushed fibers are disturbed for a distance of a quarter of an inch from each side of the nail. In two or three places only does the uninjured wood come anywhere near the nail itself. Our impression is that this is a very fair repre-



Common vs. Chisel Pointed Nails.—Fig. 1.—*Common form of Fence Nail, and its Effect upon the Wood into which it is Driven.*

sentation of what takes place in driving any broad-pointed nail into a soft wood like pine. If the nail in starting bruises the wood and carries a bunch of fiber in front of it as it is driven, the hole it makes will be much worse than the one shown, especially if the nail be driven somewhat slowly. If a piece of wood in which a nail is driven is exposed to moisture, of course the water penetrates beneath the head of the nail and rust soon commences. This weakens the wood, although it increases to some extent the hold which the nail has. When we examine the destruction which an ordinary nail makes in going into a piece of wood, it is easy to see why packing boxes which have very hard usage are so easily shaken to pieces, and why boards get off from fences, and why nailed work generally gives away so easily when any racking strain comes upon it.

Fig. 2 is a pretty fair representation of the effect produced by a chisel pointed nail, of the same size and form as that shown in Fig. 1. This engraving was also made from a specimen. In the sample before us the fibers are considerably less disturbed than they are represented in the cut. The sharp point of the nail cuts the fibers from top to bottom of the hole. The only disturbance which they then experience is in being pressed endways and downward sufficiently to make room for the body of the nail. Consequently, they are bent very much, and are more tightly packed than any other portion of the wood. Naturally, the amount of strain which such a nail would withstand without becoming loose, is much greater than that required to work the square-pointed nail entirely loose.

Wire nails, or French points, as they are sometimes called, disturb the fibers of the wood very little, and although their surfaces are smooth and they have naturally very little holding, they are for many purposes superior to a cut nail; and this superiority, we presume, is largely due to the fact that they do not break up the wood as they enter it. Any of our readers who wish to try the experiment of using a chisel-pointed nail can do so by filing the point of an ordinary nail. We think they would be convinced at once, by a test of this kind, that for many purposes these nails are very much superior to the common kind.

The superiority of chisel-pointed nails over square nails we should think would cause their general introduction and use, but we believe that, although an article of this kind was somewhat extensively advertised a few years since, it never gained a substantial foothold in popular esteem. If any of our readers have tested this matter practically, we shall be pleased to have a discussion of the subject continued in our correspondence columns.

NOTES AND COMMENTS

Our Chicago Office.—For the accommodation of the Western patrons of *Carpentry and Building*, we have opened a branch office in Chicago, at Nos. 36 and 38 Clark street, corner of Lake street. It is under the management of Mr. Henry Smith, who has been for many years connected with our New York office, and whom we cordially commend to our Western friends. The increasing importance of our interests in the district of which Chicago is the business center, renders the establishment of a branch office at that point a convenience to our customers and a necessity to us. As this branch is a part of our publication office, business conducted through it will be on precisely the same basis as with our New York office.

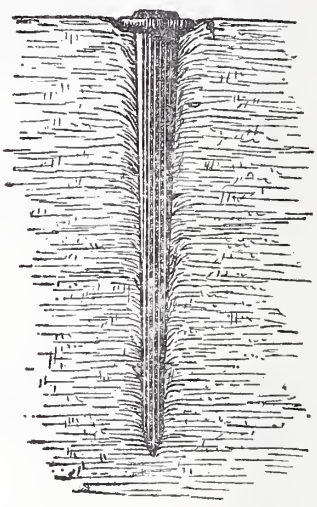
A very high iron bridge has just been completed on one of the European railways. Its lower chord is not less than 404 feet above the level of the stream which it crosses. The principal span is 544 feet long. The arch supporting the highest part of the structure is a sort of parabolical girder. The viaduct of which this forms a part is 1500 feet long, and, including foundations and masonry, has cost only about $600,000, which is considered a very low figure.

Indian patterns are becoming somewhat popular with English designers, who are studying up the underlying ideas of Indian art, and attempting to make what might be called designs founded on the old Indian theories of decorations. The result of this is often exceedingly good. Some of the patterns appear to a novice to be of Oriental origin, and are liable to deceive even the experienced. It must be understood that they are not copies or imitations in any sense, but true compositions.

The form of lightning conductors has been a subject of careful investigation by the celebrated electrician, Mr. Wm. H. Preece, of England. After a long series of experiments with Dr. Warren de la Rue's 3000-cell battery, he has come to the conclusion that a solid cylindrical rod is as good a form for the lightning-rod conductor as any that can be used. The quantity of metal is really the important feature, its form having nothing to do with the conducting power.

Slow burning construction is beginning at last to attract the attention it deserves. People are beginning to find out that a house which is built on this plan is practically just as good as one that is so-called "fire-proof." We believe that ordinary dwelling houses can be made so nearly incombustible that the furniture in any one room may be burned up without damaging other rooms save by smoke—a result which is near enough to absolute fire-proofing for any practical purposes. Such a re-sistance to fire is certainly much more than could be expected of the best classes of brick dwellings and storehouses as at present constructed in our large cities.

Gardiner, Batchelder & Co.—One of the evidences of appreciation of the efforts being made by *Carpentry and Building* which have recently reached us, is a subscription list of names forwarded to us by Messrs. Gardiner, Batchelder & Co., Lyons, Iowa. This firm has made a present of a copy of *Carpentry and Building* for 1881 to each of its customers. A neat postal card, issued January 1, and conveying the compliments of the season, contained the announcement of this course in substantially the following terms: "Having noticed that the publishers of *Carpentry and Building* have offered prizes for the best plans of houses, and that they propose to publish those that are successful in the competition, we have thought that they would be interesting to lumber dealers and their friends and patrons among the carpenters, and those who intend to



Common vs. Chisel Pointed Nails.—Fig. 2.—*Section showing the Action of a Chisel Pointed Nail upon the Wood into which it is Driven.*

build for themselves. We have, therefore, ordered the said publication to be sent to all our customers in the lumber trade. The journal is published in New York, is finely illustrated, and is a leading authority upon building topics. We trust you will find it interesting, and that some of your friends who intend to build and desire convenient and handsome homes will find just what they need in these prize plans and drawings." We congratulate the customers of Messrs. Gardiner, Batchelder & Co. upon the fact that they are doing business with liberal public-spirited men. We have no doubt that *Carpentry and Building* will find numerous appreciative readers among the many additional names thus attached to its list, and that its monthly visits will be a pleasant reminder to all of them of the enterprise of the donors.

Intelligent Planning of Houses.

Why is it that the carpenter or the builder, or the architect who designs our modern houses, does not give some attention to the subject of closets? Practically, every room in a house needs one or more closets to make it conveniently habitable. In the large cities and in many of the country towns, closets are the exception rather than the rule. We know of houses in New York City, and in some of the smaller towns as well, that do not contain a single closet aside from the one in the kitchen. Houses built in New York City a few years ago were frequently arranged so that there was but one closet on each of the upper floors, and none whatever on the par-

lor floor. The intention, of course, was to have wardrobes and cabinets, but with a perversity or lack of forethought, which to housewives seems unpardonable, the windows, doors and gas fixtures were usually so arranged that it was almost impossible to find space for the important pieces of furniture rendered absolutely essential in a room. In the hall bedrooms in some of the finest houses below Twenty-third street, in this city, there is absolutely no place whatever for a wardrobe; nor is there even a series of hooks on which to hang clothes. There is no place for a closet on the plan. Wardrobes are not only inconvenient, but unsightly, and it is far better to provide in the design for good-sized closets in every room, than to depend upon wardrobes which are practically huge closets standing in the rooms. We know, from experience, that in a house provided with an abundance of large closets it is possible to get along comfortably with a very small amount of room. In fact, we think that if one whole room in a house were sacrificed to make places for the various closets, for convenience of living the house would be more desirable and seem more spacious, than it would without the closets. Every one remembers the satisfaction with which our older people speak of the garrets of old-fashioned houses. It is true these garrets were inconveniently placed, and that they were huge lumber rooms in many cases; but they were really great closets, in which an immense amount of material necessary in the household economy could be stored away out of sight, and yet within reach.

One of the most convenient houses that we know of is located in the city of Brooklyn. It is not large in size, being built upon a narrow lot, yet every room, from basement to hall rooms on the top floor, has one or more closets. Most of the rooms, in addition, have two or more drawers built in under the window. The result is that the family living in it feels less cramped for space than they would in many of the 25-foot old-fashioned houses which have only one closet on a floor. We have known some instances where people, driven to desperation by the want of room, deliberately sent for the carpenters and had portions of their important rooms cut off and converted into spacious closets, thereby—in feeling at least, and certainly in comfort—gaining the room that had before seemed to be lacking.

There are a great variety of ways in which closet-room can be obtained without any great sacrifice in the plan of a house. Corners may be utilized by cutting them off, and so obtaining room for a closet which shall hold a few dresses or coats; or, adjacent rooms may be separated by 36 or 40 inches, and a closet so obtained for each apartment. Another method which is sometimes very convenient is to separate two rooms by means of a passageway, and from the passageway on either side open doors into closets. The curved partitions which are sometimes used at the head of stairways, or to finish lower halls, very commonly leave blank spaces behind them; these should in all cases be utilized for closet room. The space beneath a flight of stairs can also be converted into closets. In a small house, if it is possible, one light store room should be secured, and in it shelves of good strength should be placed on at least two sides.

If builders and architects would devote a couple of hours to talking with their wives in regard to the conveniences of houses and the accommodations which go to make houses homes, we think their ideas in regard to designing would undergo a very radical change. They would then see the necessity of placing windows and doors in such positions as to allow the hanging of pictures and the placing of beds and other articles of furniture; of making the house the dwelling place of a family, without necessitating a constant war with the construction in order to get the necessary furniture into reasonably convenient positions. We have seen a great many houses built in which it was almost impossible to find convenient places for a bed in any room. In other houses there appears to be a place for everything. The very construction seems to suggest a chair, a bracket, picture or bureau, showing that the architect had kept in mind the fact that people must have such things in their houses.

Hand vs. Machine Work.

There has been a constant boast upon the part of English manufacturers that in their best work everything is done by hand. The results which the art metal workers have attained in this manner in some lines of goods are indeed admirable. In others, however, they have failed most signally, and among the examples of the failures may be mentioned cabinet hardware. While the goods produced have been beautiful in themselves, they have lacked in many important particulars. For example, hand-made hinges and butts have always been shaky, loosely-fitting affairs, unfit for use in connection with the fine and accurately-fitting woodwork now universally expected. Although æsthetic critics scout the idea that machine butts are better than those made by hand, such is the fact nevertheless. Hand-made pins and joints can never compare with those produced with tools; yet what may be termed art maniacs still prefer hand-work with all its faults—a course resulting in sorrow and disgust for the people who use the work for which they are responsible. Very much of the English art hardware which we have examined is rough in the joints and loose in the fitting. In other words, for the name of the thing, hand-labor is employed on portions where it has no business to be, and where machinery could be used to much better advantage. Such goods as we have just described soon give evidence of their shoddy character by failing to work. Hardware, first and foremost, should be serviceable, and then beautiful. If the latter point is gained and serviceableness neglected, the result should be considered an utter failure.

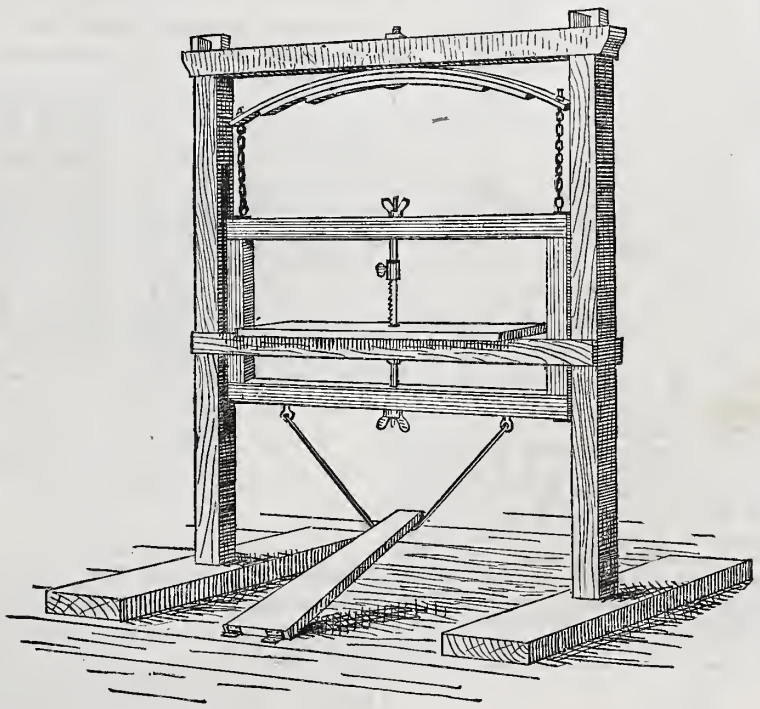
Hard Wood for Joiner's Work.—Hard wood is coming into quite general use again for the commonest of joiner's work. There are many dwellings in the larger cities where all the window frames, sashes, doors, wainscoting, closet trimmings and general finish are made of ash, cherry, walnut or mahogany, or a medley of the whole. There was a time when oak was a fashionable wood, but ash has taken its place, from being easier to work, less liable to check, and presenting quite as pleasing and a somewhat similar effect. Ash with walnut trimmings is a very satisfactory wood for finishing the interior of dwellings, and is much in vogue. Cherry is a very nice wood for the same purpose, but is somewhat more expensive.

CORRESPONDENCE.

No doubt the omission of our stair-building article this month will be a disappointment to many of our readers, but the large amount of space which we have been obliged to give to the presentation of the first prize design, has compelled us to carry over a number of good things which we had prepared for this number. We have one or two letters from correspondents upon stair-building topics which we shall present in a short time. Further accounts of the feast at "Wood Butcher's" on Christmas day have reached us, which we may publish at even a later date. Our readers will, do doubt, be glad to learn that the old gentleman survived the visit of his friends and is at present doing well. We hope to have communications from him soon for publication.

Home-Made Scroll Saw.

From W. W. S., *Stapleton.*—In the October number of *Carpentry and Building* for last year a correspondent asked for a design for a home-made scroll saw. With your permission I will describe one that I have had in use for five years, and which has given me great satisfaction. This saw, when built properly, will cut stuff from one-eighth of an inch in thickness to five and six inches. The outside frame is built of 4 x 4 spruce. The inside frame is 2 x 5 pine, being composed of two pieces of inch pine, with the grain reversed, and joined together by screws. The springs are made of three-eighths inch ash, planed to one-eighth inch on each end, and are composed of three layers, constructed much in the same way as wagon springs. Either a ch in or a rope may be employed leading from the ends of the springs to the frame. A piece of track, such as is used for sliding doors, is placed on each upright, and a piece of iron fitted to work against this track is fastened to the frame. The treadle is hinged to the floor, and, as shown in the sketch, may be adjusted to accommodate the swing of the saw in order to suit the requirements of the operator. In the machine that I am using, the space between uprights is 5 feet 6 inches in the clear. Deducting the space occupied by the inside frame and the slides, it leaves net 4 feet 11¼ inches, which gives 2 feet 5⅝ inches swing for the work which may be done in this tool. The table rests on two battens nailed on each side of frame, and in size is 2 feet by 18 inches. I trust what I have here presented will be of some interest to the correspondent who inquired, and to others of your readers.

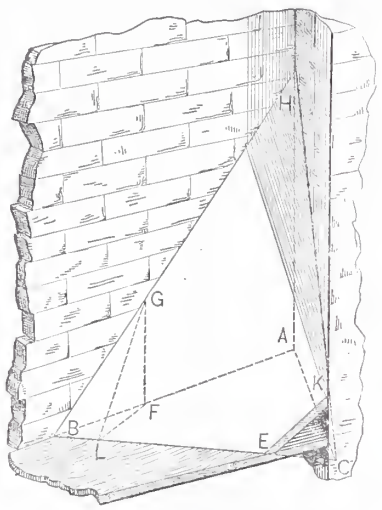


Home-Made Scroll Saw.—Contributed by W. W. S.

Problem in Angles and Bevels.

From ODD SHAPE, *Leroy, N. Y.*—A question which I desire to propound is this: How can I find the shape of a board to fit in the angle formed by three walls and the floor, two of the walls meeting at an acute angle, the second angle being obtuse? I inclose a plan of the floor and also a piece of folded paper, which will better convey my idea. I shall esteem it a special favor if you will help in the solution of this problem, as I think there are but few things that bother a carpenter more than obtaining odd shapes and the bevel for the same.

Answer.—We take pleasure in assisting our correspondent in this matter, and in doing so shall pursue a method which, perhaps on account of being somewhat original in some particulars, will call out criticisms and, possibly, other plans for doing the

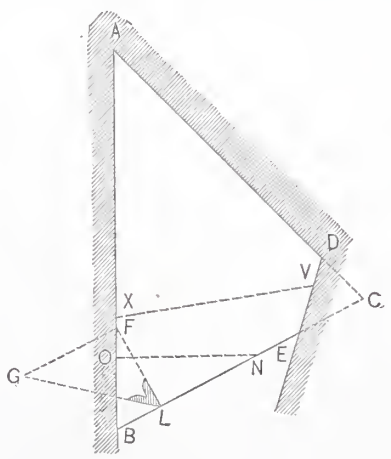


Problem in Angles and Bevels.—Fig. 1.—*Perspective View showing the Board in Position.*

same thing. We thus hope to throw enough light into this dark corner to enable all to see the matter clearly.

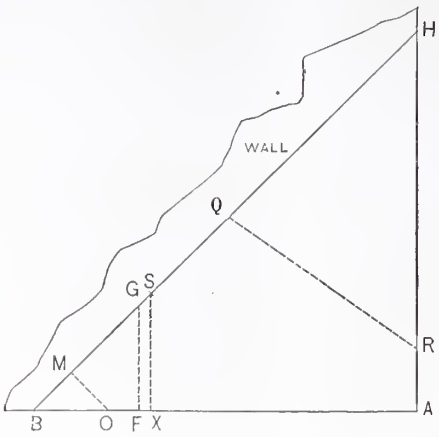
Fig. 1 of the accompanying illustrations shows in perspective the board in position. Fig. 2 shows a plan of the floor and the position of the walls. It will be seen that the board requires to be fitted on four sides; also to be beveled on each of the four sides, and that none of its angles are right angles.

By a condition mentioned in a part of our correspondent's letter not published above, the board is required to make an angle of 45 degrees with the walls. Inasmuch as the



Problem in Angles and Bevels.—Fig. 2.—*Plan showing the Angles of the Walls.*

board required to fit this space will be an irregular four-sided figure, it will be best for us at the outset to produce two of its sides so as to reduce it to a triangle, simply for convenience in developing its shape. After having got the shape in this form, it will be a simple matter to cut off one of its corners, thus bringing it back in the four-sided figure required. Therefore in the plan (Fig. 2) produce the sides B E and A D until they meet in the point C. To obtain the length of the side of the board B H, Fig. 1, take the distance B A from the plan (Fig. 2) and lay it off on any horizontal line, as B A, Fig 3. At the point A, in the same line, erect a perpendicular (A H) indefinitely. By the conditions stated in our correspondent's letter, to which we have above alluded, the side B H of Fig. 1 is to be at an angle of 45 degrees with the wall. Therefore make the hight of the perpendicular A H in Fig. 3 equal to the base A B, and draw the line B H; then B H,



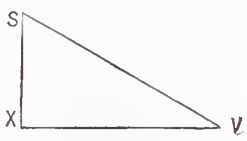
Problem in Angles and Bevels.—Fig. 3.—*Diagram for Obtaining the Length H B of Fig.* 1.

Fig. 3, will represent the length of the side of the board represented by B H, Fig. 1. Next take the distance A C from the plan and lay it on any horizontal line, as A C in Fig. 6. At the point A erect a perpendicular, A H, which make equal to A H of Fig. 3. Draw H C; then H C of Fig. 6 will be the length of one side of the triangular board B H C of Fig. 1. Inasmuch as the side B C of the triangular board lies in the horizontal plane, its length may be measured directly upon the plan, Fig. 2. Having by these several steps obtained the three sides

Problem in Angles and Bevels.—Fig. 4.—*Diagram of the Corner K E C of Fig.* 1.

of the triangle, we construct the figure as shown in Fig. 7.

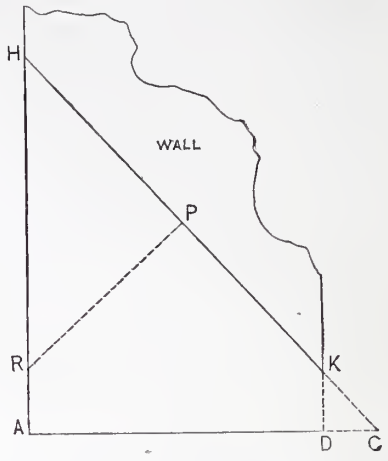
The next step to be taken is to cut off from this triangle as much as is represented by the corner K E C of Fig. 1. To do this we proceed as follows: Take the distance C D of the plan (Fig. 2) and lay the same off in the line A C of Fig. 6, measuring from C toward A, thus obtaining the



Problem in Angles and Bevels.—Fig. 5.—*Triangle Constructed in Obtaining the Bevel of the Fourth Side.*

point D. From D erect a perpendicular to the line H C, as indicated by D K; then the distance K H is the actual length of the side K H of Fig. 1. Take the distance K H of Fig. 6 and set it off on the line H C of Fig. 7, measuring from H toward C, thus establishing the point K. In like manner take the distance B E from the plan (Fig. 2) and lay it off on the line B E of Fig. 7, measuring from B toward C, thus establishing the point E. Connect the points E and K; then B E K H will represent the actual shape of the board.

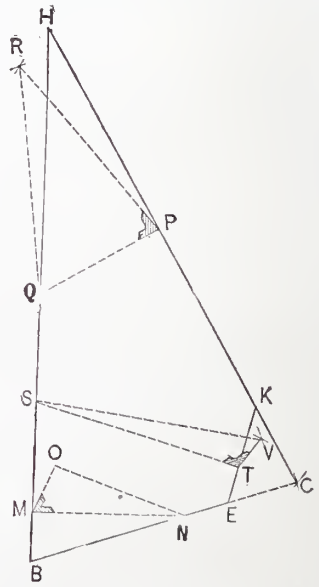
It still remains to obtain the bevels for reducing the edges of the board. For the bevel of the lower edge, B E of Fig. 1, we proceed as follows: From any point, as L, in the plan (Fig. 2) draw a line at right angles to B E, and continue it until it strikes the line B A in the point F. Set off the distance B F on the line B A of Fig. 3, measuring from B toward A, thus determining point F. On the point F erect a perpendicular, B A, which produce until it cuts the line B H in the point G. From the point F in the plan (Fig. 2) draw a line perpendicular to F L, and make the length equal to F G of Fig. 3, just obtained. Connect the points G and L in Fig. 2, as shown; then the



Problem in Angles and Bevels.—Fig. 6.—*Diagram for Obtaining the Length H C of Fig.* 1.

angle G L F will be the bevel of the side B C. The position of the triangle L F G in Fig. 2 is shown in Fig. 1 by lines indicated by corresponding letters.

To obtain the bevel of the side H K (Fig. 1) we proceed as follows: From any point in the line H K in Fig. 7, as P, erect a perpendicular, and continue the same until it cuts the side H B in the point Q. Establish the position of the point P in Fig. 6 by taking the distance H P of Fig. 7, and setting it off on the line H K of Fig. 6, measuring from H toward K. From the point P in Fig. 6 erect a line perpendicular to H K, which produce until it cuts the side H A in the point R. Establish the position of the point R in Fig. 3 by making A R in Fig. 3 equal to A R in Fig. 6. Establish the point Q in Fig. 3 by taking the distance H Q in Fig. 7 and laying it off in the line H B of Fig. 3, measuring from H toward B. Connect the



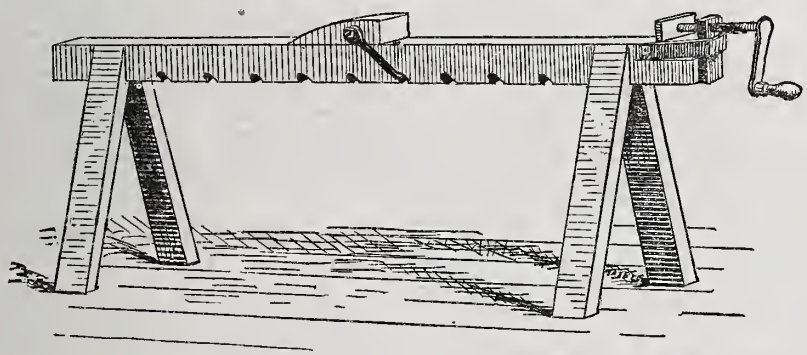
Problem in Angles and Bevels.—Fig. 7.—*The Shape of the Board, with the Several Bevels Indicated.*

points Q and R in Fig. 3. Upon the line P Q in Fig 7 as a base construct a triangle, making the side P R equal to P R of Fig. 6, and making the side Q R equal to Q R of Fig. 3; then the angle R P Q will be the angle of the bevel of the side H K of Fig. 1.

To obtain the bevel of the side H B we proceed as follows: From any point in the line H B in Fig. 7, as M, erect a perpendicular, and produce it until it cuts the line B E in the point N. In this connection it is to be re-

marked that we take the point M in the line H B sufficiently near to the point B to make the perpendicular cut the line B E, in preference to either of the other sides. By this we very much simplify the operation and shorten the work to be performed. If the point M had been so located that the perpendicular would have cut either of the other two sides, we should have obtained a section which would pass through two additional angles before a complete outline could be obtained. Referring now to the operation, we next establish the position of the point M in Fig. 3 by making the distance B M equal to the distance B M of Fig. 7. From the point M in Fig. 3 erect a perpendicular to H B. Produce it until it cuts the side B A in the point O. Locate the point O in the plan (Fig. 2) by making the distance B O in the line B A equal to B O of Fig. 3. In the same manner make B N of the plan equal to B N of Fig. 7; then connect the points O and N in Fig. 2, as shown. Next upon the line M N in Fig. 7 as a base, construct a triangle, making M O equal to M O of Fig. 3, and N O to N O of Fig. 2; then the angle N M O will be the bevel of the side B H.

The fourth side of the board is so situated that a triangular section of it alone cannot be obtained; therefore, a section must be constructed which will pass through the space between the board and the corner in the same manner as though that space were a solid. We will assume the point T in the line E K, Fig. 7, as a starting point from which to acquire the required bevel. From T erect a line perpendicular to E K, which produce until it cuts the opposite side of the Fig. B H in the point S. The next step is to construct a section of the wall against



Sash and Door Clamps.—Fig. 1.—Sketch Contributed by J. E. M.

which the side of the board E K rests. Draw any horizontal line, as D E of Fig. 4; make D E equal to D E of the plan, Fig. 2; from the point D erect a perpendicular, D K; make D K equal to D K of Fig. 6; connect the point K and E. On this line locate the point T, which was assumed as the starting point in Fig. 7, by making T K of Fig. 4 equal to T K of Fig. 7. From the point T draw a line perpendicular to K E, continuing the same until it cuts the side D E in the point V. Before the triangle S T V (Fig. 7) can be drawn, the length of the side S V, which does not lie in any of the plans that we have been considering, must be obtained. To do this we proceed as follows: Locate the point S of the line B H in Fig. 3, by making B S equal to B S of Fig. 7. From the point S, Fig. 3, drop a line perpendicular to the base B E, meeting it in the point X. Locate the point X in the plan, Fig. 2, by making B X of that figure equal to B X of Fig. 3. Locate the point V of the plan by making D V equal to D V of Fig. 4, previously obtained. Draw the line X V in the plan. Next, construct a triangle, as shown in Fig 5, making the base X V equal to X V of Fig. 2, and the perpendicular X S equal to the perpendicular X S of Fig. 3. Connect S and V; then S V will be the required length of the third side of the triangle S T V of Fig. 7. Upon the line S T construct the triangle S T V making S V of that figure equal to S V of Fig. 6, and T V of Fig. 7 equal to T V of Fig. 4. Then the angle S T V will be the bevel of the fourth side of the board.

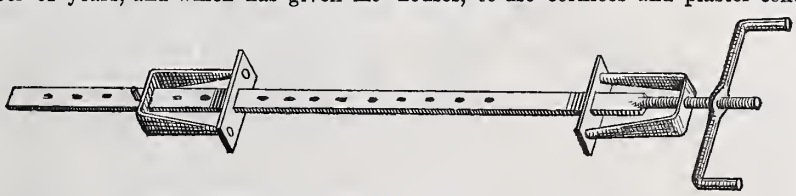
Sash and Door Clamps.

From J. E. M., *Cooksport, Penn.*—I herewith send you a sketch and description of a clamp for drawing together doors and sash, which I have made for my own use, and which I think answers a good purpose. If there is anything better in use I would be pleased to see it. Referring to the sketch, the clamp consists, in the first place, of a common truss or saw-horse, on the bottom of the bed of which notches are cut. Along the top a movable block is employed, which is fastened to the bed by an iron clevis. A second clamp is fastened at the end of the truss, in such a way as to provide for the operation of the screw mangle. It is not necessary for me to specify sizes of material, but each should be so employed as to render the various parts strong enough for the purpose to which they are to be applied. I use a clamp of this construction for doors and sash and for any other work that is wider than can be held in my bench vise. Taking the irons off, the truss can be used for other purposes.

Sash and Door Clamps.—Fig. 2.—Sketch Contributed by W. H. C.

From W. H. C., *Kingsport, Tenn.*—I inclose you a sketch of my clamp, used for drawing blinds, panel doors and sash together, which is made of iron. The rod is 5-16 inch thick and 2 inches wide. It is provided with ⅜ inch holes upon the 2-inch face. The screw at the end is 1 inch in diameter and is furnished with a good thread. The handle is made 1 inch thick, the screw passing through it. The two heads are made of cast iron, the one to the right being furnished with a chain and pin for fastening it in position. By the construction this clamp can be of any length desired. The heads are 5 inches wide and 4 inches thick.

From R. C. W., *Elizabeth, N. J.*—The accompanying sketch represents a door and sash clamp which I have had in use for a number of years, and which has given me good satisfaction. The parts are so clearly shown, and the construction so well indicated in the sketch, that very little description is necessary upon my part. By an inspection of the drawing, it will be seen that the clamp is of such a construction that it may be used on the bench or upon sawhorses by notching into them.



Sash and Door Clamps.—Fig. 3.—Sketch Contributed by R. C. W.

Determining Radius, Chord and Versed Sine being Given.

From S. B., *London, Ont.*—While reading the paper for October 1 noticed a communication from a correspondent in Mississippi, showing the method of finding the radius of a circle when the chord and versed sine are given, or, to state it in common language, when the opening and rise are given. It reminded me of a rule which I have made use of when I have been gauging brick arches of which only the opening and rise have been given. Take half of opening in inches; square it; square rise and add to it. Double the rise for a divisor and the quotient will be length of radius in inches. For example, suppose an opening to be 3 feet 6 inches and the rise 6 inches, then we have 21 inches as one-half of the opening; squaring 21 gives 441. The square of the rise gives 36, which, added to the former amount, makes 477; divide this by double the rise, or 12, which will gives 39¾ inches, or 3 feet 3¾ inches.

Note.—This rule is based upon well-known mathematical principles, and we commend it to the attention of our readers.

Where to Get Wood Naphtha.—Making Cheap Shellac Varnish.

From B. J. H., *New York.*—Please inform me, through the columns of *Carpentry and Building*, where I can get wood naphtha, gum shellac, gum benzoin and gum sandarac. By what other name is wood naphtha called?

Answer.—Messrs. F. W. Devoe, & Co., corner of Fulton and William streets, New York, can furnish all the articles mentioned by our correspondent. Wood naphtha, wood spirit, wood alcohol and pyroligneous spirit are all different names for the same article, we believe. We may here add a fact which may be of interest to our friend and perhaps some others who have occasion to make a cheap spirit varnish. It is said by an English gentleman that when he wished to make a shellac varnish and use wood spirit instead of alcohol, and, at the same time, have the quality good, he first dissolved his shellac in a small quantity of pure alcohol, and then added wood spirit in the proper proportions to make varnish. His statement was that he got a better result in this way than he could by any other means. He also stated that a wood-spirit varnish, prepared as we have described, was very nearly equal to one made with pure alcohol alone. If any of our readers can verify this we should be glad to hear from them.

Plaster Center Pieces and Cornices.

From J. K. O., *Brantford, Canada.*—Referring to your article on wall papers in the December number, I wish to ask whether it is customary in New York, in building houses, to use cornices and plaster center-pieces when walls and ceilings are to be finely finished with modern wall paper?

Answer.—Cornices are used, and are commonly tinted with suitable colors to harmonize or contrast with the papers. It is usual to omit the center-pieces. They are commonly very bad in form, and do not admit of any treatment which will make them at all satisfactory.

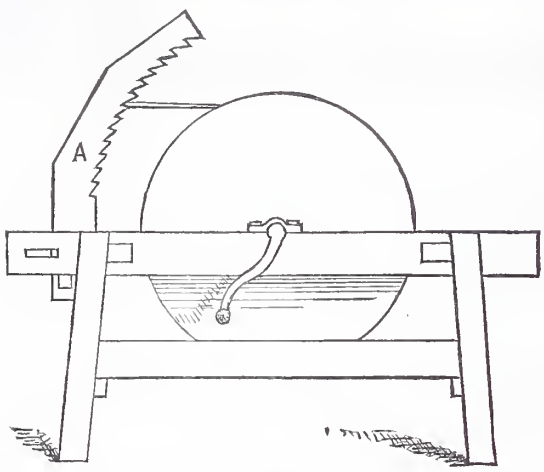
G. H. H. Understood and Indorsed.

From A. M., *Baltimore.*—I followed with considerable interest the discussion which arose from the manner in which G. H. H. applied the bevel for backing that hip post, and it appears to me that not one of those

opposed to him took into consideration the fact that the manner of backing a square hip post was under discussion at that time under the head of "Some Problems in Framing," and that G. H. H. sent the rule under the supposition that it would be applied to a square post only. In my opinion G. H. H. got the best of it in that discussion.

Grinding Jacks.

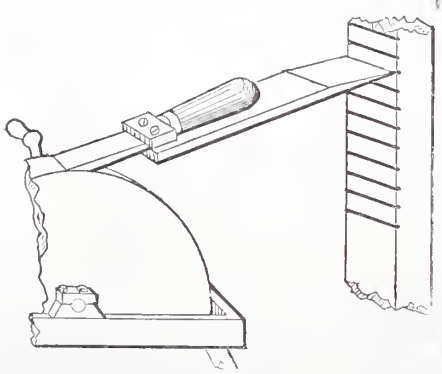
From W. H. C., *Kingsport, Tenn.*—I inclose you a sketch of my grindstone, showing the plan that I use for holding the bit. The device is very simple, as any one may see. The frame is made of 2 x 5 inch stuff,



Tool Holders for Grindstones.—Fig. 1.—Plan Recommended by W. H. C.

and the trough is placed on cleats below the stone. An upright piece, A, is circled as per sketch and furnished with notches cut in such a manner as to catch the bit. This piece, A, extends below the bench 4 inches, where it is secured by a key. It also fits between two bead pieces, and by this arrangement can be regulated to suit different-sized bits. It is the best contrivance for grinding that I have ever tried. The bit can be changed from one notch to another in order to obtain the bevel desired.

From K. M. A., *Xenia, Ohio.*—I inclose you a rough sketch of an arrangement that I have been using for a long time in connection with my grindstone, which may be of some interest to your readers. It is a tool-holder, and consists of a piece of hard wood a little wider than the widest tool I am likely to want to grind. A clamp, also made of wood, and fastened by means of two screws, secures the tool in place during the operation. The end of the tool-holder furthest away from the grindstone is beveled, as shown in the engraving. I place my grind-



Tool Holders for Grindstones.—Fig. 2.—Plan Recommended by K. M. A.

stone near a post in which are cut a number of horizontal grooves. The tool-holder is placed against the post, its beveled end fitting into one of the grooves, such a one being selected as will afford the tool the proper pitch for grinding. By this simple contrivance it is possible for one man to turn the stone and hold the tool in a satisfactory manner at the same time.

Finishing Tin Roofs at the Eaves and Flashing Around Chimneys.

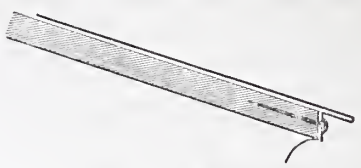
From L. S. B., *Waynesburgh, Ohio.*—Readers of *Carpentry and Building* will undoubtedly be interested in methods of finishing tin roofs at the eaves and flashing around chimneys. I have never seen published the way in which I finish the eaves of tin roofs—a plan that is applicable to both tin and iron. I first cut the metal the length required, allowing 3 inches to project over the eaves. I then place the metal with the underside up, and with my roofing tongs turn 2 inches back upon the sheet or length to be fastened, all as shown in Fig. 2. I next turn 1 inch of the edge just made back upon itself, letting it extend at right angles with the sheet, as shown in Fig. 3, after which I reverse the sheet, placing it in its correct position, and draw the flange at right angles up against the sheet-board, where it is nailed, as shown in Fig. 1.

The advantages of this plan are that it overcomes the difficulties of contraction and expansion, and that there is an inch projection under which to hang an eave trough. The nails are not so much exposed, and therefore not so liable to rust as if the water ran directly over their heads. Besides this, a roof finished in this manner presents a much finer appearance than when done in the ordinary way.

Too much care cannot be taken in fitting around chimneys. In general I recommend sawing into the brickwork and inserting an end of the flashing and then counterflashing over it. This plan is not practicable in all cases—for example, with stone chimneys. In such instances, I advise making a square box of wood around the chimney, with the top beveled to a feather edge. The roof is then to be finished to the box and a cement joint made with the chimney. For a joint of this kind I recommend ironclad cement, which, when allowed to stand for a time, becomes as hard as iron. Ironclad cement is simply dry iron-ore paint mixed with oil until it is about the consistency of putty.

In flashing chimneys in standing-seam roofs which are wider than the metal used, many tinners allow the standing seam to run down close against the chimney, malleting it down and finishing with solder and cement. The method which I advise for chimneys, skylights, &c., is entirely different, and, so far as my experience goes, has given the best of results. After obtaining the width of the chimney, I cut a piece and allow length enough to reach from the last flange which I have secured in place past the chimney and come out even with the number of strips required, all as indicated in the accompanying plan. Judgment is to be used to determine the bight the strip should be turned up against the chimney, in order to protect it against snow and water. The upper edge of this flange is made to enter a slot or a joint between bricks. The edges at each side are turned up the same as on the strips of the roofing tin. The edge of the strip toward the comb of the roof is turned down in the way for making a flat seam. This edge of the flange is secured to the sheet-boards by nailing or cleating, according to the way the roof is being laid. The end of the strips of metal forming the roof proper are secured to it by means of a flat seam. The whole is then malleted down the same as in valley work. This description will be better understood by reference to the accompanying sketches. At the bottom of the chimney I finish in the same general manner, except that I allow the metal to extend down to the eave from the chimney or to hook into the gutter, as the case may be. This part of the work is clearly shown in Fig. 6. The sides are finished by allowing the strip at the top and bottom to be enough wider to allow an inch edge to be turned up, and over the inch edge a piece made to reach from top to bottom of the chimney, with the inch edge at each end, can be hooked and malleted down, all as exhibited in the sketches. This piece should be enough wider to allow of the turning of the flange up against the chimney, and upon the opposite edge to turn an edge for seaming into the regular seam of the roof.

Note.—The letter above printed comes from an experienced tin roofer, and contains ideas and suggestions which we be-



Finishing Tinwork at Eaves and Around Chimneys.—Fig. 1.—Appearance of the Eaves Finished.

lieve cannot fail to be of practical value to carpenters and builders generally. Too often tinwork, one of the most important parts about a building, is left entirely to the discretion of tinsmiths who have had but limited experience, and who possess few ideas as to the proper way of doing work. Accordingly, if a carpenter understands the theory of the tinsmith's work, he can often contribute advice, and even superintend the work in a way to accomplish better results than if the tinner were left alone. Hence, we take pleasure in presenting these ideas to our readers, and trust they will be generally read and considered. In this connection we suggest that a very desirable subject for correspondence would be that of tinwork from a carpenter's standpoint. The subject might be enlarged to include galvanized-iron cornice work. These are items in building construction with which a carpenter has much to do, and with which, in many cases, he becomes thoroughly disgusted before his building is finished. Possibly, if more light were thrown upon these subjects from the standpoint of practical men, less offense would be given.

Three Men Carrying a Stick of Timber.

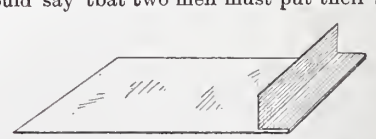
From S. B., *London, Ontario.*—I will attempt to answer the question of J. L. T. with reference to three men carrying a stick of timber, in which it is desired that each shall

Finishing Tinwork at Eaves and Around Chimneys.—Fig. 2.—First Step in the Preparation of the Tin.

carry one-third of the entire load. My rule is to divide the length by 4. The result will be the distance that the carrying stick should be placed from the front end. For example, supposing a stick 27 feet 3 inches long is to be carried. The length divided by 4 gives 6 feet 9¾ inches, which represents the distance from the front end at which the carrying stick should be placed.

From C. D. E., *East Corinth, Maine.*—The rod should be placed one-quarter distance back from the forward end. I suppose some one will explain the whys and wherefores about it, so it is not necessary for me to enter into particulars. I think it is of very easy demonstration.

From W. J. McC., *Amsterdam, N. Y.*—I would say that two men must put their bar



Finishing Tinwork at Eaves and Around Chimneys.—Fig. 3.—Second Step in the Preparation of the Tin.

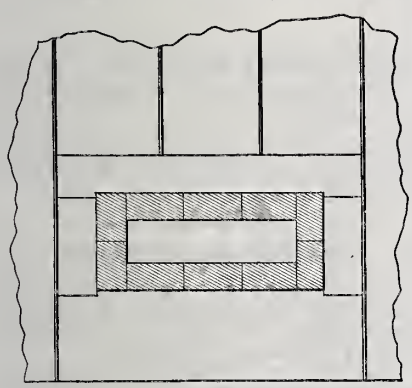
one-quarter the length of the timber from the end; that is, one-quarter must project in

front of the bar, while the third man takes the back end in his hands.

From S. P. S.—My plan for working the problem would he to divide the length of the stick by 4, and the quotient would be the answer. For example, take stick of timber 30 feet long, to be carried by three men, one carrying at the end and the other two carrying by a cross-bar. Dividing the 30 feet by 4 we have as a result 7½. That is, the cross-bar must be placed 7½ feet back from the front end.

From C. H. R., *Independence, Iowa.*—In reply to your correspondent who asks about the equal division of a load where three men attempt to carry a piece of timber, I would say that all bodies gravitate in an inverse proportion to their distance from the center of gravity. For example, suppose a stick of timber to be 16 feet long, then by the rule above mentioned we have the following proportion 1 (man): 8 feet (center):: 2 (men): answer, which being worked out in the usual way gives 4 as the result; or, in other words, 4 feet from the end of stick, or one-quarter the entire length. In further illustration of this rule, suppose a stick of timher 20 feet long is to be carried by five men, with two men at the end; then we have 2 (men): 10 feet (center):: 3 (men): required distance from the end, which being worked out gives as a result 6⅔ feet, or 6 feet 8 inches from the end, or one-third the entire length.

From W. S. E., *Wellington, Ohio.*—My answer to the problem is that one-quarter of the length of the log must project in front of the carrying stick, in order to have each man carry one-third of its weight. Take, for example, a timber 40 feet long. Place the carrying stick one quarter of its length, or 10 feet from the front end. These 10 feet will obviously balance 10 feet immediately back of the carrying stick, thus throwing the entire weight of the first 20 feet on the two men in front. There yet remains the last 20 feet to be carried. Now, if a body be carried from two ends, its weight is



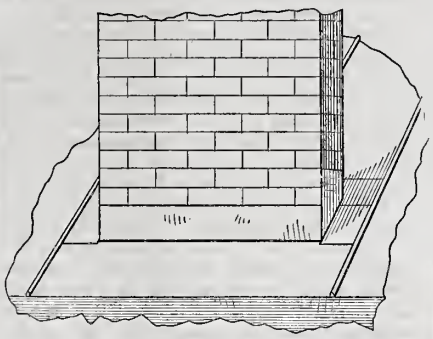
Finishing Tinwork at Eaves and Around Chimneys.—Fig. 4.—Plan of Chimney showing the Joints in the Tinwork.

thrown more upon the person on one end than upon the other, in exact proportion as he is nearer the center of the weight, and *vice versa*. The center of this last 20 feet is 10 feet from the man at the end, and 20 feet, or twice as far, from the men in front. Consequently, they only carry one-third of it, while he carries two-thirds, or 13⅓ feet, which is one-third of the entire stick.

From CURLEY, *Patterson, Ohio.*—The number of men at the spike are to the number of the men that tail the log as one-half the length of the log is to the distance that the spike must be placed from the center of the log. For example, three men are required to carry a log 12 feet long—two at the spike and one at the back end. By the rule above given we have the following proportion: 2 : 1 :: 6 : required number, which, being worked out, gives as an answer 3 feet, which means that the spike must be placed 3 feet in front of the center of the log in order that each may have a fair share of the load.

From A. S. H., *Clarksburgh, W. Va.*—With reference to the problem of three men carrying a stick of timber by means of a bar, I would say that the bar must be placed one-sixth the length of the timber from the front end, in order to equalize the load between the three men.

Note.—Of all the different solutions presented to this problem, we are inclined to helieve that A. S. H. has presented the only correct one. Our correspondent W. S. E. commences a train of argument which, if carried through, will produce a different result from that which he gives. Let us sup-



Finishing Tinwork at Eaves and Around Chimneys.—Fig. 5.—Perspective View of Chimney.

pose, for example, that a stick of timber is 30 feet in length and lies flat upon the ground. Should one of the men undertake to lift this timber by one end, he would obviously lift one-half its weight, the other half bearing upon the ground. Should one man lift at one end of the timber and two men lift at the opposite end, the one man would lift one-half of it and the two men would lift the other half, or of the two men each would each lift one-quarter. If the two men lift by means of a stick and the stick be placed back from the end any distance, that part of the timber which is between the stick and the end will balance a piece of equal length immediately back of the stick, and the man at the opposite end will lift one-half of the remaining length of the log. Now, since the log is supposed to be of uniform size throughout, each man, in order to lift one-third of the weight of the entire log, must lift the weight of 10 feet. Taking these facts into consideration, and using an algebraic method, we have the following: Let x equal the distance back from the front end of the log at which the carrying stick is placed, then $x + x$ or $2x$ will represent the portion of the log which balances over the stick. Now, since the mau at the rear must carry the weight of 10 feet, and since he carries against the point which separates the load of the two men in front from the remainder of the log $10 + 10 + 2x$ represents the entire length of the log. Suhtracting $10 + 10$ or 20 from the entire length of the log we have $2x$, or the length which balances over the carrying stick equal to 10; x then equals 5, or, in other words, the stick must be placed 5 feet back from the front end in order to equalize the load between three men. Since 5 feet is one-sixth of the length of the log, we deduce the rule that the carrying stick is to be placed one-sixth the log's length from the front end.

Shingling Extraordinary.

From G. H. H., *Philadelphia, Pa.*—I have been much interested in the shingling discussion. At last a correspondent says: "Eight thousand shingles a day; each nail holds three shingles." I raise the question—why not put on the entire 8000, and then tie a rope across the roof in order to hold them? It certainly would be sufficient until the wind blows. While writing this my little boy comes running to me and says: "Here, papa; here is the best shingler yet." Upon examination I find he has a copy of an old almanac, in which are a couple of pictures representing a wholesome punishment administered to a disobedient child by an irate mother — a shingle being the offensive weapon. The whole scene is described by a doggerel which accompanies the cuts. After reading the thing through I concluded that it was too good to be missed from the columns of *Carpentry and Building*, and therefore I send it, respectfully asking the attention of the boss shingler to the same. Here are shingles being "laid" at the rate of at least 30 per minute, 1800 per hour, 18,000 per day. Just think of that, shinglers, and stop to breathe for a moment. And all this, too, is done by a woman, and not a nail in any one of them.

Note.—We spare the "boss" shingler and the rest of our readers the infliction of the pictures and rhyme which this correspondent sends in. Anything like a vivid imagination will reproduce the scene from our correspondent's description with sufficient accuracy for present needs.

A Word of Caution.

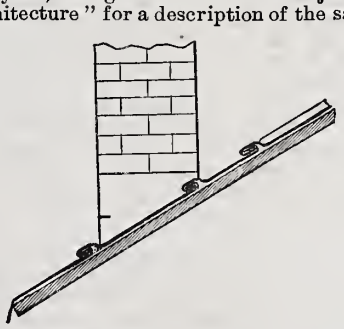
From G. H. H., *Philadelphia, Pa.*—It seems to me that the hoppermen are getting warmed up lately. I suggest that they had better look out, or possibly some one will fall through the hopper and find himself between the mill stones.

Discussions vs. Decisions.

From G. H. H., *Philadelphia Pa.*—I am very much pleased with the editor's answer to my communication in the January number with regard to decisions. The question brought out a declaration which, to me, is very satisfactory. It clearly defines the ground upon which I have been fighting for a long while. I have always contended that it was better to receive and examine a diversity of opinions, thus affording all a choice of plans to work by, than to have discussions restricted and arbitrary rules presented. I proposed the question in order to make this point clear, and I hope that all will understand now what *Carpentry and Building* is for. As I understand it, it proposes to hunt up the short routes if there are any. There seem to be plenty of new ideas coming in, and all the readers will have abundant opportunity for choice among them. The pickets, however, are pretty good ones and are constantly on the look-out. It is hardly possible that bad timber will be passed through the mill unnoticed.

Authorities on "Backing."

From C. B. J., *Medford, Mass.*—I have been very must interested in all that has appeared upon the subject of hip rafters. In learning my trade, I was instructed in the method given by S. F. D., of Newark Valley, N. Y., in the August number of last year, being referred to "Benjamin's Architecture" for a description of the same.



Finishing Tinwork at Eaves and Around Chimneys.—Fig. 6.—Side View of Chimney.

This principle is also laid down in the "Practical House Carpenter" by William Payne, published in Philadelphia in 1797; also in "Civil Architecture" by Edward Shaw, published in Boston about 1830.

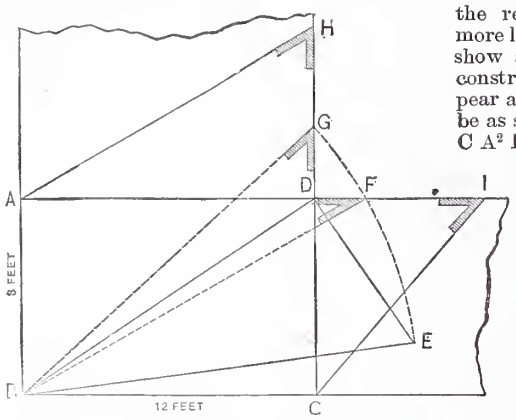
Construction of Screen Doors.

From J. V., *Canandaigua, N. Y.*—I am not pleased with the construction of screen doors recommended hy J. D. B. I prefer to make the stiles and rails ⅞ x 1½ inches, frame them together with mortise and tenon and glue the joints. Managed in this way no braces are needed. Nail on the wire with gimp tacks, turning any raw edges there may be. Hang with 3-inch spring butts (costing 25 cents per pair) at the top and back flap. Screw in a picture knob at the bottom for convenience in opening. I have two such doors in my own house, which have been in constant summer use for

five years, which are at present as square as when first hung. They always shut when not in use, and there are no fastenings to bother.

Backing Hip Rafters.

From T. M., *New York City.*—Referring to the correspondence which appeared in last year's volume of *Carpentry and Building* on the subject of backing hip rafters, A. S. L.'s letter was the first which favored the rule offered by G. H. H. I will add my testimony in favor of G. H. H., although it may seem that my letter comes rather late. The rule given by your Philadelphia correspondent was quite correct, and rested upon a thorough mathematical foundation. It was difficult for me to understand how W. B. applied it so as to obtain the result shown in his problems published on page 118 of last year's volume. However, all this is of the past. W. B.'s rules for finding the backing of a hip rafter, although quite correct, are not, in my estimation, nearly so good as the old standard way, or that given by G. H. H. W. B.'s plan requires more lines, while the lines for obtaining the angles are so short as to make it difficult to



Backing Hip Rafters.—Diagram Accompanying Letter from T. M.

set the bevel correctly by them—a matter of great importance. In this connection I will present a rule which I think is more simple, and where the lines containing the angles for taking the bevels of top side of jacket rafters are very much longer. After drawing the wall plates A B B C, set off from B to C 12 feet and from B to A 8 feet. Draw the lines A D parallel to A C, and the line C D parallel to A B immediately in the point D. Draw B D, which is the plan of hip rafter. Square up the line D E 7 feet for the rise. Join B E. By this we have the length of the hip rafter. With one foot of the compasses in B, with radius B E, describe the arc E F G, cutting the lines A D and C D produced in the points F and G respectively. Join B F and B G, and in the angle at F we have the bevel for top side of jacket rafters on side of building A B. In the angle at G we have the bevel for the top side of jacket rafters on the side of the building B C. The down bevels are the same as those of the common rafters on each side. By this it will be seen that, to obtain the top bevels of jacket rafters, it is unnecessary to draw the common rafters at all. Continue the lines D E and D G indefinitely. Set up the hights D I and D H, each 7 feet. Join C I and A H. By this we have the common rafters on each side with their down bevels, which are shown at I and H. With respect to the description given by G. H. H. of his method of cutting the lines for backing hip rafters and applying the bevel, it perhaps might have been better, but I think as it was it presented all that was required, as a square post was under consideration at the time, and he showed a square post in his sketch with the bevel applied to a diagonal line, which is the same thing as the side of a rafter.

Backing a Square Inclined Post.

From A. S. L., *Concord, Mass.*—In the "Referred to Readers" column, in answer to a query of mine concerning a certain rule or method, to wit, Fig. 29, p. 207, Vol. 1, further specification is called for. I deemed that rule incorrect, for the reason that it gives a wrong result.

Now, nothing but the strougest kind of a conviction that I am right would induce me to array myself against the writer of "Some Problems in Framing," and although it is possible that a misunderstanding exists, yet I feel certain that in this case I fully understand you. In fact, there seems to be but two ways in which to interpret it. In both cases the results would be wrong.

In the example in question the lines are nearly correct, and the nearer the pitch approaches the perpendicular the closer they will be to the truth. The opposite will be the case as the pitch inclines to the horizon.

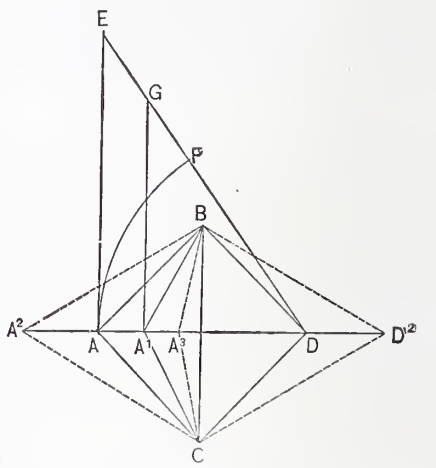
In the two demonstrations I send you the pitch is an angle of 45 degrees for each wall or side of post. In Fig. 1, A B C D is a section of the post. To obtain the backing lines, make the line A E perpendicular to A D, and equal to the gain on two sides of the post in cutting the bottom to fit the sill. Next connect E D; make F D equal in length to A D. Then E F being the gain of the diagonal line, and as one-half only will project over one side, or corner of sill, divide E F equally at G. From G draw G A^1 perpendicular to A D; connect C A^1 B, which is the the required angle to back the post. No more lines are necessary; but in order to show a comparison between the two rules, construct a section of the post as it will appear after being cut to fit the sill. This will be as shown by the dotted lines connecting C A^2 B D^2. The manner of getting this has been well described in *Carpentry and Building.* To obtain the backing liues according to Fig. 29 and the description thereto, take A D on the divider, and from D^2 set off the point A^3. Connect C A^3 B, as shown by dotted lines.

Fig. 2 is another method of obtaining the same result. Get the cut section of the post as before, with the square section inclosed, all shown by A B C D A^2 D^2. From A^2 draw the line A^2 E, making the angle B A^2 E equal to the pitch of wall —in this case 45 degrees. Extend C A to G; make G F parallel to A^2 E. Take the distance I R and set it off each way from A, producing the points L and M; connect C L and B M; the angle C A^1 B is the requisite angle; C A^3 B is the angle according to Fig. 29. If the diagrams were made at an angle of 33 degrees, the point A^3 would be on the other side of the line B C; and if the angle was 22 degrees, A^3 would fall outside the point D.

Having tried to show, by these illustrations, a conceptiou of my ideas of the principles involved and results obtained, I will patiently await the *brand*, and, if it is shown that I am wrong, I will not be slow to acknowledge it.

From T. M., *New York City.*—With regard to A. S. L.'s letter, asking for the correct brand to be applied to the rule given on page 207 of the volume of *Carpentry and Building* for 1879, while agreeing with him in the inaccuracy of the rule, I do not agree with the correspondent in saying the thing is wrong, and theu leaving it there. In my opinion there has been too much of this sort of thing already. If a rule is discovered to be wrong the error should be clearly pointed out. The inaccuracy of this rule (see Fig. 29, page 207, vol. for 1879) lies in taking the line A D and setting it on the line A D^1. From D^1 to A^1 it is too short. Now, as A^1 B^1 D^1 C^1 is evidently intended for the section of the post after it has been cut to the bevel and backed, it must be plain that the angle C^2 A^1 B^1 should be a right-angled triangle. In other words, the angle at A^1 must contain 90 degrees, which is not the case in the sketch. Further, it cannot be obtained in the way there described. I will give a way which will obtain the correct result, and which will also give the angle for setting the bevel for backing, provided backing is wanted to be done first. For the sake of illustration I will assume a lower pitch, because I think by its use the principle can be more clearly seen.

Draw the outline of the wall-plates A D C B, as shown in Fig. 3, opposite page. Set off the distance from B to C and from B to A equal to the distance between B and the first common rafter each way. Square up the lines A D and C D, meeting in the point D. Draw the diagonal B D, which is the plan of the hip rafter, or corner post. Set the hight D E and join B E, which gives the length of rafter or post. To obtain the section of post, draw the line B F indefinitely at right angles to B E. Make the distance between B and F equal to the diagonal of the square section of the post before being cut at all. Take one side of the post in the compasses, setting 1 foot in B. Make an arc at G. Then with 1 foot in F make another arc, cutting the one first drawn in G. Join B G and G F; then B G F will be a section of one-half of the post. At right angles to B F draw F H, and in like manner draw G I. Produce both until they cut B D in the points I and H. At the point I draw a line at right angles to B D, and set off I J and I K, each equal to N G. Join B J and B K, H J and H K. We now have a section of the post cut to a bevel before backing. Set the compasses in I. With the distance I J or I K set off I L. Join L J and L K. We now have the section cut and backed. Instead of the last operation, draw K L and J L parellel to the wall-plates, which will give the same results. To obtain the bevel for backing when required to be done before the post is cut to a bevel at foot, draw L M



Backing a Square Inclined Post.—Fig. 1.—*Backing a Post which Inclines* 45 *Degrees* (*A. S. L.*)

parellel to G I, or, what is the same, at right angles to B F. Join M G, and in the angle F G M is the bevel for backing.

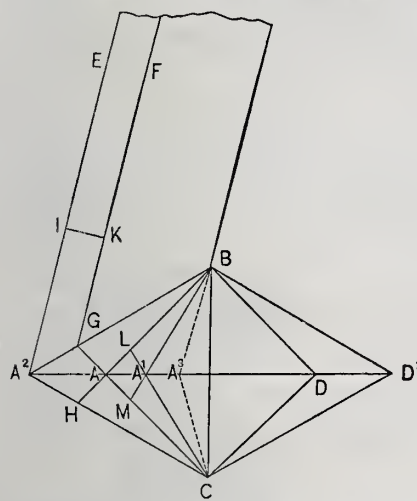
Defective Hopper Bevels.

[The following letter reached us in November, but we have been unable to find room for it sooner. It covers ground which other writers have also touched upon.]

From A. M., *Baltimore.*—My attention has been attracted to E. W. C.'s rule for getting the bevels for a hopper by W. E. M's letter in the November number. I have also examined into W. C. M.'s rule, which, along with E. W. C.'s, appears in the July number, and find that his assertions in his November letter are far from being correct. He says that his rule is defective in one particular, but that E. W. C.'s is wrong altogether. Now, I find that E. W. C. is wrong only in his method of getting the miter joint, unless his mauner of applying the square in Fig. 4, page 134, might be cousidered wrong. It should be turned over, so that the heel of the square will be toward the outside of the box, which would throw the long corner of the joint to the inside. An examination of Figs. 4 and 5 conveys the impression that the outside faces of the sides should be the longer in both butt and miter joints, which is not so. No doubt E. W. C. understands the direction in which the butt joint should be cut, but when he undertakes to convey to one's mind by drawings the application of the square in producing cuts which run in contrary directions, he should be careful to present the face side of the stuff in all cases. I think the following is the correct way of producing the miter joint from his draft laid down in Fig. 2: Take C L on the tongue

and C B, instead of C A on the blade, and apply as shown in Fig. 5.

In W. C. M.'s letter in the November number, he says that he has discovered that the rule contained in his letter published in the July number will not work, except for hoppers of very slight bevel. Now, the truth of the matter is that that rule will not work at all, except for a hopper in which the run and the rise are equal, and such a hopper has considerable flare or bevel. In reference to W. C. M.'s rule, page 135, he says: "Take width of side on blade and run on tongue. The tongue will give the cut for butt joint." It will not, except in the case mentioned above; it will give the cut for the face joint. Then he says: "Take width of side on the blade, and half the run on tongue: then the tongue will give the cut for the miter joint." I can't see it. The square applied in such a manner will give the butt joint only for a hopper when the run is to the rise as 1 is to 2, or, in other words, when the rise is double the run. Again, he



Backing a Square Inclined Post.—Fig. 2.—Another Method of Accomplishing the same Result (A. S. L).

says: "Take width of side on blade and rise on tongue; then the tongue will give the face cut." Wrong again; it will give the miter joint. I think W. C. M. is a little off on the subject of hopper bevels as produced by the application of the square.

Truth and Pretense in Workmanship.

From E. G. A., *Ossian, Iowa.*—One of your correspondents, H. M. B., of New York, takes issue with me on my criticisms upon hanging 20 doors in a day. His assertion—"This feat has been performed, and, I dare say, can be done again"—needs some investigation. Will he dare to say that, under strict specifications for first-class workmanship, he will properly put down the thresholds and fit and hang 20 doors, 7 feet by 2 feet 8 inches, or 2 feet 10 inches by 1¾ inches, with three butts to each door, and, as he says in his communication, without using any paper, wedges or putty behind the hinges? Can he do this in a day of 10 hours?

If H. M. B. will take the trouble to review my article in the July number, he will discover that I made no assertion that it could not be done, but, rather, in general terms, expressed the impossibility of one man among a thousand first-class workmen being able to accomplish such an extraordinary performance in a complete and workmanlike manner. Besides, if admitted to be a fact, I adverted to the folly of making it a basis, in any sense, for calculation or guidance in a rule of estimating work. A formula for this kind of business might be written thus: "Increase of quantity will decrease the quality." No other result can be obtained, as a rule, to apply to the average ability of manual labor.

It is the testimony of all experienced mechanics that in proportion to the faithful expenditure of time and thought upon a work, so is the degree of its excellence. Better practice the old adage, "Make haste slowly."

For my part, I am convinced that this strife of workmen to perform wonders in day's work is as mischievous in its effects as underestimating the value of work. Evidently one is an accomplice of the other in the same transaction. If work has been undervalued on contract, then overwork must be performed to make the account balance. The disadvantages of this management are threefold. First, the proprietor is harmed to the extent that he does not get what he expected in ultimate value, regardless of his ability or inability to judge of the value of work when done. Naturally, he expects the full execution of the contract, and in this sense is not responsible for the builder's errors in estimating cost.

In the next place, builders and all workmen concerned who set up a forced or extreme standard of work to be performed within a given time, defraud themselves by creating a false precedent as regards the average quantity of work that may be done. Thereafter they must expect to be taxed to the utmost to sustain the honor of their precedent, and with no better wages therefor.

Lastly, the building trade, as an art, is injured in proportion as cost of work is underestimated and forced, or overwork applied to make good the builder's deficit—productive, as a consequence, of faulty construction and bad art generally.

These are three reasons, among others that could be presented, why some uniform system ought to be devised, adopted, and, if necessary, enforced among all builders in estimating the cost of construction. It is a grievance that carpenters and joiners receive less wages than other artisans employed on builders' work.

In an article entitled "The Carpenter," which appeared in the second number of *Carpentry and Building* for 1879, the statement is made that, if a building is to be erected without the assistance of an architect, the carpenter is the first mechanic consulted, and to him is given the general direction of the undertaking; that he is the virtual superintendent of the building upon which he is engaged, and is expected to know all the requirements of the various trades connected with the construction of the building.

This is a common practice in our country, and, of course, a true statement of the fact; but it loses much of its flattering aspect when we read in the November number of *Carpentry and Building* the conditions appended to the notice of the prize designs under competition. These conditions require estimates based on New York prices, and name mechanics' labor as follows: Carpenters, $2.50 per day; bricklayers, plasterers and painters, each, per day, $3. How carpenters are required to possess more general knowledge of the construction of a building than other mechanics engaged upon it, and receive, per *capita*, less wages, is not very clear to me unless there are too many of us.

The census of 1870 gives in the building trades: Carpenters, 350,000; stone masons, bricklayers and painters, 90,000 each; and plasterers, 25,000. This census returns the number of carpenters as more than double that of any other separate trade in the country. Nearly every man we meet has fallen in love with the carpenter's trade. Many of them are deluded with the idea that to saw off boards and drive nails constitutes a man a carpenter. These workmen want to commit to heart the poet's line, "A little learning is a dangerous thing."

Let us abandon this effort to beat our competitors in quantity, rather than quality of work. Let us, with one accord, by rule and by practice, educate our patrons to discriminate between truth and pretense in workmanship, and to know the really good from the pretended good.

To bring about this desirable consummation, let us interchange ideas and suggestions, devise some plan or organization of protection against incompetency, and, if need be, make an effort to secure some general statutory law requiring every contractor and builder to pass a thorough examination before being qualified to have charge of building construction. Then it may be hoped that good workmanship and good pay will go hand in hand together.

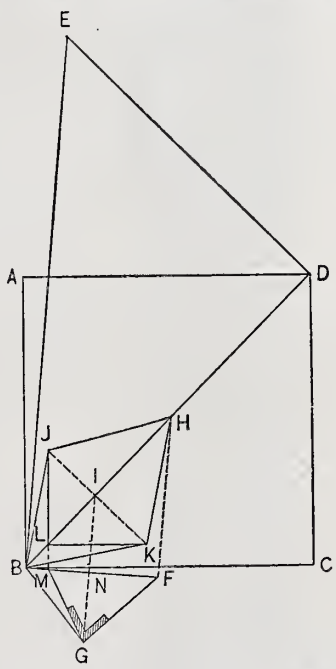
It seems to me that the want of some business-like system is the rock upon which we have split. The bottom rock ought to be found upon which to begin a new system—one uniform and profitable to all.

Private Brands of Tin Plates.

From M. & Co., *Philadelphia.*—As a matter of great importance to the contractor and builder, we suggest that you publish an article in your valued paper giving the main points and facts relative to private brands of tin plate, such as have lately appeared in *The Metal Worker* and *The Iron Age*. The articles referred to have excited such widespread comment and have accomplished such good results, that we feel confident the subscribers to *Carpentry and Building* would appreciate information on the subject.

Answer.—We will undertake briefly to sum up this matter in a way to serve the interests of the readers of this paper. In the first place, we would remark that it is not to be supposed that carpenters and builders are interested in this question in the same way as tinners. If a builder or architect understands the subject sufficiently to definitely specify the quality of material which he desires to have used upon his building, and if he knows enough practically upon the subject to detect the use of inferior material during the construction of the building he is superintending, all his requirements will be met.

In a series of articles which appeared in the volume for 1879, under the general



Backing a Square Inclined Post.—Fig. 3.—Diagram Accompanying Letter From T. M.

head of "Tin Roofs," we described the various marks and brands which are to be found upon the boxes in which tin plates are packed. In order to properly introduce this subject at the present time, it will be necessary to repeat in part what we then said. The character of the iron in a box of tin plates may be one of two general grades, known in the market as "charcoal" and "coke." Of both charcoal plates and coke plates, there are a number of different qualities. While charcoal plates in general are much better than coke plates, a good coke plate is far preferable to a poor charcoal plate. The terms "charcoal" and "coke," were derived primarily from the process employed in making iron, but at present, like some other terms used in connection with tin plates, they are used arbitrarily to designate grade or quality. It is owing in part to the misuse or abuse of these terms that the confusion in the matter of tin-plate brands has occurred.

The terms just described refer to the quality of the iron in the plate; another set of terms refers directly to the coating applied to the plate. The term "bright," in connec-

tion with tin plates, describes a coating of pure tin, while the term "leaded," or "terne," indicates a coating composed chiefly of lead. Bright plates are principally used for tinware, and are also quite commonly employed for gutters and spouting. Terne plates, on the other hand, are most generally employed in roofing, which gives rise to the term "roofing plates," which in use is synonymous with the term "terne plates," or leaded plates.

The thickness of a tin plate is indicated by arbitrary letters, or, rather, an arrangement of letters. The common gauge of tin plates, which is equal to about No. 29 wire gauge, is indicated by IC. The next grade of tin in thickness is designated as IX, which would be equal to about No. 27 wire gauge. Still heavier plates are indicated by additional Xs, giving the terms IXX, IX XX, &c. It is with the first two of these, however, that the builder has to deal ordinarily. IC is generally employed for all common purposes. IX is specified where unusual strength is required, as in gutters, or where an especially careful job of roofing is wanted.

Now, it is to be borne in mind that any quality of plate many be coated either bright or terne, and again, that any quality of plate, irrespective of its coating, may be made either IC, IX or I XX in thickness. Hence it will be perceived that the appearance of a sheet of tin plate, either in the matter of its coating or in thickness of the iron, does not fully indicate its grade or quality. The poorest grade of iron may be made of reasonable thickness and be given an appearance equal to the best.

Besides these three sets of terms, which appear upon all boxes of tin plate, there is what is called the "brand." This brand is sometimes a fancy name, an arbitrary character or an arrangement of letters. It is to be regarded at its best as the trade-mark of the manufacturer who made the plates. Accordingly, after inspecting a box of plates, not only as to the quality of the iron employed, but also as to the coating and the thickness of the plate, a person buying tin takes into account the brand or the trade-mark of the maker. This brand, therefore, becomes a sort of guarantee as to the reliability of the common marks applied to the box. Even with so complicated a system as this marking of tin plates, if the brands were honestly applied very little difficulty or embarrassment would arise. But the facts of the case warrant the assertion that, however honestly brands may be applied in some cases, they are in many other cases applied quite dishonestly.

The term private brand, employed in our correspondent's communication above, is used in contradistinction to maker's brand. A maker's brand is reliable, from the fact that no manufacturer would attempt to conduct a business in which he expected to achieve success, that was based upon deliberate and repeated misrepresentations. The self-interest of the manufacturer requires him to brand his plates according to their actual quality. The private brand—which might more properly be called the "wild-cat" brand—is a something of no responsibility whatever. It is a thing made use of by exporters on the other side of the water, and importers and large dealers upon this side, to sell inferior goods at the price of prime articles. Coke plates are given some fancy name, and are put upon the market as charcoal plates, or an inferior charcoal plate is given a name under which it is sold as a first-class charcoal plate.

So numerous are makers' brands, and so numerous also are the private brands in common use, that it is practically impossible to gather and publish a list of either class; accordingly, it is a matter of considerable difficulty to point out a remedy for this abuse, or, in other words, to indicate to the carpenter and builder any method by which he can be assured of getting exactly that quality of plate which he desires. There are in the market certain standard grades of tin, known by certain makers' brands, which stand unchallenged and unquestioned; accordingly, the best rule we can present applicable in this case is a list of a few of these brands, with a memorandum of their quality, to be used in connection with orders. In this connection we will quote from a letter written by a correspondent of *The Metal Worker* who has had long experience in the tin-plate trade, and who is eminently qualified for giving the advice which his letter contains. He says: "If I wanted the very best and highest-priced charcoal tin that is made, for the luxury of having an article used by very few people, I would order MF, Pontymyster, Dafen, or fully equal. For an excellent quality of tinware, I would order Gwendreath, Allayways, Parkend, RG, Machen, or fully equal. For common work, I would order Dean, Vole, Abercarne, or fully equal. To fill an order for a man who says that tin roofs are not made of as good stuff as they were formerly, and who is willing to pay the price for the best charcoal terne, I would order MF or fully equal. To make an excellent roof, I would order STP, Gwendreath, Allayways, Parkend, Dean orCambria ternes, or fully equal. For second-quality roofing, I would order AZ or Abercarne ternes, or fully equal; and to fill an order for the party who doesn't care what the quality is, so long as the roof is put on at a low price, I would use BC or Budd's ternes, or worse."

The brands above named by this correspondent of *The Metal Worker* are those which are well known to the trade, and will be recognized by every dealer in metals with whom an order may be placed. Accordingly, by selecting from this list about the quality which he desires to have employed, the builder is able to designate his wishes in a way to be understood by those with whom he deals. In conclusion, a word of caution. The meaning of our correspondent's letter, to which we have attempted to make reply, is this—that all new names, or uncommon names, applied to tin which the builder meets are to be looked upon with suspicion. Don't allow tin plate to be used upon work for which you are responsible that does not have a recoguized quality, determined by the staudard above named. In this way you will avoid private brands, and be reasonably secure in obtaining a fair quality of plate of the general grade which you desire to use.

A Simple Backing Rule.

From J. B. H., *Baltimore, Md.*—I admire W. B.'s mode of backing hip rafters. My way of performing this operation is simply to cut a short piece of the rafter the right bevel at the foot, and placing it in the correct position over two liues the shape of the corner of the building, mark it by them; then gauge the rafter by that mark and work from the center to the gauge on each side.

Mahoganizing Cherry.

From J. F. H., *Gaylordsville, Conn.*—Perhaps the following recipe for mahoganizing cherry, which I clipped from a paper some years since, may answer the purpose of J. C. B., who makes inquiry in the December number: Wash the work in lime water and then varnish. It is said that treating butternut in the same way makes a fair imitation of black walnut.

Horse Power for Wood-Working Machinery.

From W. S., *Norwalk, Ohio.*—I have had experience in the use of sweep horse-power, with which I found that I was able to saw 2-inch oak plank, employiug one horse. Could also make 4-inch moldings and run a jointer. I think I had as good a horse-power as I ever saw or heard of, all in running order, at a cost of about $150. I used it about six months and found that it did not pay. The first objection was that I had to have a good man to drive the horse. When I sawed a piece of lumber the horse had to pull. As soon as the saw was through the lumber, the lever would move very easily and strike the horse on the heels. If a-hold-back was employed, it would check the speed too suddenly. The second trouble was that, if my lumber was wet or not well seasoned, I found that I was unable to make smooth moldings. I found, therefore, that I needed a dry-house, but the blowing and sweating of my horse was not quite enough to heat the dry-house; so I took out my horse-power and put in a 15-horse engine. Now I am well fixed, and it costs me less than to run by horse-power.

REFERRED TO OUR READERS.

Construction of Baptistery.

From C. W. C., *Burksville, Va.*—I am about to build a baptistery in a church at this place in which there is no basement. The floor is only 18 inches from the ground. I would very much like some of the readers of *Carpentry and Building* to advise me as to the best and most economical plan for use under the circumstances. I should be pleased to have sketches, showing dimensions and manner of construction, with description of materials to be used.

Note.—Our correspondent will find at least one letter relating to the subject of baptistery in back numbers of *Carpentery and Building*. We would refer him to page 76 of the volume for 1880. This, however, only in part meets his requirements, and we trust some of our readers will answer his question accordingly.

Decking Porches.

From C. V. M., *Havana, Illinois.*—I desire to learn the opinions of some of the practical readers of *Carpentry and Building* as to the best way of covering or decking a front porch, where it is desired to use the roof for walking over? Answers to this question, with sketches, will greatly oblige.

Exterior Finish for Brick Houses.

From C. C. W., *Kansas City, Mo.*—Will some of the practical readers of *Carpentry and Building* furnish sketches of exterior finish for a large two-story brick house, such as cornices, porches and steps in moderu style, bay windows, &c.?

Seating a Church.

From J. S., *Wonewoc, Wis.*—Will some reader of *Carpentry and Building* give me a practical plan for seating a church? The size of the building is 50 x 35 feet.

Fire-Proof Vault.

From C. R. M., *Denver, Col.*—Will some readers of *Carpentry and Building* give me hints as to the proper construction of a fire-proof door for a vault? The door should be 2 feet 8 inches by 7 feet. The walls of vault are 22 inches thick, of brick. Should there be two doors, or will one answer if made hollow and filled with fire material? I desire to be informed of the best method of construction to be followed under these circumstances and the best material for using.

Three Men Carrying a Tapering Log.

From W. S. E., *Wilmington, Ohio.*—Will some reader of the paper please show where the carrying stick should be placed if the front end of a timber is 4 inches square and the back end 8 inches square, the timber to be carried by three men, and the load divided evenly between them?

Another Problem Proposed.

From J. E. W., *Royalton, Wis.*—I have a problem which I desire to propose to the readers of *Carpentry and Building* for solution. A man has a room 12 x 24 feet in size. He wishes to know the exact length of a strip of carpet, 36 inches wide, cut square at the ends, to reach diagonally across the room, each corner of the carpet touching the wall of the room. I would like a strictly arithmetical solution if I can get it. Any of your readers, by drawing a diagram of the room to scale, of the dimensions above given, and then cutting a strip of paper al o to scale, 3 feet wide, aud laying it diagonally across the figure, will see exactly what is required.

Steam Coil for Dry Kiln.

From A. J. S., *Ellisburgh, N. Y.*—Will some of the readers of *Carpentry and Building*, who have had experience, please give plans for a steam coil for heating a drying kiln for lumber? I wish to use the exhaust from my engine.

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VOLUME III. NEW YORK = MARCH, 1881. NUMBER 3.

Designs for Newel Posts and Balusters.

We present, by means of the accompanying engravings, designs for some newel posts and balusters taken from a work recently completed. For the cuts we are indebted to Messrs. C. Graham & Sons, of East Forty-third street, New York city, who executed the work here shown. Fig. 1 represents a newel post, built up in sections of kiln-dried lumber. All that part of the post above the base is round in form, some of the sections being richly embellished by means of carving, and the others are finished by polishing. The shaft and base are doweled and bolted together, the plinth being mitered around the bottom of the base. This feature of construction illustrates how a design of this kind can be lengthened when required. The nature of the ornamentation shown requires the very highest skill upon the part of the carver. The section indicated by A in the engraving is left blank at the back for receiving the hand-rail. The top of the post is properly prepared for receiving a newel light or some other ornament, as circumstances may determine.

Fig. 3 represents substantially the same design as Fig. 1, with a little different treatment so far as concerns the moldings, engravings, &c. The great feature to recommend round newel posts at the foot of staircases, is that they conform to some extent with the turned balusters now commonly employed in the railing. Further, if the stairs are not very wide, a round post takes up less room than a square one, and there is an absence of sharp angles, which are so objectionable in the latter form. Taken all in all, round posts produce a very handsome effect at a very moderate cost.

Fig. 2 represents a newel designed and built by Messrs. Graham & Sons for Mr. Flagler's house, situated corner Fifty-fourth street and Fifth avenue, New York. The design was finished in mahogany, and, as may be seen, contains same richly carved portions. It was built up in regular cabinet form, with columns on the corners in full relief, the shafts of the columns being veneered and polished before being set in place. The

Fig. 1.—Round Newel, with Octagon Base.

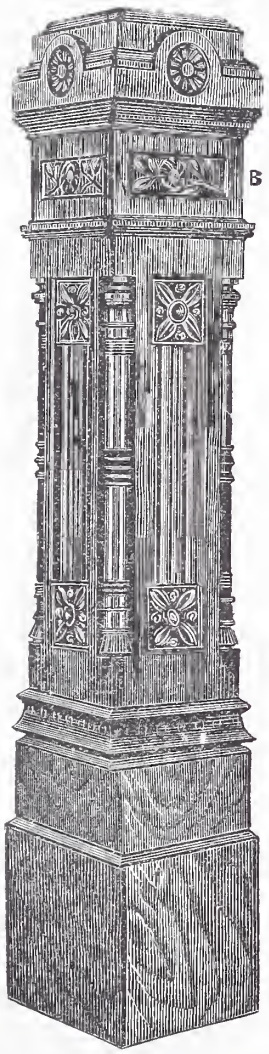
Fig. 2.—Newel Post in House corner 54th St. and 5th Ave., New York.

Fig. 3.—Modification of Design shown in Fig. 1.

newel light shown in connection with this design was furnished by Messrs. Mitchell, Vance & Co., of 836 Broadway. It consists of a fine Japanese vase with rich bronze work above. The base of this newel is about 18 inches in diameter.

Fig. 4 of the engravings shows a design for a cabinet-pedestal newel, with full columns at the corner, and with carved and reeded panels. The hand-rail of the staircase enters that portion of the newel indicated by B, the carved panel on one side being left out to receive it. The top is finished in such a manner as to adapt it to receiving a newel light or other ornament.

In Figs. 5 and 6 some designs for balusters are shown, appropriate for execution in mahogany or other hardwood, and suitable for use in first-class staircases. Those shown in Fig. 5 contain turned work between square bases and caps. In the first design shown in Fig. 5, the beaded moldings indicated by C and D are finished by being ebonized. The center of this same design is reeded with alternate small and large reeds. The turned portions are all very highly pol-

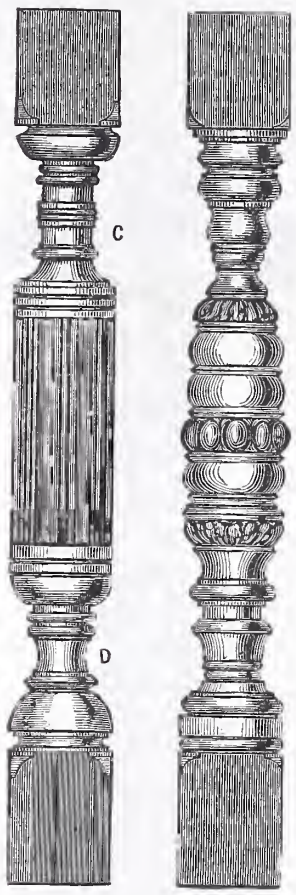


Designs for Newel Posts and Balusters.—Fig. 4.—Square Cabinet Pedestal Newel.

ished in the lathe before being put up. The whole presents a very fine effect.

Of the designs shown in Fig. 6, that at the extreme right hand is calculated to hang over the face of the front string and to be fastened with a lag screw. The rosette shown near the bottom of the baluster covers the head of the screw. All the designs of balusters here shown, to be effective, should be constructed out of 2½-inch or 3-inch lumber.

Recipes for Wood Polishes.—An exchange gives the following recipes for polishing mahogany and red cedar. It says: For mahogany.—Into a bottle put half a pint of alcohol, quarter of a pint of vinegar, quarter of a pint of linseed oil, and one ounce of butter of antimony; shake them well together. Wash the work well with warm water, in which a little soda has been dissolved, and dry it well. Now roll up a piece of cotton wool into a rubber, moisten it well with the mixture, and rub this briskly over the work until dry. This is a French polish reviver only, and may be used by any one with good effect where there is a moderate body of polish remaining on the furniture. To polish cedar.—Cedar



Designs for Newel Posts and Balusters.—Fig. 5.—Turned Balusters, with Square Tops and Bases.

usually has a very coarse open grain, which would not polish well. Fill in the grain with plaster of Paris made into a thin paste with water. Rub well in, dry, and sandpaper to smooth surface. Polish with French polish applied with a rubber. I should advise you to size twice, papering down with fine paper each coat and then varnish.

Flooring Boards.

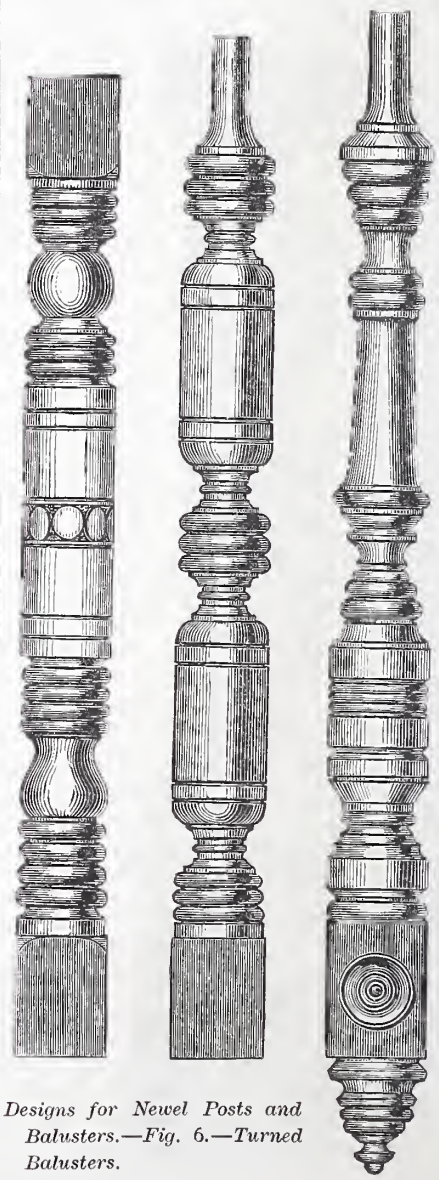
The *Timber Trades' Journal*, in a recent issue, has the following:

The best existing wooden floors in the European capitals are the parquet and the mosaic floors, and the finest specimens are perhaps to be met with in Russia. For the making of these what may justly be termed "art floors," tropical woods are exclusively employed. Fir or pine, and especially pitch pine, are woods that are never employed, as, in consequence of their sticky character, they attract and retain the dust and dirt, and thereby soon become blackened. The difficulty, too, with pitch pine is that, however well seasoned, it has a tendency to continue shrinking.

Some of the mosaic floors to be found in the palaces of the nobility of Russia are of great splendor, and in the Winter Palace of the Czar there are large floors composed of squares of wood, none of which are larger than an inch square, and one truly magnificent specimen of mosaic wood flooring in the Summer Palace of the Czar is made of small squares of ebony wood, extravagantly inlaid with mother-of-pearl.

A considerable trade is done in Dantzic and Riga by exporting small blocks of oak for parquet flooring work, and it is somewhat remarkable that no market can be found for the stuff in England, although the demand in Germany and France is so great. Last year a small vessel, loaded with these blocks and bound for Bordeaux, was wrecked on the coast of Withernsea, near Hull. The cargo was offered for sale by auction on the account of the salvors, and, there being no English buyers, it was bought by the agent of a French house, who afterward railed down the wood to Hull, and from that port shipped it to France.

But for the introduction of carpets, there can be no doubt that, with the advance in taste for art furniture, much greater attention would have been bestowed upon perfecting wooden floors. The custom of covering floors with carpets has been adopted from the East. In ancient times it was usual with the Turks and Persians, in consequence of their habits of sitting on the floor, to strew their clay floors over with rushes. As luxury advanced with the Orientals, mats were substituted for rushes, and these mats being from time to time made larger, they in the end covered the entire floor, and eventually they attained the proportions of carpets. Prof. Tyndall has told us that nothing is more injurious to health than dust. That carpets harbor dust and dirt to an undesirable degree will hardly be questioned. They may be comfortable, but they are never healthful, nor can they ever be artistic. The worst of it is that they are in pat-

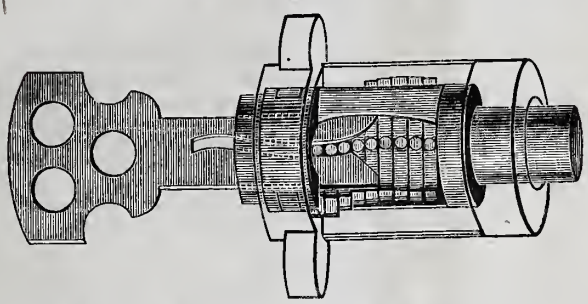


Designs for Newel Posts and Balusters.—Fig. 6.—Turned Balusters.

tern and color usually florid, which in itself is directly opposed to good taste, for the floor of a room, like the distant objects in a picture, should always be flat and subdued. As taste in England becomes more cultivated, so in the same degree may we expect that exposed wooden floors, constructed of tropical woods and of classical or elegant design, will become general.

Improved Night Latch.

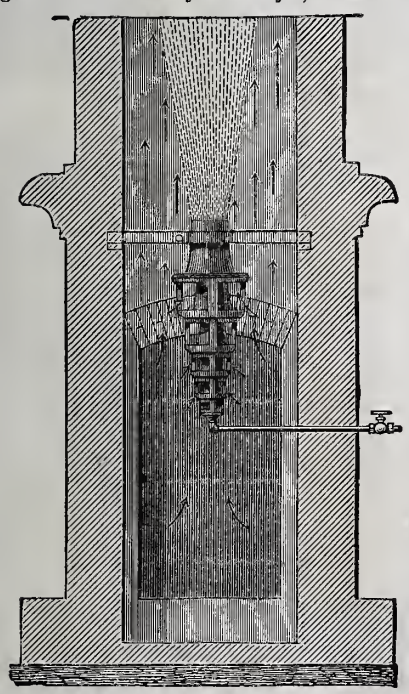
Mr. A. G. Newman, successor to the well-known firm of Newman & Capron, 1180 Broadway, New York, is just bringing out a new form of rim night latch which has several features in connection with the barrel that are of interest. The key is flat and very small. It is divided in the center by a curved slot, by means of which the tumblers are put in position, so that the lock may be opened. In the cut the key is shown partly inserted in the keyhole. No less than ten tumblers are used, which are so arranged as to need no springs, acting automatically by gravity alone. Their great number makes the work of picking the lock almost impossible, and, so far as we have any experience, the lock is as safe from being opened without a key as the most expensive of regular tumbler locks. The cylinder is held upon the lock by a couple of long screws, by means of which also the lock is adapted to different thickness of doors. The mortise form of this lock is very easily applied. After the latch is mortised into the door, two holes are bored for cylinder and knob, while the work is finished by two small ones for the screws. This improvement is also being applied to locks suitable for a great variety of places.



Improved Night Latch.—Cut of Cylinder and Key, showing Operation of Tumblers.

Korting's Steam Blast Nozzle.

Our engraving shows a new form of steam jet for creating a draft in ventilating flues, chimneys, &c., for which Mr. A. Aller, of 109 Liberty street, New York, is the general agent. The ordinary steam jet, it is well-known, is rather extravagant in the use of steam, and does not produce any considerable result; for these reasons it has never been used, save in cases of necessity. The trouble has been to apply the power of the steam to the air. This can only be done by means of the friction between the surface of the jet of steam and the air through which it passes. This friction is quite limited in amount, and as the jet is small, the friction will only carry an insignificant quantity of air. Increasing the size of the jet is excessively wasteful, since the friction only increases in proportion to the increase of circumference, while the quantity of steam used increases much more rapidly than the area itself, a comparatively small pipe, continuously open, being able to discharge all the steam made by a very large boiler.



Korting's Steam Blast Nozzle.

In the jet, or, more properly, the ejector, shown in the engraving, the nozzles are so disposed that a small jet of steam is enabled to move a vast quantity of air. It must be remembered that the power actually required to move the air is almost nominal, the great difficulty being to "get hold of a load." At the bottom of the apparatus is placed a single jet. This moves a stream of air rapidly several times its own diameter. Over and around the jet is placed a nozzle just large enough to secure this combined stream of steam and air, which in turn is used as a jet itself. Although moving somewhat slower than the steam as it comes from the pipe, it has a vastly increased friction surface, and carries with it, as it leaves its own nozzle, a greater stream of air than did the original jet of steam. The compound blast thus formed is again employed as a jet in a nozzle, its increased area adding to the amount of air which is dragged forward. This multiplication of jets, or ejectors, as they might be called, is repeated no less than six times. The resulting stream of air is, of course, enormous, while, in comparison, the quantity of steam used is trifling. The smallest size uses a ½-inch pipe, and is rated to move 500 cubic feet of air per minute through an 8-inch pipe. As the air is carried forward by the combined jets, of course a vacuum is formed below, and when necessary the apparatus can be used for exhausting. Its value in small flues, or those which are crooked and rough, when a good natural draft is impossible, is very great indeed. The largest size used (only a 2½-inch steam pipe) can move something like 15,000 cubic feet per minute. Applied to a chimney it would furnish draft sufficient to burn 3000 pounds of coal per hour.

New Uses for Sawdust.—The *Lumberman* says: We have been shown a model of a car wheel, consisting of an iron rim of 7 inches outward diameter by one-half inch thick, fitted with a well-proportioned hub, the space between the hub and rim filled with pine sawdust, pressed in so solidly that we are ready to believe the assertion that resting the iron rim upon bearings, a pressure equal to 23 tons applied to the hub failed to develop any signs of weakness. We hesitate in these days of progress to assert that anything is impossible, and we begin to think that even sawdust possesses elements of value hitherto unsuspected, and that the day may come when the filled grounds adjacent to all sawmills may be seen to have a great value in the mechanical development and utilization of the now useless debris placed upon them to get it out of the way. Sawdust car wheels, sawdust brick, sawdust fence posts, railroad ties, and even sawdust window and door frames, wainscoting and moldings, begin to appear among the possibilities of the immediate future.

Even so inflammable a material as cotton can now be used for the construction of fire-proof buildings. It is converted into a paste by chemical treatment, which becomes as hard as stone. It is molded into large slabs and designated as architectural cotton.

Competition in Dining Room Finish.

The third competition instituted by *Carpentry and Building*, the subject of which was the finish of a dining room in a $6000 house, and which closed January 31, resulted in the following award of prizes:

First prize, $100; Gould & Angell, Providence, R. I.

Second prize, $60; John W. H. Watts, Ottawa, Canada.

Third prize, $40; A. M. Stuckert, Newark, N. J.

By the nature of the subject, and the limitation of the original specifications of conditions, the committee to which was intrusted the duty of awarding prizes found but little to do besides considering the designs upon their merits. This they proceeded to do in a most thorough manner, keeping in view the features which, as originally advertised, were to have special weight in deciding this contest. Some very handsome drawings were submitted, but in number they were less than had been expected. Enough were received, however, to provide very acceptable matter for our columns, and all our readers, we have no doubt, will be pleased with their publication. We herewith present the designs receiving the first prize. Since the object of this competition was mainly to present contrasts, the two perspective views are printed upon opposite pages, thus allowing of convenient comparison. We give in full, elevations, details, sections, &c., as furnished by the architects, and also the specification and estimates. It is only proper to say in this connection, that the authors of these designs hit upon the happy expedient of employing one point of view for the two perspectives, which was according to the limitations originally set forth, but used different directions of view. By this means, although in part evading the manifest intent of the original stipulations, they have been enabled to present a more picturesque effect, and perhaps a better contrast than their designs would otherwise have permitted. Irrespective of this fact, however, their designs were considered by the committee of award the best of all submitted. We now present them for the criticism of our readers, and have no doubt that they will affirm the decision of the judges.

Specification.

DESIGN A.

It is supposed that the room will be hard finished, corniced, sash furnished, fitted and hung; the sash of the bay window glazed, the door frames set, and the finish floors laid. This specification is intended to include all the remaining finish and decoration of the room.

Finish.—The finish of this room is to be of perfectly clear, sound and kiln-dried cherry of even color; the whole to be worked and put up in accordance with the accompanying drawings; to close joints in a good and workmanlike manner. All work, when possible, to be fastened from the back; all panels to be framed; the drawers to be grooved and dove-tailed together, and fitted with hardwood runs. The sides and bottoms of drawers and cupboards may be of dry whitewood.

Doors.—The main doors of the room are to be 1¾ inches thick, veneered on both sides with cherry ¼ inch thick, and paneled and molded as shown. Doors to be well fitted to the frames and hung with three butts to each.

Door and Window Finish.—The finish of the doors and windows and the base boards to be molded as shown; the windows of the bay to have molded sills and narrow matched and headed sheathing under. The cornice A, the picture molding and the dado moldings to be of cherry, well worked and put up.

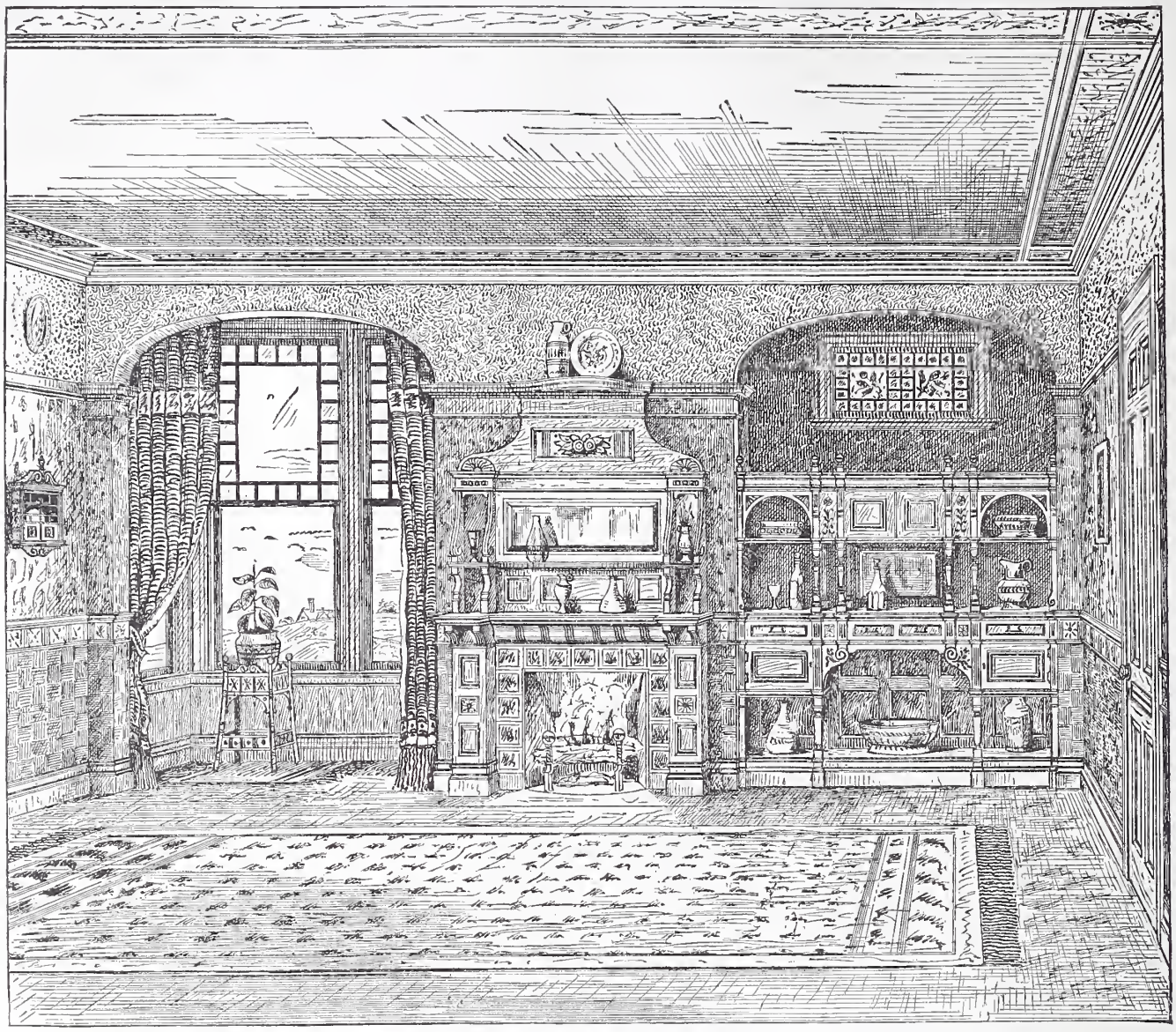
Mantel.—The mantel to have a soapstone fire-place, with a border of 6 x 6 inches, buff and chocolate printed subject tiles, and a black marble hearth. The curved moldings and the carving to be well executed, and all turned work polished in the lathe. The mirror to be of best French plate with beveled edges.

Stained Glass.—The window in the recess over the sideboard to be filled with a stained cathedral glass pattern and border set in lead, the whole to cost $2.50 per square foot.

color decoration. The wall papers to be well hung to good butted joints, well matched and rubbed down firmly to the wall.

Scheme for Color Decoration.—The room

pattern paper, the groundwork of which shall be mainly a bottle green, the figure brought out by lines of dull red. The border in the space between the cap and



Dining Room Finish.—Fig. 1.—Perspective View.—First Prize, Design A.—Gould & Angell, Architects, Providence, R. I.

Hardware.—The butts of the main doors to be loose joint, wrought iron, acorn tipped and bronze-finished, with screws to match. The locks and latches to have brass faces and bolts, the knobs and escutcheons to be of plain, polished bronze. All cupboard doors to be hung with wrought brass hinges, and polished brass face-plates screwed to doors. Drawer pulls and cupboard catches to be of polished brass and comparo in style with the hinge plates.

Finishing.—All the cherry woodwork to have the grain well filled with good filling, and all nail holes puttied up with colored putty (the grain to be slightly darkened). The filling to be well rubbed in, and then shellaced, four good coats of bleached shellac dissolved in alcohol, and rubbed down to polish with pumice stone and oil.

Decoration.—The walls to be sized with good glue size, and then papered with wall paper, worth 50 cents per roll for the frieze and wall, and $1 per roll for the dado. Above the picture molding is to be a narrow plain velvet border, and at the top of the dado a printed border worth 10 cents per yard. All paper to correspond in color and general design to the annexed scheme of

being finished in cherry, the grain of the same being slightly darkened, it is thought

Dining Room Finish.—Fig. 2.—Floor Plan of House in which Dining Room is Supposed to be Situated.

that a very satisfactory and harmonious effect may be produced in the following manner: For the dado, a simple block-

necking in the dado to be a rosette pattern in squares of green, with red and gold intermingled. The field between the dado and frieze to be a small-figured paper, a running pattern of brown leaves and flowers, with a sprinkling of bright-red berries on an olive-green ground preferred. The picture molding, which is cherry, to have a narrow band of red velvet paper above the same between it and the frieze, to carry the color of cornice "A" around the room. For the frieze, a golden olive paper-hanging, with a small damask figure of very slight contrasting color—a paper that will light up in strong contrast with the dado and afford a modest background for medallions, &c.

DESIGN B.

The finish of this room to be in accordance with the specification for Design A in all respects, except where impracticable from the difference in the designs, and with the following special variations.

Finish.—The finish of this room is to be of butternut. The architraves of the doors and windows to be molded and have turned angle blocks in the corners. The windows of the bay to have molded panels below the sills.

Mantel.—The fire-place to have a facing of Knoxville marble, with a black marble hearth. The mirror to be of French plate, with beveled edges; and the panel of the door to the bric-à brac cabinet to be of clear French plate with beveled edges.

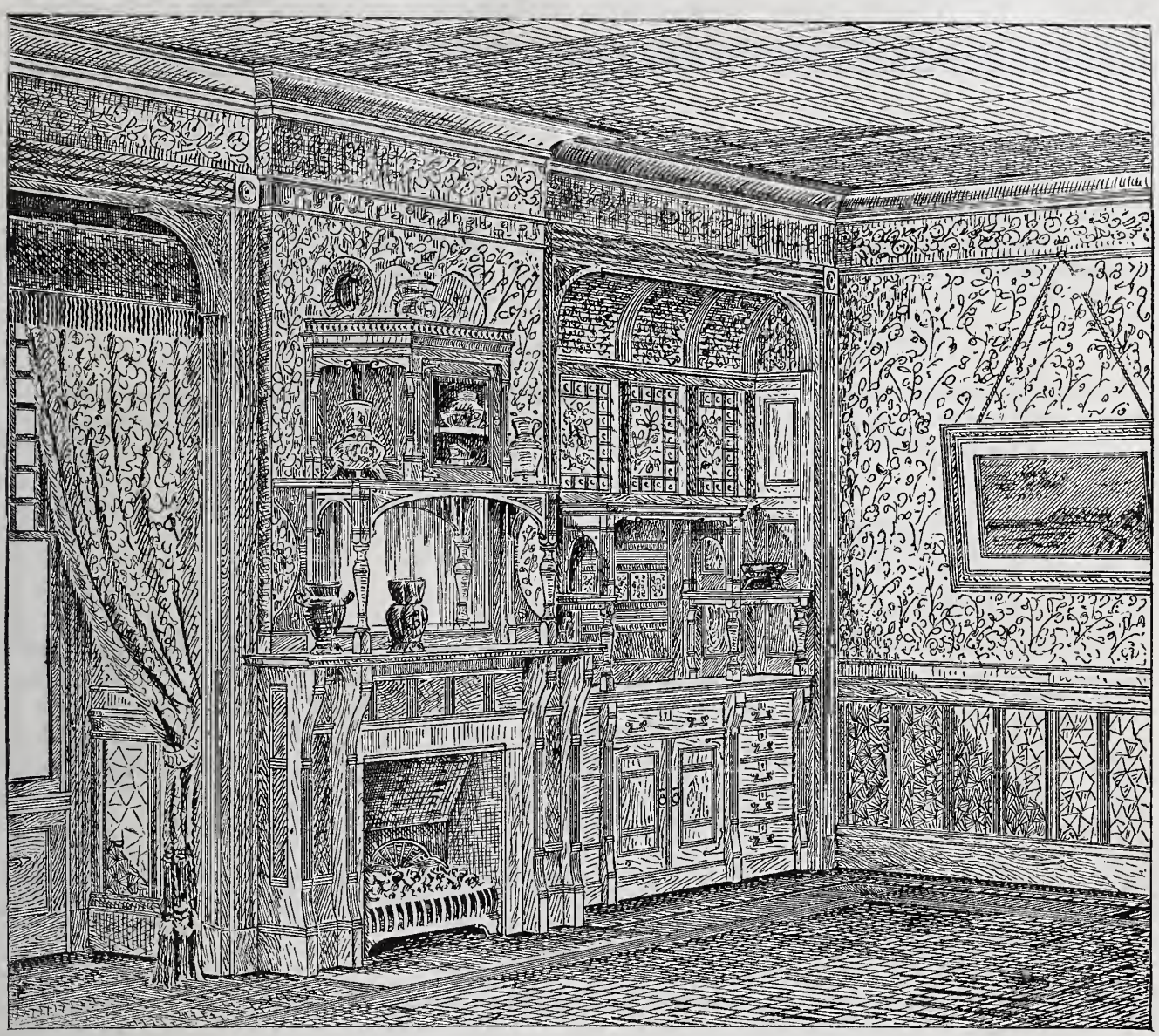
Stained Glass.—The window panels over the sideboard to be filled with stained cathedral glass of different subjects, worth $2.50 per square foot.

Dado and Cove.—The vertical bands of the dado and of the cove over the sideboard to be of butternut, molded. The large panel at the back of the sideboard to have a band of low relief carving.

Decoration.—The picture molding to be 1¼ inches wide, gold and black. The band above the dado to be finished with a ⅝-inch gold and black astragal. The wall to be papered with a paper worth 50 cents per roll; the dado, with paper worth $1, and the frieze, with a border worth 25 cents per yard. Above the dado is to be a band of plain velvet.

Scheme for Color Decoration.—The woodwork of the room (butternut) to be finished in its natural color, without stain. The dado to be finished between the bands with a paper of small pattern of dull red, black and gold well mixed. Above the dado molding is to be a band of plain velvet paper of the same tone as the red of the dado, and be finished with a ⅝-inch gold and black astragal at the top. The wall to be finished with a paper of a small Persian pattern of golden brown, olive and old gold colors. The frieze to harmonize with the colors of the wall, and also have some red of the same tone as in the dado. The picture molding to be 1¼ inches wide, of gold and black. The cove at the top of the sideboard recess to have a rich embossed paper of a darker tone than the walls.

(*For Estimates see page* 50.)



Dining Room Finish.—Fig. 3.—Perspective View.—First Prize, Design B.—Gould & Angell, Architects, Providence, R. I.

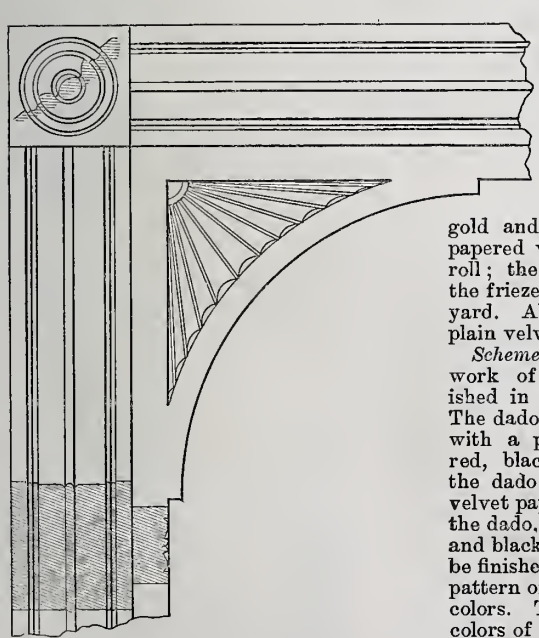


Fig. 4.—Detail of Arch Finish to Bay Window and over Sideboard.—Design B.—Scale, 1½ Inches to the Foot.

Color Effects.—The rage for house decoration which now extends to every part of the country, and makes itself felt in every village and hamlet even, has created an extraordinary demand for stuffs rich in color, whether cheap or costly, with which home and foreign manufacturers are stocking the market. Perhaps the new fever will not last long, for already it is carried by some people to an

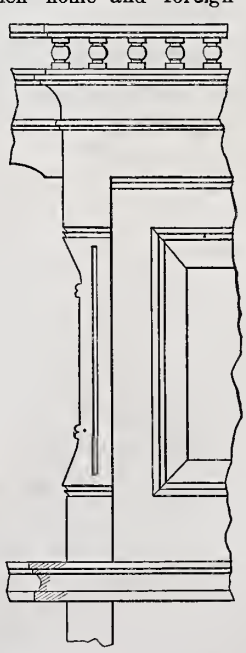
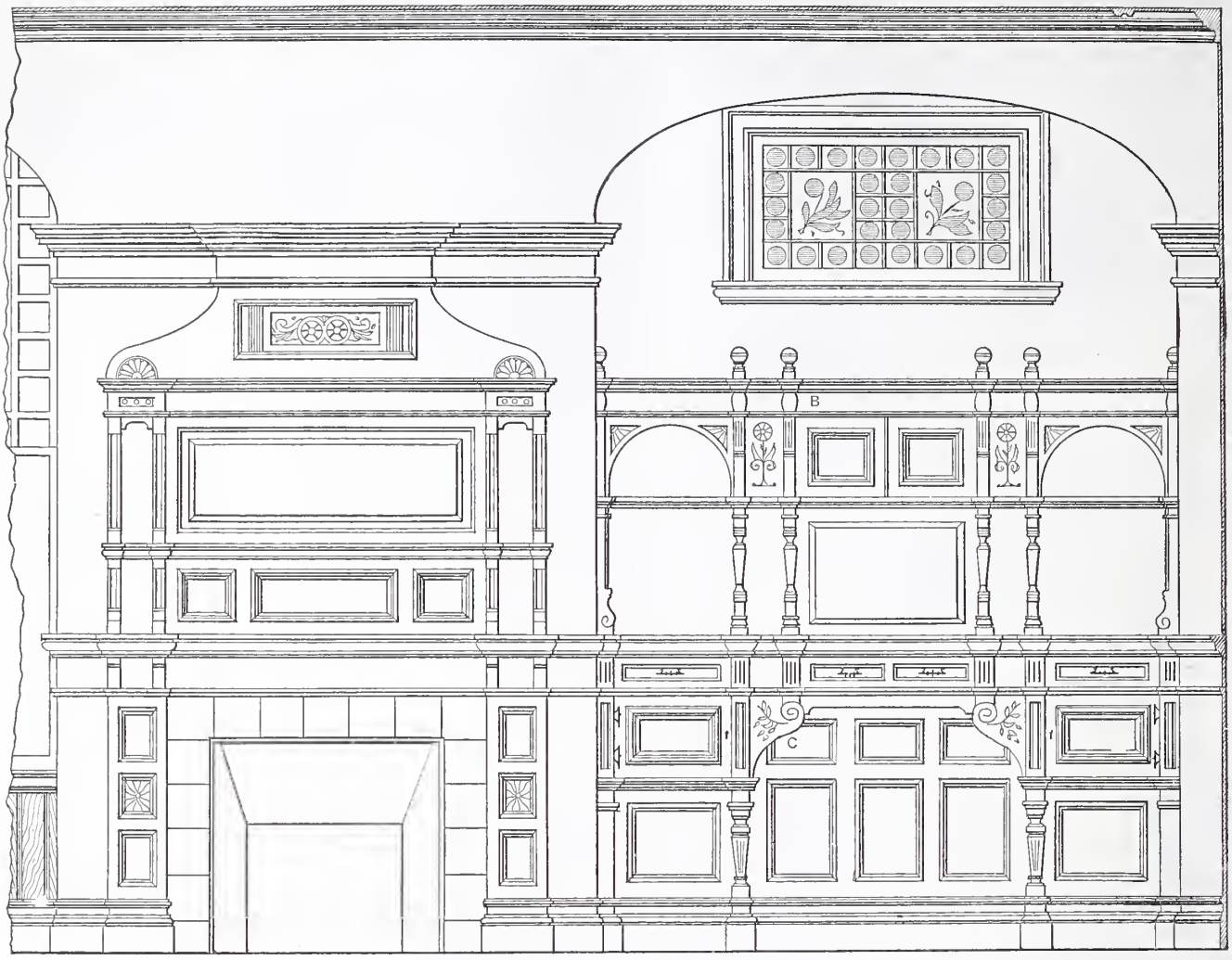


Fig. 5.—Finish Above Mantel.—Design B.—Scale, 1½ Inches to the Foot.

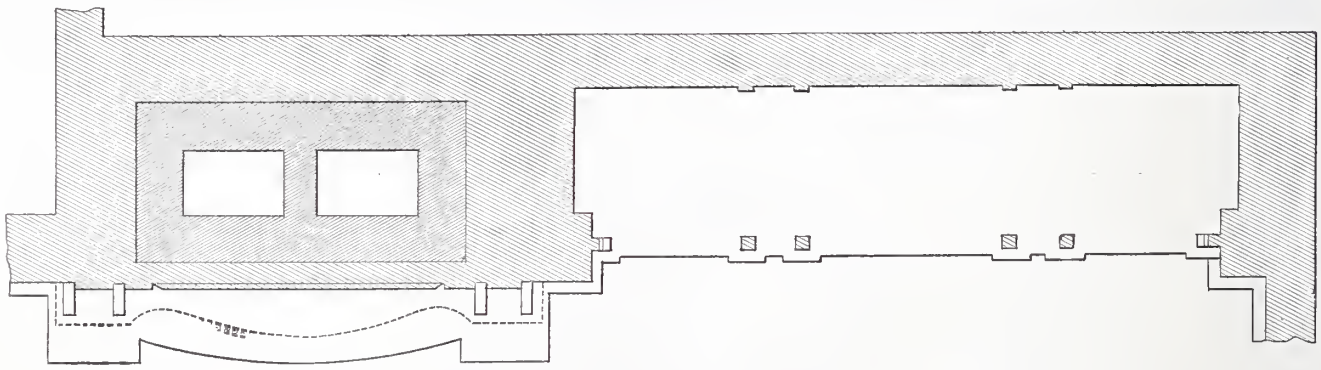
absurd extreme which presages a reaction, and here, as in England, the danger is that a wholesome improvement in the taste for decoration will be replaced by a vulgar

cotton flannel, will take the most delicate dyes and yield tints of remarkable beauty. And our own wall papers, which are now in unexampled demand, may be bought for a

construction is as great as that necessary for doing double the work with properly designed stairs. The faults of the back staircase are narrowness, insufficient balusters



Dining Room Finish.—Fig. 6.—Elevation of Design A.—Scale, ½ Inch to the Foot.



Dining Room Finish.—Fig. 7.—Plan of Design A.—Scale, ½ Inch to the Foot.

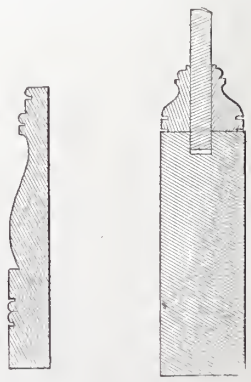
desire for display. We see nowadays city and country houses which look rather like shops for the exhibition of bric-à-brac and rich hangings, than homes in which people expect to get comfort. The rooms upon which some famous upholsterer has lavished the resources of his stock may remind one of the modern scenic sets on the stage of a theatre, but there seems to be little provision for the substantial enjoyment of their occupants. Everything in them is harmonious enough, perhaps, except the people. In color and composition they suggest a picture, but the inmates of the house are out of place as the living figures in it. They don't belong among such surroundings, and they can't be comfortable amid all this tasteful and splendid display. But unquestionably people's houses are looking better than they formerly did, and particularly those of people of moderate means. For the happiest thing about the modern decoration is that its effects are produced rather by colors than by materials, and very inexpensive fabrics will serve the purpose. Cotton stuffs, as, for instance,

small price, and yet be of patterns and colors which will satisfy artistic taste. This prevailing desire for house decoration is keeping upholsterers busy, and the work of refurnishing or freshening houses in town goes on so rapidly that all the trades concerned in it are now closely occupied.

A Plea for the Back Stairs.

We want to enter a plea for the back staircases and the cellar stairs of our houses. In more than half of the cheap or lower-priced country houses the back stairway is steep and narrow, while the cellar stairs are only one degree removed from a ladder. Yet over these stairs the greater part of the heavy work of the house must be done. In a large portion of our country towns the women of the household have the kitchen work to do, and, by preference, during the morning they use the back stairways exclusively; the result is that the amount of fatigue which they endure from improper

and too great hight of the risers, with treads which are altogether too narrow. If any



Figs. 8 and 9.—Door Stile and Architrave. Design A.—Scale, 3 Inches to the Foot.

stairway in the house must be pinched for space, or made too steep for comfort, it

should be the front one by all means—at least if we intend to make our houses for the comfort of those who live in them. Our own preferences are for stairs with a square landing, in which, after rising half the distance in one direction, a square turn is made to the remainder of the stairway pitched in the opposite direction. This is especially advantageous, because of the impossibility of falling down the whole length of the stairway, a thing of not infrequent occurrence in steep and narrow back stairs, where women

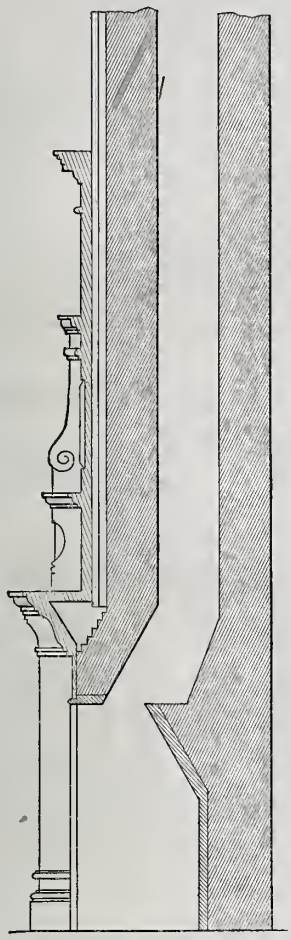


Fig. 10.—*Section through Mantel.—Scale, ½ Inch to the Foot.*

are obliged to go up and down with various articles in their arms. The cellar stairs, in a majority of houses, are built without risers. We know of such stairways that are not over 24 or 30 inches in width. The labor of taking a scuttle of coal or a basket of potatoes up or down them, is greater by reason of the inconvenience of the strained positions necessary. The labor is actually greater than would be needed in going up two flights of good stairs of equal elevation. The usual excuse for making the cellar stairway narrow, dark and dangerous, is that it is less used than any other in the house. This, in many cases, is true, but it must be borne in mind that, when it is used, it is used under circumstances which are attended with some danger. It is almost an invariable rule that something is carried up and down, so rendering the danger from a fall greater, while making it more liable to happen. The cellar stairway should be wide enough to have a convenient baluster on one side all the way up. There should also be a landing inside the cellar door, so that a person after reaching the top stair is on a level with the floor. This is important, and yet it is very rarely done. Usually it is necessary, when reaching the top stair, to hold on with one hand, while the latch of the door is found with the other. Where the cellar door is removed from the top step so as to make a landing, much of the inconvenience of opening a door with articles in the hand is avoided, because they can be readily rested upon the landing. We commend this subject to the careful attention of our practical readers. The back stairs are too important to be disregarded.

Ladies the Best Planners.

One of our exchanges says: In many particulars, in connection with the comforts and convenience of family residences, the mistress often displays better judgment than

Fig. 11.—*Detail above B of Fig.* 6.—*Scale, 3 Inches to the Foot.*

the master. Nor is this fact at all strange. If the lady is observant and intelligent, her continued experiences and contact with the general arrangement of home more fully qualifies her to comprehend alike the convenient and practical and the objectionable

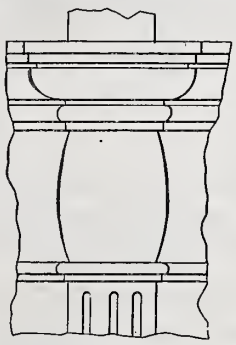
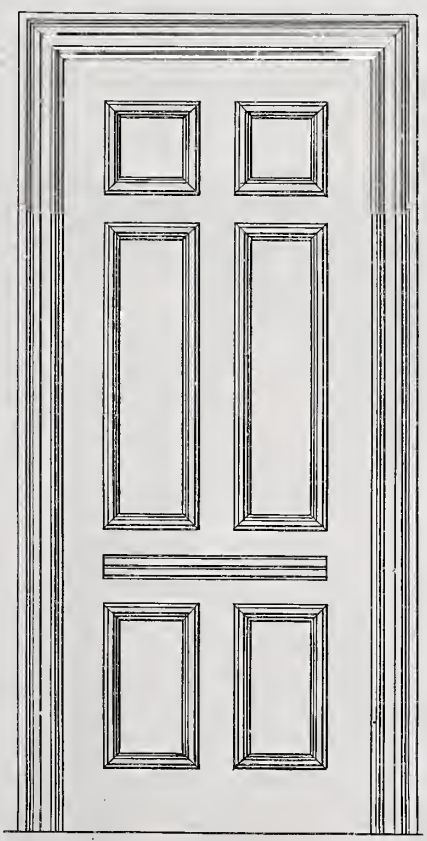


Fig. 12.—*Detail at B of Fig.* 6.—*Scale, 3 Inches to the Foot.*

arrangements met by her in home experiences, and gathered in the course of her visits among friends. Sometimes men are obstinate, and refuse their wives the privilege of any say in the matter—following



Dining Room Finish.—Fig. 13.—*Door, Design A.—Scale, ½ Inch to the Foot.*

their own views in all things; but, as a rule, better and more satisfactory results are reached when the opinions of an intelligent wife are at least consulted. Although some architects "don't want anything to do with the women," yet it is questionable whether every man in the profession who enjoys the patronage of female clients, either as wives or sole owners, has not received from them many sensible and practical suggestions; and it is perfectly reasonable that it should be so; for while the architect may fully understand the theories and principles of architecture in every phase and department, he cannot understand the detail workings of his plannings, except so far as he may have "tested them" in some special manner; while the women folk are brought in hourly contact with all defects or perfections that exist, and are thereby the better qualified to at least express an opinion. In addition to this, it is an incontrovertible fact that many ladies enjoy much better general ideas of planning buildings than do their husbands; not because the husband lacks good intelligence and business capacities, but for the reasons already stated. Home and house experiences on the part of the wife, and the intense desire and determination on her part to have everything just as it should be, naturally qualifies and

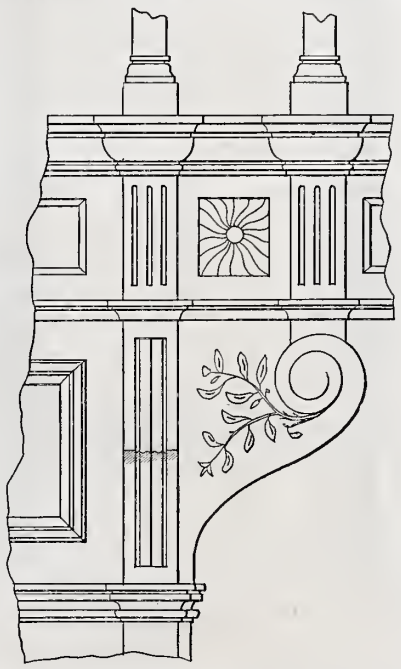


Fig. 14.—*Detail of Sideboard at C of Fig.* 6.—*Scale, 1½ Inches to the Foot.*

leads the mind to right conclusions. With all the objections urged by some to women interfering with such matters, if the many little details of occurrences that transpire during the period in which the "talking over" of plans is indulged in between man and wife could be discovered, perhaps there would be but few well-arranged houses found not to a large extent shaped by the mind of woman. For from the hour when the husband reveals an intention to build, the wife, as a rule, enters heartily into the proposition, and she at once commences to study up her part, not only so as to secure for herself all of the little conveniences of arrangement which would never be thought of by the husband, but to make the house generally as perfect in detail as the amount of money to be expended and "best judgment" will accomplish. Consequently, in the repeated discussions which ensue, the wife introduces this, and that, and the other feature, until by the time a final conclusion is reached, first thoughts are materially changed, and, to a greater or less extent, the wife's ideas and suggestions permeate almost, if not quite, every arrangement of the building.

House Decoration.

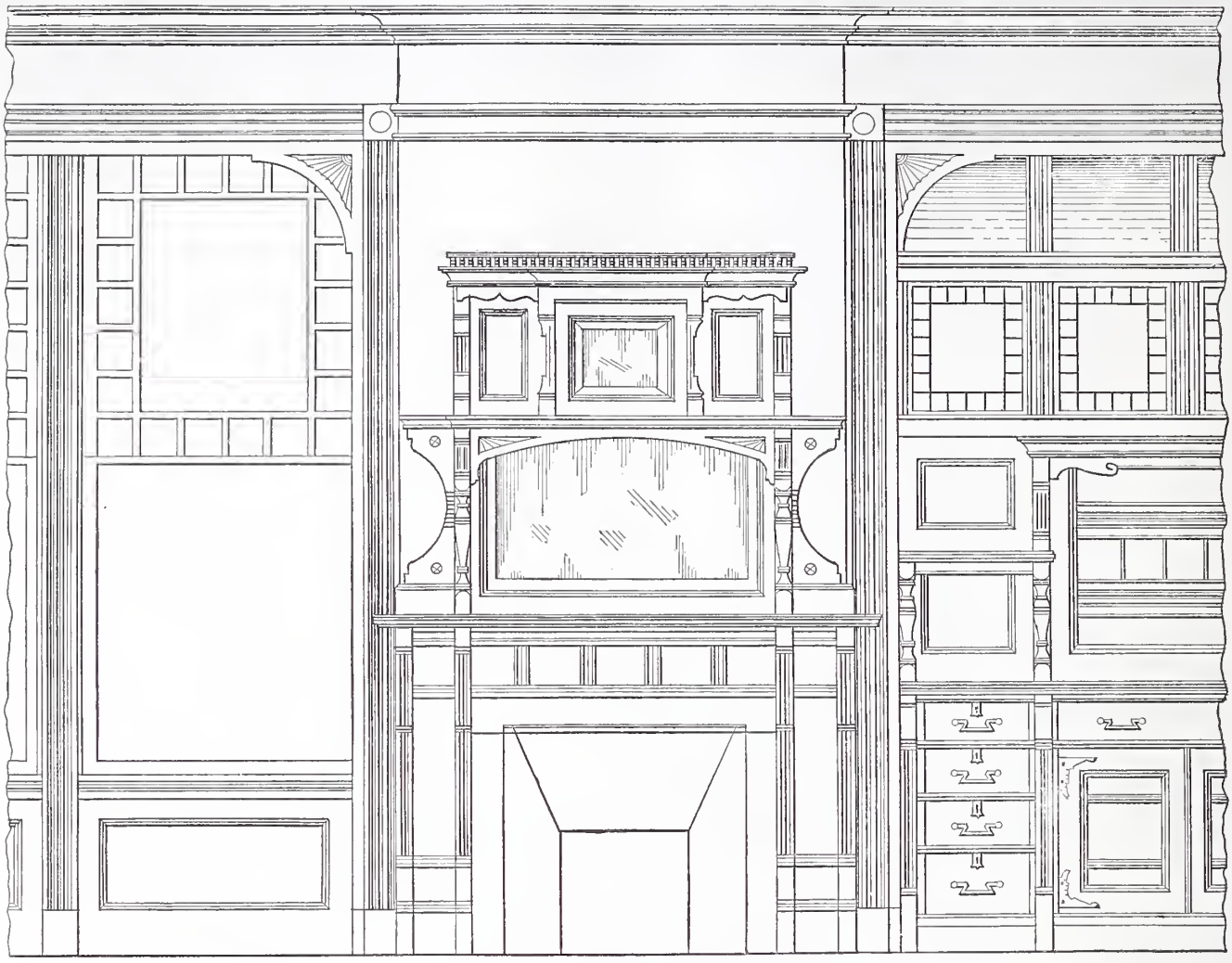
With the windows and walls disposed of, the color of the latter being pith pine or pollard oak, says an English writer, the color of the ceiling might be of a salmon pink, relieved with blue of an appropriate tint, or even a light yellow, with the pink instead of the blue. The pattern would best be of some geometrical design of square figures or straight lines—not curves, since they do not conduce to the impression of flatness, which is an essential character of a ceiling. The pattern may be either sten-

ciled on or else the ceiling papered with impressed flock paper, the relieving color being applied to the pressed portions of the paper. A cornice should separate the walls and ceil-

ish one, to harmonize with the walls and ceiling of our present example; and the space between the carpet and wall should be of some suitable parquetry pattern, the

fixed to the walls, on which is permanently fixed a moderator-lamp body, having the gas pipe passing up through it.

One writer on decoration has said, when



Dining Room Finish.—Fig. 15.—Elevation of Design B.—Seale, ½ Ineh to the Foot.

ing, which in the case of paneled walls, would necessarily be a carved cornice—not a plaster one; and that objectionable so-called, but misnamed, "ornameut" of plaster in the center of the ceiling could be dispensed with.

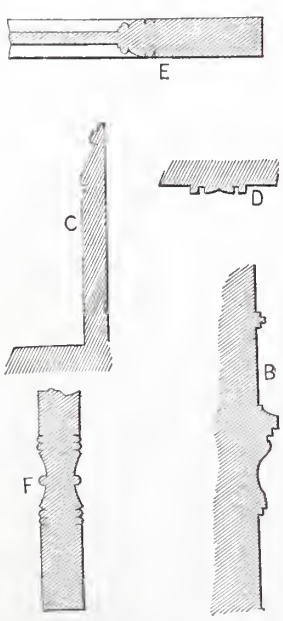


Fig. 16.—Sundry Details of Door, &c., (See Fig. 19.)—E, Door Stile. C, Base. D, Wainscot Panels. F, Reeded Panel on Lock Rail of Door. B, Cap of Wainseot.—Seale, 1½ Inehes to the Foot.

The carpet covering the floor should rather be of a Persian coloring than a Turk-

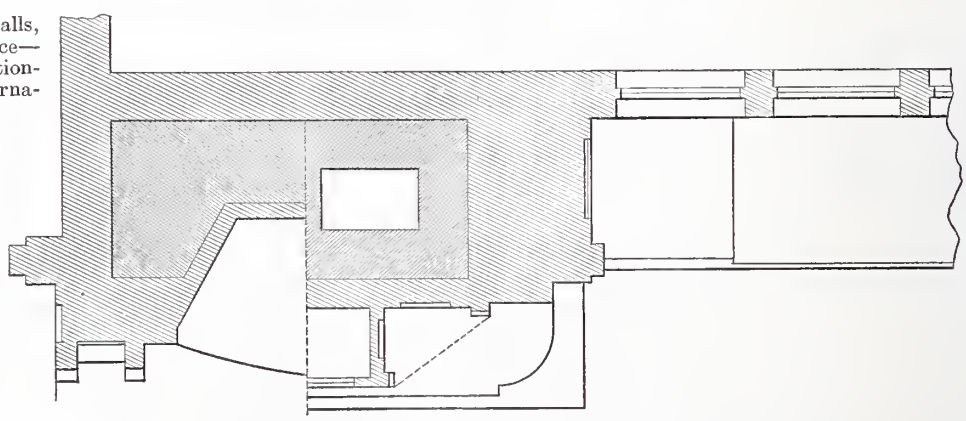


Fig. 17.—Plan of Design A.—Seale, ½ Ineh to the Foot.

color of the woods employed agreeing with that of the walls; or if the walls should be of dark wood, the parquetry border of the floor may be of light to relieve the, in many cases, gloom consequent on dark walls; but dark parquetry borders against light-colored walls are too offensive to the eye.

The comforts of a room are sometimes destroyed by the presence of glass. We hail with pleasure the abolition of the formerly inevitable "chimney glass." The very idea that gave birth to its adoption was a false one, it being placed over the fire-place, having frequently another one opposite, to give the room an appearance of being larger than in reality it was. Moreover, the open break it causes in the wall space is decidedly uncomfortable to æsthetic feeling or repose of the mind. Another objectionable feature gradually disappearing is the stupendous gasalier suspended from the center of the ceiling. To take its place we would recommend, if gas be preferred to colza-oil lamps, brackets

explaining how to arrange pictures, that "all their bases should range at one level." This is absurd. We should get harsh lines formed, landscapes possessing distant perspective views far too high or low to be rightly appreciated, small pictures that require minute and close observation too low, and many other iucongruous effects. There is no hard-and-fast rule by which to hang pictures in a room, although in a gallery they may be on the line or dado. They must be hung according to their sizes and subjects. Thus, supposing pictures must be had in a dining-room to please the owner's fancy, paneling, unless in large panels, would not be so appropriate as a paper of two colors produciug a ueutralized bloom, or of two tones of the same color, and of small pattern, so as to form a suitable background.

Then, choosing the picture most fitted for the position of houor—the center of the panel or wall—either for its beauty, the

greater excellence of the painter above those surrounding him, or the nature of the subject, the proper hight should be determined, and then those on either side may be arranged so that the "sight" of them correspond with the "sight" of the center one; or the center of them is level with the center of the middle one, or the top of the frame a few inches below the top of the center frame.

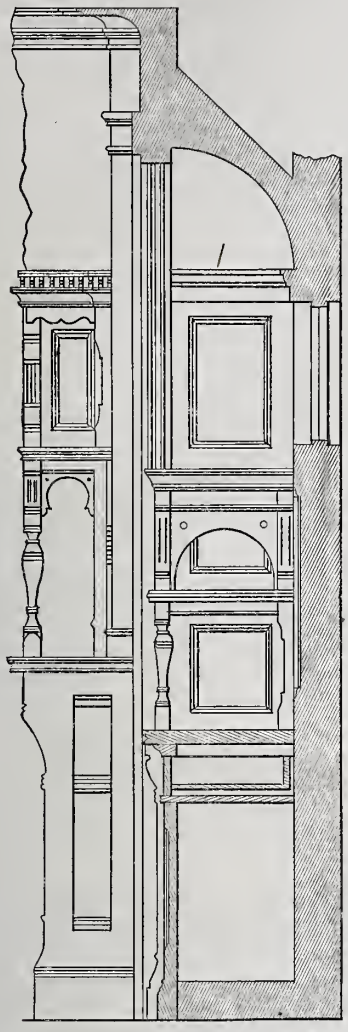


Fig. 18.—Section through Sideboard and End Elevation of Mantel.—Scale, ½ Inch to the Foot.

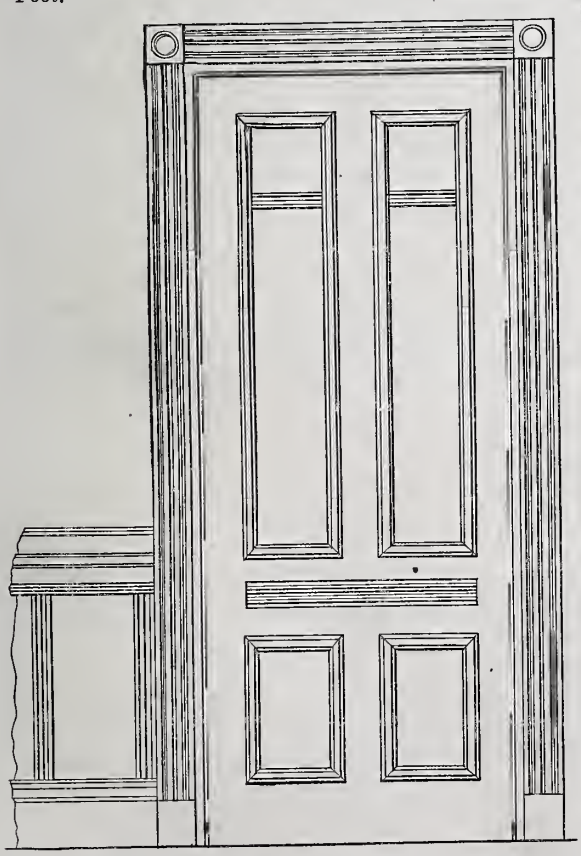


Fig. 19.—Door, Wainscoting, &c., Design B.—Scale, ½ Inch to the Foot. (For Details see Fig. 16.)

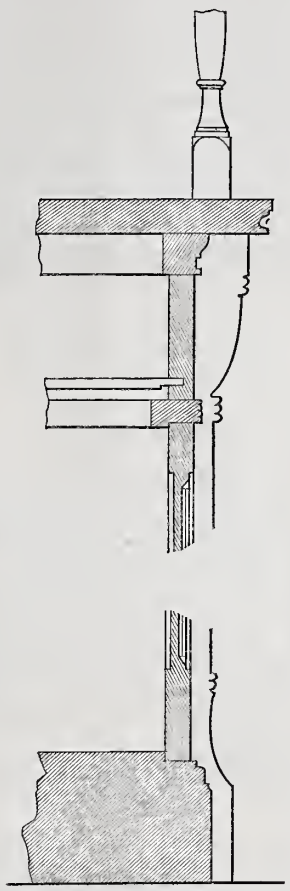


Fig. 20.—Vertical Section through Sideboard, Fig. 6.—Scale, 1½ Inches to the Foot.

In fact, the position is variable, according to the nature of the picture and the number to be hung. A symmetrical figure, however, should be aimed at, rather than hanging them independent of each other.

Stick to Your Business.—There is nothing which should be more impressed upon the minds of young men than the importance of steadily pursuing some one business. The frequent changing from one employment to another is one of the most common errors committed, and to it can be traced more then half the failures of men in business, and much of the discontent and disappointment which render life uncomfortable. It is a common thing for a man to be disappointed with his business, and to desire to change it for some other which, it seems to him, will prove a more lucrative employment, but in nine cases out of ten it is a mistake. Look around you and you will find among your acquaintances abundant verification of our assertion. There is an honest farmer who has toiled a few years, got his farm paid for, but does not grow rich very rapidly, as much from lack of contentment mingled with industry as anything, though he is not aware of it. He hears the wonderful stories of California, and how fortunes may be had for the trouble of picking them up; mortgages his farm to raise money; goes away to the land of gold, and after many months of hard toil comes home again to commence at the bottom of the hill for a more weary and less successful climbing up again. Mark the men in every community who are notorious for their ability and equally notorious for never getting ahead, and you will find them men who never stick to one business long, but are always forsaking their occupation just when it is beginning to be profitable.

Learning Versus Common Sense.

Democritus long ago drew an emphatic distinction between learning and wisdom. Learning consists of knowledge acquired mainly from books, and often its possessor is developed by its acquisition only in his perceptive and retentive faculties. Though his memory may be a vast store-house of useful facts and brilliant second-hand ideas, yet, owing to a judgment originally weak and only partially trained to discriminate, he may be the most inconsequent and uncertain of reasoners. Wisdom, on the contrary, is the outgrowth of native sagacity, sound judgment, wary discretion—in a word, of good common sense, and yet of common sense acting under the enlightenment of more or less knowledge. Thus wisdom makes a man a true seer. He not only sees and grasps the best means to accomplish an end, but he instantly sees and selects the highest and best ends as the objects of his aim and life. Regarding learning and knowledge as

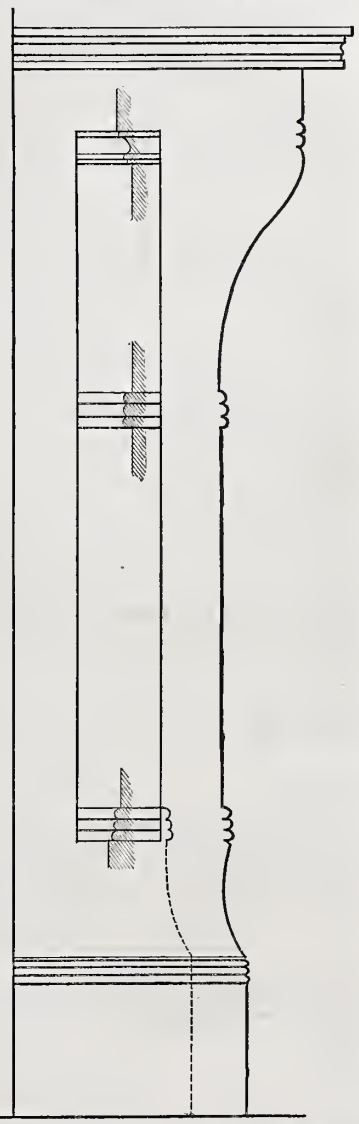


Fig. 21—Detail of Mantel Supports, Design A.—Scale, 1½ Inches to the Foot.

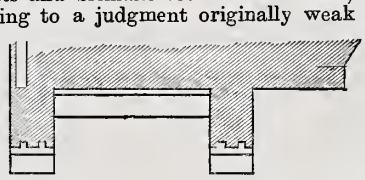


Fig. 22.—Horizontal Section through Supports to Mantel, Design B.—Scale, 1½ Inches to the Foot.

the same thing, we may conclude with Cowper that

> Knowledge and wisdom, far from being one,
> Have oftimes no connection.

The paradox is, therefore, not unfrequently met of learned physicians who are destitute of skill as practitioners, of learned orators who are wretched statesmen, and of learned professional men in various connections who are sadly ignorant of the practical features of their calling.

Competition in Dining Room Finish.

(*Continued from page* 45.)

DETAILED ESTIMATES OF COST.

DESIGN A.

BAY WINDOW :		
125 feet of cherry	$12.50	
Hardware and other material	4.00	
Machine and bench work	15.00	
Setting	18.00	
Finishing	11.00	$60.50
SIDEBOARD :		
200 feet cherry ; 25 feet pine	$21.60	
One beveled plate mirror, 14 x 22	7.00	
Hardware and other material	12.75	
Machine work	15.00	
Bench work	76.00	
Carving	20.00	
Finishing	24.00	
Conveying and setting (city limits)	16.00	192.35
MANTEL :		
96 feet cherry ; 10 feet pine	$10.20	
One beveled plate mirror, 12 x 36	9.50	
Hardware and other material	1.50	
Machine work	10.00	
Bench work	56.00	
Carving	16.00	
Finishing	15.00	
Conveying and setting (city limits)	12.00	130.20
SOAPSTONE FIRE-PLACE, tile and hearth		25.00
DOORS AND CASING :		
Two doors and architraves, 120 feet cherry	$12.00	
Hardware and other materials	10.00	
Machine and bench work	30.00	
Belting	8.00	
Finishing	12.00	72.00
MOLDINGS AROUND ROOM :		
60 feet of cherry	$6.00	
Labor and machine work	37.00	
Picture molding, 50 feet at 5 cents	2.50	45.50
DECORATION :		
Stained glass	$9.00	
Four rolls paper (dado) at $1	4.00	
Ten rolls paper (wall) at 50 cents	5.00	
Five rolls paper (frieze) at 50 cents	2.50	
Fifteen yards border at 10 cents	1.50	
Three yards velvet paper at 40 cents	1.20	
Labor of hanging same	7.50	30.70
Total		$556.25

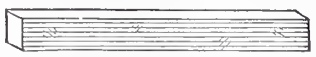
DESIGN B.

BAY WINDOW AND ARCH IN FRONT OF SAME :		
155 feet butternut	$15.50	
Hardware and other material	3.00	
Machine and bench work	20.00	
Carving	5.00	
Setting	22.50	
Finishing	14.00	$80.00
SIDEBOARD AND ARCH IN FRONT OF SAME :		
185 feet butternut	$18.50	
100 feet pine and white wood	5.00	
Hardware and other material	7.50	
Machine work	16.00	
Bench work	68.00	
Carving	15.00	
Setting	18.00	
Finishing	22.00	
Four panels stained glass at $4.75	19.00	189.00
MANTEL AND CABINET :		
88 feet butternut	$9.00	
Two beveled plates, 38 x 22 and 14 x 12	24.00	
Hardware and other material	5.00	
Machine work	10.00	
Bench work	42.00	
Carving	12.00	
Setting	7.00	
Finishing	14.00	
Soapstone fire-place and marble hearth	25.00	148.00
OTHER FINISH OF ROOM :		
Two doors and architraves, 130 feet butternut	$13.00	
Hardware, &c	10.00	
Machine work	6.50	
Bench work	24.00	
Setting	8.00	
Molding of dado, &c., 65 ft. butternut	6.00	
Labor	37.00	
Finishing	12.00	116.50
DECORATION :		
Four rolls paper (dado) at $1	$4.00	
Ten rolls paper (wall) at 50 cents	5.00	
Three yards velvet paper at 40 cents	1.20	
Twenty-seven yds. border at 25 cts.	6.75	
Paper for cove at sideboard	2.00	
Sixty feet 1¼ picture molding	3.00	
Sixty feet ⅝ astragal at 3 cents	1.80	
Labor	7.50	31.25
Total		$564.75

Practical Stair Building.—VII.

TIMBERING STAIRS.

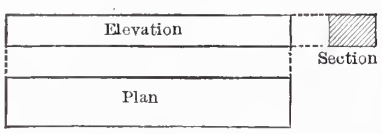
Before giving any description of hand-railing, a part of our subject which we have no doubt many of our readers are anxious we should reach, we will give brief consideration to the matter of timbering stairs. Straight flights are usually supported by joists run lengthwise of the stairs. Lath for plastering are generally laid on across them. The front string is nailed to the outside joist, allowing enough room above on the stringer to receive the lath and plaster. The center joists are fastened to the stairs by rough brackets. These are nailed on alternately on opposite sides of the joists to keep them steady. The front edge of each bracket is toe-nailed to the back edge of a step.



Stair Railing.—Fig. 1.—*Perspective View of a Piece of Straight Rail.*

Winding stairs are in many cases timbered in the same general manner. It requires considerable skill, however, in furring for the lath to make the stairs firm, and yet to have the curves of the lath natural and easy. Referring to the cuts published in connection with our article in the January number, Fig. 1 shows the general method of placing the joists and furring in a flight of stairs with quarter-circle windows at the top and bottom. In this case the lath are placed parallel with A^1 C^1. Fig. 3 shows a way of placing the joists in a flight of stairs having half-circle winders at the top and a large cylinder. On this flight all the lath are kept square to the front stringer.

While the plan of timbering winding stairs, above described, is in quite common use, there are several serious objections to it, and stair-builders who pride themselves in their work very frequently introduce other methods. Theoretically, just as much care should be exercised to have the soffit of a staircase parallel with the line of nosings as to have the hand-rail correspond with the steps it surmounts. Using long timbers for stair supports frequently interferes in accomplishing this object. Much valuable strength is lost by cutting into the timbers



Stair Railing.—Fig. 2.—*Elevation, Plan and Section of Straight Rail.*

where necessary to accommodate the steps, while reducing them upon the opposite side still further weakens them. All this can be avoided in many cases by using short timbers, which, on account of their length, can be adapted to the grade of the stairs, and at the same time be so thoroughly supported and united by keying as to provide ample strength. Upon these points we may have more to say at another time. In the meanwhile we shall be glad to have our correspondents take up the question and present their ideas. It is one well worth discussion.

When it is required to build a rough carriage and to plaster before the finishing wood is put on, it is well to use dry, sound plank in place of the joists above described, cutting them to fit the steps and risers as required. Make a ground cylinder of dry wood; put grounds on the front stringer and at the top edge of the wall stringer for plastering. Use rough boards for temporary steps and risers.

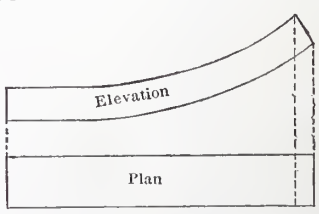
STAIR RAILING.

A careful search through the history of stair-building fails to reveal staircases having a complete circular form, or partly circular well-hole with continued hand-railings, earlier than the middle of the eighteenth century. From this it will be seen that the art and science of hand-railing is quite modern as compared with some other departments of carpentry. The first known author on the subject of hand-railing was a Mr. Price, of England, who, some time prior to the year 1792, published a book called "The British Carpenter." The next author was the renowned Peter Nicholson, who, in the year 1792, published his first book, and continued issuing works down to the year 1835. Modern editions of the same books have been issued at different intervals, and no doubt many copies of these really valuable treatises are to be found in the libraries of our readers. Another of the early authors on hand-railing who may be mentioned was Pain, whose work was issued in 1799, but it was so nearly like that of his predecessor, Peter Nicholson, as to amount to little more than a copy.

The earliest method of forming wreathed rail was by constructing a cylinder parallel to the well, to suit the inside circle of the rail. Around this several thicknesses of veneer, sufficient to complete the width of the rail, were bent and glued together. The next step in advance of this was to cut the rail out of solid wood by the use of face and falling molds. The face mold gave the form of the sides and the plane of the plank. The falling mold gave the shape of the top and bottom, and also the joints of the rail. In practice, however, little dependence could be placed upon these joints, for it was always necessary that they be fitted either over the stairs or around a cylinder constructed for that purpose at the shop. This was the

Stair Railing.—Fig. 3.—*Perspective View of a Ramp.*

condition of the art of stair-building when Peter Nicholson entered the field with a practical and scientific exposition of the whole subject. His book, to which we have above alluded, showed how to cant the plank in two ways, and thus cut a wreathed piece out of much less thickness of stuff. In one of his later editions, published some time previous to the year 1830, he explained his improved and simplified method of producing face molds, by finding the line intersecting the plane of any two given rakes upon which the rail plank might be required to cant. This at once gave the direction of the ordinates. This discovery was one of great importance, and appears to have been duly appreciated by scientific people generally, for Mr. Nicholson was awarded for it a gold medal by one of the prominent scientific societies of London. After all, Mr. Nicholson did not carry his work to perfection, else there would have been no need of the modern books which have been published upon this subject. Authors who have succeeded Mr. Nicholson have pointed out shortcomings in his system and have undertaken to improve upon it. While they have been successful in many particulars, great credit is still due to this master mind who



Stair Railing.—Fig. 4.—*Elevation and Plan of a Ramp.*

preceded them, and but for whose efforts the art would not be in its present state of perfection.

With this much of historical statement concerning hand-railing, we will now proceed to give definitions of some of the more important parts and plain directions for construction, by which our readers will be enabled to provide any stairs which they may construct with convenient and graceful rails. With reference to the curvature, stair-railing is encountered in four simple forms. There is the straight rail, illustrations of which are shown in Figs. 1 and 2 of the

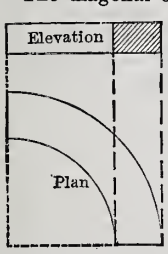
accompanying engravings; ramps, represented in Figs. 3 and 4; level turns, shown in Figs. 5 and 6; and wreath pieces or twists, illustrated by Figs. 7 and 8. A ramp is a piece of rail which stands over a straight ground plan, being curved in its inclination. A level turn is a level piece of rail which stands over a curved ground plan. A wreath piece or twist is an inclined piece of rail which stands over a curved ground plan, or, in other words, which curves in two directions.

The end of the piece of the rail where it joins another piece, whether it be straight rail, ramp, level turn or wreath piece, is

Stair Railing.—Fig. 5.—Perspective View of a Level Turn.

called a butt joint. Stair-rail joints are fastened with a bolt at the center, and are kept from turning by dowel pins placed near the edges of the rail. The joints are also filled with hot glue when they are finally fastened up. To mark the center points of the bolt and dowel pins, make a square pattern of the rail out of straw board or from a thin piece of wood, and through this pattern prick with an awl the center points of the bolt and of the dowel pins. Place this pattern upon the end of the rail-piece, with the bottom and sides even, and prick through upon the wood at the point required.

Having thus given a general outline of the forms in which stair railing is to be found, the next thing is to consider the patterns required and the methods in use for producing these parts. In forming a ramp piece, a side pattern only is required. The form of the pattern is cut square with the face of the plank. Level turns require a face pattern. Wreath pieces require a face pattern for the block of wood from which the twist is to be cut. When the rail is round, this pattern is of the same width throughout its length, being the same as the diameter of the rail. In all other cases except round rails, the face pattern must be enough wider than the width of the rail, and the piece cut from the plank enough thicker than the thickness of the rail, to allow for the twist of the piece. The diagonal of the square



Stair Railing.—Fig. 6.—Elevation and Plan of a Level Turn.

pattern is always sufficient for the width of the pattern at either end, or for the thickness of the plank. If there is not much twist to the piece, then the plank need not be very much thicker than the rail. A little experience soon determines the requirements in these particulars.

In making wreath pieces, the face pattern is cut square through the plank. The butt joints are made square to the face of the plank. The twist or wreath is cut in such a manner that when the piece is put up in its place, any line drawn square across the top will be level. The sides of the piece will be plumb, and will also be plumb over the inside and outside lines of its ground plan. The proper twist of the piece is determined as follows: Across each end of the piece a line is drawn through the center point, at such an angle with the surface of the plank that when the face is put in its true position this line will lie wholly in the vertical plane, or, to put it in other words, the line will be plumb across the face of the joint. The angle which this line makes with the surface of the plank is called the plumb bevel. The square pattern rail is then laid on at the center joint square across the plumb line. The places of the bolt and dowel pins are pricked through the pattern, and the pattern is marked around. The position of the square pattern at each end determines the twist of the piece. In forming the piece after the shape has been determined, as above described, the superfluous wood is cut away, leaving the rail everywhere of the proper width and thickness, and suitable to the place which it is designed to occupy. All calculations as to the position of stair-railing are reckoned from the center of the rail.

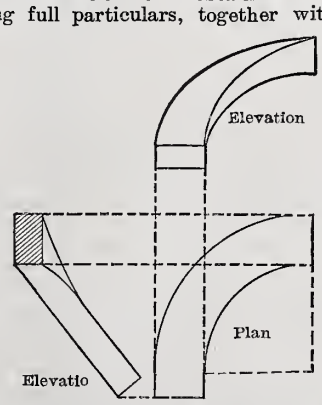
In our next paper we shall present some further particulars with reference to the principles underlying the construction of the curved portions of hand-railing, illustrating them by suitable diagrams, and then shall proceed to a classification of wreath pieces, following with practical problems.

NOTES AND COMMENTS.

Competition in Stove Designs.—We called the attention of our readers several months since to a competition in stove designs advertised by *The Metal Worker*. The result of this competition, which should have been announced in our last number, but which was unavoidably crowded out, gave the prize of $100 for the best design for a base burner to Thomas J. Gould, of Providence, R. I., and the prize of $25, for the best design for a base-burner top and top ornaments, to Frank W. Angell, also of Providence. Favorable mention was made by the judges of other designs submitted,

Stair Railing.—Fig. 7.—Perspective View of a Wreath Piece or Twist.

among which may be mentioned that of "Triumph," "No," Fullington," "Harmony" and "Hero." The success attendant upon this first competition has induced the stove manufacturing firm who bore the expense of the first competition, to offer prizes in a second competition, to be conducted under similar conditions to that first announced. The prizes offered are: $100, $50 and $25 for the best design for a heating stove for wood, the best design for the side of a low-reservoir cook stove, and the best design for the top and top ornament for a heating stove, respectively. We have no doubt that many of our readers are interested in this matter, and such as desire further information can obtain a circular, giving full particulars, together with the



Stair Railing.—Fig. 8.—Elevation and Plan of Wreath Piece or Twist.

conditions under which the competition is instituted, by addressing Mr. J. C. Bayles, Editor of *The Metal Worker*, 83 Reade street, New York.

Technical Schools of the Metropolitan Museum of Art.—During the present season the Metropolitan Museum of Art of New York has opened a series of technical schools, in a building erected by the liberality of Mr. Auchmuty, on First avenue, between Sixty-seventh and Sixty-eighth streets. The building itself is especially designed for the purpose, and is very convenient in all respects. The classes are under the superintendence of Mr. John Buckingham, who has been foremost in the work of organizing the schools. Classes in carriage building, drawing, carving, modeling, fresco painting and plumbing, are now in operation. These schools are practically open to all persons over 12 or 13 years of age who wish to become skilled in the arts which are taught. It was at first intended to make the schools free, but last year's experience taught that the scholars' attendance was not so uniform, nor so well sustained at the close, as was to be desired. They cared little for what cost them nothing. Small fees are now charged, barely large enough to cover the cost of the materials furnished. This has been found to work admirably, weeding out those who came from a mere impulse of the novelty. The classes are well attended, and the progress made during the two months in which they have been in operation, has been very rapid. Mr. John Buckingham, the manager, will furnish any desired information to those interested in the schools. His address is First avenue, between Sixty-seventh and Sixty-eighth streets.

Builders Controlling Plumbing Work.—We commend to the attention of contractors and builders the article in another column, entitled "Plumbing Materials and Plumbing Work." Enterprising operators do not need to be told that by buying their own plumbing materials and employing competent men to put them in, they can do better for themselves and the owners for whom they work, than by subcontracting with the plumber for both materials and labor. By saving the profit which the plumber expects to make on what he purchases, the builder can afford to pay more for workmanship and supervision, and get a better job, without adding anything to the total cost of the furnished plumbing work. In pursuing this course, however, care must be exercised, or difficulties of a very grave nature will arise. There is no part of building work in such bad repute, on account of the way it has been done in the past, as plumbing. Poor materials and poorer workmanship have been the rule in many instances. The buyer of plumbing materials, therefore, must look to it that he obtains proper quality, and he must also be careful to secure proper skill for putting them into the building. Good materials and skilled labor always command fair prices, and to this no one should object. The builder's gain from thus managing his own plumbing arises from saving to himself the profit the plumber has been making in the way of a percentage on the material he handles, and not from buying cheap goods. In pursuing the plan we have outlined, the builder becomes as directly responsible for the quality of plumbing in his building as for the stability of the foundation walls, and he has like opportunity for knowing just what enters into the work. There is no one to hoodwink him as to quality, and no one on whom he can lay the blame for defects discovered after the work is done. All things considered, the plan named seems calculated to remove the present reproach attaching to plumbing, and to possess several other advantages of no small importance.

Messrs. Mallory, Wheeler & Co. made a very fine display of locks at the Paris Exhibition of 1878. The report of Prof. William P. Blake, Honorary Commissioner of the United States, concerning this exhibit, has been considered by the firm to be of enough importance to warrant its insertion in this number of *Carpentry and Building* as an advertisement. Unlike ordinary advertisements, it contains matter of real information, and, therefore, we have no doubt it will be read with great interest by many. We commend Prof. Blake's report to the attention of all who have a pride in American manufactures.

Carbonized Building Felt.—The advantages of employing building paper under weather boards, shingles, slate, &c., are well understood. Many objections, however, pertain to the common grades of tarred paper and rosin-sized paper commonly sold in the market. The requirements of a per-

fect material for the purpose seem to combine all the advantages possessed by both of these articles, with none of the disadvantages of either. Mr. George Sheppard Page, as the result of extensive experiments, has recently perfected an article of this description which, it is claimed, more nearly approaches the ideal in this respect than anything which has preceded it. The manufacturers, Messrs. Page, Booth & Co., of 49 Wall street, New York, claim that a pound of this new material will cover almost double the surface that is covered by a pound of ordinary tarred paper, and that it has all the advantages of the latter article, with none of its defects. It is said to be strong, free from offensive smells, vermin proof, and capable of being more easily handled than the common article, and, as above noted, cheapor, because it covers more surface to a given weight. Messrs. Butler & Constant, of 87 Chambers street, are agonts for this article.

THE HORSESHOE, as an emblem of good luck, was originally used by the half-converted Pagans in the north of Europe, who put it up as a signal to Odin to have his imps and all his train pass their houses. Now that the superstition has almost entirely died out in Europe, it is being multiplied in Christian America.

Plumbing Materials and Plumbing Work.

It is becoming evident to those familiar with the course of events in the building trades, that great and important changes are taking place in the plumbing business. A few years ago the plumber monopolized the business of selling plumbing materials to the builder and house owner. The manufacturer and jobber "protected" him, and his discount, sometimes larger and sometimes smaller, was something no one but a plumber could get. At that time he was also to some extent a manufacturer. He made his own traps, lined his own bath tubs, and made a good many necessary things entering into the piping of a house which were not to be had in open market. Some of them abandoned plumbing and became manufacturers, outsiders went into the business, and the competition thus induced has had a marked influence in improving and diversifying the line of goods known as plumbers' supplies. Gradually still another class multiplied and gained prominence—that of general dealers in plumbers' supplies. Most of these manufacture or control one or more patented specialties, but they sell anything the trade wants, and in the principal centers of business the competition in this line is about as sharp, and profits are cut as closely to secure trade, as in any other. These dealers sell to anybody, and have no interest in protecting the plumber except on their private specialties—and on these only because they believe that it is to their interest to secure and retain the favor of the trade, to assist them in introducing goods which could not otherwise be sold except at ruling market prices for articles of the same class. Many of these specialties are valuable and desirable improvements; but the builder or owner can buy about as cheaply as the plumber everything needed for the complete plumbing of a house, cheap or costly, and is doing it to an extent never before practiced.

Trades and guilds are always conservative and tenacious of established custom. Naturally, the plumbers object to having their trade in materials taken away from them, and are protesting vigorously against the loss of the profit they have hitherto made as retailers. Their continued demand for a percentage on materials used, whether they buy them or not, is absurd and unreasonable and puts them in a position analagous to that of the carpenter who should demand a percentage on all the timber used in a building in which he worked, or a mason who should demand a percentage on the bricks in the foundations or chimneys. The builder or owner, as the case might be, would indignantly refuse a request so unreasonable. In the case of the plumber there is no reason to suppose that it will receive any more favorable consideration.

The plumbing trade is one calling for more intelligence and more mechanical ability, even in the journeyman, than any other that is generally practiced at the present day. It is a trade upon which the life and health of the community depend. It is an indispensable branch of the arts which go to make up our civilization. It is absurd in the extreme, therefore, to undertake to reward those engaged in it by a system which constantly tends to fraud, poor workmanship and shystering generally, instead of rewarding them according to their merits. The plumber is in no sense a retailer. He has practically no stock on hand, and he does not sell across the counter. He who would attempt to make a living in this way would starve to death. The plumber's work is a double one. He is a mechanic, when considered in his work of putting in pipes, setting fixtures and wiping joints; and he is also a sanitary engineer, when we consider his task of designing the work, overseeing the men and watching every inch of pipe put up and every joint that is made, to be sure that all is tight. On his intelligence, honesty and vigilance depend the health and lives of those who are to use his work.

Now, if in order to obtain pay for these invaluable services he has to leave his men and attend to the purchasing of supplies in the cheapest market, and run here and there to get the thousand little things that are necessary, he is doing something which is taking him away from the very work which he is paid to do. He is no longer the engineer or superintendent whose brains are wanted, but a middleman whose services are of no considerable value. It were better, in fact, to pay retail prices twice over and keep the plumber where he belongs, than to have him try to run a two-cent retail business in connection with his trade. Indeed, the fact that this has been the common method of doing work is one of the reasons why the trade is so poorly paid. If the plumber who undertakes the work in a house could draw up his plans and then hand to his client a specification, saying, "I want these things to complete this job," he would at once be placed in a vastly better position than at present. Such a position for the leading men of the trade is certainly desirable. They will then rank with other professional men, and be able, on account of their superior value, to command the remuneration which they deserve.

There is still another side to this question which appeals still more closely to the plumber. There are in every large city a great many boss plumbers having small capital who are first-class workmen. They are able to design and carry out the largest jobs to be found in city or country. These men complain that they cannot undertake more than one or two jobs at a time, because they have not a sufficient amount of capital or credit to buy the materials needed and pay their men. In conversation very recently, one of this class remarked that he did not dare to assume the responsibility of buying much material, fearing that before he could make his collections on the finished work he would be swamped by this necessary outgo. This man is now obliged to work along with one or two good-sized jobs, while he is amply able to carry on twice the amount of work but for this unfortunate necessity of being both dealer and plumber. As a class, plumbers have a very low rating on the books of the mercantile agencies. They have nothing in the way of stock, fixtures or plant which represents invested capital; and a leading jobber of plumbers' supplies remarked, not long since, that there were not more than half a dozen plumbers in his whole list of customers to whom he would sell a hundred dollars' worth of goods on credit without some other security than their notes.

Let us now suppose that, instead of burdening himself with the purchase of all the materials he is using, the average plumber with small capital leaves that responsibility where it properly belongs, with the builder or the owner, as the case may be, What would be the result? Instead of one or two jobs at a time, he might be carrying on ten or a dozen. His capital and ability would be ample for the work itself, but when he undertakes to be a storekeeper and supply all the stuff that he is smart enough to use, he is at once limited in his work. Instead of having a large income from the use of his brains and knowledge, he is getting a very small one from playing jobber on a nominal capital and a small credit. Men in this position are not exceptions to the rule. One of them whom we know well and greatly respect, is employing three or four men and doing no little work with his own hands, and yet he is capable of undertaking and personally carrying out as extensive works of plumbing as have ever been done in this country. The system itself prevents him from rising, because he has not the capital necessary to supply large amounts of materials. The whole system by which plumbing work has been and is being largely done at the present day, injures and degrades the plumbers. They are essentially mechanics and engineers, and the mental effects of trying to squeeze a 25-cent profit from between the lines of a bill amounting to a dollar, have not been beneficial.

We have no quarrel with the plumbers. On the contrary, we want to see them placed in a position where they may elevate themselves and their trade. As the business is at present managed, they are trying to get a fair income from the most picayune practices. Men who should have an income of thousands, are working hard for the gains of a very small retail trade combined with their business. Other men are seeing that this is too small a business for them, and, abandoning the shopkeeping, are undertaking to do work and furnish the brains to superintend it, and, when the work is done, they have a large and well-deserved profit—not from what they have saved and skinned or overcharged, but as pay for their skill and ability. If the plumber is paid at all, he should be paid for what he does, and for the knowledge and experience which the art requires. If first-class men would take this position and abandon trade altogether, they would not only be the gainers in actual income, but they would kill, to a great extent, the "snide" or "skin" plumber who has been for so many years the bane of the trade. These men have made large profits on materials and ignorance. They have used the latter article as so much stock in trade and charged for it accordingly, though it has not always appeared in the bill.

The future of the trade is of great interest to us, and we expect to see, within a comparatively short time, vast changes take place in it. The most important of these will be in the direction of better education, more science, and a corresponding increase in the profits. In other words, the trade, as a whole, will be better paid. Those who cannot rise to be leaders must, however, sink to the level of mere workmen; but even among them we shall expect to find greater skill, better wages and better work. Meanwhile, those of them who persist in trying to retain at the hands of the trade the "protection" they claim, will have their trouble for their pains. The trade in plumbers' materials is much too large, and the competition much too sharp, to be controlled by the plumbers. The builder and the owner will not pay the plumber a profit on materials when they can buy as cheap as he can—and often cheaper, if they have cash or unquestioned credit, and buy largely enough to be recognized as desirable customers by dealers. The plumber will have to make his profit on his work, and when he has nothing else to attend to he will do better work, and be much more intelligently critical as to materials, than it has hitherto been to his interest to be.

Rice Cement.—One of our exchanges recommends the following: Mix powdered rice with a little cold water, and then gradually add boiling water until a proper consistency is acquired, being careful to keep it well stirred all the time. Boil the mixture for one minute in a clean saucepan, and use the same as common flour paste. This adhesive is beautifully white and almost transparent, for which reason it is well adapted for fancy paper work, which requires a strong and colorless cement.

Corner Wall Bracket.

The accompanying perspective view, elevation and plan, represent a very neat corner wall bracket, of a character adapted to construction by carpenters, cabinet makers and amateur woodworkers generally. The form in itself is very pleasing, so far as its outline is concerned, while the ornamentation of the edges and the engraved lines on the inner side of the supports add much to its appearance, and make it a very desirable ornament for room decoration. The parts are so simple that the merest novice in woodwork will have no difficulty in constructing the bracket,

Corner Wall Bracket.—Fig. 1.—Perspective View.

either in common wood or of any of the hard or fancy woods. The design is one that will look well executed in almost any wood, and will also look well if finished by ebonizing. In the latter case the lines of the engraving should be brought out by gilding or other treatment, in order to brighten up the otherwise somber appearance. What are known as cabinet hangers are provided on two sides of the shelf for hanging the bracket in position, as may be seen in the perspective.

NEW PUBLICATIONS.

THE PAINTER'S MANUAL: Containing the best and latest improvements in the various branches of the art; 96 pages, paper covers. Price, 50 cents. Jesse Haney & Co., Publishers.

This little work, though quite unpretentious, contains a great deal of matter of just the kind that is most needed by the painter, or by one who has occasion to practice the trade without being entirely posted in regard to it. There are useful directions to avoid painter's colic, hints in regard to the best colors to use, notes on the composition of colors, directions for mixing tints, and five very closely printed pages devoted to the subject of paper-hanging. The remarks in regard to measuring painted work and the method of charging for it, will be found valuable by those who are somewhat inexperienced in such matters; although the prices given are those which prevailed just after the war. It will, however, be easy for each one to reduce them to the present basis. The work fills a want which is often felt by those who are not professionals.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. To contain 80 lithograph plates of new and original designs of dwellings of moderate cost in Queen Anne, Eastlake, Elizabethan and other modernized styles. To be completed in ten parts. Parts Five and Six. Bicknell & Comstock, publishers. Price, $1 per part.

The eight plates contained in Part V of this work cover designs as follows: 5 cornices in wood, terra-cotta and stone; 4 designs of single doors and 2 designs of vestibule doors; 8 designs for exterior and interior doors; 15 designs of windows; 2 designs of bay windows, with details; plans, elevations and view of a surburban house of moderate cost; details of house just mentioned; elevations and outlines of hall, library, parlor and two chamber mantels. Part VI contains the following: Perspective view and plans of house at Arlington, Mass., costing about $6000; scale elevations of the same; details of piazza, front gable, dormers, finial, main cornice, cut shingles, &c.; interior details, comprising stair rail and balusters, bracket in hall, window finish, elevation of staircase, newel post, &c.; Perspective view and plans of house in Queen Anne style, at Short Hills, N. J., costing $6000; front and side elevations of same; exterior and interior details of same. The quality of the work established by the earlier numbers is being sustained throughout.

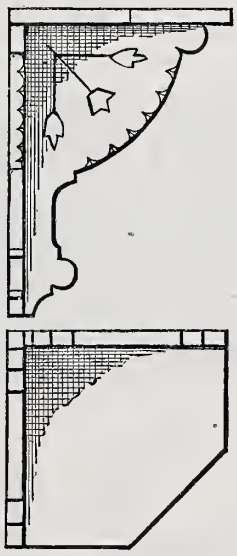
The portfolio cover intended to hold the numbers of this work is now ready. In design and finish it is very handsome, being altogether appropriate for the excellent plates it is intended to protect. The price of the cover alone is $1. To subscribers to the entire work, paying in advance, the cover is furnished without extra charge.

SLATE TABLES DESIGNED FOR THE USE OF SLATERS, QUARRYMEN, ARCHITECTS AND DEALERS. With practical directions with regard to slate roofing. By H. N. Stafford. D. C. Pratt, publisher. Bound with tuck for pocket use. Price, $3.

This is a new edition of an old standard work, which has been in constant request among the trade ever since its first publication, nearly twenty-five years since. There is an introduction entitled "Slate as a Roofing Material;" then follows rules for ascertaining the number of slate in a square; how slate is put on (illustrated); how to ascertain the number of squares in a roof; slate tables, showing the number of squares and feet contained in any given number of slates of various sizes, showing the value of various sizes per thousand, at a given rate per square, variation in lap, average weight of slate, method of selling slate at the Welsh quarries; tin tables, showing the number of squares and feet contained in any number of sheets, and the number of sheets required for any number of squares or feet. The book also contains six colored and two plain plates, showing patterns of ornamental slating.

JAPANESE ORNAMENT. Designs and ornaments for sign painters, designers and decorators. Jesse Haney & Co., publishers. Price, $2.

This work consists of twelve plates of what are supposed to be Japanese designs.



Corner Wall Bracket.—Fig. 2.—Elevation and Plan.—Scale, 1½ Inches to the Foot.

They are engraved on wood and nicely printed on good paper. The size of the page is 10 by 13 inches. An introduction, covering nearly two pages, is given with the plates. Each plate is made up of a great number of members, which may be considered as separated designs. Although not very Japanese in style, and not particularly artistic in composition, the designer who wishes to do something in the popular fashion may find in these plates considerable assistance.

LONDOLPHE'S ORNAMENTS. A book of scrolls and ornaments for ornamental, sign, carriage and fresco painters; 27 plates. Jesse Haney & Co. Price, $1.

This little work, whose pages are 5½ x 9½ inches, contains a good variety of standard ornaments, scrolls, &c., useful in all kinds of ornamental painting, besides a dozen different plates devoted to lining, striping, &c. In this department each plate contains a number of designs, all of which are practical and look well on finished work. The ornamental painter in any branch of work will find the book valuable.

Antique Sideboards, Sofas and Tables.

A writer in a Boston paper, criticising modern styles of furniture, says:

By and by, if we continue to go crabwise in pursuit of novelties in furniture, we shall arrive at the days of Adam, when there was no furniture at all and upholstery was unknown; but at present we have only come to the sixteenth century, and are ornamenting our rooms with chairs and tables, sideboards and buffets almost exactly like those which the Valois and the Tudors used. It is the spirit of carving which constitutes the principal difference between the old work and the new, although it is possible to have the old imitated so pefectly that no one can distinguish between the original and the copy. A little while ago, a Spanish chair, two centuries and a half old, was brought here, and to-day its owner has three modern chairs in which the grinning Moorish mask of its back and the two female figures that are its supporters, the queer hollowed seat, and straight piece of wood that serves it instead of four legs, are repeated with an accuracy so perfect that he can only distinguish the original by a private mark. On the other hand, the very little tables which the Venetians used to make for vases and statuettes are not exactly imitated, but have an india-rubber-like plumpness of the little boys that support them replaced by arms and legs and bodies that seem to represent flesh and blood, and faces that do not wear the provoking grin which makes one long to put a bandage over the mouth of the Venetian youth, as if he were a bad little boy and had been caught whispering at school.

Some of this antique furniture is only a mask of modern luxury, as, for instance, the writing cabinets, the front of which let down to show a desk and pigeon holes and drawers fastened by locks of a simplicity and effectiveness unknown to old-time artisans, but their exterior plan is entirely ancient. It does not seem as if anything but the airiest and most elegant of writing could be done at one of these desks, with its many shelves and recesses, each filled with its own special gem of pottery or sculpture, and each with its own bit of fine carving in supporting column or at the recess. Surely one could not soon learn to ignore these or the two griffins at the top, or the strange claw feet, or the masks that lurk under the projecting carved rims at the top, and would fly to a hopelessly ugly corner and a lap tablet when one wanted to do any real work.

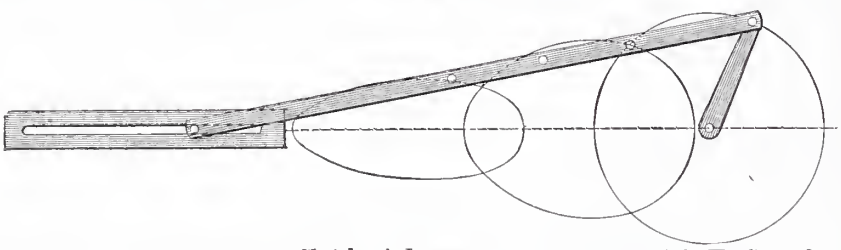
In strong contrast to the antique styles, are modern sideboards of San Domingo mahogany, with one immense mirror extending from end to end and surmounted by a boar's head, so finely carved that each particular bristle can be distinguished as clearly as if the creature were real, and with the corn and wheat through which he peers, and the dependent wreaths of oak leaves and acorns so faithfully wrought that one almost expects to see them wave to and fro. This is the sideboard that the intensely American purchaser wants; the sideboard which uses our American products as the Greek used the acantbus and parsley, and the Egyptian the lotus. Another phase of the American feeling is considered in the colonial bedroom furniture, which is either mahogany or cherry, and has asters strung in formal festoons for its decoration.

Another revival of a very old fashion is what is called the Spanish sewing chair, which has exactly the curves of the old Egyptian chairs that represented water birds, having the neck of the fowl for the back and his body for the seat. These are delightfully comfortable, and so are the Turkish pillow chairs with their square cushioned backs and seats, and the Morris reclining chairs, in which there is a "sincere" absence of all concealed machinery, and which are supported by a brass rod that rests in whichever one of a succession of grooves gives the right angle of inclination. The cushions in this, as in all Morris furniture, are separate from the chair, and can be turned, shaken and aired as often as one pleases.

Ovals and Ellipses.

In the issue of *Carpentry and Building* for September of last year (page 172), we published a letter from a correspondent, accompanied by some drawings of ellipses and ovals, which excited the curiosity of many of our readers. The author of the diagrams in question promised at the time to explain the method of their production in a subsequent letter. So far, however, we have had no further communications from him, and therefore, in reopening the subject, we present our own ideas and those of correspondents who have given the matter attention, of how the figures in question were drawn, instead of the solution originally anticipated.

By examination of the illustrations accompanying the article above referred to, it will be seen that the figures produced are of two kinds, ovals and ellipses. Both styles of figures are presented in series, commencing at one end with but a slight remove from a circle, and concluding at the opposite extremity in a long narrow shape. The explanation accompanying them gives the information that in the construction of both kinds of figures they are derived primarily from a circle. From these conditions and explanations the conclusion is at once forced upon the mind that the figures are produced by some instrument which in its general characteristics is analogous to the connecting rod in the ordinary form of a steam engine. Whether one set of figures consists of perfect ellipses and the other of a set of ovals, or whether both sets are in reality ovals, we will allow our readers to determine after reading what follows. Upon the face of the matter, it seems extremely probable that the only difference in the forms of the figures produced is in the length of the connecting rod of the instrument by which they are drawn. The inaccuracies incident to drawing figures by instruments of ordinary construction, to say nothing of the roughness of paper, make it impossible to determine a point of this kind by actual measurement, and more especially so when the figures are so small as in this case. Therefore, we invite particular attention to the following explanation of principles involved in the construction of the shapes named.



Ovals and Ellipses.—Fig. 1.—*Sketch of Instrument Employed by W. H. C. and other Correspondents in the Solution of the Problem.*

Numerous letters bearing upon this matter have been received from our correspondents in the interval since the article above referred to was published. Various suggestions have been made in them with reference to drawing ellipses by instruments which are different from trammels in construction and principle, and which are more accurate than the method of two pins and a piece of string. Various attempts to explain the construction of the figures in question have been made. The greater number of those who have written us, and among them W. H. C., of Kingsport, Tenn., and D. C. H., of Kingwood, W. Va., describe an instrument with a crank and connecting rod, one end of the latter moving in a straight line, and the other connected with the crank pin. Holes in the rod are made to take the pencil and draw the figures as the crank is turned.

In Fig. 1 we show a sketch of an instrument given by W. H. C. This method of producing ovals doubtless is very old, and has occurred to almost every one who has given the matter any attention. In drawing an ellipse, however, this plan has one fatal defect, in that the figures which it produces are unlike at the two ends. In other words, such an instrument will only make egg ovals and never true ellipses. This is not easily discovered, because in most cases very long connecting rods are used, which greatly diminish the amount of difference between the two ends. One of our correspondents shows in his letter an instrument where the rod is no less than eleven times as long as the crank.

An ellipso is a figure obtained by making a section of a cylinder at an angle to its center line. Its two halves, whether taken on the long or short diameter, are alike in all respects. The ellipse may be also described as a circle seen in isometric perspective.

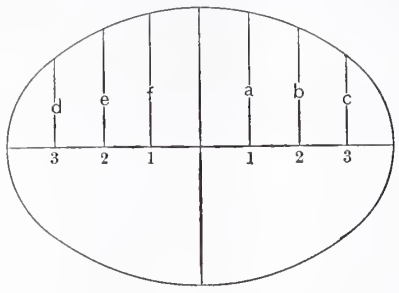
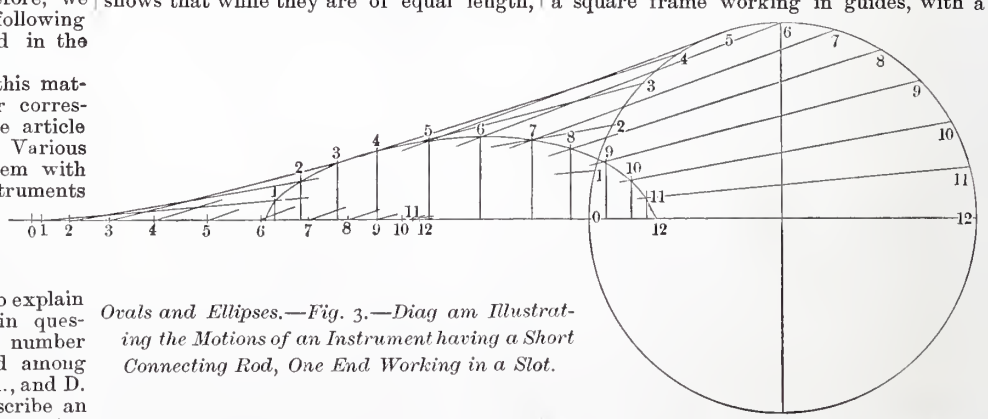


Fig. 2.—A 45-Degree Ellipse.

Fig. 2 represents a 45-degree ellipse—that is, one obtained by cutting a cylinder at an angle of 45 degrees, or drawing a circle in isometric perspective, as though seen at that angle. It will be found that if we divide the diameters into equal parts, beginning from the center, and then erect lines perpendicular to the diameters, we shall have these lines of equal length at equal distances from the center. Thus *a* will be found to be equal to *f*, both being located one space from the center, in like manner $b = e$ and $c = d$.

To demonstrate the form of the figure developed by a point on a connecting rod, we have drawn the diagrams shown in Figs. 3 and 4. Fig. 3 gives motions, &c., of an instrument having a short connecting rod, one end of which is is supposed to work in a slot. A glance at the lines perpendicular to the long diameter shows that while they are of equal length, as they must be from the very nature of the case, they are by no means equally spaced. Those marked 1, 2 and 3 are much further apart than 9, 10 and 11. In this case the connecting rod is less than three times the crank, or 1½ times the diameter in the length.

In Fig. 4 we give a similar diagram, showing the figure produced by an instrument having a slotted connecting rod and a pin, instead of a fixed slot, by which the end of the rod is compelled to move in a straight line. Here, it will be seen, that the departure from a true circle is much greater than in the other instrument. This is the result of making the slot in the connecting rod, rather than in the table upon which the instrument rests.



Ovals and Ellipses.—Fig. 3.—Diagram Illustrating the Motions of an Instrument having a Short Connecting Rod, One End Working in a Slot.

Most of the correspondents who have mentioned this way of drawing ovals tell us that, so far as they know, the plan is original with them, and they also add that the machine is so bulky that for practical work they prefer to use the trammels or the pins and string. This probably arises from the fact that they are obliged to use such long connecting rods and small circles in order to obtain an approach to accuracy.

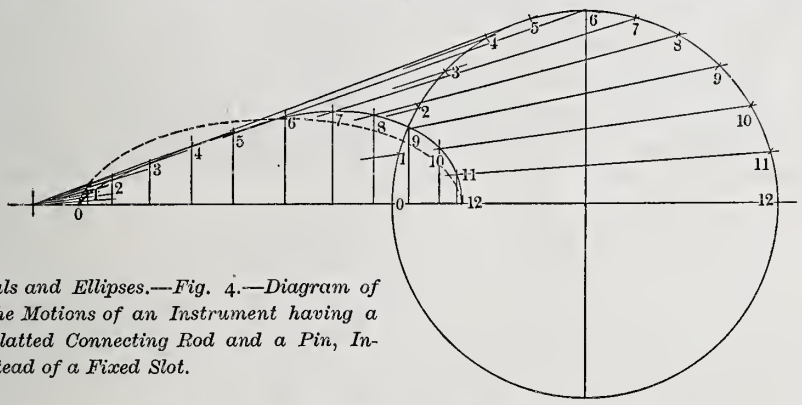
At first our readers may not see why the connecting rod draws a distorted figure. This can be easily shown when we consider that the widest point of the oval is in the middle of its length. Now, when the back end of the connecting rod has just reached its half travel, the front end will be some distance from the center of the crank circle. In other words, the crank will not be at right angles to the center line of the instrument. When the connecting rod is very long this difference is slight. If the rod could be made infinitely long the difference would disappear entirely by becoming infinitely small. Fig. 5 shows the relation of the parts with a rod of 1½ times the length of crank. This lagging of one end of the rod upon the circumference of the circle is due to what, in steam engine practice, is known as the "angularity of the connecting rod." The figure shows the crank and rod disconnected. The crank is at exactly right angles to the center line, having passed just half the distance from side to side, or one quarter of a revolution; the rod, too, is shown as having passed just half way along the slot, and while the rod, if running down, would touch the center of the circle, it will by no means reach the crank pin. This "angularity" makes a distortion in all parts of the figure.

The first thing that presents itself to the mind after a consideration of these points, is to devise some apparatus by which both ends of the connecting rod shall move at the same rate of speed, and where one end is at half stroke the crank shall be at half stroke also. This may be done by an adaptation of what is called the slotted crosshead in combination with the connecting rod. The slotted cross-head is used upon steam engines to avoid the use of the connecting rod. It usually consists of a T-shaped piece, in the horizontal portion of which there is a slot in which the crank pin works. The upright portion travels in a slot to confine it to a straight line. By fastening a connecting rod upon the lower portion of the T and allowing the crank pin to pass through a slot in the end of the rod, we have a machine which, at first sight, appears to draw perfect ovals. For convenience of working, it is best made by using a square frame working in guides, with a slot for the crank pin in one end. The solid lines in Fig. 6 show an apparatus of this kind. When this instrument is made with a rod four or more diameters long, the figures drawn by any point upon the rod are so nearly accurate that they may be used as true ovals in all ordinary work.

Both ends of the rod have the required motions; when the crank pin is at right angles, the frame, and of course the back end of the rod, has moved through just half of its travel. Stopping here in our reasoning, we should at once be led to conclude that a true oval or ellipse was formed. Such, however, is not the case. The figure is an "egg oval," with the large end re

versed and the point toward the crank. The reason for this is found in the fact that from the point A to B the rod introduces a small and independent angularity of its own, which, as the back end is moving with the crank, produces a reverse effect upon the figure which it draws. Even with this fault the instrument is a somewhat useful one, as it is much more easily made than a pair of trammels, and will do reasonably accurate work, as we have said.

The instrument, by the addition of another cross-head for the pencil to work in, can be made to draw perfect ellipses. It then becomes so much more complex and difficult to make, as well as to manage, that it can hardly be said to be a practical machine. Tho dotted lines in Fig. 6 show how the extra cross-head may be applied. It is fastened across the frame at the middle point of any ellipse that may be desired, and the point of the pencil is compelled to travel in the slot. This cross-head may be made to fasten in any desired position upon the frame. With this arrangement the point which describes the ellipse has exactly the same longitudinal motion as the crank and the angularity due to its distance from A. If the guides G G G G are connected over the top of the machine and the crank attached to a cross-piece below, it would not be an unhandy instrument, in either of the



Ovals and Ellipses.—Fig. 4.—Diagram of the Motions of an Instrument having a Slatted Connecting Rod and a Pin, Instead of a Fixed Slot.

forms we have described, for drawing large ovals on working drawings, &c. It must be remembered, however, that in its first form it only produces a very close approximation to the ellipse.

New Queen Anne Style.

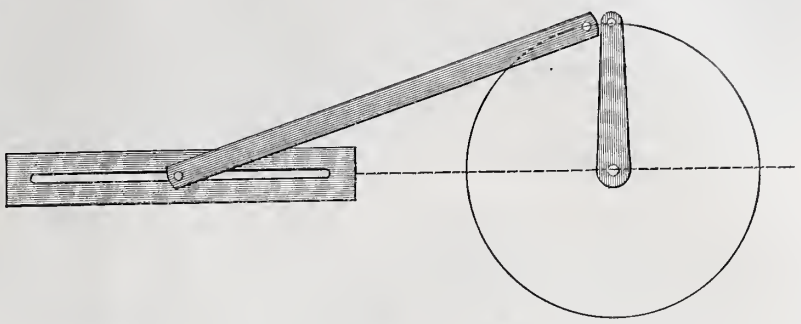
One of our exchanges has the following: What people now call Queen Anne fashions, with a charming indifference to trammels of dates, are the fashions of the three Georges, the "Marie Antoinette style," (under that queen the Louis XV furniture and decoration, while still sumptuous, became refined and moderate), and especially everything which came in during the Empire (Napoleon I). Now, as Anne died in 1714, and Napoleon resigned his crown in 1815, there are just 100 years of perhaps the most remarkable changes and developments in art which ever occurred in a century, all named after Anne, whose tastes, in reality, belonged to her father's generation.

Chippendale, the elder, was a cabinetmaker who flourished about the middle of last century. He was the author of many of the most elaborate Louis XIV patterns in England—frames, tables, commodes, pedestals—all of them ingenious and contradicting every sense of purpose in frames, tables, commodes and pedestals; not a straight line anywhere—not a moment's rest for the eye—all wriggling curves, like bewitched vegetation, giving birth in unexpected places to human heads, beasts and birds.

He also adapted his workshop to the prevailing taste when it turned pseudo-Greek, and manufactured many good, and as many bad, articles of furniture. His simulations of bronze stands, the impossible curves strengthened by internal wires, were turned out among his bureaus and chairs really well and durably constructed, with mere servility to the customer's purse. A fashion for plainness and simplicity in decoration is convenient in more ways than one. It is convenient to the new-made virtuoso; convenient to those born without taste, for it saves them fiascoes; convenient to the impecunious, for it saves them money; convenient to decorators who have crept into notice by good luck, not merit. Hence, the running popularity of the so-called "Queen Anne" furniture and scheme of decoration now attainable by every upholsterer.

We know that the key note of all "Queen Anne" rooms is quiet and mortally "severe;" the chairs are few, hard, square, and heavy, and covered with dingy stuffs laboriously made to look poor and imperfect in web, and recalling in color mud, mildew and ironmold. We know that there is not to be a low or easy chair in any room. We know we must expect only small beveled mirrors in mean little frames, or convex ones which make our faces seem bloated with toothache or hollow with atrophy, our figures spent and wasted as with a sore disease. All this we know—the papers on the walls, the colors in the carpet, the inescapable blue china, the one or two auto types, photographs and etchings alone permitted us—the bare, comfortless bedroom, the austere dining-room. We know this sort of thing is æsthetic, and let us be æsthetic, or we are nothing.

All such rooms resemble each other. The Queen Anne mud decorators have but one idea, and drive it to death. We know without entering it what that house is like. There is not one original thought in it, from its inconvenient entrance to its last dark and æsthetic cranny. We know every chair, every tint, every brass knob, every wretched hard sofa and skewer-legged table, almost every "orthodox" work of art on those deadly-lively walls. These houses reflect no inmate's character, no natural need and requirement; they contain no thought, no sweet little surprise, no touch of genius, not even of ability.

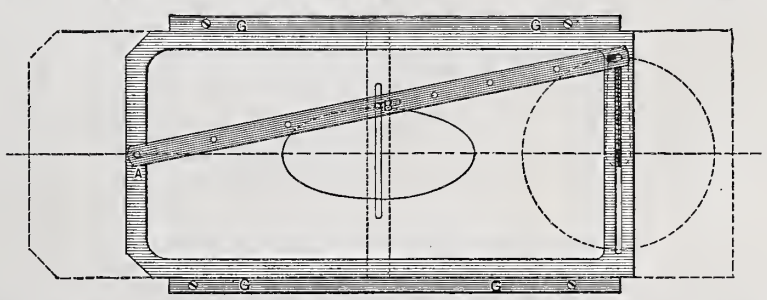


Ovals and Ellipses.—Fig. 5.—Diagram Illustrating the Relations of the Parts with a Rod One and a Half Times the Length of the Crank.

Yet they are "æsthetic." Much labor and lucre are spent on making them so, and the inhabitants are duly "worked up" to their walls, with a garb and a language of their own. After all, what does æsthetic mean? If æsthetic means "discriminating," we only see that the æsthetic discriminate between vulgar comfort and select misery; if it means "eccentric," popularity is surely bringing the seeds of death, unless the eccentricity be of speech, and then we bow, baffled, before the "inescapable and lordly niceness" which results in "distinctly inevitable" obscurity. But though our unregenerate hearts may sigh for relief, and sometimes neither blue-green nor green-blue, we must not be unjust. These rooms are so convenient after all! They are less offensive than the cold red and gold business. You can move easily among the sparse furniture. The little joints and inlaid spots are very "nice," and the little skewer legs vibrate sympathetically at a touch, so light are they. There is something weakly and feminine about this style which goes to our hearts. Yet the inoffensivenees, unwarmed by some character, some *chic*, is in itself sometimes an offense.

The Qualifications of a Successful Sawyer.

The following directions for sawyers are in part applicable to men operating other forms of woodworking machinery. Accordingly, they will be found of interest by others than mill operators: 1. Acquire sufficient knowledge of machinery to keep a mill in good repair. Remember that if a knowledge of machinery is a good acquirement, one cannot have too much of it. 2. See that both the machinery and saws are in good order. A man cannot do the best work when he is in ill-health, neither can machinery do the best work when it is in ill-repair. 3. Bear in mind it does not follow because one saw will work well that another will do the same on the same mandrel, or that even two saws will hang alike on the same mandrel. On the principle that no two clocks can be made that will tick alike, no two saws can be made that will run alike. 4. It is not well to file all the teeth of circular saws from the same side of the saw, especially if each alternate tooth is bent for the set, but file one-half the teeth from one side the saw, and of the teeth that are bent from you, so as to leave them on a slight bevel and the outer corner a little the longest. 5. Never file a saw to too sharp or acute angles under the teeth, but on circular lines, as all saws are liable to crack from sharp corners. 6. See that each tooth will



Ovals and Ellipses.—Fig. 6.—Suggestion of an Instrument, Working on the Principle of a Connecting Rod, which may be made to Produce Perfect Ellipses.

do its proportional part of the work, or if a reciprocating saw, keep the cutting points pointed on a straight edge. 7. Keep the teeth of your saws so that they will he widest at the very points of the teeth, otherwise the saws will not work satisfactorily, the tendency of all saws being to wear narrowest at the extreme points. 8. The teeth of all saws should be kept as near a uniform shape aud distance apart as possihle, in order to keep a circular saw in halance and in condition for cutting.

CORRESPONDENCE.

In order to accommodate especially interesting features of the paper this month, we have been obliged to reduce our Correspondence department to unusually small proportions. This has made it necessary to defer still longer the publication of certain communications to which allusion has already been made. We trust our readers will see the wisdom of our course, and will continue to wait patieutly for the discussion of these problems, in which they are greatly interested, as we learn by letters received.

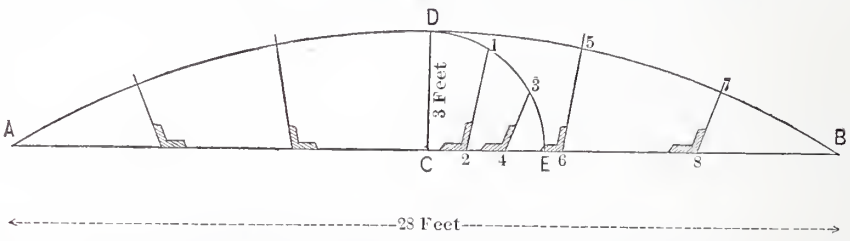
We have discovered an efficient plan for calling out communications from the practical readers of the paper. All that is necessary for us to do is to publish something which is not quite correct. The avalanche of letters which is precipitated upon us immediately thereafter, calling attention to the error and proceeding to demonstrate the mistake, is wonderful to behold. On the other hand, when we keep in the beaten track, the paper goes from month to month without so much as a word from those whom we suppose are the most interested in the subject discussed. Our conclusion from this is that it would be a good plan for us occasionally to publish something which is at least a trifle "shaky," if not really "rotten," in order to keep up the interest. It was not with this intention, however, that we penned our comments upon the problem of "Three Men Carrying a Stick of Timber," which appeared in the last number. The way we have been taken to task, however, for our conclusions, fully demonstrates the feasibility of the course above suggested. We regret that we have not time or space to enter into further discussion of this problem in this number. We are obliged to defer it until a later period, when we will give it the attention that it deserves.

Comments on the first prize design for $3500 dwelling house, which was puhlished in our last number, are heginning to reach us as we go to press. In the main, they aro highly complimentary, not only to the author of the design, but also to the judges and to the paper whose enterprise instituted the competition. There are also some questions propounded which it will he our pleasure to answer at a future time.

We have at different times invited letters from our correspondents, among other topics, on the subject of stair-building, hut our invitation has met with only a meager response. Whether what wo have puhpuhlished has boen considered as anticipating every possihle question that could be brought up, or whether our readers are less interested in the subject than we supposed, are questions we cannot answer. We still invite letters upon this topic, however, and trust, for the interest of the paper and the advantage of numbers of our readers, that the responses for the future will be more numerous.

Describing Segments, the Chord and Rise Being Given.

From C. B. J., *Medford, Mass.*—In the October number of *Carpentry and Building* for last year, a method was published for ohtaining the form of arches. Accompanying this please find a sketch showing a plan practiced in the mold loft in naval architecture, which I have found very convenient for use. Lay off the base line A B, for instance, 28 feet. At center, C, erect the perpendicular C D, representing the hight or spring, which, for example, in this case, we make at 3 feet. From C as center, with C D as radius, describe the arc D E, which divide into three equal parts. Also divide the space C E into three equal parts. Then draw lines cutting the points thus established, as shown in the sketch hy 1 2 and 3 4. Divide each half of the base liue A B into three equal parts. Set the hevel to the angles 1 2 C and 3 4 C, and apply as shown at 5 6 C and 7 8 C. Repeat the same operation in the other half of the base. Draw lines 5 6 and 7 8, on which set off respective'y the distances 1 2 and 3 4, as shown. Repeat this operation in the opposite half of the figure; then a thiu piece of wood, sprung from A to B in such a manner as to touch the points thus determined, will give the line of the arch.



Describing Segments, the Chord and Rise Being Given.

White Stains on Brickwork.

From "Who Can Tell?" *Philadelphia, Pa.*—Who can tell me the cause of the appearance of the white suhstance found upon brickwork? Generally it is seen on walls near the conductor pipes. Is there any remedy for it? I have even seen it on brown stone on a church spire base. The church at Thirteenth and Spring Garden streets is an example. The discoloration is at least 50 feet from the pavement. It is found on old walls as well as new. Some of the best modern huildings in Philadelphia are in a miserable condition. The only comparison in regard to them that I can make would be to suppose that a cannon loaded with plaster had been fired at them. When scraped off the substance tastes like soda. It appears to eat the bricks of the harder qualities. Now, bricklayers, can you untie this knot? If not, hide away your trowels, for who wants a house built of brick that, as soon as winter comes, looks as though it had been whitewashed in a whirlwind. Is this ghastly brick mold a complaint found in other cities? Let us hear from all parts of the country ahout it, for it is really worthy of discussion.

Note.—The trouble mentioned by our correspondent is by no means local. In New York City it afflicts a large proportion of all buildings where the mortar is exposed, hut as this city has only painted fronts as a rule, it is not very noticeahle.

While we will not attempt just now to explain causes, we may make a few remarks about prevention. After brickwork has had time to dry, if the surface is cleaned and several coats of raw linseed oil applied until a film of oil is formed just within the surface, there will ho no further trouble for many years. This will greatly improve the appearance of the bricks, and will keep the wall dry and protect it from injury by water or frost. The beauty of a good front, when finished in this way, is something to he remembered when once seen.

The reader, of course, will say that this is a remedy worth trying, and will make up his mind to have the first piece of new brickwork he puts up finished in this way. Unfortunately, there is an objection in the way which cannot be overcome, and, instead of getting what he wants, he will have a painted wall iu spite of himself. The ohjection is of the painter, who, knowing or guessing that a wall so treated will last a dozen years without atteution, will add "just a little red" to "color the oil." No matter how strong the owner's determination is to have an oiled front, the painter, by persuasion, will get permission to add the color, or will do it without permission, and will thus substitute the painted for the oiled surface. The least touch of color will ruin the effect and spoil the job, and most of the paiuters know this fact. This is the experience in New York City at least, and, as a result, most of the brick buildings are painted that are not badly discolored. We have seen on small buildings, where the job was not worth much, the raw oil applied, hut usually the owner was satisfied with a single coat. This is of little value. What is needed is a sufficient numher of applications to thoroughly coat the surface and fill the pores of the hrick. The color which can be obtained in this way is more heautiful than any paint, and is durable.

When paint is used it remains on the surface, holding the oil, where it is exposed freely to the action of the weather. After a short time the paint loses its substance and crumbles away, making a very unsightly appearance, and necessitating repainting. When paint has been once applied there is, we think, no remedy, for no one could be found who would undertake the job of cleaning off the paint from a building of any size. Tho finish we have spoken of is especially adapted to fine pressed brickwork. Whether any other method of treatment is needed when common face brick are to be coated, we do not know. Perhaps some of our readers can throw further light on the subiect.

The Slide Rule.

From J. C. R., *Carthage, Ohio.*—Will you not illustrate and write up the slide rule, giving examples of its uses and a list of the problems to the solution of which it is adapted? I notice that there is a great deal heing said in the mechanical journals about this instrument, and I think it would be of interest to your many readers to have a description of it published in your columns.

Answer.—Since the slide rule is an instrument of no special practicahility, although its many applicatious in the solution of common, as well as curious, problems, make it an interesting subject for study, we do not think our space would he well employed in giving it attentiou. The principles upon which the slide rule depends aro, of course, mathematical laws, and if the instrument could be constructed large enough, with divisions fine enough and the parts fitting together with sufficient accuracy, it would undoubtedly prove desirable; hut in the shape in which it is ordinarily put out, it is not satisfactory for the solution of any problem in which fractions or decimals enter to any considerable extent, and there are very few problems which can be solved entirely in whole numbers. To such of our readers as desire to investigate this subject, we would suggest that a little book entitled "Utility of the Slide Rule," costing $1, aud a specimen rule, also costing $1, will be altogether to their satisfaction. The form of the slide rule is not so well calculated to produce accurate results as some other shapes in which calculating machines have been made. The instrument constructed hy Mr. Nystrom in the preparation of his celebrated "Engineers' Pocket-Book" is analagous to the slide rule in some particulars, hut is of far greater utility than the slide rule ever can he. A person having euough skill and mathematical knowledge to operate a slide rule, can preform all necessary operations without it, and with less lahor than hy employing it. Without mathmetical skill the rule canuot be used at all with advantage.

Scroll Saws.

From B. L. T., *Verbena, Ala.*—My advice to your correspondent W. E. B., whose letter was puhlished some months since, in the matter of scroll saws, is to send to Charles H. Little, No. 59 Fulton street, New York City, for what is called a velocipede saw. I have one, and find I am able to cut

any kind of wood not more than 2½ inches thick. I would not part with it for four times the price, provided I was not able to get a duplicate.

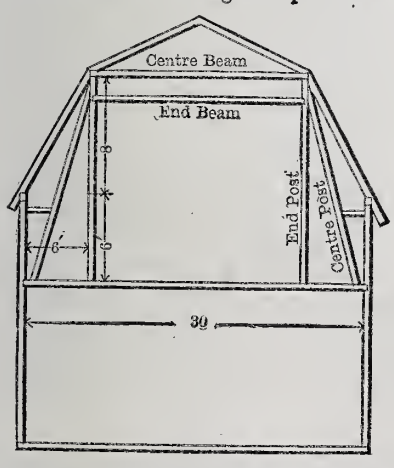
A Question Answered.

From GEORGE H. MILLER, *Bloomington, Ill.*—I desire to say to "Gleaner," of Toledo, Ohio, that I should have been pleased to answer his question, propounded in the November issue, much sooner, but my attention was not called to it until a very short time since. I trust this circumstance will be sufficient excuse for my delay. With reference to the construction of the stairs in the design published in the October issue of *Carpentry and Building*, it will be noticed of the front elevation that the door is on a line with the top of the windows. This is a mistake made by the draftsman in reducing the elevation from the originals. The front door in the house, as constructed, was 8 feet 6 inches high, which left 6 inches for finish above the doors. This dwelling was built in this city for a Mr. Boone, and the execution of the design attests its practicability, barring the mistake of the draftsman above referred to.

Gambrel Roofs.

From A. H. R., *Spartansburg, Pa.*—At different times correspondents have asked for information regarding gambrel-roofed barns. I have waited, hoping that I might learn of something new, but as I have seen nothing given as to the proportions of the roof and the style of frame, I have concluded that it is best to send my plan along, hoping that it may be of benefit to some of the readers of the paper, as well as call forth discussion.

The accompanying sketch illustrates the rule which I employ. Divide the width of the building into five equal parts; set the purline posts one-fifth of the width of the building in from the outside posts. Allow the outside posts to extend one-fifth of the width of the building above the second floor. Then, for the hight of the first section of the roof, let the inside posts extend above the outside posts to the amount of one-fifth of the width of the building and one-third of one-fifth additional. For example, the sketch illustrates a building 30 feet wide. The purline posts are set in from the outside posts 6 feet, which is one-fifth of 30. The outside posts extend above the second floor 6 feet (one-fifth of 30), and the hight of the inside, or purline, posts above the top of the outside post is 8 feet, being one-fifth of 30 (6 feet) plus one-third of 6 feet (2 feet), making 8 feet. After determining the pitch of the



Gambrel Roofs.—Sketch Accompanying Letter from A. H. R.

lower section of the roof in this manner, make the upper section one-quarter pitch. Set the middle posts back, bracing under the roof. By this construction they are out of the way, affording more room in the upper story, all of which is clearly illustrated in the drawing.

Excellent Advice.

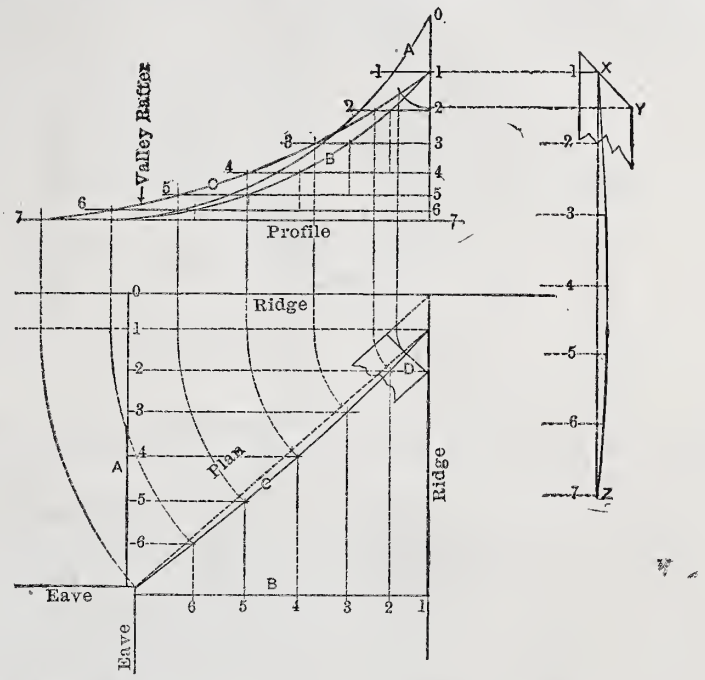
From P. C. M., *West Sandlake.*—I desire to say a few words to young beginners. Get all the insight into drafting possible. It will be a great help to you in future life in many ways. Learn your trade before you put out your sign as boss. Get good tools and use them well. In this way they will do you service.

Hip Rafters in Curved Roofs.

From C. O., *Canton, Miss.*—I inclose you herewith an attempt to answer the questions put by M. W. C. and J. A. E., some months since, with regard to shape of hip rafter and valley rafter for curvilinear roofs of different pitches. In the engraving, which represents the wants of M. W. C., the lines A and B represent the common rafter and C the valley rafter. In plan and profile, respectively, the curves of common rafters being given, I first determine the seat, or base line, of valley rafter, which in roofs of this kind is curved. To illustrate my method, I will say, supposing the common rafters were cut and put up on both sides of valley strips, tacked on one side parallel with eave or ridge, and the same number of strips on the other side, tacked in the same manner and at the same vertical hights, it is evident that their intersections would represent the line of valley. Therefore, the curves of common rafters being drawn, I divide, for example, B into any convenient number of parts, and through the points thus determined draw horizontal lines. The lengths of these lines, determined by where they cut the curve of common rafter, are set off on corresponding rafter in plan. Then draw lines parallel with eaves or ridge, as shown in the sketch, and where these lines intersect is the base line C of valley rafter. The same points of intersection project on corresponding lines of profile, giving the line of valley rafter.

To obtain the lateral curve of valley rafter, take distance on outline of valley rafter, as made by the horizontal lines already described, and draw lines, as shown, between X and Z at the right of my sketch. Draw a vertical line cutting all these lines, and set off on each corresponding line the same lateral distance as between the straight and curved base line in the plan. To find the top bevel of valley rafters, let the thickness be as shown at D in plan. Project the length of bevel by half the thickness on curved line in profile. Project the length thus found on corresponding line on upper face, as shown by X Y at right of the sketch. From the two points thus determined draw a line, which will be the true bevel.

J. A. E., in his question, does not give the radius for either side of roof. I would, in his case, to avoid having a curved hip, determine the curve for one side and have the hip straight sideways, letting the curve of the hip determine the curve of common rafter on the other side.



Hip Rafters in Curved Roofs.—Sketch Accompanying Letter from C. O.

Making a Frame House Tight.

From W. S. H., *Louisburg, Pa.*—Can you inform me what is the best material to put between the weather-board and plastering to make a building warm? I am living in a house built in 1875, and find it very difficult in the winter time—especially the present season, when the thermometer (for example, last night) runs to 20 degrees below zero—to keep warm. I have left room on the garret floor to put in filling between the studding—that is, the garret floor is not extended out against the weather-boards. Would the space filled with sawdust accomplish the purpose? I fear, however, that with such a substance there would be difficulty, on account of its liability to get wet or damp from rain making its way through cracks in the weather-boarding. Can you recommend a substance that will be a non-conductor and will answer the purpose, even if it does get wet?

Note.—We fear that our correspondent has commenced at a late day to make his house warm. A little care and very small expense at the outset would have guarded against the difficulty he now encounters, and to remove which satisfactorily we fear will be a very expensive matter. Instead of applying the clap-boards directly to the studding, as we infer from a sentence in his letter is the character of construction employed, it would have been better to have sheeted the house on the outside, and over it placed a thickness of building paper before applying the clap-boards. This plan of construction, which is in general use in various localities, makes very warm houses, and, withal, is not unreasonable in point of expense. In addition to the paper, back plastering—that is, a rough coat on the studding—then furring out and plastering again, would have still further aided in making the house warm. To attempt to fill the space between the studding now that the house is completed, will be a difficult job in any event. How it had best be done we shall leave to the readers of the paper to advise. We are certain that sawdust would not be satisfactory, and materials to which the objection of dampness does not apply would, we fear, be too expensive. Mineral wool would undoubtedly give excellent results. If any of our readers can help this correspondent out of the difficulty, we should be pleased to publish their answers.

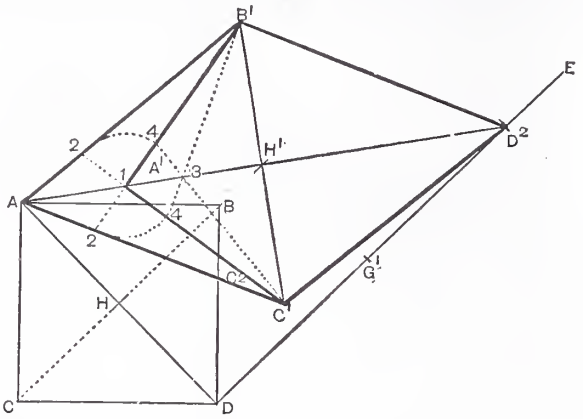
Mahoganizing Cherry.

From A. H. R., *Spartansburg, Pa.*—If J. C. B., of Orange, N. J., who, in the December number of *Carpentry and Building*, asks for a recipe for mahoganizing cherry, will make a strong solution of lime water, and with a sponge or rag rub it over the cherry, he will succeed in producing the

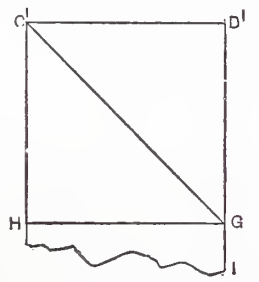
desired effect. If the first application does not make the wood dark enough, repeat the operation until the desired shade is reached. I have used this recipe myself and like it very much.

Backing an Inclined Post.

From W. B., *Springfield, Mass.*—At the risk of having the readers of *Carpentry and Building* say that I must have the hip disease, or that my brain must lie near the hip, I venture to address them again upon that all-important subject. I do not desire to reopen the old controversy which has been running so long in the columns of the paper, for my object has already been accomplished in it. I do desire, however, to throw a little light on the discussion of backing a square post, some letters upon which have appeared in recent numbers of the paper. This discussion refers to a series of articles in the first volume, entitled "Some Problems in Framing." The letters by A. S. L. and T. M., published in the February number, have caused me to look back through the volume of 1879, and to carefully examine the diagrams published in connection with the series of articles above named. T. M. asserts that backing a post upon the plan outlined in these articles cannot be accomplished. By this he conveys the idea that the plan there given is entirely defective, and he does not allow that possibly a mistake may have been made in the description. Now, my conclusions are somewhat different. I find that a mistake seems to have occurred in this matter, very similar in its nature to the one pointed out by A. M. in the hopper bevel matter. I am very much surprised that A. S. L., with his familiarity with lines, did not discover it. Perhaps he did notice this feature, and only withheld the information in order to see if it would be discovered by others. Be this as it may, I feel that the readers of *Carpentry and Building* have been well served by the communication of this correspondent on backing and its kindred subject, hopper bevels, and I believe the letters he has written have been duly appreciated.



Backing an Inclined Post.—Fig. 1.—*W. B.'s Correction of Fig.* 10, *Page* 172, *Volume* 1, *showing its Correspondence with the Plan Proposed by T. M., as Represented by Fig.* 2, *Page* 39, *last number.*



Backing an Inclined Post.—Fig. 2.—*Side Elevation of Post.—D¹ G shows the Gain in Each Direction as the Post Inclines.*

In referring back to the articles on framing, I find that the writer who furnished them gave two plans for each of the several operations. He carried the two methods along side by side in a way to give the reader the choice between them, and in a way to make one illustrative of the other. One of these methods was called the practical method, and in it he showed how lines were obtained by means of the tools applied to the timber direct. The other, which for lack of a better term I may describe as the theoretical method, employed a drawing by which lines and angles were indicated, to be transferred to the timber in a subsequent operation. It is the diagrams relating to this latter plan which are now under discussion. With the idea in mind that the discrepancies which your correspondents have noted arise not from an actual error, but from some oversight, I will go through the description of that portion of the work which has been disputed, following the directions as they are laid down so far as possible, and then I will take what appears to me as the evident intention of the writer and carry it through, showing that what he had in mind and what A. S. L. has produced are one and the same thing. In order to make this demonstration clearer, I will assume, as A. S. L. has done in his last letter, an angle of 45 degrees in place of the pitch shown in the original diagrams, as this will leave the lines in less confusing positions, and will be a fairer basis for comparison with the work of your correspondent last above named.

Referring to the inclosed diagram, and following the directions on page 172, volume 1, we have the following: Draw A B D C equal to the square of the timber. Draw a diagonal A D. From D, at right angles to A D, lay off D E indefinitely, and upon D E set off twice the gain shown in the elevation C¹ D¹ G H (Fig. 2) all as indicated by D G¹ and G¹ D². From D² draw a line to A. Obtain the middle point of A D², as shown by H¹, and draw a line through it, as indicated by C¹ B¹. Make H¹ B¹ and H¹ C¹ equal to C B of the plan. Connect the points thus obtained, as shown by A B¹ B¹ D² D² C¹ C¹ *a*. We now have what? Just what the author undoubtedly intended to have at this point of the work, namely, the rhombus produced by cutting the post to a level plane, or, in other words, the figure that would be produced if the post were cut for the foot joint and then marked around. Now, turning to page 207 of the volume for 1879, instead of reading, "take the distance A D in the dividers, &c.," read, take the distance H B¹ in the dividers, and from H¹ set off A¹, then connect A¹ B¹ and A¹ C¹. With this change in simply two letters, we have the figure corrected so far as we have gone, and have produced just such a figure as we might expect the author of "Some Problems in Framing" to make in connection with his diagram shown by Fig. 11, page 172, first volume. Referring to this latter figure, if the post were to be marked along the blade and tongue of the square as shown in position, and the square then removed, it would present exactly the same outlines as so far constructed in the figure we are describing, and as indicated by the heavy lines in my sketch.

This shows how much is to be taken off by the backing lines; but it must be borne in mind that what we have written is on a horizontal plane through the inclined post, therefore it becomes necessary to find what the lines should be to be applied to a square section of the post. The lines B¹ A¹ and C¹ A¹, continued out to the boundary of the figure producing the dotted lines, I have marked 1 2. Determine the points 2 2 on the face of the stick, and show where the backing lines running down the post would strike the level of the plate. The length 1 2 is what the gauge should be set for reducing such a post. Hence it follows that that amount taken from the corner of a square of some shape, would give the line to set a bevel by. As we have such a square at A¹ B¹ and A¹ C¹, it is a very convenient place to make the required measurement. Accordingly, with A¹ as center, and 1 2 as radius, we describe the arcs 2 4, thus determining the points 4 and 4, and then draw the line 4 B¹ and 4 C¹.

I believe the plan as I have completed it to be what was in the mind of the author of "Some Problems in Framing," because it harmonizes with all his other work in these papers. I believe that the discrepancies discovered in his work in this particular arose from some other cause than from a lack of a thorough understanding of the subject. It was muddled in the description and in the engravings, but not necessarily muddled in his brain.

Whether this mode of finding the lines has merit or not I will leave to the readers of *Carpentry and Building*. Probably there will be a difference of opinion. It may be objected to on the ground that it is not one of the "standards."

I did not hear the story until a long time after its occurrence, but it is told that some centuries ago the "standards" held that the earth was not round. One old fellow disagreed with them, teaching that day and night were caused by the earth revolving upon its axis. The "standards" took him, so the story goes, and hung him on a rail, head downward, telling him that when the earth turned over, according to his theory, he would be right end up. This was a severe test, and as we now know an unfair one. However, it was true that the earth did revolve, and hence the old fellow who failed to agree with the "standards" has been pronounced correct and level headed by the best informed among mankind. The "standards" were left so far in the shade that my confidence in the infallibility of standards generally has been shaken. Now, I do not consider it a great thing to be able to back a post by following an ironclad rule, but I do think it a very good thing to be able to understand the underlying principles of the operation.

My attention was called to the article in the February number by hearing the boys say: "What would T. M. do if there were no common rafters in his building?" I told them that they should not indulge in frivolous criticism; that, of course, T. M. simply meant to give the run and rise of his post. I then for the first time read that I had been using short lines. I felt saddened, for I thought the only way out of the difficulty was to lay aside the old bevel and to get a small one. So I gave 35 cents to the youngest apprentice and told him to get the smallest bevel that he could find at the hardware store, so as to be sure that it would work. He very modestly said: "Just as you say, boss; but wouldn't it be just as well to extend the lines and use the big bevel?" What a thought for a boy! I said: "Solomon, keep the 35 cents, your wisdom has saved it." Cheap at that price is the pleasure that I shall have of still using the faithful old bevel that has branded on its side the initials W. B.

Designs for Store Fixtures.

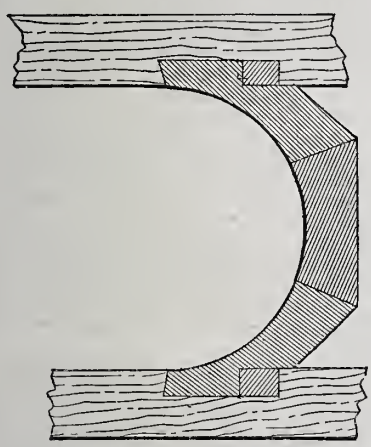
From F. Z., *Marshalltown, Iowa*—There is one thing, it seems to me, that is lacking in *Carpentry and Building*. So far it has not shown anything with regard to store fixtures, shelvings, counters, &c. I would like to see some good designs of this kind in the paper. I have some very pretty drawings myself, but I am anxious to see something new.

Answer.—We would suggest to our correspondent that the best plan for him to pursue will be that indicated by the golden rule "Do as you would be done by." If he has some desirable styles, why not send them along for publication in *Carpentry and Building*, thereby inducing others to match

him by publication of their designs. It is upon this rule of action that the correspondence department of *Carpentry and Building* is made interesting and entertaining. Meanwhile, if any of our readers see fit to forward designs for store fixtures we shall have no hesitation about publishing them in advance of those above requested, but we hope F. Z. will not be slow in this matter.

Joint for Cylinder with Stringer or Face Board.

From R. C. W., *Elizabeth, N. J.*—By the inclosed sketches I show a method of making the connection between the string-piece and cylinder which I have been using for over thirty years, and which I think your readers will find advantageous to employ. The sketches show it so thoroughly that very little description is required. The wedge should be from 14 to 15 inches in length and about ¼ inch thick at the point. Its straight side bears against the stave, while its sloping



Joint for Cylinder with Stringer or Face Board.—Fig. 1.—Horizontal Section.

side bears against the end of the stringer, which is cut on a pitch for the purpose. By making the joint in this way the stair-builder is enabled to key up his work for

Joint for Cylinder with Stringer or Face Board.—Fig. 2.—Vertical Section.

fitting. After everything has been made right it may be glued as required. As it is, I recommend it to the attention of your practical readers.

Useful Recipes.

From H. C. S., *Boston, Mass.*—I have some recipes which may be of interest to the readers of *Carpentry and Building*, and which, therefore, I forward you for publication.

Glue.—To 1 pound of common glue put 3 piuts of rain water; soak for 10 hours; melt; add 1 quart of crude pyroligneous acid and 3 ounces of unrefined glycerine; mix thoroughly. The above is for wood. For paste, add to this preparation 1 gallon of the acid and 2 gallons of rain water.

Rubber Cement.—Melt 1 ounce of raw gutta-percha with bisulphate of carbon; add 1 pint pure camphor. This must be kept air-tight.

Comments on First Prize Design for $3500 Houses.

From W. I. T., *Denver, Col.*—I have examined somewhat the prize design in the February number of your paper, and find it, in most respects, a very commendable plan, and yet—like all other plans, especially those that are limited in cost—not above criticism. While I attempt a few remarks in this direction, I readily acknowledge that it is more easy to criticise than to originate:

1. The plan is too wide for erection on an ordinary city lot; and if it is claimed as a plan for the country, it lacks the all-important and indispensable feature of a country house, and one which city architects seem wholly to forget—the family bedroom—really the most important room in a country residence, and of equal importance in a city dwelling where ground room can possibly be had, for there are old people and invalids in cities who cannot always ascend to a seoond floor. Further, a house in the country is wholly unsaleable without the family room. A residence that will cost the amount in question is quite a respectable structure, and should, if economically planned, include this all-important feature.

2. The "outline" is too great, compared with the amount of room in the interior, to be economical.

3. The ceilings of the first story are too low, when we consider the cost of the building.

With the above exceptions, the plan has many pleasing features. The arrangement of passage, hall and staircase, the cozily arranged fire-places, the general form of parlor, and the general conveniencies of the kitchen are all commendable.

Proportions of Stairs.

From W. O. K., *Cedar Rapids, Iowa.*—I have been very much pleased with the papers on stair-building. However, I think some of the rules presented in relation to proportioning the rise and run of stairs are of a character liable to lead beginners astray. For example, referring to a rule published in the first volume, the statement is made that "experience has shown that the step of which the tread is 12 inches in width and the risers 5½ inches high, is convenient and well proportioned." The inference is that such a flight of stairs should be put in wherever a good, easy staircase is required, provided there is ample hall room. Let us see. The hight of the story is 10 feet 1 inch from floor to floor; 5½ inches rise and 12 inches run give 22 risers and 21 feet run. Now, if I put up such a flight of stairs and called them convenient, every one would laugh at me. In flights of stairs having frequent landings, a lower rise and broader tread can be used than in one long, continuous flight.

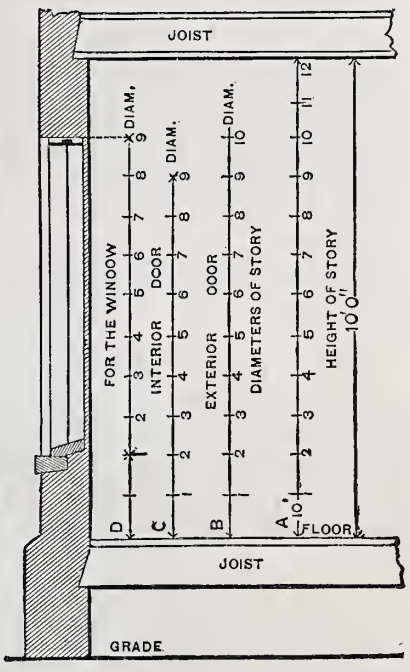
My experience with stairs of the latter class has been that it is best never to use a riser less than 7 inches nor more than 7¾ inches, if the run will admit. To find the run, I allow 25 inches as the average step taken on the level. Allowing a person to rise one-half the distance he would walk on the level, we have, using 7½ inches rise, $7\frac{1}{2} \times 2 = 15$, and $25 - 15 = 10$, the width of the tread. I have found this rule to give very good proportions.

In conclusion, I would say that it will not do to be too arbitrary with regard to rules regulating the rise and run, for he that follows stair-building for a living will find houses in which no rule will work, and yet will be required to put up an easy flight of stairs.

Note.—Our correspondent's reading of an article published in one of the early numbers of the first volume of *Carpentry and Building*, has been deficient to a certain extent. He has failed to pay attention to the rule derived from the proposition that a step, of which the tread is 12 inches in width and the riser 5½ inches high, is convenient. Every practical man admits the impracticability, as well as the impossibility, of building stairs upon this ideal scheme. Having the ideal stair before him, however, the builder is enabled to so proportion the stairs he does construct as to accomplish the best result possible under the circumstances. All of these points, however, have been covered in more recent articles published in *Carpentry and Building*, and therefore we need not refer to them at length in this connection.

Proportions of Doors and Windows.

From S. P. S., *Joliet, Ill.*—I was much interested in the discussion which took place in *Carpentry and Building* some time since, with reference to the proportioning of doors and windows with respect to the rooms in which they are located. I inclose you a drawing which illustrates a rule that I have always used, and which may be of some advantage to the readers of *Carpentry and Building*. It is simple, requiring very little explanation. Divide the story into 12 diameters or parts; subdivide one diameter into



Proportions of Doors and Windows.—Diagram Contributed by S. P. S.

five minutes or parts, which gives the units of measurement for interior details. To obtain the hight of entrance doors, cut off two diameters from the top story, leaving ten diameters for the door. For interior doors, cut off three diameters, leaving nine diameters for the hight of the opening. For windows, cut off two diameters at the top story and two at the bottom, leaving eight diameters for the length of the window. I think all your readers will understand the rule from the accompanying sketch and this explanation.

An Exhortation.

From A. L. T., *Rochester, Ind.*—I desire to say to my fellow carpenters that in *Carpentry and Building* we have one of the best journals ever published. I ask, therefore, why not make it still better by giving more attention to the solid points in the trade, and spending less time in blowing about who is the most expert at shingliug, hanging doors or at some other labor. I have been taking the paper for over 18 months, and as yet have not expressed mysolf about any of the points under discussion, but for the future I intend to be found among its contributors, and I shall be perfectly willing to tell what I know about building, and shall be glad to see my ideas criticised by my fellows. What I have learned from *Carpentry and Building* during the last year is worth more than fifty times what it cost me. I presume other readers can say the same thing. Let us, then, encourage the paper by contributing to it freely. I am sure that any attempt to improve the paper will improve ourselves likewise. Let us each try to prevail upon our brother workmen to add their subscriptions to the list.

Ceiling Tongs.

From J. D. H., *Bell Green, Franklin County, Ala.*—In response to T. A. T., who, in the December number of *Carpentry and*

Building, asks for a more explicit description of the pair of ceiling tongs sketched by me and published in the October number, I will describe a pair that I have been using for two years, and which work very satisfactorily. I consider them the best thing I have yet discovered for use in laying ceiling. The tool is bent in at the extreme point half an inch. From this bend to the pivot is 4 inches, from pivot to bend in handle is 2½ inches, and from this point to the end of handle 24 inches, making the tool 2½ feet in length. I consider it a splendid device for the purpose for which it is intended. I think, however, it might be improved by changing its proportions.

REFERRED TO OUR READERS.

Stave Cylinders.

From W. I. D., *Paterson, N. J.*—Will some reader of the paper explain how to connect a cylinder made of staves to the string for stairs having a cylinder on landing. I desire to know whether the cylinder is always connected to the string on the line of risers at landing for 8, 12, or 14 inch cylinders? Answers to these questions will be acceptable.

Note.—We refer this correspondent to the letter from R. C. W., published on page 59 of this number, for a part of the information he desires.

Greenhouses.

From M. T. G., *Auburn, N. Y.*—Will not some reader of *Carpentry and Building* furnish a drawing of the construction of a greenhouse for plants, also for a forcing house? These topics carefully worked up will be of great interest to myself, and, I have no doubt, to others among your readers.

Perspective Drawing.

From D. B. C., *Peoria, Ill.*—Will not some of the draftsmen and artists whose efforts so acceptably illustrate the pages of *Carpentry and Building*, furnish some instructions for perspective drawing? I think a short article upon this subject from some of your numerous contributors would be very appropriate, and would be generally acceptable.

Joining Roofs of Different Pitches.

From S. McE., *Stillman Valley, Ill.*—I desire to ask a question which I trust some of the better informed readers of *Carpentry and Building* will undertake to answer for the benefit of those not so well posted. I desire to put up an upright 16 feet wide, the roof of which has a one-third pitch. To this I desire to add a wing or L, say 14 feet wide, of the same hight as the upright. I want the edges to correspond, and the corners on both to be of the same projection. How can I miter the parts so as to appear the same as if both roofs were of the same pitch?

Calculating the Spring of Arches.

From A. R., *Detroit, Mich.*—I shall be glad to have some reader of *Carpentry and Building* solve the following problem: Given, the diameter of a circle and the length of any chord; what is the hight of segment? Thus: Supposing the diameter of the circle is 16 feet and a certain chord is 2 feet, what is the hight of the segment—or, in other words, the spring of the arch?

Plan for Dry-House.

From J. A. S., *Rochester, N. Y.*—I am about fitting up a dry-house for drying lumber. Perhaps some readers of the paper may be able to give me information as to the best plan for the same. I will remark that the intent of my dry-house is to season lumber in the plank.

Black Mortar.

From J. G. H., *Wapakoneta, Ohio.*—I desire to ask how to make black mortar; also how to make white mortar for fine work? If any readers of the paper will answer this question they will greatly oblige.

Cutting a Board.

From C. S. J., *Chicago, Ill.*—I have a question which I desire to ask of the readers of *Carpentry and Building*. Can a board 9 x 16 inches be cut so as to close an opening 12 inches square. Each figure, it will be noticed, contains exactly 144 square inches. If not, why not? and if so, how?

Drawing Scrolls.

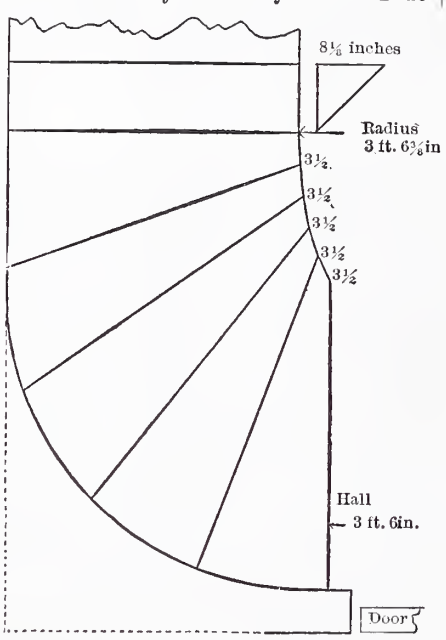
From J. A. N., *Pepperel, Mass.*—Will some of the readers of *Carpentry and Building* show me the most correct way of drawing a scroll by mechanical means? I am acquainted with several plans, but do not know of any that is entirely satisfactory.

Construction of Observatory.

From D. H., *Mattawana, Ohio.*—I am about to construct an observatory, and would be glad if some of the practical readers of the paper will furnish a sketch of such a building for my use. I desire to make it about 8 feet square, with a balustrade extending around it and furnished with seats.

Question in Hand-Railing.

From S. N. W., *Coshocton, Ohio.*—I desire some advice from practical stair builders concerning a hand-rail that I have to build. The accompanying sketch shows the conditions with which the same must comply. I will remark in this connection that I did not have anything to do with the building of the stairs, or they would have been started very differently. What I desire to know is this: What is the best plan to pursue under the circumstances to obtain the most desirable rail possible? If some practical stair-builder will give this question attention he will not only oblige me, but possibly bring out points of value to other readers.



Question in Hand Railing.—Sketch showing the Shape of Stairs.

Boring Holes in Chair Legs.

From F. A. W., *Kibesillah.*—Will some of the practical readers of *Carpentry and Building* give me a device or rule by which I can bore the different holes required in legs of chairs in the proper direction? Any one who will inspect a chair will notice that the several holes are required to be at different angles. I use a lathe for a boring machine, but have difficulty in accomplishing satisfactory results.

Moving Buildings.

From C. O., *Canton, Miss.*—As a topic for discussion in *Carpentry and Building*, I would suggest methods and implements for moving houses, brick and frame buildings. Few carpenters are familiar with this branch of the trade. Undoubtedly some of the readers of *Carpentry and Building* have the necessary information, and might lay their ideas before their fellow-readers with great benefit to the craft.

Area of Segment of Circle.

From O. W. D., *Hornellsville, N. Y.*—Will some reader of the paper show me how to find the area of the segment of a circle, either by lines or arithmetically?

ACKNOWLEDGMENTS.

W. H. S., of Honedye Falls, N. Y., sends a problem in the measurement of land which he desires submitted to our readers. Since land measuring is somewhat out of the line of *Carpentry and Building*, and since there is no practical good likely to come from a solution of his problem, which has no other interest than that of the novelty of the shapes involved, we are compelled to decline his request.

"SUBSCRIBER," Topeka, Kan., sends us a number of shop rules, illustrated by shapes cut from cardboard. Some of the forms treated have already received attention in our columns, and others are of but limited application. Accordingly, we do not attempt their reproduction. We hope to be favored with still further communications from this correspondent.

E W. C., of Randolph, some time since sent us a lengthy communication upon the subject of hopper bevels, illustrated by cardboard models. As the illustrations in *Carpentry and Building* are necessarily restricted to line drawings, we have no means of laying before our readers this curious, and to us very interesting, plan of demonstrating the principles involved in this class of work. We are under many obligations to this correspondent, and hope to hear from him again.

T. A. B., of Philadelphia, sends us an interesting communication on the subject of hopper bevels. After expressing his preference for the rule given by *Carpentry and Building* at the outset of the discussion (see March number, volume for 1880), he proceeds to give some rules for obtaining bevels in hoppers of different flares—1½-inch flare for 2½-inch hight, 2½-inch flare for 2½-inch hight, and 3½-inch flare in 2½ inch hight. Since his rules do not appear to be based upon unvarying principles, but, rather, are arbitrary in character, their usefulness being restricted to the cases mentioned, we think they are of hardly sufficient interest to our readers to warrant publication at present. We are, however, much obliged to our correspondent for his trouble, and hope he will favor us with other letters.

The fast shinglers, it would seem from late letters received, have not yet got through with their stories. Letters telling how to shingle well are also still numerous. We think, with many of our readers who have written us, that enough upon this subject has appeared for the present, and, therefore, for the immediate future we shall not publish letters of merely ordinary interest on this topic.

J. W. P., of Maryland, N. Y., sends us a design for a cheap pulpit, and requests that other readers of the paper also contribute in the same direction, that a series of designs for articles of this kind may be accumulated. We regret that the crowded state of our columns at the present time prohibits our publishing the design inclosed. We may call it up at a later day. In the meantime, we should be pleased to have our readers give the matter attention, with the expectation that the designs will be printed sooner or later.

A. B. S., of Waltham, Mass., sends a question which he desires referred to the readers of *Carpentry and Building* concerning the proportions of the outside finish to frame houses. For example, the projection of the cornice for buildings of different hight. From the nature of his question we judge it is one which is not likely to be answered satisfactorily from a discussion of the kind suggested. We would refer him and all others who are interested in similar questions to a little book entitled "Architectural Proportions," by Atwood, the price of which is $1. We published a plate from this work in the volume of *Carpentry and Building* for 1879, an examination of which will give an idea of the work.

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Second Prize Design in the Competition for $3500 Dwelling Houses.

We present our readers this month with the perspective view, elevations, details, specification and estimate submitted by Messrs. Smith & Howe, of No. 10 Warren street, New York City, in the recent competition for $3500-dwelling houses, to which was awarded the second prize. It would be out of place to offer critical remarks concerning the design receiving a prize at the hands of a committee of competent judges, and therefore we refer this plan to our readers for their consideration and criticism. We shall content ourselves with calling attention to some of the most marked features. It will be seen that no money has been wasted in the exterior decoration of the building, which is remarkably plain, yet in style the design is in keeping with the architectural fashions of the day. More attention has been paid to the convenience of arrangement than to elegance of appointments, which, indeed, permits so large a house as this to be built for the small amount of money at which it has been estimated. By placing the principal entrance at the side instead of at the front, a very commodious parlor is obtained with an unobstructed view. The window through the chimney above the parlor mantel is a feature which no doubt will please many who admire odd effects. In proper hands, it affords a very fine subject for treatment in the interior decoration and furnishing of the room. The construction of the house is so thoroughly described in the following specification, while the architectural features are so clearly shown by the drawings, that further description upon our part would be superfluous.

Specification.

The plans and elevations are drawn to a scale of 8 feet to 1 inch, and the details as marked.

Hights.—Cellar, 7 feet; first story, 10 feet 6 inches; second story, 9 feet 6 inches.

MASON WORK.

Excavation.—The mason will excavate all the earth as required for the cellar, and grade the same around the premises.

Foundations.—Start the foundations on a footing of concrete. From this course they will be of stone, 18 inches thick, to the hight required. The foundation of bay window will be of brick, as will also the partition between cellar and laundry.

Chimneys.—The chimneys will be of good hard North River brick, well burned; to be carried up and topped out as shown. The chimney on the northwest side of the house will be faced with Croton-front brick, and have four courses of black brick as shown.

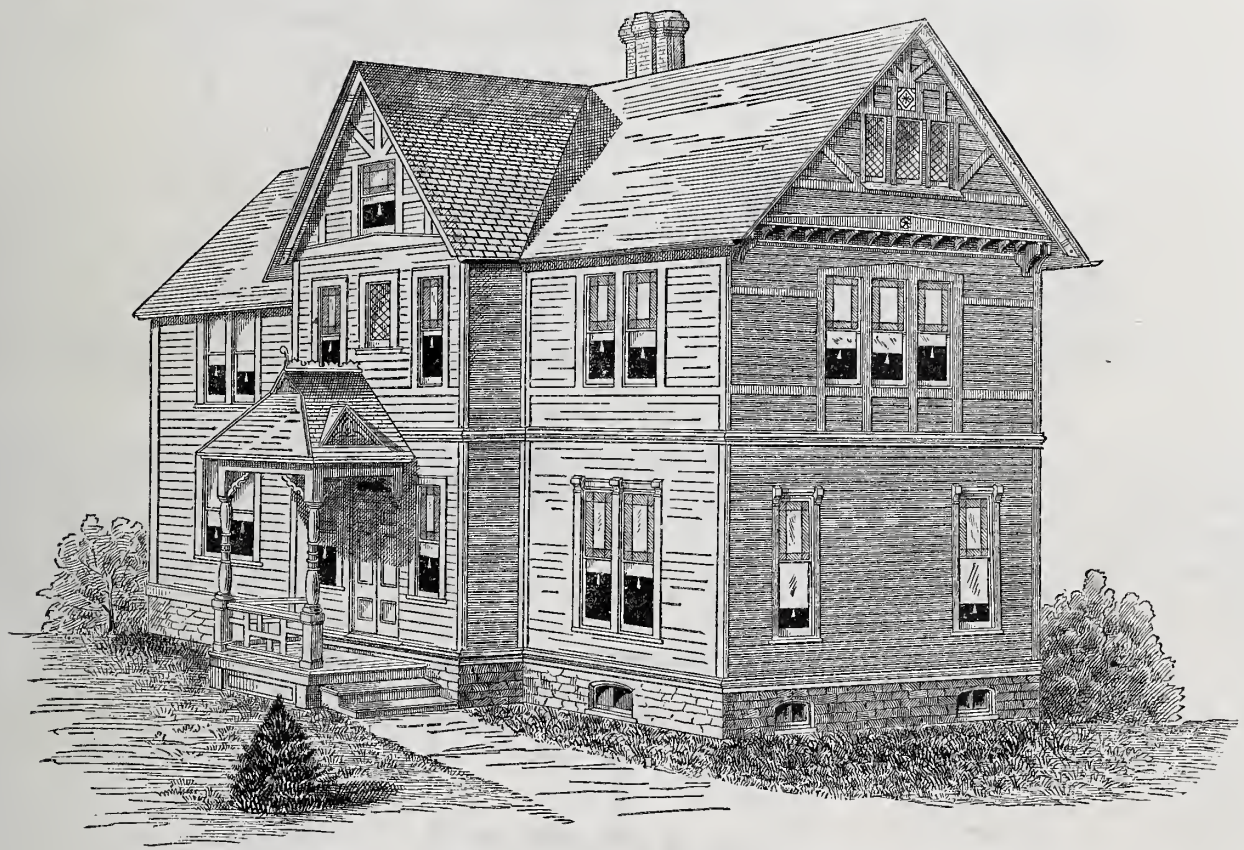
The window in the chimney will be as shown, with a Gothic top, with course of black brick as shown.

Cellar Wall.—The outside of cellar wall will be cemented. The floor of cellar will be concreted 4 inches thick and finished with a coat of cement.

Plastering.—All walls and ceilings of all rooms, halls and pantries will be lathed with dry pine lath, and have two coats of brown mortar, composed of lime, sand and long goat's hair, and then finished with a coat of plaster of Paris. Small cornice run in the sitting room, hall, parlor and dining room.

CARPENTER'S WORK.

Timber.—The timber of the frame will be of spruce and of the following scantling: Sill, 4 x 8 inches; plate, 4 x 3 inches, doubled; posts, 4 x 8 inches; window and door studs, 3 x 4 inches; intermediate studs, 2 x 4 inches, 16 inches between centers; braces, 3 x 4 inches; first-story beams, 2½ x 9 inches; second-story beams, 2½ x 9 inches; attic floor-beams, 2½ x 9 inches, all 16 inches between centers, with one row of cross-bridging between each bearing; rafters, 2 x 6 inches, 20 inches between centers; ridge, 2 x 11 inches; valley rafters, 2 x 10 inches; girders, 6 x 8 inches. Timber of porch and piazza.—Beams, 2 x 7 inches; sill, 4 x 6 inches; plate, 4 x 4 inches; rafters, 2 x 5 inches. All the above timber must be of selected quality, free from rot, sop and shakes.



$3500 *Dwellings.—Second Prize Design.—Fig. 1.—Perspective View.—Smith & Howe, Architects, New York.*

Sheeting.—The whole of the frame is to be sheathed with hemlock sheathing boards 1 inch thick and not over 10 inches wide, put on diagonally, well nailed to the studding. Over the sheathing will be placed felting paper of a durable quality. That portion of the building that is shown having belt and sill courses, as also the work in the pediments, will have the timbering done before the clapboards are put on. This timbering will be of 1¼ inch plank and of the various widths, as shown on the elevations and details. The plank must be of the best selected quality of white pine, free from knots, sap and other imperfections.

Clapboards.—The clapboards are to be put on the entire frame between timbering, as shown, and are to be of clear white pine, laid to show about 4½ inches to the weather.

Window and Door Frames.—The window frames will be constructed in the usual manner. The jambs ⅞ inch thick, with pulleys let in for sash weights; the outside casing 1¼ inches thick, 4¾ inches wide; the false sill ⅞ inch thick. Where there is no main

sill, the false sill will project enough to cover the joint made with the timbering. The main sill of windows will be 2 inches thick, narrow matched and beaded boards, and securely let into the stiles and rails. These doors will be 2 feet 6 inches wide each half, this door, as shown. Other doors (except closet doors) will be 1½ inches thick and 7 feet 6 inches high for first story, and 7 feet

$3500 *Dwellings.—Second Prize Design.—Fig. 2.—Front Elevation.—Scale, ⅛ Inch to the Foot.*

ploughed underneath to receive the clapboards. There will be tin flashings over all the windows. The windows in the extension will have the ordinary drip board. The door frame will have 1¼-inch jambs and casings, and have drip boards over the head casing. Sills of doors to be 2½ inches thick.

Sash.—Sashes 1½-inches will be hung in all windows, and unless otherwise specified will have weights and best sash cord and meeting-rail fastenings. Those sashes in pediments and cellar will be hung with butts and fastened with bolts. The lower rail of sash in pediments will be rebated so as to fix over the false sill. Wherever the sashes are shown to have designs for the upper sash, the same is to be done in the usual manner of the design as shown.

Partitions.—The partitions will be set with sill and plate. The door studs will be 3 x 4 inches, and intermediate studs 2 x 4 inches. Care must be taken that short pieces are nailed in all corners for the proper securing of the base.

Flooring.—The flooring throughout will be 1 inch thick and not over 4½ inches wide, and blind nailed. All heading joints must be smoothed off. Flooring of laundry will be 9½ inches wide, laid on chestnut sleepers.

Roofing.—The roof will be covered with best quality pine shingles, laid on spruce shingle-strips. The porch and piazza will be covered in the same manner. All valleys to be lined with tin.

Cornices and Pediments.—The cornices will be made as shown on details. The verge board will be 1½ inches thick and have a bead stuck on the edge. All the outside work will be as shown on the elevations. All gutters will be of tin, 5 inches wide, and stopped at ends with ornamental gutter-stops. Leaders to be of tin 4 inches in diameter.

Doors.—The front doors will be 2¼ inches thick. The panels will be made of ¾-inch and 8 feet 6 inches high, hung with three 4½ x 4½ inch loose-joint japanned butts, and locked with an outside door mortise lock with a pass key attachment; knobs of lava. The standing door will have mortise bolts top and bottom. Put transom sash over for second story, in four panels, raised moldings, &c., and hung with two 4½ x 4½ inch japanned butts, and having cottage mortise lock with porcelain furniture. Closet doors to be 1¼ inches thick, finished in the same manner, locked with rim lock. Furnish hard-wood saddles to all doors.

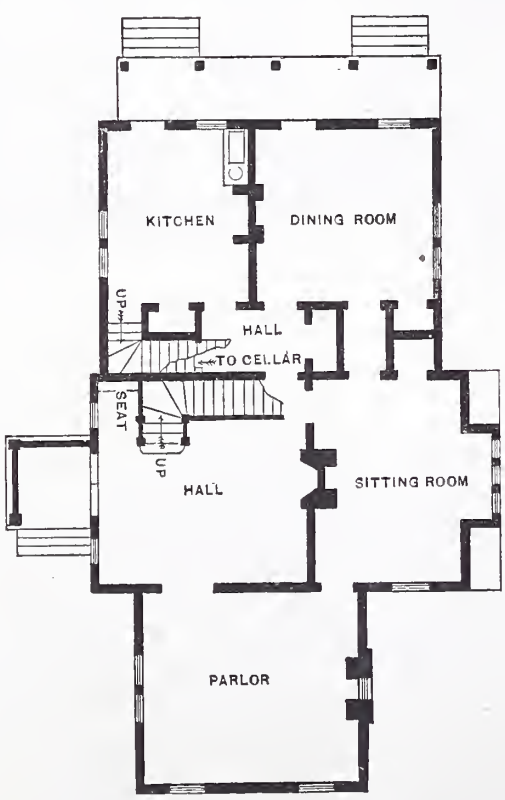


Fig. 3.—First Floor Plan.—Scale, 1-16 Inch to the Foot.

Base.—The base in all rooms of the first story will be 10½ inches high, composed of a 1¼ x 2 inch plinth on the floor, 6-inch base and a 2½-inch molding on top, with a wall member running around all doors and windows.

Trimming.—The trimming of all rooms will be as per detail.

Piazza and Porch.—The entrance porch on the side of the house will be built as shown—flooring, 1¼ inches thick, 4½ inches wide, laid with white lead in the joints; turned columns, balustrade and cornice as shown. Rear piazza will have 6-inch square posts and 4-inch brace work. Roof of both to be shingled and ceiled overhead in the usual manner.

Stairs.—The front stairs will be built as shown on plan. Treads, 1¼ inches thick; risers, ⅞ inch thick, well and strongly bracketed underneath The newels will be built of 1¼-inch pine and have turned balls on top. The rail will be 5 inches wide and 2½ inches thick, with a bead run on the lower edge; the uprights, 2 x 4 inches; the cut spandrel work, ⅞ inch thick, cut and pierced. The rear stairs will have strings, treads and risers, same as front stairs, and with hand-rail. Cellar stairs will be same as rear stairs.

Closets and Pantries.—All pantries will have four rows of shelves. All closets will have one shelf and a row of hooks, screwed on a hook strip.

Wainscoting.—Wainscot the bath-room all around with black walnut narrow beaded boards, 3 inches wide and ⅝-inch thick, with a neat cap; case in tub and basin in same manner. The water-closet inclosed with black walnut, with lid and seat hung.

PLUMBING.

Wash Trays.—The wash trays will be made of 1½-inch pine, put together with white lead in the joints in the usual manner.

Sink, &c.—Furnish and set up in kitchen a 16 x 32-inch iron sink set on legs. Furnish a 30-gallon copper boiler connecting with the water-back of range. The sink will be supplied with water through a ⅝-inch "A" lead pipe, with ⅝-inch bibbs, wasted through 1¼-inch "B" lead pipe, with S trap and screw.

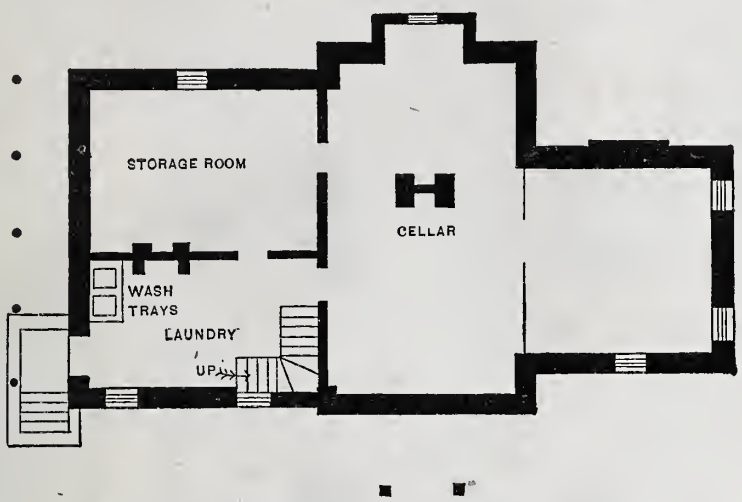


Fig. 4.—Foundation Plan.—Scale, 1-16 Inch to the Foot.

Lead Pipe.—⅝-inch "A" lead for bath tub and water-closet, and ½-inch "A" pipe for basin; waste of tub, 1½-inch "B" lead pipe and S trap; waste of basin, 1¼-inch "B" pipe and S trap, connecting with the 4-inch lead waste of water closet, which, in its turn, empties into a 4-inch cast-iron waste. A ventilating tube of copper from trap of water-closet must be carried out above the roof; ⅝-inch "A" lead pipe and ⅝ inch brass bibbs to wash trays and 1½-inch "B" lead pipe to waste.

Gas Pipes.—Gas pipes run through house, giving outlets in each room. The size as regulated by the gas company.

Fittings in Bath Room.—Provide a 5-foot copper, tinned and planished bath tub, also an approved water-closet, with plated cap and pull. A porcelain hand-basin, with marble slab and back. Silver-plated bibbs for both tub and basin.

PAINTING.

All wood and tin work usually painted will have two good coats of linseed oil and standard white lead; the last coat in sash tints, as selected All nail holes puttied up and all knots shellaced. The rail, newels and balustrade of main front stairs will be finished with a wood filler and then have a coat of varnish. All hardware to be oiled two coats.

Schedule of Estimate on Second Prize Design.

LUMBER:		
6850 feet spruce timber, at 22 cts.		$150.70
400 wall strips, at 12 cents	48.00	
150 3 x 4-inch joist, at 15 cents	22.50	
4000 ft. rough sheathing, at 16 m.	64.00	
4000 feet pine flooring, at 35 m	140.00	
575 clapboards, at 16 cents	85.00	
15,000 shingles, at $3.75	56.25	
450 spruce furring strips, at 4 cts.	18.00	
500 ft. 10-inch worked boards, at 2½ cents	12.50	
1000 feet 1¼-inch pine, at 30 m	30.00	
1000 feet 1-inch pine, at 30 m	30.00	
500 feet shelving, at 25 m	12.50	
1000 feet narrow beaded boards, at 35 m	35.00	
250 feet beaded B. W., at 12 cts.	30.00	
150 feet 2-inch pine, at 2½ cents.	3.75	
50 feet 1-inch walnut, at 10 cents.	5.00	
350 running feet, 4 x 4-inch pine, at $3	10.50	$753.70
SASH, BLINDS, DOORS AND MOLDINGS		725.00
STAIRS		100.00
CARPENTER'S LABOR		347.00
PLUMBING		235.00
PAINTING		175.00
RANGE		40.00
MASON WORK		950.00
Total		$3,325.70

Certified to by J. V. Douvan, 401 West Twenty-seventh street, New York.

Covering the Floor.

An exchange says: Modern fashion is responsible for so many absurdities that it is only fair to expect from it some really sensible innovations. To offset the ridiculous eruptions of meaningless and ugly *bric-a-brac*, the collections of china dogs and climbing monkeys, the fire-places, with their mock logs and senseless gas flames, we have at least one sensible, wholesome fashion. In place of the old-fashioned carpet, serving as a reservoir of dust in the rooms of a careless housekeeper, and as a continual thorn in the flesh to the careful one, we may now have polished floors and movable rugs, and yet be in the fashion.

The outcry which the devotees of hygiene make against carpets, as affording such admirable hiding-places for dust and the germs of disease, cannot be urged with equal force against rugs. In the first place, the corners of the room are always open to sun and air, to water and soap, and these, all housekeepers know, are the places where dust accumulates; in the second, with very little trouble a rug may be taken up, beaten and sunned; and whenever the floor is washed, dusted or waxed, it should be lifted along the edges, and the dust carefully removed. Where rugs are filled in about the edges with carpeting, however, they have no advantage over carpets, and are quite as objectionable to hygienists as the latter.

I have nothing to say to the people who can afford to have inlaid or even simple natural wood floors; but there is many a careful housewife who is living in a rented house, or who cannot afford either to have her floors relaid or covered with wood carpeting, and yet who would be glad to replace her worn-out carpets with rugs. The floors in well-finished Northern houses, having all the modern improvements and conveniences about them, are an astonishment to Southern people, who are used to seeing, in every decent house, good, well-finished floors, with smoothly-planed, narrow, clear-grained, close-fitting planks. What to do with the knotty, rough irregular planks, covered with spots and splashes of paint left by the careless workmen, is a puzzling question to the housekeeper. The painter who is called in to remedy the evil has usually but one suggestion to make—the universal panacea—which is "paint it," and he goes on to expiate upon the "elegant floors he has painted for so and so." Do not be beguiled into painting your floor. Every footstep will leave a dusty impression, many repeated footsteps will leave it scratched and ugly beyond redemption by anything less than radical measures—which will bring you back to the naked planks.

1. If your floor has been already painted, or is covered with drippings from the paint-brush, cover the spots and splashes with caustic potash; leave this on till the paint is dissolved. It will take, perhaps, 36 hours to do this if the paint is old and hard; then have the floor well scoured, taking care not to let the mixture deface your wash-boards.

2. If your flooring is marred by wide, ugly cracks beneath the planks, have them puttied, as they serve otherwise as a multitude of small dust-bins, and show an ugly stripe between your shining boards.

If the planks are narrow and of equal width, you can have them stained alternately light and dark, oak and walnut. In that case, stain the whole floor oak and then do the alternate stripes dark. The staining mixture can be bought at any paint shop, or can be ordered from any city and brought by express in sealed cans. In almost every case it is safe to dilute the staining mixture with an equal quantity of turpentine. I have never seen or used any which was not far too thick as it is bought. It helps very much, when staining in stripes, to lay two boards carefully on each side of the stripe to be stained and then draw the brush between. This guards the plank from an accidental false stroke of your brush and saves time to the aching back. If, however, the dark staining should chance to run over on the light plank, before it dries wipe it off with a bit of flannel dipped in turpentine.

When the floor is to be all walnut, the best staining I have ever seen is done without the use of a brush. Buy at a grocer's—for a single medium-sized room—a one-pound can of burnt umber, ground in oil. Mix with boiled linseed oil a sufficient amount of this to color properly without perceptibly thickening the oil; by trying the mixtures upon a bit of wood till the desired color is attained, the quantity can easily be determined. It should be a rich walnut brown. Rub this into the wood thoroughly with a woolen cloth, rubbing it off with another woolen cloth till the stain ceases to "come off." Never be beguiled into using boiled oil to keep the floors in order, for it is more like a varnish than an oil, and after the pores of the wood have once become filled, it lies on the surface, attracting and holding dust till it ruins the wood, and can only be removed by the use of caustic potash, sand-paper, or

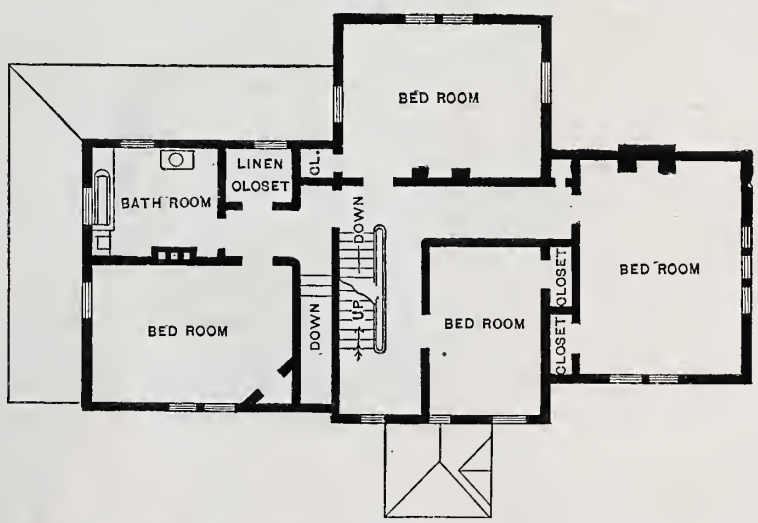


Fig. 5.—Second Floor Plan.—Scale, 1-16 Inch to the Foot.

the plane. But this first, or any subsequent coloring of the floor, must be done as here directed.

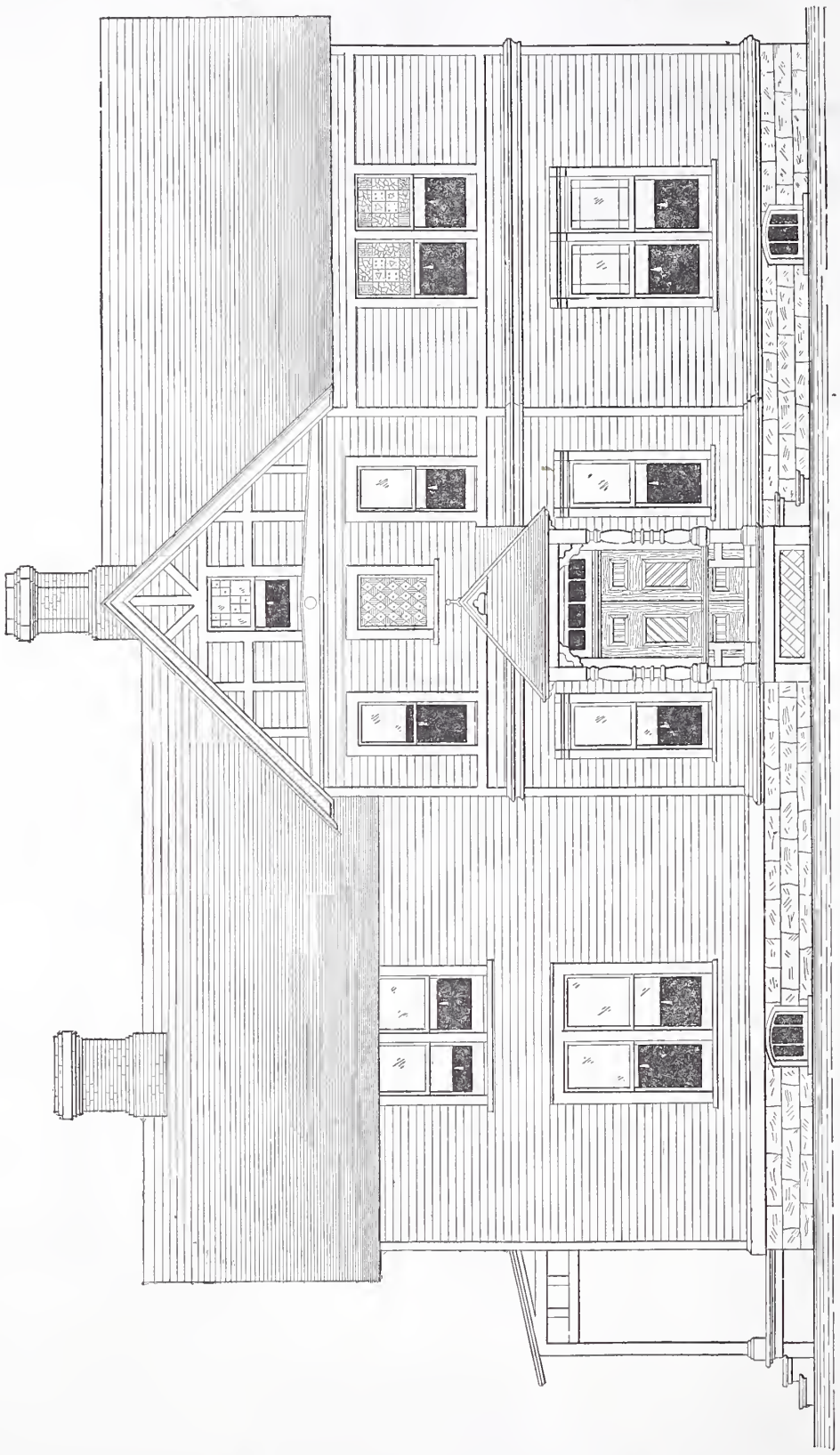
If you find, when the coloring matter dries, that it is not dark enough, rub on another coat. Do not be discouraged that your floors look dull and poor, for they only need a few weeks of proper care to be what you want.

When the staning is done, prepare for the next day's waxing. Mix turpentine and yellow beeswax in the proportion of one gallon of turpentine to one pound of wax, shaved thin. Let the wax soak all night, or longer, in the turpentine before using; then rub it on with a woolen cloth. A few times of using this will make the floor gain a polish like that of an old-fashioned table-top. At first it must be done frequently, but beyond the smell of the turpentine, which soon passes off, and the trouble of applying, it has no disadvantage. When the wood finally becomes well polished, the wax need not to be applied oftener than once a week or even a fortnight. The floor, in the meantime, can be dusted off by passing over it an old broom or hair floor brush, with a piece of slightly moistened rag tied around it. Everything that falls upon it lies upon the surface, as on that of varnished furniture. Nothing ever really soils it. It can, of course, be washed up, but never needs scrubbing.

Now for the rugs. A room, unless it is very full of furniture, never looks well with bits and scraps of rugs about it. The main open space should be covered by a large rug, if possible. The rug need not be so expensive as a carpet, for it can be made of American Smyrna, velvet, Brussels, or even ingrain carpeting, edged with a border to match. It should cover the open space in the midle of the room, and be held down, if possible, here and there, by the heavier pieces of furniture. If made of carpeting, it is better to have it made by the firm of whom it is bought, as home-made rugs usually bear the impress of domestic manufacture. They need, after being sewed, to be shrunk and pressed, so as to lie flat and smooth and perfectly square.

Of the domestic and imported rugs there is a great variety, with corresponding range of prices. The Pennsylvania rugs—imitation Smyrna—are exceedingly pretty, and are got up in pleasing colors—olives and crimsons and blues; but the Occidental appreciation for color is crude and vulgar compared to the Oriental; and the domestic rugs, even the prettiest, smack of the designer and the loom, while the Oriental ones often show an audacity of color and design in detail which produces a charmingly harmonious result.

The Indian designs are dark and rich and somber, but very beautiful, while the Turkish are bright and vivid, and are far handsomer when toned down by wear than at first. The Persian are scarcely to be distinguished from the Turkish by the uninitiated.



$3500 Dwelling.—Second Prize Design.—Fig. 6.—Side Elevation (Left).—Scale, ⅛ Inch to the Foot.

The Smyrna or Oushak rugs usually have a vivid cardinal center, broken by set figures and surrounded by a border of deep, rich, harmonious tints, or else they are of the old-fashioned colors, brick-dust red with indigo blue—a somber combination, but one of which the eye never tires.

Rugs, like wine, grow more valuable as they grow older. Not with our usage, scampered over by children with muddy boots or trodden by the heeled shoes of adults, but with the Eastern usage they are worn from their original woolliness of surface to an exquisite sheen, almost like that of silk plush, and are sold, half worn, for prices above what the new ones bring.

It is recorded that a builder who had contracted for a new City Hall for a Western town made a botch of it and fled to Canada, leaving word with his friends that he should "remain until the matter blew over." Next day a high wind struck the town and his friends telegraphed him, "Come back, it blew over last night."

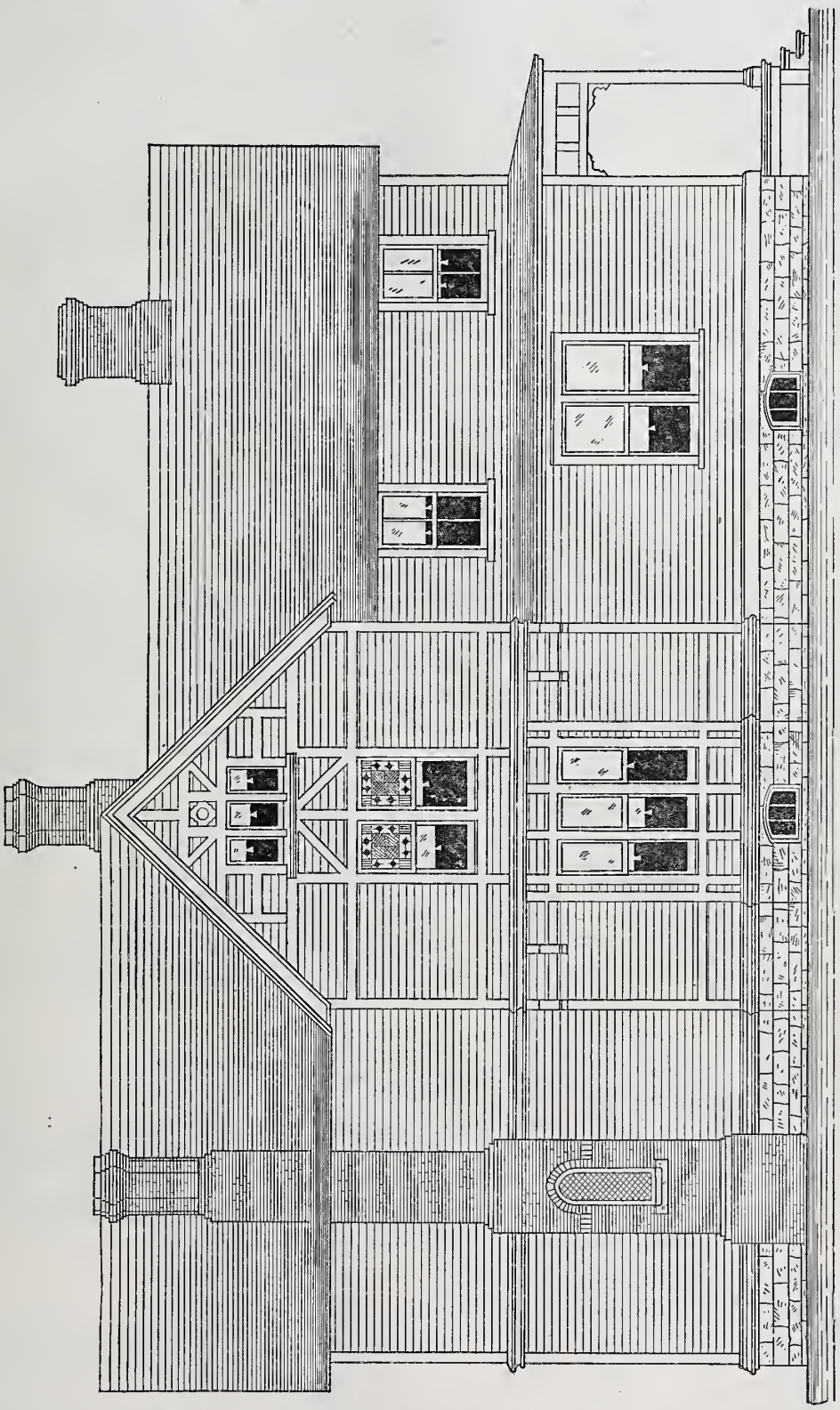
Raising Water.

One of the universal and most pressing wants of the human race is water, and among the earliest labors of any people having fixed habitations was the raising and carrying of water. Whether the hollow gourd or the bag of skin formed the first water vessel we do not know. It is certain, however, that in the earliest ages skins and gourds were used for carrying water from springs or wells to the dwellings. As soon as water-tight vessels were made from clay they were employed in this universal work. As soon as wells became common, we find that a little machinery was necessary in order to get the water, or at least the method of getting it became complicated by the use of a rope to let the vessel down into the well and draw it up.

In Eastern countries the work of bringing water, fell naturally upon the females of the family, and in their hands was the first system of water distribution placed.

Wherever the gourd grows, there it is used among the primitive people for water vessels; whether it is in the islands of the Indian Ocean, in Africa, Japan, or among the ancient Egyptians, there we find traces, in one way or another, of the gourd as a water vessel. Indeed, the gourd was one of the first models upon which vases were formed.

Among the earliest forms of machines for elevating water was the cord and pulley. Here a pulley block fixed upon a beam fastened above the surface of the ground served to hoist the bucket, jar or skin. The use of the pulley was known in the most ancient times. In fact, it dates so far back into antiquity that both the origin and the facts concerning its early use are lost. It has been forcibly argued that the well is one of the first works which savage man was called upon to execute, and that in drawing water from it the invention of a pulley almost necessarily followed. In the very early times the well was public property, and each one brought his own cord and vessel to draw with. Later, the fixed



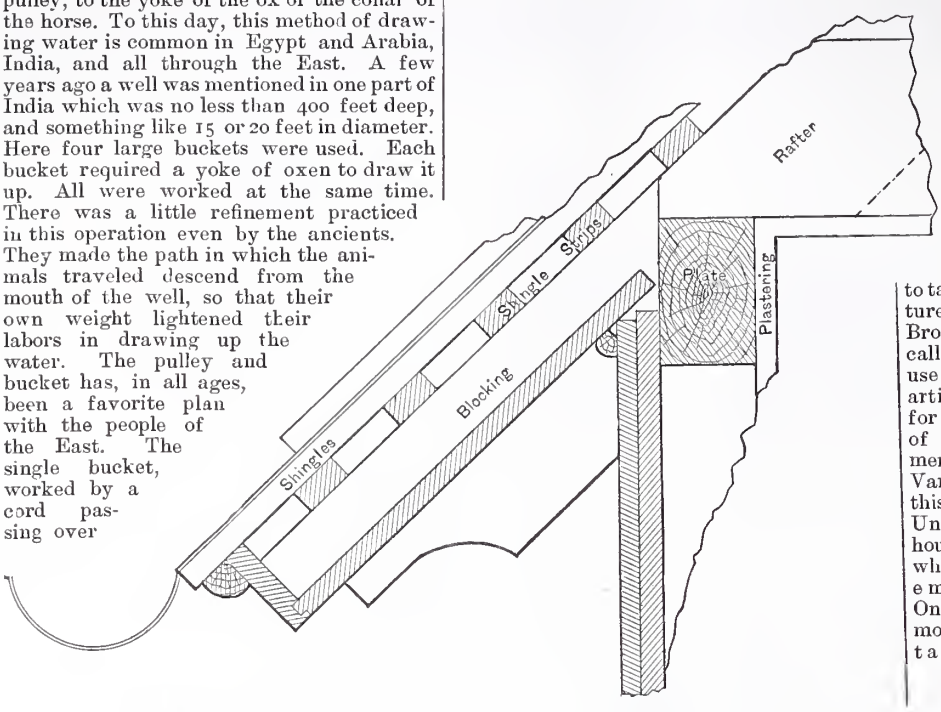
$3500 Dwelling.—Second Prize Design.—Fig. 7.—Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

pulley, with the beams and posts, came into use, and was considered a portion of the real or personal estate of the well.

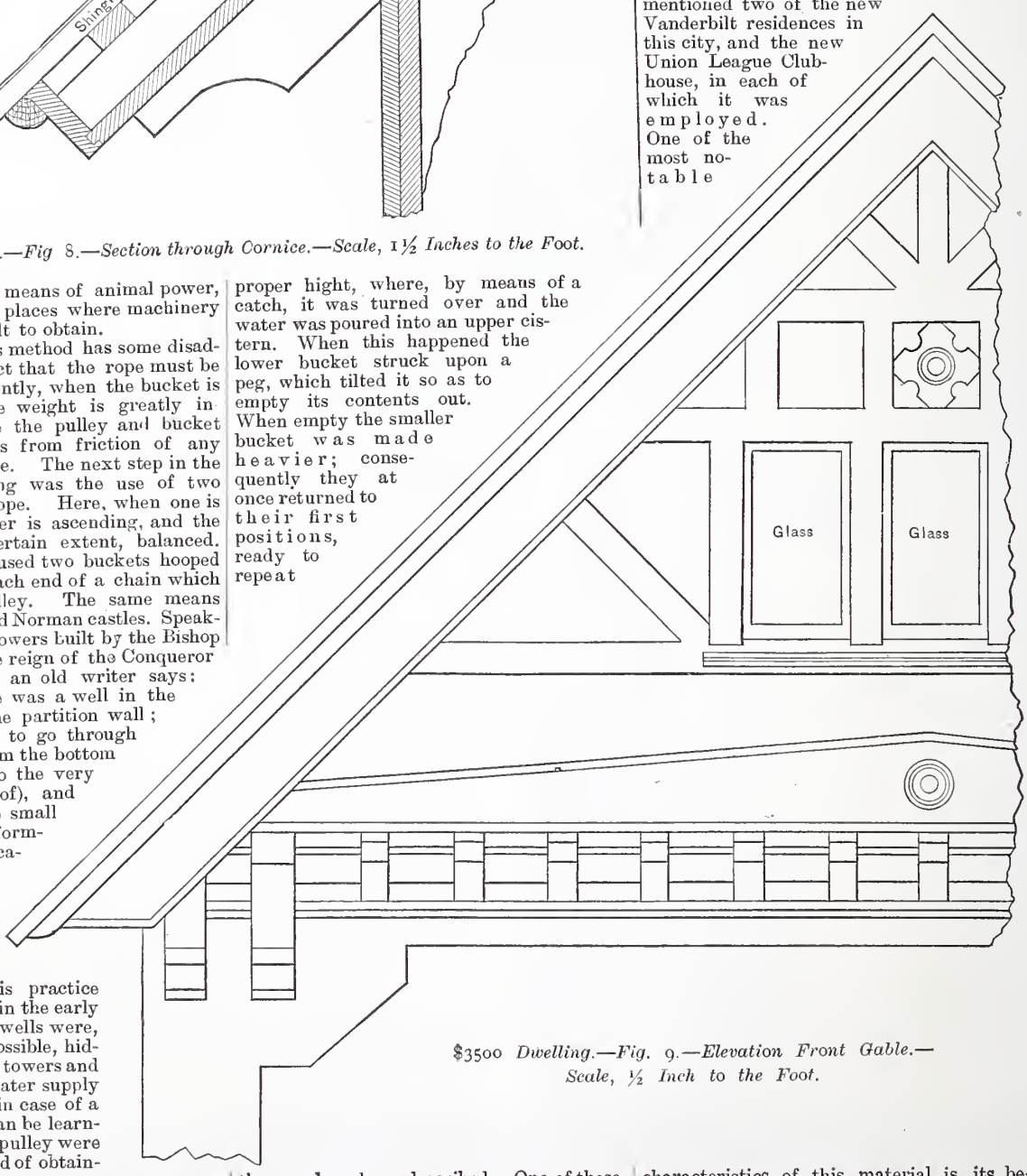
Where a great quantity of water was needed in those primitive times, a larger bucket was used and a horse or ox was used to lift the load. This was done by attaching a cord, after it had passed from the pulley, to the yoke of the ox or the collar of the horse. To this day, this method of drawing water is common in Egypt and Arabia, India, and all through the East. A few years ago a well was mentioned in one part of India which was no less than 400 feet deep, and something like 15 or 20 feet in diameter. Here four large buckets were used. Each bucket required a yoke of oxen to draw it up. All were worked at the same time. There was a little refinement practiced in this operation even by the ancients. They made the path in which the animals traveled descend from the mouth of the well, so that their own weight lightened their labors in drawing up the water. The pulley and bucket has, in all ages, been a favorite plan with the people of the East. The single bucket, worked by a cord passing over a pulley, raised by means of animal power, is a favorite one in places where machinery is costly and difficult to obtain.

In deep wells this method has some disadvantages, in the fact that the rope must be long, and, consequently, when the bucket is at the bottom the weight is greatly increased; otherwise the pulley and bucket have the least loss from friction of any water-raising device. The next step in the art of water lifting was the use of two buckets upon one rope. Here, when one is descending the other is ascending, and the weight is, to a certain extent, balanced. The Anglo-Saxons used two buckets hooped with iron, one at each end of a chain which passed over a pulley. The same means were used in the old Norman castles. Speaking of one of the towers built by the Bishop of Rochester in the reign of the Conqueror or William Rufus, an old writer says: "For water there was a well in the very middle of the partition wall; it was also made to go through the whole wall from the bottom of the tower up to the very leads (viz., the roof), and on every floor were small arches in the wall, forming a communication between the pipe and the wall and several compartments, so that by a pulley water was communicated everywhere." This practice was a common one in the early English times, and wells were, whenever it was possible, hidden in the walls of towers and castles, so that a water supply might be secured in case of a siege. So far as can be learned, the bucket and pulley were the common method of obtaining water.

A cord and two buckets with a pulley does not seem to be an apparatus capable of being adapted to very extensive water raising, nor would we look for it as a promising field for a self-acting apparatus; and yet, in Italy, in the neighbourhood of the year 1600, a machine was built which was not only self-acting, but delivered water at a point considerably higher than the level of the supply. The pulley was fixed at a considerable elevation. One of the buckets was arranged to drop into the cistern, and so was filled. The other bucket was filled by a spigot which delivered water from the cistern into it. As the second bucket was larger than the first, when it was full it descended, raising the smaller one to the proper hight, where, by means of a catch, it was turned over and the water was poured into an upper cistern. When this happened the lower bucket struck upon a peg, which tilted it so as to empty its contents out. When empty the smaller bucket was made heavier; consequently they at once returned to their first positions, ready to repeat the round we have described. One of these, it seems, was at work in Rome in 1616, though by whom it was invented it is hard to say. In one apparatus the two buckets were filled from small tubes or faucets, one of which was larger than the other and came into action first. The weight might be so arranged that the smaller bucket could travel a greater or less distance than the larger one if more than one pulley was used.



$3500 *Dwelling.—Fig* 8.—*Section through Cornice.—Scale, 1½ Inches to the Foot.*



$3500 *Dwelling.—Fig.* 9.—*Elevation Front Gable.—Scale, ½ Inch to the Foot.*

NOTES AND COMMENTS.

A Substitute for Shellac.—For many reasons shellac is, among woodworkers, a favorite material for finishes of all kinds, more especially for indoor work. While its faults are almost innumerable, and the difficulty of putting a smooth coat of it upon any surface is so great that no one except an expert is able to obtain a glossy surface, shellac has many good properties, on account of which it has held its place so long as a finish for wood. All who have attempted to use shellac experimentally will bear us out in the assertion, that the work of obtaining a sufficient body to polish is very tedious and quite uncertain. After the desired finish has been obtained it is easily damaged by water or hot applications. We have recently experimented with a material, intended to take the place of shellac, which is manufactured by Messrs. Berry Brothers, of No. 279 Broadway, New York. This preparation is called "Hard Oil Finish," and is adapted to use in a variety of places. It is not a new article, for it has been in the market for several years. Among other instances of its employment may be mentioned two of the new Vanderbilt residences in this city, and the new Union League Club-house, in each of which it was employed. One of the most notable characteristics of this material is its behavior under the action of heat, and hot and cold water. When hot or even boiling water is poured upon a surface finished with it, there are none of the white "plague" spots produced which are usual to varnish and shellac under similar treatment. The resistance to scratching is greater with this material than with any other known finish, while the luster of the surface is much

better. When applied over Wheeler's or any other good filler it is like well-rubbed varnish. Cold water does not appear to have any effect upon it, even after several hours' immersion. This finish is made in four colors—"walnut," "light," "white" and "ebony"—and has the recommendation of being much cheaper than shellac, even when that material is

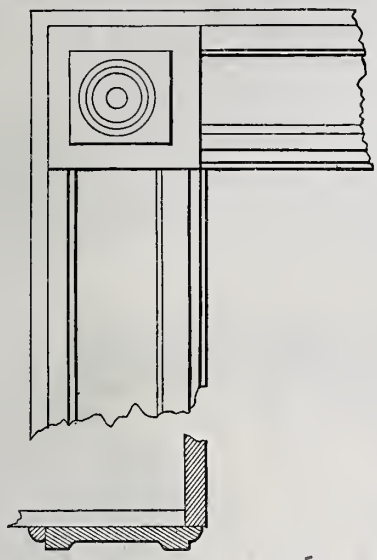


Fig. 10.—*Door Trimming.—Scale,* 1½ *Inches to the Foot.*

made from wood spirit. As an inside finish it is especially desirable, whether for furniture or woodwork.

Competition in Designs for Outbuildings.—The designs received in response to the advertisement of our fourth competition were not of a character desirable for publication, and therefore, in accordance with the provisions of the original announcement, instead of awarding the prizes, the drawings have been returned to their authors with a note of explanation. Although we regret that architects have not found time to give this competition such attention as it was hoped it would receive, we are disposed to congratulate the fraternity at large upon the fact that regular business is so good that there is less need of working upon competitions at the present time than usual. After the long period of slack business, to be fully employed must be appreciated. We trust that this present season of prosperity may long continue. Those who have been looking forward to the publication of designs of stables, summer houses, well houses, &c., need not experience any disappointment on account of the above. During the year we shall give some attention to designs of buildings of this character, and hope to present what will be of service to our readers. At the present, it being the commencement of the building season, we presume houses are of more interest than stables and outbuildings; accordingly, we shall defer attention to these subjects until a later date.

Essential Qualifications for Contractors.—A thorough knowledge of details and complete information concerning the various materials which enter into a building, are alike necessary to intelligent superintendence and profitable contracting. As the building business is at present managed, there are three classes of men to whom a knowledge of materials, both with regard to quality and prices, as well as suitability for specified purposes, is essential, all of which are interested in obtaining such information. These are, first, the architects who draw the plans and write the specifications; second, the contractors who engage to erect the buildings; and last, but not least, the carpenters who superintend. Whatever may be the trade of the contractor or master builder, the managing superintendent is pretty certain to be a carpenter. Hence the importance of his position. The plan of subcontracting all portions of a building excepting that which is in the regular line of the builder, is attended with many disadvantages, and when prices are as close as they are at the present time, renders it impossible to conduct business profitably. Accordingly, it is fast becoming customary for contractors, whether bricklayers, stonemasons or carpenters by trade, to control the entire work of a building, buying their own material and hiring the labor necessary to complete it. In our last number we called attention to the advantages of builders controlling their own plumbing work, and our remarks thereon have attracted wide attention. Among other items which may be managed in the same manner, and which, for the same general reasons, are to the advantage of the builders to control, may be

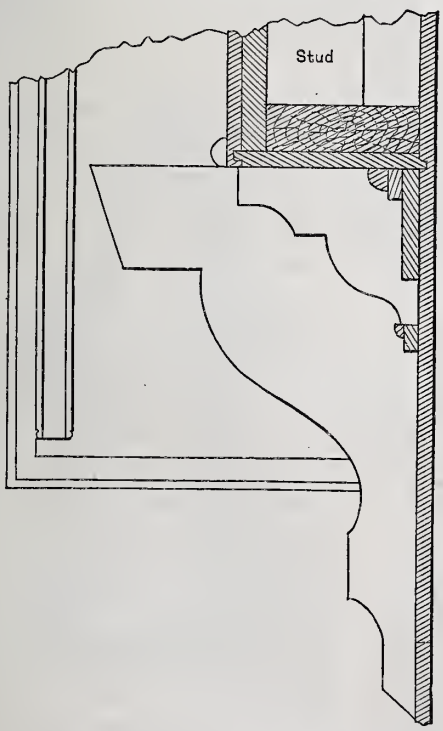
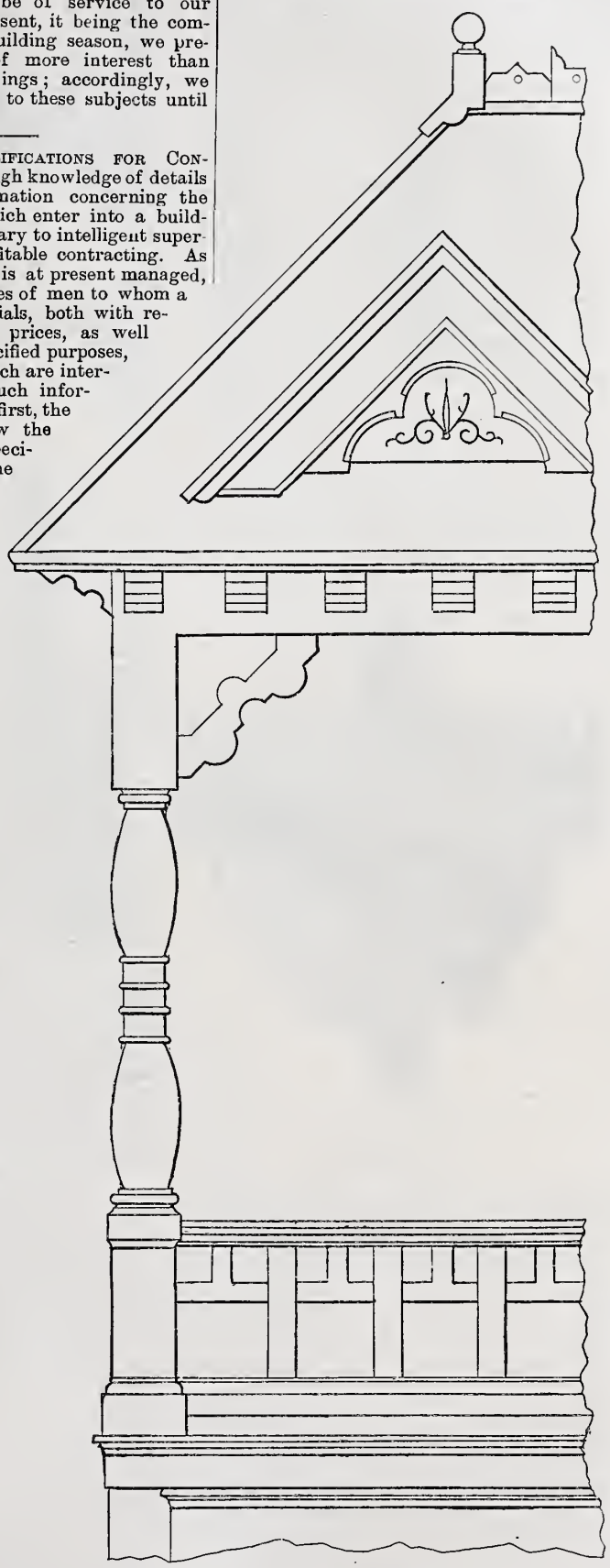
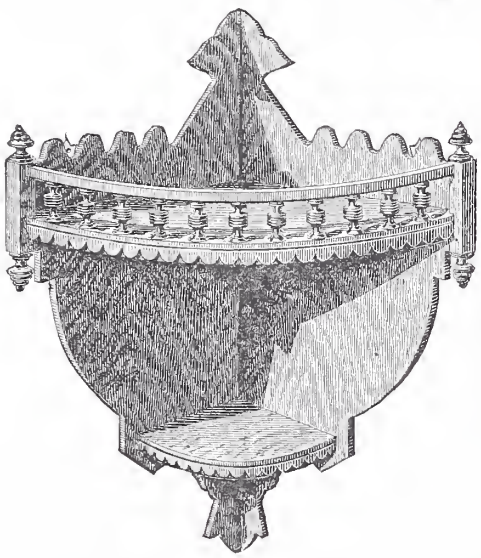


Fig. 11.—*Section Through Cornice Across Front Gable.—Scale,* 1½ *Inches to the Foot.*



$3500 *Dwelling.—Fig.* 12.—*Elevation of Porch.—Scale,* ½ *Inch to the Foot.*

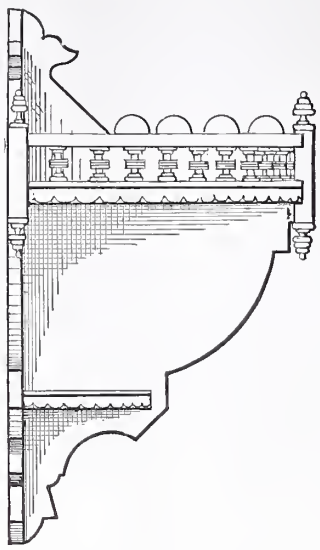
mentioned slating, furnace work, ranges, fire-proofing and, in some instances, tinning and galvanized-iron work. For the contractor to execute these items satisfactorily and in a manner equal to that of those regularly in the trade, the greatest care and attention to details are necessary. In short, the builder must become a slater, a tinner, or a plumber, as the case may be, with all the general knowledge peculiar to successful managers of business in each of these departments. The undertaking, therefore, becomes of more serious importance than would at first appear. The question arises—how are builders to acquire the necessary knowledge and experience? Much, of course, may be done by judicious selection of employes, such as foreman, workmen, &c. Beyond this, however, there must be a practical acquaintance with materials and prices, in order to insure good work, at figures which will render this system profitable. We call attention to this matter, in order to impress upon our readers the advantages likely to accure to them from acquiring a knowledge of details of other trades than their own, as opportunity offers. Much may be learned in a practical way by observing the management of men in the various occupations referred to. Much also can be learned by careful examination of manufacturers' circulars and catalogues. By combining these two sources of information, with close attention to such details as from time to time appear in *Carpentry and Building*, the enterprising builder will soon find himself in a position to compete in even the closest markets, and able to manage his



Wall Bracket.—Fig. 1.—Perspective View of Bracket in Position.

undertakings in a manner calculated to make the greatest profit for himself while furnishing the best quality of work to his clients. In view of the many things which the contractor should understand in order to be master of his business, we can scarcely hope, in one or many articles, to more than give mere hints in the direction in which his study and observation can be most profitably directed. Recognizing the value of practical information in various departments of building, it has been our policy in the past, as it will be in the future, to present from time to time discussions of problems in roofing, plumbing, heating &c., in a way to be of practical service to builders. Such information, combined with what intelligent men should learn by observation and experience, will equip any builder for successfully controlling every detail of the work he undertakes.

Galvanized Iron Work for Builders.—Among the parts of buildings which it is ordinarily the custom to subcontract are the galvanized iron cornices. From the fact that in many cases buildings are located away from a convenient supply of work of this kind, and therefore that men to put up the work have to be sent from the shop at the expense of transportation, and that in many cases, when they arrive at the building, they depend upon the carpenter in charge for directions, and in some instances for actual help, thus making him more trouble than it would have been to put up

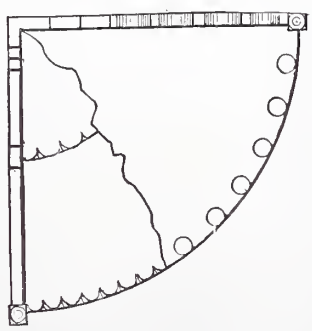


Wall Bracket.—Fig. 2.—Elevation.—Scale, 1½ Inches to the Foot.

the entire work of construction in wood, many builders have been led to use other material for their cornices, rather than to be thus annoyed. Undoubtedly the trade in sheet-metal house trimmings has been greatly abused at the hands of its friends, and until a change is made in some respects, it is not likely to be altogether popular among builders. We notice that one firm at least has taken warning in time, and is adapting its business to the demands of the times. Messrs. Rasner & Dinger, of Pittsburgh, are making a specialty of supplying builders direct with sheet metal trimmings, furnishing such directions with them as may be necessary, thus enabling the superintending carpenter to control his own work and to escape the annoyances to which we have above alluded, while effecting a material saving in cost. This firm has been long established and is favorably known to the building trade and architects generally. The advantages of the plan of doing business above named, especially to builders in remote sections of the country, are very considerable, and we have no doubt that many of our readers will consider themselves fortunate in learning of the fact of its availability for their purposes.

Wall Bracket.

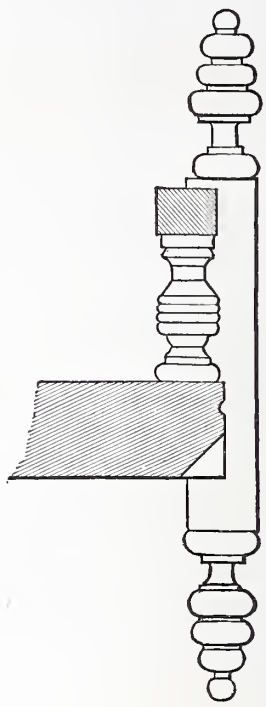
In compliance with the wishes of many of our readers for additional designs of cabinet work, we present herewith another design for a corner wall bracket. Fig. 1 shows a perspective view of the bracket in position. Fig. 2 is an elevation of the same, by which



Wall Bracket.—Fig. 3.—Plan, &c.—Scale, 1½ Inches to the Foot.

the pattern may be obtained for laying it out full size. Fig. 3 shows in part a top view of the upper shelf, and in part a bottom view of both the upper and the lower shelf, illustrating the ornamental edge to be seen on both in Fig. 1. Fig. 4 shows a detail half full size. The parts are so clearly shown by these several engravings that further description is not necessary.

Fashion in Furniture.—In furniture there have been frequent changes of fashion, depending rather upon the caprices than the necessities of society. In early times, owing to the insecurity of property, the principal furniture consisted of chests, but, as public security increased, ease and luxury in style began to develop. It is curious, indeed, how furniture, like architecture, has marked the history of a country. As nations increased in wealth and intelligence, so has the gorgeousness of their furniture increased in proportion. The chairs used by the Greeks, for instance, were elegant in form and grace-



Wall Bracket.—Fig. 4.—Details One-Half Full Size.

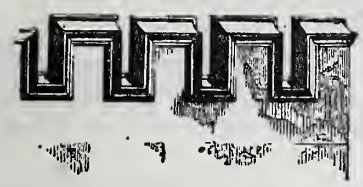
ful in design, the materials varying in costliness according to the means of the owner. At the present day the designing of furniture is generally handed over to the upholsterer; and thus it is that houses are often filled with articles incongruous in design, bad in taste and form, and often utterly commonplace and uncomfortable.

Simplicity and Appropriateness in Design.—In decoration and furniture the great aim of the designer should be simplicity and appropriateness of form and design, with harmony of color, to show that the cheapest and commonest things need not be ugly; that truth in art and design, in fact, need not of necessity involve costliness and lavish expenditure. Fitness and absolute truth are essential to all real art, and it should never be forgotten that design is not the offspring of idle fancy; it is the studied result of cumulative observation and delightful habit. By a careful regard to this we may make our homes and habitations, if not absolutely shrines of beauty and good taste, at least pleasant places where the educated eye may look around without being shocked and offended by gross vulgarity and gaudy unpleasantness.

Wall Decoration.—Tapestry is gloomy and holds dust, and silk and satin are too delicate to stand the smoke and dirt of town atmospheres. Anything, in fact, that holds dust is essentially out of place on walls; everything which collects dust on its surface is to be carefully avoided in all wall decoration; and for the same reason, all flock papers, as well as those stamped in relief are to be rejected, except for ceiling or frieze decoration.

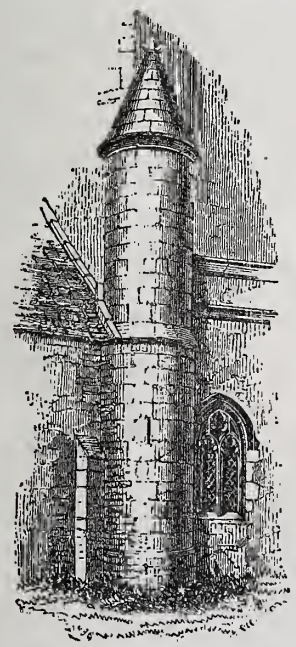
Moldings.

That features once fulfilling a useful purpose have in the course of time lapsed into ornamental features, is a fact of which the student of architecture cannot be ignorant. The history of the art affords several instances of parts of buildings that have become so far changed from their original use that we can now simply regard them as ornaments to the structures they are associated with. The battlement with which architects love now to crown the summits of their towers, of course originated in the requirements of the ancient mediæval fortress. The merlons and embrasures that make so pleasing an indented parapet were actually used to cover the soldier, and to afford him a notch for the discharge of his arrows. The openings between the corbels were like-



Moldings.—Battlement of St. George's Chapel, Windsor, England.

wise to enable the defenders to throw down or hurl upon the besiegers stones and other instruments of destruction. The angle turret or pinnacle, so frequently employed to relieve the angles of gables and towers of Gothic and Renaissance buildings, had its origin in the bartizan, which was a small turrt corbeled out from a wall or tower, to enable a warder to see around him or scan the flanks of his fortress. The very crenelles or perforations imitate the oylets or arrow slits used in the old system of defense. The buttress, the pinnacle, the penthouse, the flat roof and parapet all had an original purpose, which, in the course of ages, grew obsolete, the form still remaining as an architectural feature. Ruskin says, in one of his works, that all architecture is characterized by useslessness, though if we were to trace back these ornamental features to their beginnings, we should find that they were all dictated by use,



Moldings.—Turret at Beckley Oxen, England.

and in this sense, certainly, his dictum fails. It would not be difficult to show that even such a thing as a molding grew out of necessity at first, and became in time one of the most important and expressive features of a building. Imagine what a house or any building would be without a cornice, and can we picture to ourselves any structure that would look coherent and connected in its openings without one or two horizontal bands or strings to bind the parts together? A plain perforated wall, however well we may dispose the windows and doors, never looks better than a wall with holes in it. But the architect of the present day never omits anything; his chief fault is that he uses frequently a member he does not appear to know the exact meaning or use of.

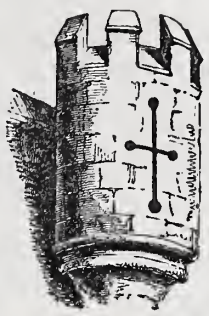
Let us take the subject of moldings generally. We find an amount of ignorance or indifference in the use of this feature that is surprising. We have frequently observed a cornice where it cannot be of any service whatever, while the upper part of the wall is left unprotected and unrelieved. In a low position, it performs the function of a mere cincture, and would have been better expressed as a string-course. The idea of proportioning a molding to its hight and position never occurs to half of our designers of the "inspired" and "cut-and-dried" schools. They profess to design by the eye merely; they reject all method and rule; they place their moldings to "look well," and they do not much trouble to care for their size or contour.

A little consideration of the functions and artistic value of moldings might enable one to detect their object, and begin to find out

Moldings.—A Pinnacle on Bottle Church, England, Erected A. D. 1250.

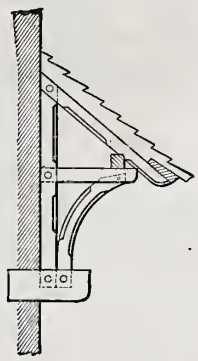
a new source of pleasure in them. We suggest the following points as desirable conditions in their design: (1) Function or purpose; (2) position; (3) hight from the eye; (4) material; and (5) contour. In speaking of the first, it is clear, from what we have just hinted, that the real object of the molding is not clearly borne in view. Its first and most important use is to cover and protect, as in the cornice of the Greek temple; it may, secondly, only serve to crown and afford shadow and relief to a wall or a column (in the last case it may be well illustrated by the capital of a column); it may form a footing, as in a base mold or plinth; and, lastly, it may be used to separate stories or define other features. Each of these functions may be found exemplified in the works of the Greek and Middle Age architects, and the molding was never used where it could not be understood. The cymatium and corona of the cornice became at once the cover, guttering and drip to the wall below it; the abacus and ovolo of the capital were the earliest and simplest types of the crowning member, or the expressive transition between the supported and supporting members; while the molded base and plinth transmitted in like manner the weight of the wall or column to the ground in an easy and agreeable manner. In both the two last cases we have the idea of pressure, and the types of the simple Doric order illustrate this, at least as regards the capital, while the base moldings found at the Erectheium and in the Ionic orders show how well the forms of the moldings express the condition of pressure, as well as lead the eye by a gradual transition from the column to the ground.

The position of a molding is almost as necessary to its proper design as its function, and here we find even graver faults perpetrated. Of course, if an artist disregards the purpose of any member of a building he can have no clear idea of its position. We may pick out a dozen new buildings anywhere in an ordinary street, and find that the class of molding used for a string is similar or a repetition of that used for a cornice, but the chief blunder committed is



Moldings.—Bartizan, Walingate, York, England.

in using moldings unsuited to the point of view from which they are seen. Thus a a series of moldings only suited for a capping member is placed below the eye, the consequence of which is that no one except children and dogs can possibly see them. Of course, every molding ought to be made suitable for its destination; a cornice should be molded below the corona, so that its shadowed part may be relieved by reflections and half lights, or be accentuated by dark lines of shadow or luminous lines in its prominent parts. Thus the moldings of an ordinary cornice, if lit up by the sun at an angle of 45 degrees, would probably show three luminous lines on its upper members. First the upper fillet would catch the sun, next the lower curve of the cyma recta and third the lower edge of the corona or drip; the bed moldings would be buried in shadow,



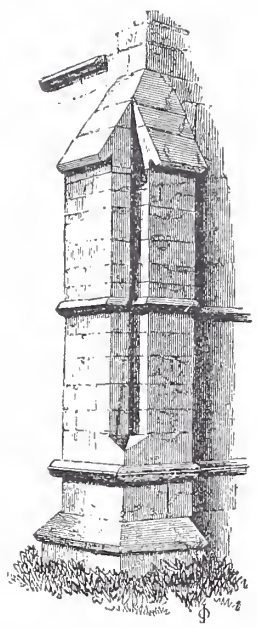
Moldings.—A Pemhouse, i. e., An Open Shed or Projection over a Door, Window, &c.

but this shadow would be relieved by the ovolo and cavetto, and by the quirks between them, which will appear dark lines from below.

A string-course is a band or cincture, and its use is to define or mark a separation; it should have its moldings on the face; they should be shallow, and if above the eye, the condition necessary to a cornice may be obeyed; if below, that necessary to a base molding, where the eye may rest on well-defined members which expand gradually toward the ground, as in many of the twelfth-century moldings. A string-course may suggest pressure, and some of the old labels and string-courses of the Mediævalists afford excellent types. The hight or distance of the molding from the eye is frequently neglected by young and inexperienced designers, the consequence of which neglect is that we often find large coarse moldings around windows and doorways close to the eye, while the moldings above or at a distance, like cornices and chimney cappings, are crowded with small members that cannot be seen at all. The fineness of the molding should invariably diminish in the direct proportion of distance. The taste of the artist is often shocked by the glaring

violation of this and the former rule in interior cornices. In suburban houses these finishes to the rooms are generally regulated upon the principle that the principal apartments should have the widest cornices, and no discrimination is exercised as to scale; whether they were originally designed for rooms of twice the size and hight or not, is a question that does not trouble the builder, even if the poor unlucky occupant grieves under the weight and width of a cornice that appears to crush all below it. Even in houses professedly designed by the architect, we have seen some moldings glaringly inconsistent with the size and position of the apartments.

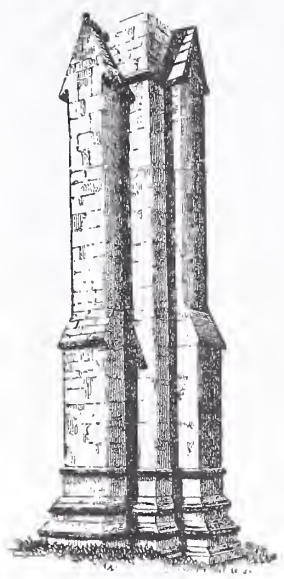
Material is a more important condition than it seems to be imagined, and architects, as a rule, ignore this consideration woefully. We constantly see moldings intended for stone or marble reproduced in wood. Of course the brittleuess of stone suggests moldings that are not easily chipped; the hollows may be deep, but the angles cannot be so finely cut without a risk, as in wood or more plastic materials. Cement and plaster



Moldings.—Buttress at Irthlingborough, Erected A. D. 1220.

dictate their own mode of treatment; the moldings should be shallow, but they can be finer than those proper for stone. In joiners' work the moldings can be very fine, and it is this minuteness of treatment that renders the fine wood moldings of the Queen Anne period so interesting.

The last point relates to contour, and here the skill and taste of the artist must be exercised in the agreeable balance of the three elements, rounds, hollows and squares; but we cannot, in a single article, say much on this head. The late M. Viollet-le-Duc observes the importance of designing moldings on certain principles. Two conditions, he says, must be observed—the function they have to perform and the effect to be produced in the place they occupy. A molding is good ouly in as far as it fulfills these conditions. He further alludes to the material employed. "It would denote a condition of profound barbarism," he says, "to give to moldings of joiners' work the section adapted for those that suit stone or marble—to moldings inside a hall the section adapted to those outside it." The artists of the Middle Ages pushed the rigorous observance of principles as far, it is contended, as the Greeks. "In the Greek and the twelfth-century architecture the molding," says Le Duc, "serves three purposes—it either supports a projection, or it forms a footing, or it marks a hight or defines an opening. In the first case the molding is a cornice; in the second, a base or plinth; in the third, a string-course, a jamb, or frame." These functions have typical forms or arrangements, which are sketched by the same author. The exquisite skill and refinement shown in the Greek moldings are pointed out by Viollet-le-Duc as having been carried to perfection by the artists of the twelfth century, who preferred hand curves to those struck by instrument. He describes various forms of cornices in which the contour has been designed, not only in accordance with structural requirements and position, but with reference to an exquisite sense of light

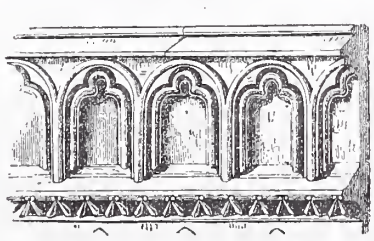


Moldings.—Buttress at Higham Ferrers, Erected A. D. 1250.

and shadow and reflected light. Some of the classical moldings exhibit a particular care to accentuate the shadowed parts by dark lines. Thus the shadow thrown by the dip and sinkings between ovoloes, was geuerally relieved by dark lines or quirks, and these were occasionally employed to separate the parts of a cornice. Moldings were also designed with reference to reflected light; the various members, scotias and sinkings were defined by sharp shadows in many of the old base moldings. The whole subject of moldings is replete with interest to the artist, and our remarks may tend to incite the student to examine it with more scientific method and care.

The Old Timber Houses of England.

Previous to the reign of Henry VIII it was customary to construct a house with a framework of timber, filled up with plaster. Not alone were single houses in the couutry constructed in this manner, but streets in villages, towns and cities were formed of timber and plaster-work, and even in districts where stone was common we find that there were comparatively few houses composed of that material. History tells us that even the humble cottage had its timber supports and smoky rafters, though clay and turf were invariably used to fill up the spaces between the timbers, and thatch was the covering for the rafters. In London, where, from the vast number and contiguity of the houses, fires were more frequent and extensive than elsewhere, an order was issued during the reign of Richard I that the



Moldings.—Parapet, Salisbury Cathedral.

lowermost story of all houses should be built of stone, and the roof be covered with slates or tiles, but in other cities and towns no such regulation existed; consequently, the entire skeleton of a house continued to be of wooden construction. There still remain very many good specimens of this old and picturesque style of street architecture in the more ancient towns and cities of England, such as Chester, Exeter, Bristol, York, Shrewsbury, Leicester, Ipswich, Warwick, together with several others. They invariably present a very picturesque appearance, and undoubtedly are worthy of the study of the painter, as well as of the architect. The counties of Cheshire and Shropshire were particularly noted for country mansions in this style of construction. Leland, writing of Evesham, in Worcestershire, immediately after the destruction of its great abbey in the reign of Henry VIII, says: "It is meekly large and well builded with timber; there be divers pretty streets in the towu." The very few specimens of this kind of building remaining at the present time in London are old and dingy, and are not at all fair specimens of what did really once exist. In some of the ancient towns, as Chester, large and lofty houses in this old and picturesque style still continue to be not unfrequently built, with their timber framework and plaster walls.

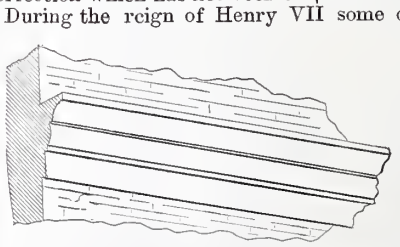
It would appear that little or no attention was paid to the external appearance of half-timber houses in the disturbed and warlike times which preceded the reign of Henry VII,

Moldings.—A Cincture.

but a very great change took place after the wars of the rival houses of York and Lancaster, and through six successive reigns following these wars, which were reigns of comparative peace, the domestic architecture of England continued to be cultivated, and, as far as regards external appearance, reached a very high state of perfection. The homes of England became as fair to look upon without as they were happy within.

Although the art of building with brick was first introduced into England by the Romans, it soon fell into disuse, probably on account of the troubled times which followed their departure, and in fact continued to be disused up to the reign of Henry VII, though churches and castles were for the most part composed of stone. The castles and mansions for the nobility were composed of solid stone walls and massive gates, and those of the classes next below the nobility were also fortified—at least all such mansions as were not within the walled towns; the churches alone were safe. Under the encouragement of kings and nobles and wealthy churchmen, ecclesiastical architecture about this period reached a degree of perfection which has not been surpassed.

During the reign of Henry VII some of



Moldings.—A String Course or Belt Course.

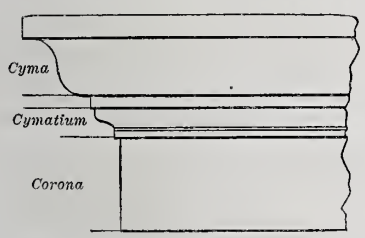
the nobility began to build their houses with brick, but timber continued in use with the great body of the people, rich as well as poor. Not ouly houses iu the country, but streets iu villages aud towns, were formed of timber in the indigenous old style, but with especial regard to the beauty of appearance. In its earlier state this style of architecture was called the Tudor style, and in its still later state the Elizabethan, or it may perhaps be called the style of the sixteenth century, commencing as it did at the latter eud of the fifteenth century and terminating in the early part of the seventeenth, prevailing during the Tudor dynasty. In its cuief characteristics it is essentially Gothic, resembling that of the ecclesiastical buildings, but some parts are altered and others added to suit the difference between church architecture and domestic architecture. In the gables with their crowning pinnacles, in the porches, the doors, aud the general forms of the mullioned windows, tue resemblance is

obvious; but chimneys, which are not required for the church, are characteristic of the house, and the overhanging of the floors and the projection of the windows are still more striking characteristic differences. As the walls were formed of nothing more substantial than plaster, the overhanging of the stories was perhaps chiefly required to protect the walls from the weather. For the overhanging of the first floor story there was another reason, which especially applied to the streets. Commodities of all kinds were exposed for sale in the open fronts of shops, and were protected from the weather by the overhanging story. In fact, it is no very great length of time since there remained a silversmith's shop on Ludgate Hill which had a projecting story and open front, the plate and jewelry being offered to view in separate glazed frames. The convenience of passengers also would doubtless

Moldings.—Cavetto from the Theatre Marcellus, Rome.

be attended to in those times, when umbrellas had not been brought into use. Ladies might go shopping on a wet day and walk the length of the whole streets under a complete covering of overhanging stories.

In these half-timber houses the framework of all the walls consisted of horizontal beams resting on upright timbers, which were sometimes very close to each other; where the upright timbers were more distant, diagonal timbers extended from the top of one to the bottom of the other, and so on alternately. Sometimes the diagonal timbers were curved or angular, and were otherwise varied in form. The floors, as has been said, generally overhung each other, and the roof was often continued over the top of the framework, so as to form a protection from inclement weather at the top as well as the bottom. The roof, which was commonly high and sharp, so as to throw the wet off rapidly, was mostly relieved by dormer-windows. The gables, which were extremely diversified, and which, in their ornaments, were generally sharp in the inclination of their sides, corresponding with the steepness of the roofs, and the gable boards, the hori-

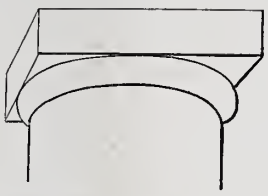


Moldings.—Cyma, Cymatium and Corona.

zontal foot board, and the triangular center were often elaborately carved and ornamented, and the apex surmounted by a nicely decorated pinnacle.

Nicholson says: "There is one class of houses which reached its zenith during the reign of Elizabeth—I allude to the half-timbered houses. They were composed of timber framework, and present an appearance of brick nogging, the spaces within the frame being plastered. The timbers are arranged sometimes vertically, with horizontal beams at intervals, and this arrangement has a very pleasing appearance; at other times the secondary timbers were ranged diagonally, or disposed so as to form geometrical figures, such as squares, triangles, diamonds, &c., and not unfrequently curved timbers were introduced. Such houses are peculiar in having the upper stories of larger dimensions and projecting over the lower ones, and are remarkable for their barge boards overhanging the gables. These are frequently of very beautiful design, and delicately carved; they have a singularly pleasing appearance. Wooden corbels, in the shape of grotesque figures, are also common. The plaster work was frequently ornamented with devices of various kinds, either in relief or recession."

Galleries and balconies of open carved work were also frequent. The windows of the principal apartments were large and

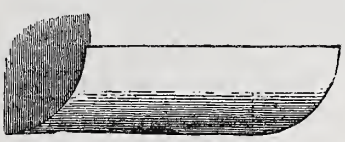


Moldings.—An Abacus.

square, divided into compartments by mullions and transoms, which were not so massive as those of houses built of stone, but richer in their tracery. Oriels or bay windows are rarely wanting in the side walls or gables. The oriels are sometimes single and sometimes compound, rising one above another from story to story.

The doors of this ancient style of buildings are deeply recessed, with weather-moldings above them in high relief. Often we find porches to the entrances surmounted with small gable tops, and corresponding with the larger gables of the house, and breaking with their deep shadows the monotony of the flat sides. In the larger houses there are often turrets, and generally stacks of ornamental chimneys, which have sometimes an appearance very much resembling turrets, it being usual to have each shaft of an entirely different pattern.

The projections throughout are bold, and the shadows consequently deep; the variety



Moldings.—A Roman Ovolo from the Theatre Marcellus, Rome.

of form in the outline is almost infinite, displaying a great variety of invention and consummate skill. No matter whether in town or country, the general effect of these houses is extremely picturesque. In towns the streets were often narrow, and, from the overhanging of the stories, dark, but passengers were sheltered from the sun and shower. In other respects the houses were not crowded; trees and gardens were intermixed, and the carved and painted gables, overhanging floors and galleries, and projecting windows and porches, are reputed to have had an effect in the highest degree varied and pleasing. In the country, the beautiful accordance of this style of building with rural scenery, may be seen in the groups of cottages at Hadzor village, near Droitwich.

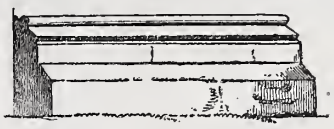
Mansions and manor-houses of timber construction were built in vast numbers throughout England during the whole of the sixteenth century. Many have been suf-

Moldings.—A Quirked Ovolo from a Temple at Corinth.

fered to fall into decay, and more have been demolished to be replaced by houses of modern construction. Still many of the old mansions remain, some of which are as large as palaces, and as magnificent as they are picturesque. It is with a feeling of delight that we come suddenly upon one of them, standing with its gables and projecting windows and varied richness of decoration among trees and country surroundings.

Almost the whole of the old timber houses which still remain belong to the sixteenth century; the style underwent considerable change during that period—in the reign of Henry VIII, by Holbein, who introduced several Continental variations; and in the reign of Elizabeth by the introduction of Italian designs and ornaments by John of Padua. John Thorp was the most celebrated architect of this period, and the names of nine or ten others who were eminent are known.

Of the larger timber houses which still remain there are many which are well worthy of mention. Bramhall Hall, about two miles from Stockport, in Cheshire, is of very large dimensions, the great hall of which is 36 feet square. Formerly a long and lofty gallery extended the whole length of the front, surmounting the roofs, and terminating at each end in a deep gable.



Moldings.—A Molded Base.

This old structure, which was an ancient seat of the Davenports, still retains much of its original form, being built for the most part of timber; some parts appear to be of as early a date as the reign of Edward IV, whose family devices are in some of the chapel windows. In the east windows of the chapel are various coats of arms of the Cheshire gentry. There is a large upper chamber in its original flat, with a timber roof; the walls are painted with flowers, grotesque animals and other figures. The great chamber would appear to have been altered in the reign of Queen Elizabeth, whose arms appear over the chimney-piece, and the ceiling is enriched with pendent ornaments; on the door, which is richly inlaid, appears the date 1592.

NEW PUBLICATIONS.

BARN PLANS AND OUTBUILDINGS. Published by Orange Judd & Co. 235 pages, 5 x 7½ inches in size; 257 illustrations. Price, $1.50.

This is a practical work, describing barns and other farm buildings that have actually been erected in different parts of the country, together with a great deal of theoretical matter, presented in the same connection. We believe that all other works which

Moldings.—A Plinth.

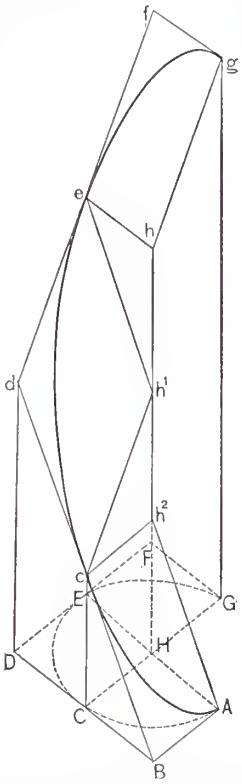
have preceded this upon the subject of barns and farm buildings have been of a character known as expensive books, ranging in price from $5 upward. This book is so cheap as to bring it within reach of all, and every man, be he farmer or otherwise, who intends erecting any buildings of the kind described in this book, can, by means of it, secure a large number of designs and plans ready for use.

SPECIFICATIONS FOR FRAME HOUSES RANGING IN COST FROM TWO THOUSAND TO TWENTY THOUSAND DOLLARS. By William T. Hallett, Architect. Third edition, revised and enlarged. Bicknell & Comstock, publishers. Price, bound in paper $1. Cloth, $1.50.

This specification is a small quarto in size, and is bound in ordinary book form. The plan upon which it is arranged is that pursued by the author in his regular practice, and is of a character to command it to architects and builders generally. A complete index for carpenters and joiners' work, and for masons' work precedes the specification proper. A form of contract follows, after which is given a glossary of terms, calculated, we presume, to overcome the liability of misunderstanding between parties not fully informed in the technicalities of building.

LEARNING TO DRAW; THE STORY OF A YOUNG DESIGNER. By Viollet-le-Duc. 320 pages; size, 5x8; 110 cuts. Putnam & Co. Price, $2.

As the title indicates, this is the history of a young person during the time he is learning to draw. It may almost be called a story, yet it is one which should be used and studied both by designers and by those who have use for designs. The foundations of the whole science of designing are briefly hinted at and their relationship noticed. The whole circle of the sciences is laid under contribution to afford material for the designer's work. As a writer, few men of modern times have been more clear or forcible than Violet-le-Duc, and in originality and genius he stands alone. No matter how familiar we may be with a subject, he is sure to approach it from some new direction, or to treat of it in some hitherto unthought-of manner. This work, though not a drawing book, will be useful to every draftsman, and though not a criticism upon artistic work and methods, will be a text book for those



Wreath Pieces.—Fig. 1.—Obtaining the Lines.

who wish information to aid them in deciding upon the merits of designs presented to them. We commend it to the attention of all our readers.

THE FURNITURE AND CABINET FINISHER: 98 pages. Jesse Haney & Co., publishers. Price in paper covers, 50 cents.

This is a convenient little work, and contains many useful recipes for the preparation of dyes, stains, polishes and finishes used upon furniture. While it is not quite as complete as other works on the same subject, the price is considerably less. It contains many valuable general directions, and is a book likely to give satisfaction to those who buy it. One point is well worthy of notice, and that is that the directions are full. Too many such works have an abundance of recipes, without giving any hints as to their actual value or the proper methods of applying them in practice. In our own experience we have found that recipes alone are of comparatively little value. Instructions as to the best methods of procedure are indispensable, and for this reason we are much pleased with the book. Its directions are always intelligent even when short.

PALLISER'S USEFUL DETAILS. A new and practical work, embracing every description of modern detail. Forty plates, 20x26 inches each. One volume. Palliser, Palliser & Co., publishers. Price, $3.

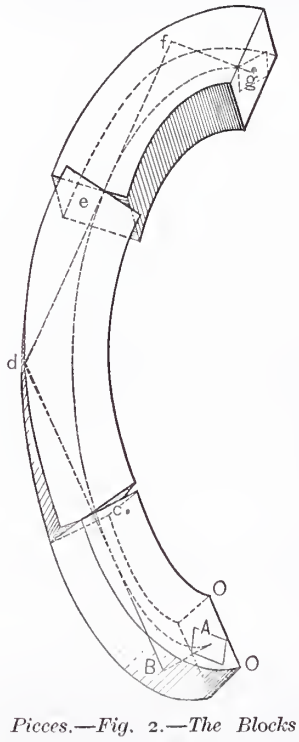
We have received an advance copy of this work, which our readers will remember has been announced for somo time. The designs are photo-lithographed from carefully prepared originals. The plates are large, and, withal, are crowded, as though space were valuable. While in one sense this is an objection, in another it is an advantage, since so many more designs are obtained for the money expended. The scales to which the drawings are made are unusually large ones for the purpose, none of them being less that ¾ inches to the foot, and some of the shapes being half full size, a feature which will be appreciated. That the designs are practical in their character is attested by the fact that they have been gathered direct from work which has been executed. They are from the best examples of the style which they represent. A free adaptation of the so-called Queen Anne may be said to predominate, and yet other new and popular styles are well represented. The subjects treated embrace everything, from a fence and gate to interior details, furniture, &c. Brick and stone work are considered, as well as wood work. Terra-cotta work, crestings, finials, conservatories, plant cabinets, pews and seats for churches, newels, stair rails, picture moldings, center-pieces, inlaid floors, grocery and dry goods and drug store fittings, are among the items of unusual work to which special attention has been given in the book.

Practical Stair Building.—VIII.

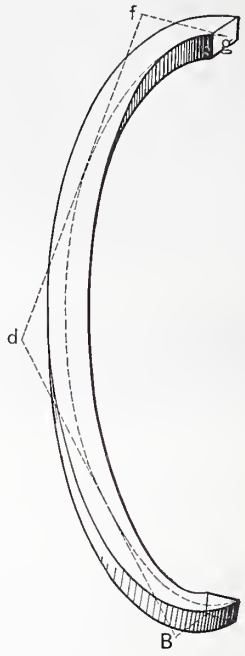
GEOMETRICAL LINES INVOLVED IN THE CONSTRUCTION OF WREATH PIECES.

Although not mathematically correct, for all practical purposes the center line of every wreath piece may be considered a plane curve. Some of the diagrams which we shall introduce in the illustration of this subject are based upon this assumption, and we call our readers' attention to it at this time that no misapprehension may exist as to the real facts of the case.

Referring now to the accompanying illustrations, Figs. 1, 2 and 3 show the planning and execution of a wreath piece in different stages of progress. Fig. 1 illustrates the forming of center lines. The dotted line A C E G is the center line of the rail in the ground plan. The curved line A *c e g* is the elevated center line of the rail. To obtain this line, three plane curves, A *c*, *c e* and *e g*, are so joined as to form one continuous curve. As may be readily seen by inspection of the engravings, straight lines drawn tangent to the curved lines at the various points form the basis of calculation by which the elevated curved line is drawn. The lines A B, B D, D F and F G are called the ground tangents. These lines are drawn to coincide with the ground center lino at the points A, C, E and G respectively, and to intersect each other at the points B D and F. The points *c d e f g* and *h h h* are plumb over corresponding points in the ground plan indicated by like letters. These points in the elevation are taken as the corners of planes upon which to draw the continuous curved line A *c e g*. After the position of the planes is thus determined,



Wreath Pieces.—Fig. 2.—The Blocks from which the Rail is to be Made, in Position.



Wreath Pieces.—Fig. 3.—The Rail Reduced to Shape.

the curves are drawn upon them, so as to coincide with the tangent lines at the points A *c e* and *g*. A better idea, perhaps, of what is really done in this operation than is shown in Fig. 1, will be obtained by examination of Fig. 4, in which the planes are made more apparent. The hight which the rail is to rise in passing from A to *g* is estimated on the tangent lines, and is measured up at the corners D *d* and F *f*. (Fig. 1.)

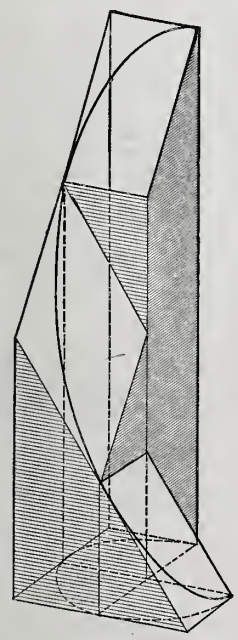
We shall not undertake at this stage to do more than indicate an outline of the general method of procedure in such cases, preferring to introduce full explanations at a later period in our discussion of practical problems. We do think it desirable, however, to present an idea of what is to be done and what is necessary to its accomplishment before we attempt to give more specific directions for executing work; therefore we shall not stop to introduce the explanations which it may seem desirable to the reader should accompany the description and diagram shown in Fig. 1, but proceed at once to give a brief summary of succeeding operations.

In Fig. 2 is shown the form of the blocks of wood in position, from which the rail is to be made. The various lines shown in this figure are as follows: The elevated tangent lines taken from Fig. 1, the outside corner lines of the rail blocks, the plumb bevel lines, and the square pattern of the rail marked on each butt joint. The butt joints are made at right angles each way with the tangent lines which pass through them. To illustrate this, suppose the line B *d* to be the axis of a circular saw, with the saw placed at the point *c*. The blade of the saw would represent the plane of the butt joint.

The lines A B and *f g* are level lines; therefore the butt joints at A and *g* are vertical or plumb. The pitch of the plank in the blocks in Fig. 2 is that of the elevated planes represented in Fig. 1. Suppose Fig. 1 to be a solid figure in three parts, joining at C H *c h* and H E *h e*, then the plumb bevel at the joint *g* of Fig. 2 would be the pitch of the solid angle G *g h*, Fig. 1, of which the lines *f g* is the vertex. The plumb bevel of the same piece at the joint *e*, Fig. 2, is the solid angle of which *e f* is the vertex. The plumb bevel of the middle piece at the joint *e* is the angle of which the line *d e* is the vertex. From this we see that the plumb bevel of any butt joint is the solid angle of which its own tangent line is the vertex.

The rule just stated supposes that to produce the angle the tangent line is joined on the under side by a vertical plane, which, with the plane representing the pitch of the plank, forms the solid angle of which the tanget line is the vertex. When, according to the rule, the plumb bevel is an obtuse angle, it is more convenient to obtain and use the inverse acute angle, as will appear in the following explanation :

If, in applying the plumb bevel across the butt joint, it makes on one side of the plumb line an obtuse angle with the face of the plank, on the other side of the line the angle is acute, and is the inverse of the obtuse angle. The principle upon which this depends was explained in our third article on stair-building (see page 187 of the volume for 1880). It is evident that if we can obtain the inverse acute angle, it may be used as a plumb bevel with advantage. Now, in making a drawing for the rail, as will hereafter be shown, and in applying the bevel to the butt joint, the acute angle is easier to obtain and more convenient to use ; therefore it is customary to obtain and use it in preference to the other. The angle at the rake line *h e*, Fig. 1, is the inverse of the



Wreath Pieces.—Fig. 4.—*Diagram Better Illustrating the Planes through which the Center Line of Wreath Piece passes, as shown in Fig.* 1.

angle at *c d*, and, therefore, may be used in its place as the plumb bevel at *c*. If the line *c d* and *d e* have the same pitch, the same bevel may be used at both ends of the piece. At the joint A, the inverse acute angle B *c* C is used as the plumb bevel. If the lines B *d* and *d f* have the same pitch, the same bevel can be used at A *q*.

Fig. 3 of our illustrations shows the rail reduced to shape from the blocks represented in Fig. 2. Corresponding letters in the different engravings represent corresponding parts. From this presentation of diagrams the reader will, we believe, possess a better idea of the principles with which he is to deal and the ends it is necessary for him to accomplish, than he would have had by our proceeding to the consideration of practical problems without this preliminary work.

CLASSIFICATION OF WREATH PIECES.

The various forms of wreath pieces may all be classified, as to their properties of elevation, in three general classes, as follows :

1. Comprising all wreath pieces which pass from a rake to a level, or, to describe it in other words, having raked and level tangents.

2. All wreath pieces which have a continuous rake, or, in other words, which have the two tangents both of a length.

3. All wreath pieces which pass from one rake to another rake of different inclination, that is, having within their length two different pitches, or having their tangents of different lengths.

Each of these groups may be subdivided as to the form and extent of the ground plan over which the wreath extends. There are six different cases under which each of these classes may come.

1. When the ground plan is a quarter circle, as illustrated in Fig. 5 of the accompanying diagrams.

Wreath Pieces.—Fig. 5.—*The Plan a Quarter Circle.*

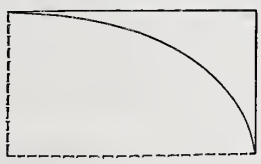
2. When the ground plan is a quarter ellipse, as shown in Fig. 6.

3. When the ground plan is more than a quarter circle, as shown in Fig. 7.

4. When the ground plan is more than a quarter ellipse, as shown in Fig. 8.

5. When the ground plan is less than a quarter circle, as shown in Fig. 9.

6. When the ground plan is less than a quarter ellipse, as shown in Fig. 10.

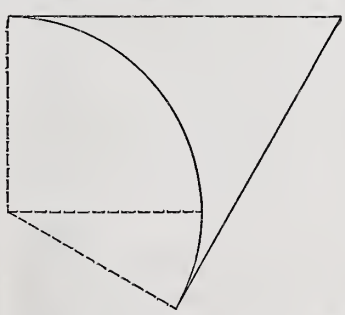


Wreath Pieces.—Fig. 6.—*The Plan a Quarter Ellipse.*

In our next paper we shall commence the consideration of problems in which wreath pieces pass from a rake to a level, with the ground plan a quarter circle.

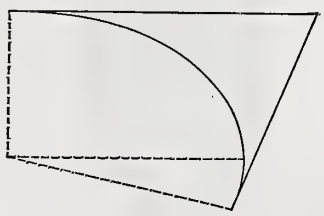
Astronomical Comparisons.

Some curious astronomical calculations have been presented by Mr. C. B. Warring before the Poughkeepsie Society of Natural Science, a few of which possess general interest. If we suppose the distance between the earth and the sun (about ninety-two and one-third millions of miles) to be reduced to a dozen rods or more, the size of the two globes to be reduced in the same proportion, the distance from the earth to the nearest fixed star would still be, on the same scale, about 9000 miles, and to the more distant ones it would be not less than 18,000,000 of miles. From those more distant stars the light must travel for sixty centuries before it reaches us, and yet light travels so fast that it would circle round the earth more than seven times in a single second of time. If the sun could be reduced,



Wreath Pieces.—Fig. 7.—*The Plan more than a Quarter Circle.*

in imagination, to 1-100th of an inch in diameter, the earth would then be of microscopic size, about 1-10,000th of an inch, but the distance between it and the nearest star would not be less than three miles. If the sun were a hollow sphere and the earth were placed at its center, with the moon revolving around it in its established orbit, there would still be a distance of 200,000 miles from the lunar orbit to the surface of the solar sphere. If these relations of size and distance are inconceivable, the forces which compel the planets to move in their elliptical orbits are quite as much beyond our comprehension. A bar of steel 3 inches square will sustain a weight of 540 tons, but a bar having a section of 144 square inches, would sustain 8640 tons, which upon a railroad would require 864 cars to support it, and 23 locomotives to transport it. To deflect the moon from a straight course into its present orbit, or, what is the same thing, to retain it in its present course, would require the united strength of not less than eight steel bars, each 100 miles square, or, more accurately, a single bar whose section is 87,500 square miles—more than large enough to cover the States of New York and Ohio together. If this force were represented by a web of steel wires, each one-quarter of an inch in diameter, stretched from the earth to the moon, they would be distributed over our earth on the moon side only 6 inches apart, and if a similar web were stretched from



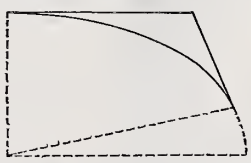
Wreath Pieces.—Fig. 8.—*The Plan more than a Quarter Ellipse.*

the earth to the sun, the force exerted between these two bodies would require the wires to cover one side of the earth as close together as blades of grass upon a lawn.

Coloring Drawings.—Use the best colors only ; do not mix with too little water ; if the first coat is not dark enough, wait till dry and give another coat. Make up your mind what portion you are going to color

Wreath Pieces.—Fig. 9.—*The Plan Less than a Quarter Circle.*

before applying a drop of paint ; do not stop in the middle of a wash, but when once the brush touches the paper, go straight through with the portion you begin. If obliged to leave the job for a minute, paint up to a line (a dotted line will do if there is not a "full" one handy); this will hide the join between the two patches of color. Do not let your brush be too wet, nor yet too dry ; a few trials will soon show you the right amount of color to take up. Use the best English drawing-paper; if you then find any trouble, a little prepared ox-gall mixed with the color will do wonders. Clouded drawings,



Wreath Pieces.—Fig. 10.—*The Plan Less than a Quarter Ellipse.*

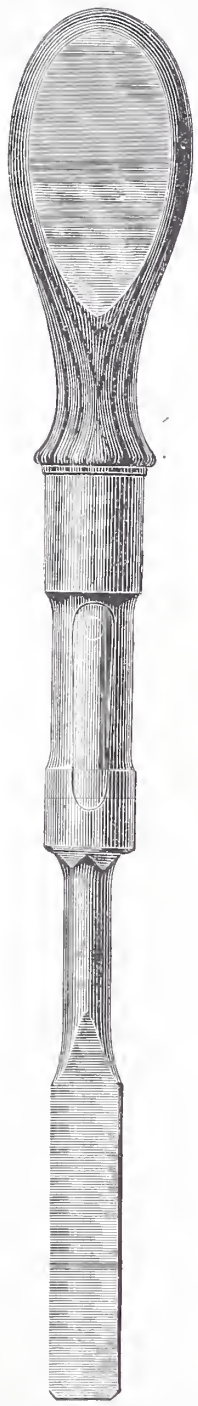
as a rule, are caused by letting the work dry and going over the edges again when starting afresh. No piece of coloring should be left until finished.

Art should be Subservient to Utility.—True beauty and art form are dependent upon no particular style. It is essential, first of all, that everything in a house shall be as fitting as possible, and that extravagance of all kinds, or so-called high art, shall be subservient to comfort, truth of construction, utility and general convenience. Houses should not, in fact, be made show places.

NOVELTIES.

CLARK'S IMPROVED SCREW-DRIVER.

Figs. 1 and 2 of our novelties this month represent what is known to the trade as Clark's best quality screw-driver, the special feature of which is the handle. This handle is so constructed, as will be readily seen from inspection of the engraving, as to allow the bit to be taken from it at will. The tool is furnished in a neat box, as shown in Fig. 2, the set consisting of three sizes of bits and a handle. Taken altogether, it forms a very handy tool, and is one, we believe, that is destined to find many friends among mechanics. The handle is so constructed that any bit may be made to fit it by a small amount of filing. The manufacturer of this article is Messrs. R. H. Brown & Co., of Westville, Conn., by whom the trade is supplied. We also learn that this firm is preparing to put upon the market a set of chisels, running from the smallest sizes up to 1¾ inches, arranged for use with the screw-driver handle. The convenience of such tools will be at once appreciated.



Novelties.—Fig. 1—Clark's Improved Screw Driver.

IMPROVED SCREEN HINGE.

The general want experienced by amateurs and cabinet-makers for an effective screen hinge has at last been supplied by Messrs. J. B. Shannon & Sons, of 1009 Market street, Philadelphia, Pa., who are just putting upon the market the article shown in Fig. 3 of the engravings. This hinge is very simple in its working parts, and yet very effective. It admits of the wings of the screen being set at any angle, while a close joint is maintained between the parts. The hinge consists of a flat connecting plate, which extends between the two centers of the pinions shown in the engravings. This holds the two wings of the screen together, while the pinions engaging, keep them apart and complete the hinge motion. In applying this hinge to the screen it is necessary simply to run a saw scarf into the frame of sufficient width and depth to receive the pinions shown at the top, and to mortise in for the lower parts of the hinge, which are held in place by the screws shown in the engraving.

LOCK FOR SLIDING DOORS

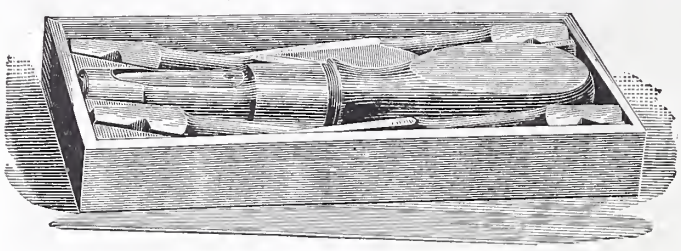
The Russel and Erwin Manufacturing Co., of 45 and 47 Chambers street, New York City, have recently brought out an improved lock for sliding doors, the face plate and bolt of which are shown in Fig. 4 of the accompanying engravings. This lock is a great improvement over those formerly in use for this purpose, and needs only to be seen to be appreciated. Its peculiarities consist of the double bolt shown at the top, which is so constructed and arranged that it is thrown forward into the lock plate upon the opposite door the greater portion of its length before it parts, as shown in the engraving. By this means the lock is very much stronger than it is possible to make those having the goose-neck bolt. This form has the additional advantage of being positive in action, and accordingly is calculated to give much better satisfaction than anything that has preceded it. This style of lock is sold at the same price as the old lock of corresponding size and finish, a fact which will doubtless bring it into general use.

IMPROVED WARDROBE HINGE.

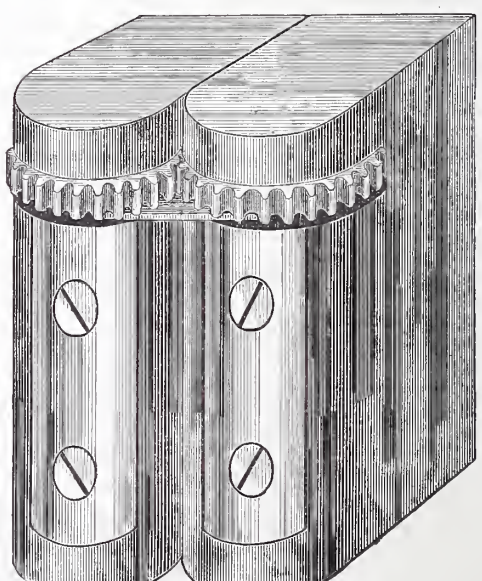
The need of a form of hinge for desks, wardrobes, &c., which should be better than the old pin arrangement for throwing the door out beyond the moldings, has long been felt. The device shown in Figs. 5 and 6 of our engravings is an attempt to supply this want. By inspection of the cuts it will be seen that in principle this hinge is an eccentric. Fig. 6 shows the hinge in the position it occupies when the door lid is closed, while Fig. 5 shows its position when open. It has the advantage of occupying less space than the old forms of hinges, and, like a butt hinge, is out of sight; at the same time it requires no rounding of corners to make it work. Although the use of this hinge upon water-closet seats and in similar situations is not mentioned in the circular sent out by the manufacturers, Messrs. J. B. Shannon & Sons, 1009 Market street, Philadelphia, we should think it would be very useful for that purpose. The small space that it occupies and the close joint that it makes seem well calculated to adapt it to purposes of this character.

PELICAN NAIL PULLER.

Fig. 7 represents a new nail puller just brought out by the Millers Falls Company, No. 74 Chambers street, New York, the character of which is so clearly shown by the illustration that it requires no description. In length the tool is about 16 inches. It is made of the best material, and is calculated to prove a useful adjunct to any carpenter's kit.



Novelties.—Fig. 2.—Case Containing Handle and Set of Screw Drivers.



Novelties.—Fig. 3.—Improved Screen Hinge.

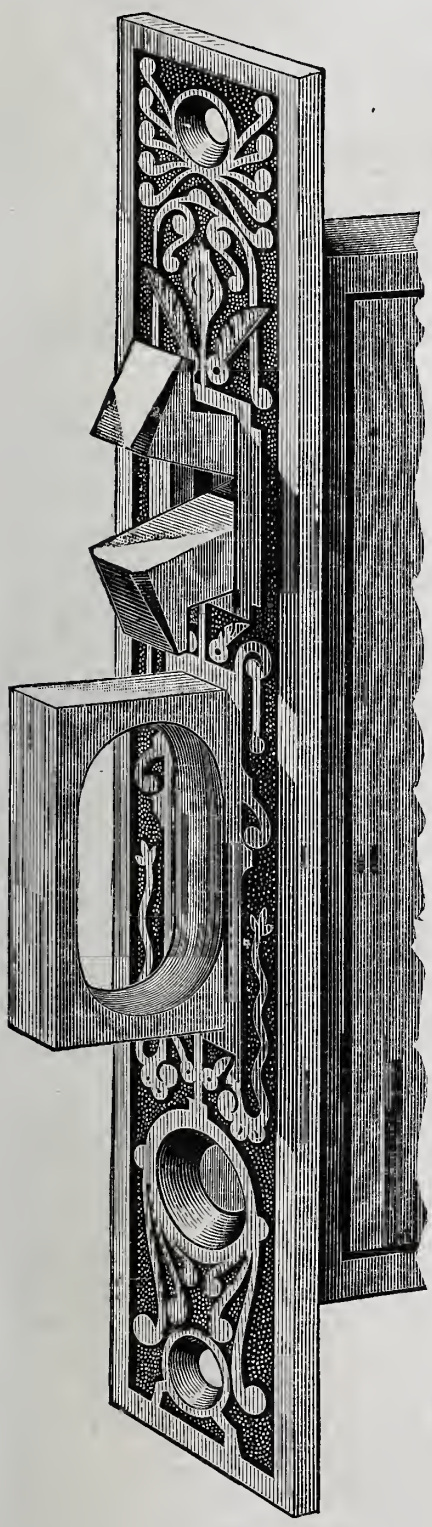
Homes for Employees.

The question of providing homes for mill operatives and others of a similar class, is one which is of considerable importance to managers of the great manufacturing corporations of the country. From a recent number of a Boston paper we take the following:

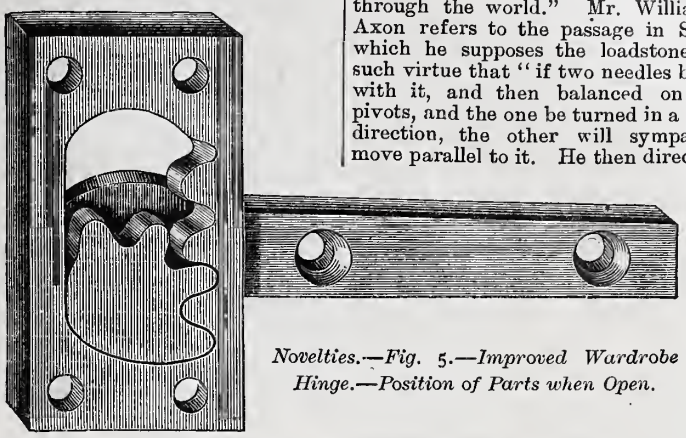
It has always been a question of no small importance to manufacturers how best to provide homes for the hundreds, and often thousands, of their employees, and as the manufacturing sections of the country grow older the question is gradually receiving more and more attention. The absence of the vicious land system of other and monarchical manufacturing countries simplifies the question in this country somewhat, and so, also, does the absence here of class distinctions. Here in New England, a very few manufacturing cities excepted, the homes of employees are rightly considered the best in the world; more are owned by their occupants, and more contain those comforts of life which have made American homes cynosures in the eyes of the laboring world. Foreigners have been utterly astonished at the "quarters" of the laboring people of our New England villages. As for cities, Philadelphia is far ahead of others in this country in respect to the homes of its wage workers, but the adoption of its system by other cities, though of slow growth, is taking place, and that, too, it is gratifying to note, in such cities as New York and Brooklyn, where the tenement-house system has come to be almost a curse. There are two worthy objects which underlie all movements looking toward the improvement of the homes of working people; one is business, the other is intellectual advancement. These two objects are interdependent. It is business for employers to encourage anything that tends to greater efficiency of

labor; it is no longer a mooted question that home comforts and adornments tend directly to intellectual advancement, and that in turn to increased efficiency in business of any sort.

The Chicago *Inter-Ocean*, in remarking upon the Brooklyn Association, which is erecting dwellings of artistic designs for people of moderate means, says that this may sound Utopian to the ultra-practical man, and may not in every case prove successful, but the children who will be born and reared in these houses cannot but have more elevated desires and more refined tastes than those whose early lives will be spent in surroundings of filth and rudeness. The mind is reached and influenced through the eye easier and more quickly than by any of the other organs, and the introduction of object lessons and other refining influences into our schools has resulted in much moral as well as intellectual good. We agree with our contemparary that the Brooklyn Association is right in its ideas, and submit to those of our readers who are manufacturers that the benefits resulting from carrying out such ideas must be mutual. We could mention scores of employers within a radius of a hundred miles of Boston who could corroborate this statement. In Connecticut, too, wherever attention has been given to the matter, the same pleasing testimony comes. The Pennsylvania Railroad Company, one of those corporations which are popularly supposed to have no souls, has, in several cases, adopted the Brooklyn plan, and finds that it secures a better class of mechanics, more industrious, ingenious and intelligent by offering them attractive homes.



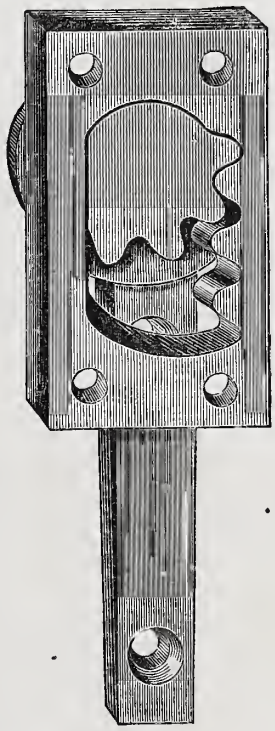
Novelties.—Fig. 4.—Lock for Sliding Doors.



Novelties.—Fig. 5.—Improved Wardrobe Hinge.—Position of Parts when Open.

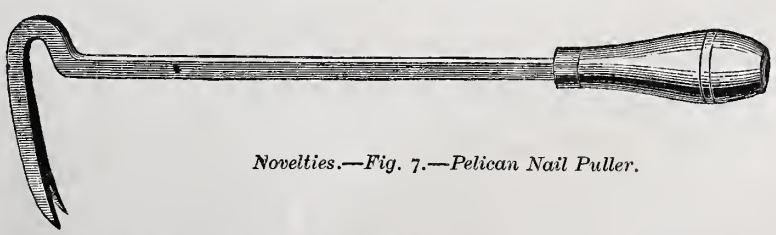
Growth of Inventions.

Prof. Stanley Jevons, ten years ago, found allusions to a magnetic telegraph running through many scientific or quasi-scientific works of the sixteenth or seventeenth century. The poet Addison speaks of "a chimerical correspondent between two friends by the help of a loadstone." Sir Thomas Browne, in his "Pseudodoxia Epidemica," says: "The conceit is excellent, and if the effect would follow, somewhat divine;" and he speaks of it as a conceit "whispered through the world with some attention, credulous and vulgar auditors readily believing it, and more judicious and distinctive heads not altogether rejecting it." Sir Thomas, it would seem, submitted the matter to experiment, but found that, although the needles were separated but half a span, when one was moved the other would stand like Hercules' pillars. Joseph Granville, in his "Scepsis Scientifica" (1665), discusses the objections of Sir Thomas Browne, and concludes that "there are some hints in natural operation that give us probability that it is feasible." Glanvil, more than 200 years ago, said: "Though this pretty contrivance possibly may not yet answer the expectation of inquisitive experiment, yet 'tis no despicable item that, by some other such way of magnetic efficiency, it may hereafter with success be attempted when magical history shall be enlarged by riper inspection, and 'tis not unlikely but that present discoveries might be improved to the performance." The earliest book in which Mr. Jevons found allusions to a magnetic telegraph is the "Natural Magic" of Baptista Porta, published in 1589. In the seventh book he describes the "wonders of the magnet," saying in the preface: "I do not fear that with a long-absent friend, even though he be confined by prison walls, we can communicate what we wish by means of two compass needles circumscribed with an alphabet." In the eighteenth chapter of the same book he describes the experiment of putting a magnet under a table and moving thereby a needle above the table. This experiment, as Porta remarks, was known to St. Augustine, and an exact description will be found in his "De Civitate Dei," a work believed to have been begun A. D. 413. It seems probable that this passage in St. Augustine suggested the notion either to Porta, Bembo, or some early Italian writer, and that thus it came to be, as Sir Thomas Browne says, "whispered through the world." Mr. William E. A. Axon refers to the passage in Strabo, in which he supposes the loadstone to have such virtue that "if two needles be touched with it, and then balanced on separate pivots, and the one be turned in a particular direction, the other will sympathetically move parallel to it. He then directs each of these needles to be poised and mounted on a dial having the letters of the alphabet arranged around it. Accordingly, if one person has one of the dials, and another the other, by a little prearrangement as to details, a correspondence can be maintained between them at any distance by simply pointing the needles to the letters of the required words."



Novelties.—Fig. 6.—Improved Wardrobe Hinge.—Position of Parts Closed.

Cement for Marble.—Sift plaster of Paris through muslin, and mix with shellac dissolved in alcohol or naphtha. As soon as mixed apply quickly, and squeeze out as much of the composition as possible, wiping off that which squeezes out before it sets. The cement will hold better if the parts to be joined be roughened by a pointed tool before cementing, which can be done without destroying the edge of the fractured part.



Novelties.—Fig. 7.—Pelican Nail Puller.

CORRESPONDENCE.

In our March number we alluded to the correspondence which had been called out by the answer to the question of where the spike should be placed, when three men carry a stick of timber, in order to equalize the load. We were not able at that time to print the letters for lack of room. We now present them, and allow them to occupy more space, perhaps, than will at first seem appropriate. When, however, the spirit of these letters and the earnestness of the writers are taken into consideration, we think our readers will agree with us that a full showing is desirable. Every one of them has hastened to show the error of the former answer, in order that the correct brand may be applied at the earliest possible moment. Several of these correspondents have expressed their surprise that *Carpentry and Building* should make a mistake. One or two of the writers say they have come to regard the paper as almost infallible. Now, this is all wrong. We are not perfect, by any means. The distinguishing difference between this paper and other journals of its class is this, that whenever a mistake is made by it, either editorially or otherwise, proper correction is made at once, and the true answer is presented in such a manner as to remove all possibility of any one being led into error by the first publication. It is this course which has made *Carpentry and Building* of value to its readers, and the plan we have found to work so well in the past we shall continue in the future. The quality of every journal depends in a great measure upon the ability and enterprise of its staff of contributors. We congratulate the readers of *Carpentry and Building* upon having the ablest corps of correspondents of any mechanical journal published. The care with which they work out their conclusions by patient investigation, as evidenced by the following letters, is of no small importance to our readers. We are glad to know that all that we publish is being criticised and tested. By this means errors are eliminated, mistakes corrected, the best rules brought forward and the correct brand applied in all cases.

Three Men Carrying a Log.

From J. G. W., *Nevada, Iowa.*—This problem has been discussed by mathematicians and philosophers of yore, each of the two classes claiming his solution correct. The result generally obtained—supposing the log to be 30 feet long—are 5 feet and 7½ feet from the end of the timber to the spike. As it is the policy of *Carpentry and Building* to favor free discussion—a trait which I admire—I take the ground that 7½ feet, or one-quarter the length of the stick, is the correct answer, and will attempt to prove the same. Now, for the sake of argument, suppose the lever to be placed 5 feet from the end of the stick of timber. This will balance 5 feet back of the lever, which is 10 feet carried by the two men at the lever, leaving a balance of 20 feet yet to be carried. Let us now saw the stick off at this point (5 feet back of the lever) and bring it forward, placing one end upon the lever and letting the tail man carry the other end. It is evident that each man now carries one-third of the whole stick, for the two men at the lever are carrying 10 feet balanced on the lever and one end of the other 20 feet, or one-half of it, thus making 20 feet carried by the two men at the lever and 10 feet carried by the man at the tail. But the tail man is now 5 feet nearer the lever than he would have been had the stick not been sawed in two; therefore, in order to maintain the "trilibrium" and carry out the conditions of the problem, this 5 feet must be divided between the lever and the tail man, which causes the lever to be moved back 2½ feet more, making it 7½ feet from the end of the stick. C. H. R. gave the true philosophic principle involved, but his proportions were not correctly stated. To those who are not satisfied that one-quarter of the length of the stick is the correct distance from one end to the lever, I suggest that they test the matter practically with a pair of sensitive scales.

From D. A. S., *De Soto, Wis.*—A brother mechanic and myself were arguing the point this week. He contended that the lever should be placed one-quarter of the length of the stick from the end, while I believed that it should be placed one-sixth of the length from the end. As we could not agree, we concluded to set the matter at rest by the following experiment: We took two pairs of spring balances, and attaching one to the end of a board of even width we suspended that end; then the other balance was suspended by a string, and placed at such a distance from the opposite end of the board as was required to get double the weight shown by the first. For example, the first end weighed five pounds and we hung the second balance where the weight was ten pounds, the whole board weighing fifteen pounds. By measuring we found that the second balance had to be placed just one-quarter of the length of the board from the end. In order to be sure that the ends of the board were of even weight we reversed it and obtained the same result. Of course, I had to give up the argument.

From W. H. D., *Mt. Hope, Kan.*—By an actual experiment with scales and a bar of iron or stick of timber, according to convenience, it will be found that one-quarter of the distance back from the end is the proper place for the spike.

From W. R. W., *Bellaire, Ohio.*—A brother mechanic and myself thought we would try by actual experiment where the spike should be placed. We took a piece of iron just 6 feet long. We measured 18 inches, or one-quarter the distance, back from the front end. Then, with two pairs of balance scales, we suspended it, and we found that the scales, which were placed 18 inches, or one-quarter the distance back from the front end, carried just twice as much as those suspended to the tail end.

From J. P. S., *Hillsborough, Wis.*—My attention was called to this problem a good many years since by seeing the question in one of the school arithmetics. The problem, as there stated, employed 30 feet as the length of the timber, and the answer was 7½ feet from the end, or one-quarter the length of the stick. I have always used the rule that way, but have invariably found the man at the end of the timber complaining that he was carrying all the stick. On account of what was published in the February number, I experimented as follows: I took a piece of sawn timber, 2 x 4 inches and 6 feet long, and carefully weighed it, and then got two steelyards that weigh exactly alike, and, fastening a string at the end so that it would not slip off, I fastened one of the steelyards to the loop. I then took a small round stick 4 inches long, and, fastening a string to both ends, I hooked the other steelyard in the string end and commenced weighing with the following results: At 18 inches from the end, or one quarter the length of the stick, the weight was 8 pounds 2 ounces, and at the other end, 4 pounds 8 ounces. At 12 inches, or one-sixth the length of the stick, 7 pounds and 4 ounces, and at the opposite end 5 pounds 6 ounces. At 20 inches from the end the steelyard registered 8 pounds 6 ounces, while at the other it stood 4 pounds 4 ounces. At 19 inches from the end it registered 8 pounds 4 ounces at one end, 4 pounds 6 inches at the other. At each weighing we held the stick as nearly level as possible. I then took a piece 30 inches long and dressed it until it exactly balanced in the center on the edge of my trisquare and weighed it. The weight was 2 pounds 8 ounces. According to calculations made from the above weighing, 8 inches from the end would be the proper place to put the bar or handspike for the two men in carrying a 30-inch piece. I marked off 8 inches, and, fastening a lead pencil on a string, I placed the pencil at the 8-inch mark and rested the other end of the stick on the edge of the bench, the steelyards showed a weight of 1 pound 10 ounces, or, about two-thirds of the weight as near as I could get it, as the steelyards will not weigh less than 2 ounces. From the above experiment I have concluded that the length of the stick divided by 3¾, will give the proper place for the handspike.

Note.—More accurate scales would undoubtedly have given the same results as the other letters.—*Ed. C. and B.*

From A. S. H., *Clarksburg, W. Va.*—I find that the answer given to the problem in the February number is incorrect. If a bar be placed under the center of a log, the entire log would balance on the bar. If the log is 40 feet in length and the bar is moved 10 feet toward the front end, and two men carrying at that point, the one man would have to move the 20 feet which would be at the back end of the stick, and 10 feet would project in front of the bar, which would be one-quartar the length of the stick. I tested this problem by weighing a bar of steel, and find that when two-thirds of the weight is on the scales, one-quarter the length will project over, which makes it plain that the stick or bar should be placed one-quarter from the front end of the log. I think it only proper to make the above statement, for, although my answer was endorsed as correct in the February number of *Carpentry and Building*, I find that it was in error.

From M. T., *Clarksburg, W. Va.*—I tested this problem by means of balances, selecting a bar of steel of uniform thickness and density, and found by experiment that the carrying stick should be placed one quarter the log's length from the end opposite to the one at which the one man carries. An algebraic explanation of the problem shows the following: Let x equal the required distance at which the spike must be placed from the center of any log of uniform thickness and density. Let l represent the length of the log; then $\frac{1}{2}\ l$ equals the distance from the center to either end of the leg. By a well-known principle in philosophy, we have the proposition: $2 : 1 :: \frac{1}{2}\ l : x$; from which we find that x equals $\frac{1}{4}\ l$, or that the required distance is one-quarter the length of the log. The fallacy in making the required distance one-sixth the length of the log is this: If you place the spike one-sixth the length of the log from the end, it is argued that the 5 feet in front of the two men will balance 5 feet behind them. Grant this. Now, of the remaining length of the log, the man at the end must carry 10 feet and the other two men must each carry 5 feet. But the one man is at the end of the piece that is 20 feet long, while the other two men are 25 feet from him; therefore the man at the end lifts more than one-third of the log.

From H. J. H., *Grumley Center, Iowa.*—Suppose a stick of timber to be 24 feet long, and each foot in length to weigh 1 pound. If the lever be placed one-quarter the length from the end, there will be 6 feet or 6 pounds projecting beyond it, and 8 feet or 8 pounds between the lever and the man at the other end of the stick. Now, supposing the 6 feet projecting were cut off at the lever, it is plain to be seen that the man at the end would lift one-half of the weight between his end and the lever, or 9 pounds. It is then evident that with the 6 feet projecting beyond the lever, he will lift 9 pounds less what the 6 feet will balance at his end. The 6 feet weighs 6 pounds, distributed in equal proportions from the lever to the end, and will have a direct balancing power at its center or 3 feet from the lever. The man at the end being six times this distance on the opposite side of the lever, the projecting end will balance one-sixth of its weight or 1 pound at his end, and he will therefore lift 9 pounds less 1 pound, or 8 pounds, which is one-third the weight of the stick. It follows, of course, that the two men at the lever must lift the other two-thirds of the weight.

In answer to the problem of W. S. E. I will quote the following rule, which will apply to sticks of any shape or size: "Balance the stick to be carried across a lever. The point at which it balances is the center of gravity. From this point the one man must be twice as far as the two men at the lever."

From A. F. H., *Bangor, Me.*—My answer to the problem is one-quarter the distance from end, or in the case of a log 30 feet long, 7½

feet from the end. The 7½ feet projecting will balance 7½ feet more, which will leave the 15 feet to be carried by the single man and the two men at the bar, and as the center of gravity of the remaining 15 feet is 7½ feet from the one man and 15 feet from the two men, according to the principles of leverage the one man will carry 10 feet.

From R. E. F., *Prospect Hill, Wis.*—A. S. H.'s rule, published in the February number, instead of being indorsed should be branded rotten. The proper place for the carrying sticks is one-quarter the length of the timber from the end. This I know by weighing a stick.

From C. R. S., *Caldwell's Prairie, Wis.*—Where two persons lift a timber, the distance they are from the center of gravity governs the amount of weight each one lifts. The weight decreases in proportion as you increase the distance from the center of gravity, and, on the other hand, increases as the distance decreases. My rule is to find the center of gravity, multiply it by the number of men at the tail of the log and divide by the number of men at the carrying stick. For instance, if a log be 30 feet, to be carried by three men, the formula would be $\frac{15 \text{ feet} \times 1}{2} = 7$ feet 6 inches, the distance the stick must be placed ahead of the center of gravity. With four men at the stick and three at the tail, the formula would be $\frac{15 \text{ feet} \times 3}{4} = 11$ feet 3 inches, or 3 feet 9 inches from the end of the stick. Where there are three men and the spike is placed one-quarter back from the end, the two men will carry the part that projects over the stick and a portion of equal length back of the spike which the first part balances. This will leave half the timber. The center of gravity of this part is one-quarter the length of the whole timber from the back end. Now, the one man being just half the distance from the center that the two men are, he must necessarily carry twice as much of this half as they do, or he will carry two-thirds of half while they will carry one-third of half, thus making them carry equal weight. I present this rule in all confidence, because I have proved it, employing a stick of timber and scales. I have tried it in every possible way, and it has not failed me in any particular.

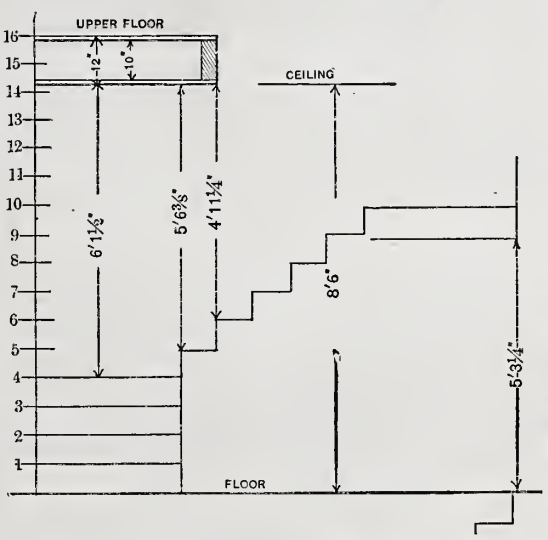
The same rule will apply to a stick of timber that tapers. Thus, in the problem proposed by W. S. E., where the stick is 4 x 4 at one end, and 8 x 8 at the other, it is necessary first to get the center of gravity; then the center of gravity of that part of the stick under which the spike is to be placed is the point at which the timber must rest upon the spike. If the spike is to be placed under the small end, use the following formula: Length × .3475. If the spike is to be placed under the large end: Length × .188. By this means the distance to put the spike from the end where three men are to carry the stick is readily obtained. I have not put my rule for calculating the tapering log to the same tests mentioned above, but I propose to try it at the first opportunity. In the meantime I will leave it for others to brand.

From CURLEY, *Patterson, Ohio.*—By placing the spike one-sixth the length of the log from the end, A. S. H. would impose very much upon the man that tails the log, as he would be compelled to carry 12½ feet, instead of ten feet, in a log 30 feet long. C. H. R. has the right idea, but he has failed to state it correctly. In every true proposition the product of the means must equal the product of the extremes. What I would like to see is a formula by which all similar problems can be disposed of. For example, suppose a log is to be carried by five men instead of three, two at the tail and two at the spike; how is the spike to be placed in this case?

From G. H. H., *Philadelphia, Pa.*—Believing that a little experiment would settle all controversy on this question, I spent about half an hour in that way to-day. I took a piece of yellow pine, 3 x 6 inches, 7 feet long. I found, upon weighing it, that it balanced 37 pounds, which, divided by three, gave 12⅓ pounds for each man to carry—two men, accordingly, should carry 24⅔ pounds. Next, I placed the timber one end resting on a block; then I attached spring balances and placed a rope which suspended the timber at that point, which showed by the balances 24⅔ pounds. When this point was reached the rope was 21 inches from the end of the timber, or one-quarter the length back. Next, I moved the balance to what would be the end at which one man would carry, and it registered 12⅓ pounds. I shall expect to see this question thoroughly ventilated in an early number of the paper, for evidently there has been some shaky timber allowed to pass.

Comments on First Prize Design.

From G. W. B., *Chatham, N. J.*—Perhaps you will think, when you have read this letter through, that I am in a fault-finding mood, but as fault-finding, when there is any to find, is a part of my regular business, I think it is quite proper that I should exercise my faculty in this direction with reference to the first prize design, published in the February number. In the remarks concerning the drawings received, it is said that a number of plans were thrown out for various reasons, among which were mentioned shortages, omissions of items of material, and general merit. The assertion further was made that in many cases the builder's certificate was a mere complimentary favor to the architect on the part of a good-natured friend. Now, I am inclined to think that some of these faults pertain to the first prize design, and I shall undertake in part to point them out.



Comments on First Prize Design.—Fig. 1.—Diagram of Stairway from G. W. B.

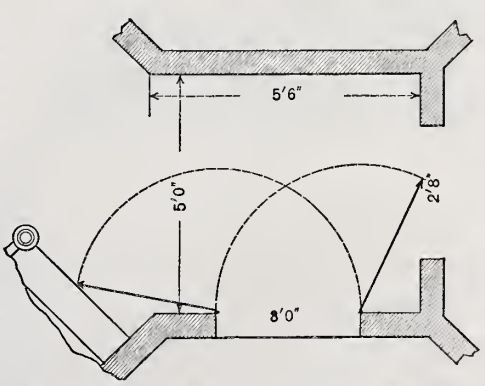
With reference to omission of items, I notice that there is no range called for in the specification, and that there is no fire-place in the kitchen to put one in. No mantels or grates appear in the estimate. There is no bell to the front door, which certainly would be a very convenient, if not an absolutely necessary, article in a modern house; but possibly the owner is to find all these articles as he does the water-back. Referring to the estimate, I find the figures upon the blinds are $120. In the specifications the inside shutters are required to be of cherry. At the prices given in the November number, they would cost $169, without fitting or hanging. I am not basing this upon my own ideas, but have taken the pains to get estimates from two different firms, and the lowest price for blinds, hung complete, is $212.50. I have also had the plumbing figured. I cannot get it done for less than $300. Taking the shortages altogether, I make out the following list: Blinds, $92 50; plumbing, $50; range, $50; mantels and grates, $75; cellar bottom, $10; tinwork, $25. Total, $302.50, making an excess in total cost above the stipulated price of $202.50. From this it would seem that Mr. Pike, who certified to this estimate, must have been one of the good-natured builders inclined to do a complimentary favor, referred to in the remarks above cited.

Now, for the plans. I think the first story very low for a modern house. On examination, as will be seen by the accompanying sketches, I find there is just 4 feet 11¼ inches head-room for the stairs. On the first landing there is but 6 feet 1½ inches. These dimensions would hardly do for a 6-footer wearing a high hat. Since the author of this set of plans received a prize in the first competition and was taken to task—justly, too, I think—for lack of head-room in his first design, it would seem to me that he did not profit by experience, and that the committee who made this last decision must have been near-sighted or very short in stature. The head-room to the cellar stairs is also scant. Another fault in the plan is in the opening of the front door, which I also illustrate by a sketch inclosed. To open the front door one way will close more than half the parlor door, and to open it in the opposite direction would close more than half of the stairs. Perhaps this is a very convenient arrangement, but I don't think so. I might specify a great many more faults. There are no private stairs. The first story windows come against the ceiling, or within an inch or two of it. There is no closet in the dining room. But I will not further particularize.

From M. O., *San Jose, Cal.*—I suppose comments on the first prize designs are now in order, and therefore I beg to ask if 8 feet 6 inches is not very low indeed for the principal story of a $3500 house? In this place 10 feet is about the lowest to be thought of for a house of the class represented, but 12 feet is considered much better.

From A. P. C., *Springfield, N. J.*—In looking over the plans of the first prize design several questions occur. I would like to know where the range and hot-water apparatus is to be put? I find sinks and wash-trays properly located, but I see no provision for range and boiler. The specification called for the owner to furnish the water-back. It looks to me as though he would be obliged to furnish a place for the range as well.

From A. C., *New Rochelle, N. Y.*—I take the liberty to ask for information with regard to the staircases in the first prize design for $3500 houses. The plans called for ceiling 8 feet 6 inches in the clear between timbers for the first story. The architect has four risers of 7 inches each to the first platform. Deduct 2 inches for floor and ceiling, it leaves only 6 feet in the clear for head-room.

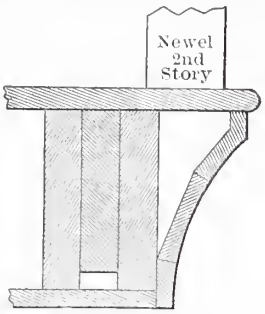


Comments on First Prize Design.—Fig. 2.—Enlarged Plan of Front Hall from G. W. B.

Is that ample space for all ordinary purposes? He shows 8 feet 11 inches for hight of ceiling in the detailed drawings for staircases. I desire to inquire where he gets the extra 5 inches? I also desire to ask how communication is had with the third story or attic?

Note.—With reference to these various

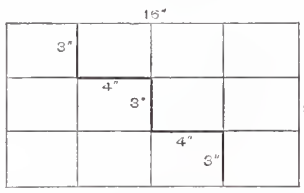
comments concerning first prize design, it is to be remarked that each individual has written from his own particular standpoint. He has evidently had the customs peculiar to his own neighborhood in mind, and has not stopped to think that possibly some other way of doing things exists than that which he has been in the habit of employing. For example, those who have referred to the lack of chimney breasts in the kitchen, forget that portable ranges are used almost exclusively in many sections of the country. Similar remarks might be made with reference to other points raised. It is not necessary, however, to refer to them. Pur-



Comments on First Prize Design.—Fig. 3.—Manner of Obtaining Head-room in Stairway. From the Author of First Prize Design.

suing our usual plan, we present the letters as received, leaving our readers to judge as to them seems right. The last letter above published, which was received first, we sent to Mr. Morrison for his comments, and in response have received the following :

From W. L. Morrison, *Rochester, N. Y.*—In response to your correspondent's inquiry, I would say that the hight of the first story, 8 feet 6 inches, is figured in the clear, that is,



Cutting a 9 x 16 Board to Fill a 12 x 12 Opening.—Fig. 1.—Division of the Board as Proposed by W. L. M. and others.

from top of floor to the ceiling. The head-room going down stairs is provided for by coving the trimmer in the manner illustrated by the accompanying sketch. The discrepancy in dimension between the detailed drawing of the staircase and the sectional drawing of the elevation is an error. The extra 4 inches mentioned by your correspondent is the result of hasty drawing. The attic is intended to be reached through a scuttle in the hall closet.

Cutting a 9 x 16 Board to Fill a 12 x 12 Opening.

From W. L. M., *New York.*—Divide the length into four equal parts, the width into three ; then line out and cut as shown in the

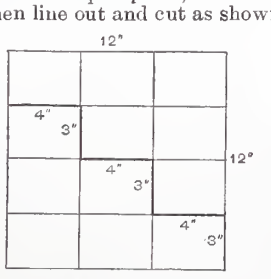


Fig. 2.—W. L. M.'s Method of Joining the Parts.

diagrams. Possibly a little putty would be of service in order to make tight joints.

The following have also sent in the same solution as above given : J. W., Brooklyn ; D. W. J., Lowell, Mass.; T. H. C., Buffalo, N. Y.; J., Hamilton, Ontario ; D. H. J., Danielsonville, Ct.; D. S. D., Philadelphia ; J. F. B., Virginia, Ill.; C. R. J., Georgetown, Del.; C. R. G., Hudson, N. Y.; J. L. L., Scottsdale, Pa.; H. M., Morrice, Mich. ; W. S., Penn Yan, N. Y. ; J. H. M., Brewsters, N. Y. ; W. U. D., Jersey City ; W. S. H., Ogden City, Utah.

From Y. A. M., *Hartford, Conn.*—C. S. J., of Chicago, asked how to cut a board, 9 x 16 inches, so as to close an opening 12 inches square. It can be done by cutting the board in three parts as shown in the accompanying sketches. (Figs. 3 and 4).

From J. W. P., *Marytand, N. Y.*—C. S. J., of Chicago can cut a board 9 x 16 inches, so as to fill an opening 12 x 12 inches, according to the sketches inclosed. (Figs. 5 and 6).

From G. O. W., *Clairmont, N. H.*—The problem proposed by C. S. J., of Chicago, is not a very deep one. Let him cut 4 inches off one end of the 9 x 16 board, thus reducing it to 9 x 12. Then cut the 4-inch piece into 3 parts, making each part 3 x 4 inches in size. Next, turn them in the opposite way from their position in the original piece

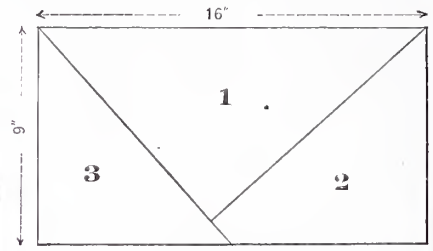


Fig. 3.—Y. A. M.'s Method of Cutting the Board.

and place them along the 9-inch side of the board. This will fill out the square. Any of the readers of the paper can perform this experiment with a piece of cardboard and a pair of scissors.

Horse Power for Woodworking Machinery.

From E. S., *Garrie, Ontario.*—A correspondent asked recently whether horse power could be used advantageously for operating woodworking machinery. In response to this question I desire to narrate my own experience. Some eight years since I was exactly in the same position as your correspondent, when I heard of a second-hand planer for sale, driven by horse power,

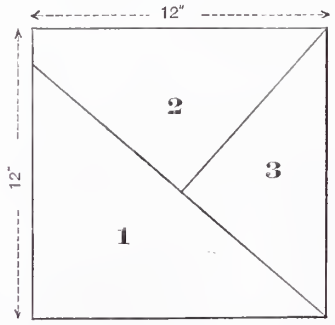


Fig. 4.—Y. A. M.'s Plan of Combining the Parts.

which I bought for $100. This planer had a capacity of 2 feet in width and 6 inches thick. A 12-inch circular saw was also attached. It had no counter-shaft, so I employed a jack and a Pitt's horse-power when moving around the country. When at home, a single-geared 8-horse-power, with a large jack, was used. I had one horse of my own with which I moved my machine and jack—which weighed about 1000 pounds —the machine having a wooden frame. When doing planing, I generally obtained an extra horse. With dry pine I could surface quite as much as by steam power. I speak from experience, for I am running the same planer at the present time with steam. I was able to stick light moldings, using one horse. When I first got the machine I made several patterns of molding irons, took them to a blacksmith shop and had them forged, filing and tempering them myself, with which I made my casings, base and band molding, cornice molding, &c. I ripped all my stuff with the circular saw and grooved my door stiles. I have also driven a jig saw with one horse. I never found any difference in the draft of horse powers, although they were heavy. Although I have had no experience in tread powers, I believe, from report, that two horses will do as much with a tread as three will do with a sweep. With a wood-turning lathe one horse is sufficient with either a tread or sweep power.

I will add that if I had kept on working with horse power I would have been better off to-day, but as I was living in a village I

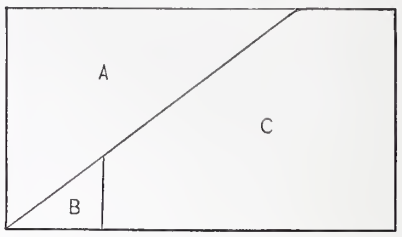


Fig. 5.—J. W. P.'s Method of Cutting the Board.

was urged to build a factory and to get steam power, which I did. The times, however, were not propitious—the village went backward rather than forward. I did not make the factory pay, and lost all I had by the speculation. Hence, I would advise your correspondent to be satisfied with what his means will allow, and if he can by any possibility meet his demands with a horse power, to use it rather than to purchase a steam engine.

From C. P., *Clevetand, Ohio.*—I have been very much interested in what has appeared

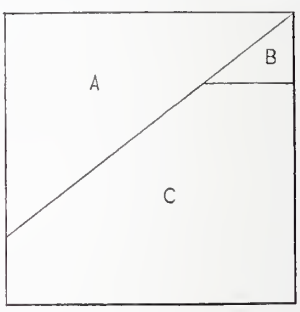


Fig. 6.—J. W. P.'s Method of Joining the Parts.

in the correspondence department of *Carpentry and Building* with regard to horse-power for wood-working machinery, and I now desire to ask one or two questions having a practical bearing. I am running a stair-building shop in this city, and am considering the propriety of using horse-power in connection with the same, because my business is so small that it does not seem likely steam power will pay. I want to inquire from those who have written to *Carpentry and Building* upon this subject, or of others who have had experience in the same direction, what style of horse-power they employ, and whether or not any patents are involved in the use of the same.

Note.—C. P. will find his question answered in part by the letter from E. S. above.

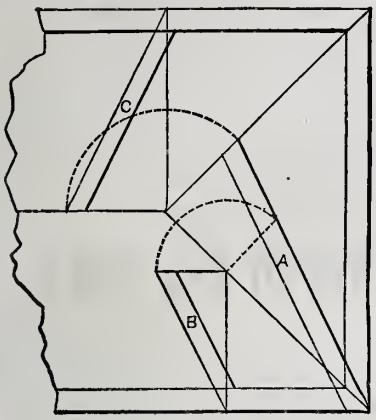
White Stains on Brickwork.

From D. H. J., *Danielsonvitte, Conn.*—I notice in a recent number of the paper a question concerning white stains on brickwork. I was brought up in a brickyard ; my father and my grandfather before me being brick makers. As long as they operated the yards the bricks produced never gave any indication of white stains, but those which came from other yards in the vicinity were stained, and the cause was said to be coal dust mixed with the clay to facilitate the burning. Since the yards owned by my father and grandfather have passed into other hands coal dust has been used, and the bricks now produced, when used in buildings and chimneys, show the white stains referred to, and yet are made from the same bed of clay. It is generally

believed in this vicinity that something in the coal dust causes the stain. The mason cannot help such blemishes if the brickmaker uses coal dust.

A Correction.

From "PHIL."—I desire to make a correction with reference to the letter published from me on page 236 of the December number. In the plan of roof, Fig. 1, there given, one of the lines in connection with the jack rafter is in error. The dotted line



Correction from "Phil."

in the plan, from the seat of the jack to the side of the hip, should be drawn at right angles to the hip, as indicated by the inclosed sketch. I trust, although some time has elapsed since my letter was published, that you will find space for this correction, in order that I may be placed right before the readers of the paper.

Hopper Bevels.

From W. H. C., *Orillia, Ont.*—I see by your January issue of *Carpentry and Building*, that my rule for "hopper bevels" has been subjected to the geometrical microscopes of "Old Mahogany" and A. S. L. Yes, the rule, as presented, is quite worthy of the brand "rotten," as I saw as soon as it appeared. How I came to make the blunder I cannot tell, and I now give the drawings as they should have appeared, which will stand the test of your critics. Fig. 1 shows how to get the side, butt and miter bevels for a hopper having sides of equal flare. A B is the given flare, A C being a horizontal and C B a vertical; make C D = A B, and connect A D for the side bevel shown at A; on A, center, radius A D, intersect B E in E, B E being square to C B; connect E A, and on C, center, radius touching A E, draw the arc to H; square H F to H A; bisect A F in G and connect G H; then the bevel at G is the butt bevel, and that at F the miter bevel.

Fig. 2 is for a case where there are two unequal flares to the hopper. On the right angle A^1 C D^1, at D, draw the two flares, as B A, B A^1, and for the side bevels make C D = A B and C D^1 = A^1 B, and connect A D and A^1 D^1 for the side bevels shown. Bisect the angles of the flares by the line B X; make C Y = B X, and on X, center, radius X Y, intersect at E, B E being square to C B; connect X E, and on C, center, strike an arc, touching X E to H; square H F to X H, and bisect X F in G, G bevel being the butt and F bevel the miter.

A. S. L. thinks I "have very curious ideas of hopper bevels," and thinks that "few mechanics can be found willing to use a bevel in the manner described by me." Well, I can't help A. S. L.'s geometrical or practical blindness to the advantage of using a bevel in the same manner in which a try-square is used—a manner, too, which makes one independent of whatever form the edge of board might be—say, with both edges rounded to a semicircle. In that case, how would A. S. L. apply the bevel to the edges by his rule? Does A. S. L. think that my present Fig. 2 "has not a single redeeming feature?" No, A. S. L., I am not at all "discouraged," nor do I need to "study carefully," &c., because my rule, as corrected, will, I think, be declared by the readers of this journal, when they weigh the matter, to be the best yet submitted for the solution of hopper bevels.

REFERRED TO OUR READERS.

Stretching Chromos.

From J. P. F., *South Acton, Mass.*—Will some one give me the way of mounting chromos preparatory to framing, or, as some call it, stretching? By so doing a great favor will be conferred.

Clothes Rack.

From I. L. R., *Germania, Ohio.*—Will some of the readers be so kind as to furnish a design for a clothes rack suitable for kitchen use?

Board Measure.—Contents of a Tapering Log.

From G. A. L., *Middletown, R. I.*—Will some reader of the paper show me how to figure out the number of feet contained in a stick of timber which is 30 feet long, 12 inches square at one end and 6 inches square at the other?

From J. C., *Newport, R. I.*—I would like to inquire, through the columns of the paper the proper rule for finding the contents of a tapering timber in board measure, or the contents of a stick 12 inches square at one end, 6 inches square at the other and 30 feet long?

Design for Furniture Store.

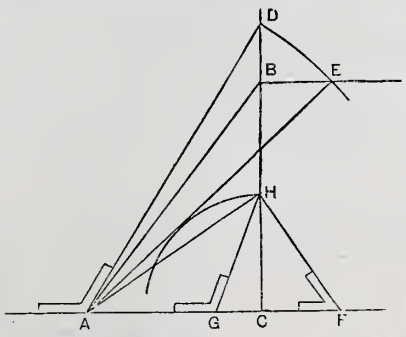
From J. H. W., *Due West, S. C.*—Will some of the readers of the paper be so kind as to send in a plan and front elevation for a furniture store suitable for a country town? I would like also to see an estimate of the cost. My desire is for a wooden building.

Construction of a Right-Angled Triangle.

From C., *Patterson, Ohio.*—Will some of the readers of the paper give a correct solution to the following: Where must a tree which is 70 feet high break off, so that one end of the piece broken off may rest on the stump, and the other end on the ground 20 feet from the base of the tree? I would prefer an arithmetical rather than algebraic solution.

Questions Concerning Plastering.

From S. J. B., *Menominee, Wis.*—I desire to ask the intelligent readers of the paper a few practical questions. Why do architects invariably call for dry and well-seasoned lath? Is there any advantage in lath being well seasoned for plastering purposes? Is it possible to use one bushel of hair to one barrel of lime for plastering mortar? I see it called for very frequently by architects. Does hair do mortar any good except to make it work better on lath? I should be pleased to have these questions answered by some of the practical readers of *Carpentry and Building*.



Hopper Bevels.—Fig. 1.—Accompanying Letter from W. H. C.

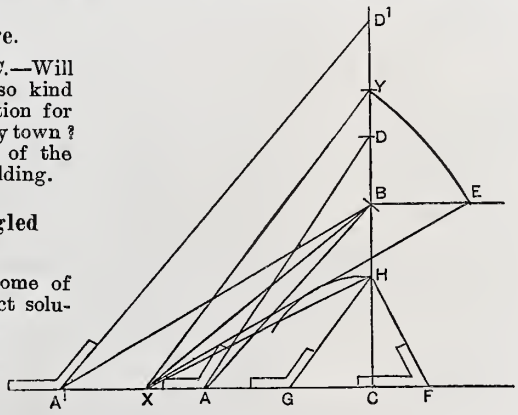
Combined Bookcase and Secretary.

From G. W., *Marysville, Mo.*—I will be obliged to some of the readers of *Carpentry and Building* if they will furnish for publication a design for a bookcase and secretary combined.

Dampness in Walls.

From C. M., *St. Louis, Mo.*—The wall of my house for from 18 to 24 inches above the base-board inside is slightly damp. The plastering is rotten, the sand always falling from it. When new plastering is applied, it soon becomes in the same condition. The dampness is absorbed from the earth, as the brickwork extends below the surface of the ground. I would like to know of some cheap, effectual way of preventing the water from soaking up, so as to keep the wall dry. I inclose a rough drawing of the way in which the wall was put up.

Note.—The sketch inclosed by our correspondent represents the foundation walls of his cellar of stone, extending, probably, 12 to 18 inches above the cellar bottom. Upon this a wall of brick 12 inches thick is built, which is continued up to the hight required for the house. The ground line outside of the house is 12 or 18 inches below the first floor line on the inside. His difficulty seems to be that of water soaking into the wall and working its way up, to the detriment of his plastering, as described. Since this is a question with which many of our practical readers undoubtedly have to do very frequently, we are disposed to refer it to them before we attempt any answer ourselves. Several plans occur to us by which a remedy could be provided, all of them being somewhat expensive and not easy of application. We trust our readers will discuss this question, that practical remedies may be published.



Hopper Bevels.—Fig. 2.—Accompanying Letter from W. H. C.

Carpenters' Tools.

From W. G. M., *Warrensburg, Mo.*—Will not some expert write a chapter on the character and uses of the various tools employed by carpenters, joiners and cabinet makers? Such an article from a practical man would be very interesting and of great usefulness.

Construction of Windows.

From W. G. M., *Warrensburg, Mo.*—I shall be pleased to see an article on the best plan of making and fitting window frames, with full descriptions for hanging sash and trimmings. An article giving all the particulars concerning the construction of windows would be of great value to the readers of the paper generally.

Proportionate Reduction.

From E. T., *Lorraine, N. Y.*—I want to ask our old friend W. B. to furnish a method of reducing a bracket in exact proportion. In the December number he gave method of reducing a given plan or surface, but not a figure of irregular outlines. Something of this kind will be of value to me, and I have no doubt of general interest to your readers.

Three Men Sawing off a Log.

From J. R., *Post Hope.*—Three men agree to saw an equal amount in cutting off a log 36 inches in diameter. How far shall each man cut in order to complete his share of the task, and how shall they find the lines to cut to? I should like to see some of the readers of the paper display their skill in the solution of this problem.

ACKNOWLEDGMENTS.

From J. W. P., Maryland, New York.—We have a set of plans and elevations with a description of a hop house which we regret we have not space at present to publish in full. The sketches represent a house built upon the hillside. We think we can give such a description of them as will be of service to our readers. The intent of the designer has been to produce a hop house and dwelling combined. Accordingly, in the lower or basement story we find a kitchen, pantry and cellar. The principal story contains at one end the kiln, in the middle part the press room, and over the living apartments of the basement a parlor and bed room. The upper story has the kiln at one end and the store room occupying the remainder of the floor. The kiln at the end of the building is surmounted by a very neat cupolo which also serves as a ventilator. The correspondent, in describing his plans, says: "The building represented is to be erected on a bank, the kiln end being against the hill. By thus locating on the hill a great deal of hard labor is saved in getting the hops into the kiln. It is proposed in this building to make the kiln 14 feet from the ground up to the hop carpet. Six draft holes are provided under the sills, which, in connection with the ventilator on top, will insure a good draft. The draft is regulated by means of a trap door that can be raised and lowered at pleasure. Large doors are provided on the sides of the building which may be closed in case of wind. The living rooms provided are ample for any family usually living in such places. I consider the entire arrangement much better than anything of the kind I have ever seen."

Y. A. M., of Hartford, Conn., proposes a problem with reference to the equal division of a board which is wider at one end than at the other. This problem is essentially the same as that already discussed in our columns under the head of "Problem in Equal Areas," and, therefore, we do not see fit to revive it at this time. We have in hand still other communications on the original problem, which will be published as soon as we can find space.

From J. W., of Brooklyn, we have a problem relating to the length of a spiral around a tapering post which he submits for solution in this department of the paper, but which we must decline. It is sometimes very difficult to decide what to publish and what to refuse in matters of this kind. We cannot err, however, in rejecting problems which have no practical application in the daily work in which the majority of our readers are supposed to be engaged.

Prices of Building Materials in New York, March 21, 1881.

Blinds.—OUTSIDE.—Discount 15 @ 25

Per lineal, up to 2.10 wide	$	@ 0.24
Per lineal, up to 3.1 wide		@ 0.28
Per lineal, up to 3.4 wide		@ 0.31
Per lineal, paint'd and trim'd	0.45	@ 0.55

INSIDE.

Per lineal, 4 folds, Pine		@ .56
Per lineal, 4 folds, ash or chestnut		@ .90
Per lin'l, 4 folds, cherry or butternut		@ 1.30
Per lineal, 4 folds, bl'k wal't.		@ 1.30

Bricks—(Afloat.)

Pale	₱ M. $2.50	@	3.00
Jersey	" 5.50	@	5 75
Long Island	" 6 25	@	6.50
Up-River	" 6 00	@	6.25
Havers'aw Bay, 2ds	" 6.00	@	6 50
Havers'aw Bay, 1sts.	" 6.50	@	6.75
Croton—Brown	" 10 00	@	11.00
Croton—Dark	" 11.00	@	12.00
Croton—Red	" 11.00	@	12.00
Philadelphia Fronts	"	@	24.00
Trenton "	"	@	23 00
Baltimore	" ...	@	38.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2 00 for Crotons aud $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh	$35 00	@ ....
Scotch	30.00	@ ....
English	30.00	@ 32.00
Silica (English)	35.00	@ ....
Silica (Welsh)	50.00	@ ....
Stourbridge	50.00	@ ....
American, No. 1	.....	@ 40.00
" " 2	.....	@ 30.00

Afloat. 500 ₱ M less

Cement.—(Cargo rate.)

Rosendale. ₱ bbl	$....	@ 1.10
Portland Saylor's American, ₱ bbl	2.25	@ ....
Portland (Imported) ₱ bbl	2.75	@ 2.95
Roman	" 2.75	@ 3.00
Keene's coarse	" 5.75	@ 6.00
Keene's fine	" 10.50	@ 11 00

Add 25 cts. to above rates for yard prices.

Doors.—15 to 25 % dis.

RAISED PANELS, TWO SIDES.

2.0 x 6.0	1¼ in.	$1.10 ....
2.6 x 6 6	1¼ in.	1.53 ....
2.6 x 6 8	1¼ in.	1.58 ....
2.8 x 6 8	1¼ in.	1.67 ....
2.10 x 6.10	1¼ in.	1.90 ....
3.0 x 7.0	1¼ in.	2.00 ....

MOULDED.

Size.	1¼ in.	1½ in.	1¾ in
2.0 x 6.0	$1.81	....	....
2.6 x 6.6	2.33	2.68	....
2.6 x 6.8	2.28	2.72	....
2.6 x 6.10	2.32	2.80	....
2.0 x 7.0	2.39	2.91	....
2 8 x 6 8	2.37	2.92	3.56
2.8 x 7.0	2 49	3.03	3.75
2.10 x 6.10	2.61	3.16	3.96
3.0 x 7.0	2.73	3.41	4.20

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Bends & Elbows, Each.	—Branches— Sing.	Traps, D'bl. & V.	Each.
2 in..	$ .13	$ .40	$ ...	$1.00
3 " ..	.16	.50	.61	1.25
4 " ..	.20	.65	.75	1.30
5 " ..	.25	.85	.90	1.55
6 " ..	.30	1.15	1.05	1.80
7 " ..	.35	1.50	1.20	2.05
8 " ..	.45	2.00	1.45	2.45
9 " ..	.55	2.50	1.70	2.85
10 " ..	.70	3.00	2.00	3.30
12 " ..	.80	3.75	2.52	4.24
15 " ..	1.25	5.00	House	Sewer
18 " ..	1.60	7.50	Branches pr. lin. ft.	Branches pr. lin. ft.,
			15x6 $1.75	15 in. $2.25
			18x6 2.50	18 " 3.00

Longer than 1 ft., Scharged as pipe.

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$8.25	$7 50	$7.00	$6.50
11x14—15x24	9.25	8.50	8.00	7.25
16x24—20x28	10.75	9.75	8.75	7.75
15x34—24x30	12.25	10.75	9.00	8.50
26x28—24x36	13.00	11.50	9.75	9.00
26x36—26x14	14.50	13.25	10.75	9.50
26x46—30x50	15.00	14.00	11.25	10.50
30x52—30x54	16.00	14.50	12.00	...
30x56—34x56	17.25	15.50	13 50	....
34x58—34x60	18.25	17.25	15.00	....
36x60—40x60	20 75	18.75	17.25	....

DOUBLE.

6x 8—10x15	$12 75	$11.75	$10.75	$10.00
11x14—15x24	14.50	13.25	12.50	11.25
16x21—20x28	17.25	15.75	14.00	....
15x34—24x30	19.75	17.25	14.50	....
26x28—24x36	21.00	18.50	15.75	....
26x36—26x44	23.25	21.25	17.25	....
26x46—30x50	24.00	22.50	18.00	....
30x52—30x54	25.75	23 25	19.25	....
30x56—34x56	27.75	25.00	21.75	....
34x58—34x60	29.25	27.75	24.00	....
36x60—40x60	33.25	30.00	27.75	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: Singie, 70 %; Double, 70&10 %.

French

WINDOW, PICTURE AND CAR GLASS.

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x13	$6.50	$5.75	$5.50	$5.25
11x14—16x24	7.25	6.75	6.25	6.00
18x22—20x30	9.25	8 50	7.75	7.25
15x36—24x30	10.25	9.25	8.25	....
26x28—24x36	11.00	10.00	9.00	....
26x36—26x44	11.75	10.75	9.50	....
26x46—30x50	13.25	12.50	10.50	...
30x52—30x54	14.00	13.00	11.25	....
30x56—34x56	15.00	13 75	12 50	....
34x58—34x60	15.50	15 00	13 25	..
36x60—40x60	17.50	16.00	15.00	. ..

DOUBLE.

6x 8—10x15	$8.25	$7.75	$7.50	$7.00
11x14—16x24	10 00	9.25	8.75	8.25
18x22—20x30	12.75	11.75	10 75	....
15x36—24x30	14.25	13.00	11.25	....
26x28—24x36	15 25	13.75	12.50	....
26x36—26x44	16 25	14.75	13 00	....
26x46—30x50	17.50	16.75	14.25	....
30x52—30x54	18.50	17.25	14.75	....
30x56—34x56	19.50	18.25	16.25	....
34x58x34x60	20.50	19.50	18.00	....
36x60—40x60	23 00	21.00	20.00	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: 50&15 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS

Per square foot, net cash.

⅛	Fluted plate, case 10c; cut to size	16c.		
3-16	Fluted plate	" 13c.	" "	18c.
¼	Fluted plate	" 16c.	" "	20c.
¼	Rough plate	" 16c.	" "	20c.
⅜	Rough plate	" 21c.	" "	27c.
½	Rough plate	" 28c.	" "	33c.
¾	Rough plate	" 45c.	" "	55c.
1	Rough plate	" 55c.	" "	65c.

Hair.

Cattle	₱ bushel,	$0.13 @ 0.15
Goat	"	0.18 @ 0.20

Lath.

Cargo rate	₱ M	$2.00 @ ....

Lime.

Glen's Falls, or Keenan's common, cargo rate ₱ bbl	@	.90
Glen's Falls, or Keenan's finishing Jointa		1.15 @....
Rockland, common		1 00 @....
Rockland, finishing		1.25 @....

Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Pine, very choice and ex.. dry, ₱ M. ft. thick	$60.00 @	$65.00
Pine, clear	55.00 @	60 00
Pine, selects	45.00 @	50.00
Pine, pickings	35.00 @	42.50
Pine, selected, box	20.00 @	22.00
Pine, common box	17.00 @	20.00
Pine, common box, ⅝	15.00 @	16.00
Pine, 1¼x10, 13 ft., matched, each	.40 @	.43
Pine, 1¼x10, 13 ft., culls	.28 @	.30
Pine, 1x10, 13 ft., good matched, each	... @	.30
Pine, 1x10, 13 ft., common, matched, each	.23 @	.25
Pine, 1x4½, clear, match'd, each	.23 @	.25
Pine, 1x4½, merchantable, matched, each	.17 @	.18
Pine, 1¼x4½, ci'r, match'd, each	... @	.35
Pine, 1¼x4½, merchantable, matched, each	.28 @	.30
Spruce, 1x9, 13 ft., rough	.19 @	.20
Spruce, 1x9, 13 ft., matched, each	.22 @	.24
Spruce, 1¼x9, 13 ft., rough	.23 @	.25
Spruce, 1¼x9, 13 ft., matched, each	.25 @	.27
Spruce, 2x9, 13 ft., rough	.38 @	.40
Spruce, 2x9, 13 ft., match'd, each	.44 @	.47
Spruce, 2x4, 13 ft.	.15 @	...
Spruce timber, flat, ₱ M ft	22.00 @	23.00
Spruce timber, square, ₱ M ft	23.00 @	25.00
Hemlock, 1x10, 13 ft., each	.18 @	...
Hemlock, 2½x4, 13 ft., each	.16 @	.18
Hemlock, 3x4, 13 ft., each	.19 @	.20
Hemlock, 4x6, 12 ft., each	.40 @	.43
Ash, good, ₱ M ft	45.00 @	55.00
Oak	45.00 @	55.00
Oak, quartered	70.00 @	90.00
Maple, common	25.00 @	35.00
Maple, good to 2 in	40.00 @	45.00
Maple good thick	45.00 @	55.00
Maple white	55 00 @	60.00
Chestnut	45 00 @	60.00
Bl'k walnut, good to choice	85.00 @	100.00
Black Walnut 2d	55.00 @	65.00
Black walnut, 5/4	75.00 @	85.00
Black walnut, selected and seasoned	100.00 @	120.00
Bl'k walnut counters, ₱ ft.	.12½ @	.20
Cherry, wide, ₱ M ft	85.00 @	100.00
Cherry, ordinary	70.00 @	80.00
Whitewood, or Poplar 5/4 in.	30.00 @	35.00
Whitewood, or Poplar 5/4 panels	35.00 @	45.00
Whitewood, or Poplar 1 to 1½ inch	40.00 @	50.00
Whitewood or Poplar. 2 in. and upward	45.00 @	50.00
Shingles, extra sawed pine, 18 in.	5.00 @	6.00
Shingles, clear sawed pine, 18 in., 2 md	4.00 @	5.00
Shingles, cypress, 7x24	14.00 @	18 00
Shingles, cypress, 6x20	12.00 @	14.00
Shingles, Cedar, 6x24, No. 1	— @	22.00
Shingles, Cedar, 6x24, A's	— @	16.00
Shingles, Cedar, 6x20, No. 1	— @	12.50
Shingles, Cedar, 6x20, A's	— @	10.00
Shingles. Cedar Eastern	— @	3.50
Shingles, Hemlock	— @	3.75
Shingles, Pine	4.00 @	5 00
Shingles, Spruce	— @	3.50
Shingles, Redwood (California), ordinary, per bunch	— @	.85
Shingles Redwood (California) 6x16 cut	— @	1.85
Yellow pine dressed flooring, wide, ₱ M ft	35.00 @	37.00
Narrow ditto	35.00 @	40 00
Yellow pine timber	30.00 @	45.00
Locust posts, 8 ft., ₱ in	.18 @	.20
Locust posts, 10 ft.	.24 @	.25
Locust posts, 12 ft.	.25 @	.30
Chestnut posts, ₱ ft	.03 @	.3½
Mahogany, ¼ in. ₱ ft	.05 @	.07
Mahogany, ⅜ in. ₱ ft	.08 @	.10
Mahogany, ½ in. ₱ ft	.10 @	.12
Mahogany, ⅝ in. ₱ ft	.12 @	.14
Mahogany, ¾ in. ₱ ft	.14 @	.16
Mahogany 1 in. ₱ ft	.16 @	.18
Rosewood, ¼ in. ₱ ft	.11 @	.15
Rosewood, ¼ in. ₱ ft	.16 @	.20
Rosewood, ⅜ in. ₱ ft	.24 @	.28
Rosewood, ⅝ in. ₱ ft	.40 @	.45
Rosewood, 1 in. ₱ ft	.60 @	.75
Satin wood, ¼ in. ₱ ft	.25 @	.35
Satin wood, 1 in. ₱ ft	.35 @	.50
White holley ¼-inch	.10 @	.12
White holley ⅜-inch	.15 @	.18
Cedar (Cuban and Mexican) ₱ ft	.10 @	.14
Cedar (Florida) Less than 1 inch	.16 @	.24
1 inch and over	.25 @	.30
Redwood (California) 1 to 2 in., dry, per M	@	60.00
3 in. and over, per M	@	60.00

Mouldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof building, ₱ lb.	.16c @	17c
Rosin Sized Sheating, ₱ lb.	4c @	5c
Dry Sheating ₱ lb	3c @	3½c
Tarred Felt. ₱ lb	.... @	3c

Plaster.

Calcined City	Mill rate.	$1 25 @ ....

Sash.—15 to 25 % dis.

Dimensions of windows.	GLAZED. 12 Lights.	8 L's.	4 Lights.		HEAD LIGHT. Two or three Lights, Glazed. 12 Lights.	8 L's.	4 Lights.
	1¼pi. 1¼c.	1½c.	1¼c.	1½c.			
2.1x3.6	$1.12 1.20	....	....	....	....	....	....
2.4x3.10	1.28 1.36	....	....	1.52	....	....	....
2.7x4.6	1.59 1.67	....	....	1.90	2. 0	....	....
2.7x4.10	1.68 1.75	....	....	2.20	2.30	....	....
2.7x5.2	.... 1.85	....	....	2.28	2.40	....	....
2.7x5.6	....	....	2.49	2.45	2.60	....	....
2.7x5.10	....	....	2.54	2.60	2.75	....	....
2.10x4.6	1.71 1.81	1.92	....	....	....	....	....
2.10x5.2	1.91 2.00	2.16	2.51	2.50	2.65	....	....
2.10x5.6	2.05 2.16	2.35	2.56	2.61	2.83	....	....
2.10x5.10	2.35 2.45	2.65	2.69	....	3.05	....	....

c. means counted checked—plowed and bored for weights.

Hot bed sash, glazed		$2.35

Slate.

Prices unsettled, probable advance in all except roofing.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're.	$5.50 @	$6 00
Green slate	5.50 @	6.00
Red slate	.... @	10.00
Black slate, Pennsylvania	4.00 @	4.50
Tiles, 1¼ in. rubbed, ₱ sq. ft.	.25 @	.28
	₱ sup. ft.	
Steps and platforms, 1 in. thick		.30c
" " 1½ "		.40c
" " 2 "		.55c
Risers, 1 inch thick		.35c
Coping, 1½ "		.35c
" 2 "		.40c
	Lineal ft.	
Window sills, 4x7		.55c
" 3x7		.45c
Window caps, 4x10, plain		.80c
" 4x8, "		.60c
" 3x10, "		.55c
" 3x8, "		.50c

Stair Material.

BALUSTERS.

Black Walnut. 1½ in.	1¾ in.	2 in.	2½ in	
Fancy Turned	7c	9c	10c	16c
Neck Turned	9c	10c	12c	19c
Fluted or Octagon	12c	14c	17c	25c

OCTAGON PANELED NEWELS.

Panels Veneered with French Walnut.

8-inch Newels, with Cap		$6.12
9 " " "		6.88
10 " " "		7.60

SOLID NEWELS, WITH CAPS.

Black Walnut.	5 in.	6 in.	7 in.	8 in.
Fancy Turned	$1.60	$1.90	$2.50	$3 40
Octagon	2.10	2.40	3.00	3.90

STAIR RAIL.

Worked out and finished ready to put up. Easements and cylinders counted double. Price per foot Newels and Balusters not included).

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded	40c	45c	50c	53c
Toad Back	45c	50c	63c	68c

STAIR RAIL, UNFINISHED.

Price per foot.

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded	11c	13c	15c	17c
Toad Back	12c	14c	16c	18c

Stone.

Cargo rates. delivered at New York.

Amherst Blue		$0.90
Amherst freestone, in rough. ₱ C ft		1.00
Bay of Fundy, Wood Point, brown	0.80 @	1.00
Bay of Fundy, Mary's Point, brown	$0.80 @	1.00
Bay of F'dy, Mary's Pt., olive.	0.80 @	1.00
Berlin Blue	.... @	0.90
Berlin freestone. in rough	.... @	1.00
Berea freestone, in rough	.... @	.80
Brown stone, Portland, Ct	1.25 @	1.50
Brown stone, Belleville, N. J.	1.00 @	1.50
Granite rough	.50 @	1.00
Dorchester, N. B., stone, rough ₱ foot.	.... @	1.00

BLUE STONE.

Rubbed hearth, 10 ft. or under		25c
Rubbed hearth, 20 ft. or under		35c
Rubbed hearth, 30 ft. or under		45c
Rubbed hearth. 40 ft. or under		50c
Rubbed sills		30c
Sawed & Planed		40c
Sills and lintels	.... @	18c
Sills and lintels, fine quarry cut sills	.... @	35c
Coping, 11 to 18 in. wide		20c @34c
Coping, 20 to 28 in. wide		38c @ 6cc
Coping, 30 to 36 in. wide		65c @ 80c
Steps, 8 in		.... @60c
Steps, 7 in		.... @55c
Steps, 6 in		.... @35c
Steps, door. per in. wide	.... @	3c
Platforms, promiscuous, 4 in.	.... @	32c
Wyoming Valley, promiscuous, per cubic ft		1.30@1.35

Vault Lights.—Nominal.

Platform, sq ft		$3.50
Step and risers, sq. ft		3.50
Floor light, sq. ft		2.50
Roof light, sq. ft		2.50
Platform, 2d quality, sq. ft		2.60

COVERS.

Diameter.	Round.	Hexagon.
14 inch	$3.00	$0.00
16 "	3.75	4.00
18 "	5.50	6.00
20 "	8.00	8.50
24 "	14.00	15.00
26 "	16.00	17.00
30 "	23.50	25.00
36 "	31.00	33.00

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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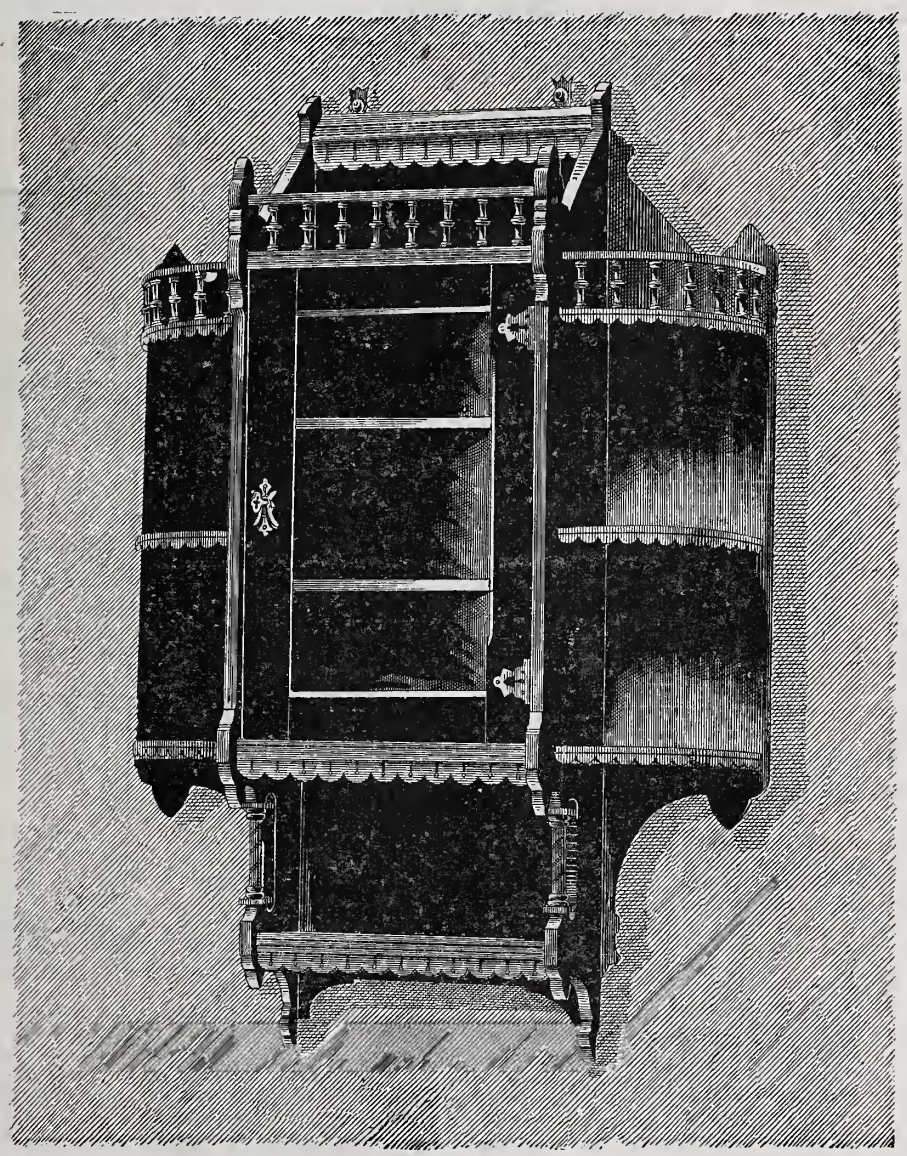
Hanging Wall Cabinet.

Our first illustration this month shows a hanging cabinet of a kind quite fashionable at the present time, but which possesses the merit of also being exceedingly useful, not only for holding porcelain, glassware and fashionable *bric-a-brac*, but also for the more rational purpose of a book and newspaper rack, and even for a movable mantel shelf. By the several views we present, including details, any carpenter can make this article for his own use or to sell. The glass door allows the interior to be seen, and at the same time serves as a protection from dust. The engraving shows the cabinet ebonized. This makes it a very rich and showy article, provided, of course, the work is well done. Poor ebonizing is never so good as the natural wood. We have seen this same design in chestnut. The filling of the pores was perfect, and the finish was a dead smooth gloss. The beauty of such an article as this depends as much upon the finish given to the wood as upon the workmanship employed by the constructor. In the large furniture establishments it may be noticed that cheap and costly articles often differ from each other more in this respect than in design or durability.

This design, if made up in light woods, might be varied by making the spindles and little columns below the principal shelf of some rich colored wood, which would contrast with the main body of the work. The brasswork used upon this article should be left yellow if the cabinet is to be ebonized. In any event, the parts should be thick and showy. If the hinges, &c., cannot be had at the hardware stores, and the carpenter has a suitable saw, he can cut out of soft sheet brass such patterns as he wants, polishing them by way of finish. By increasing the size of the parts he can make up for the thinness of the brass he will be obliged to use. Some saws, however, will cut soft brass up to 1-16th of an inch in thickness.

If "polished plate" glass can be had for the door, it is to be preferred. The extra cost will probably be more than repaid by the increased price obtained for the cabinet in case it is made to sell. Failing to get "polished plate," try to get a heavy "polished sheet" glass. If this cannot be obtained, get the heaviest and clearest common glass possible, which, after all, can be made to answer a very good purpose.

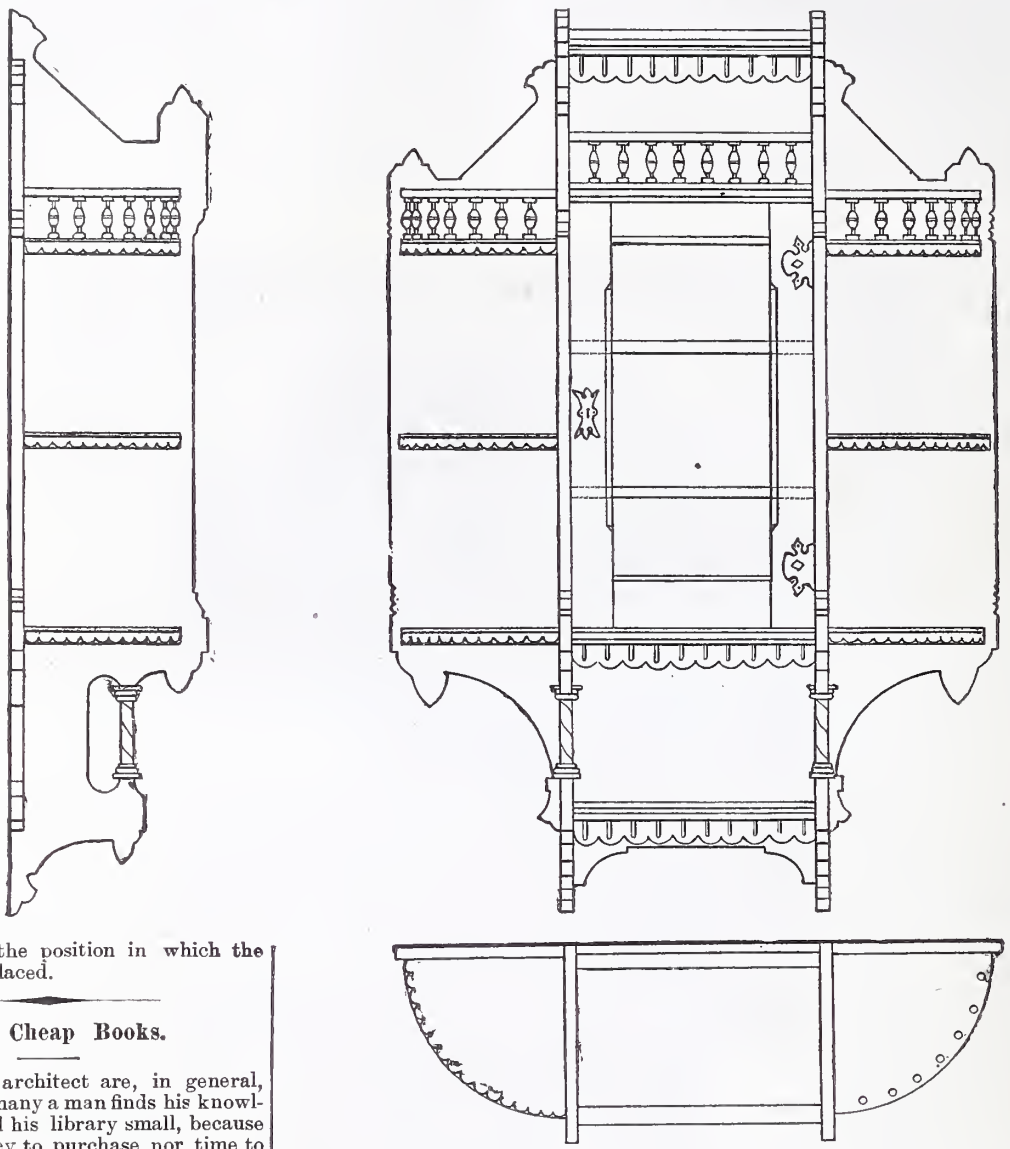
If a light wood is used, the inside of the cabinet may be lined with red cloth. If expense is an item, "Turkey red" can be used. This is a standard article, though the price in this city varies from 12 or 15 cents per yard up to 45 or 50 cents. It is the right color for the purpose, and does not fade. An "old gold" plush might be used for a lining for the cabinet if ebonized, though it is quite usual when ebonizing to make the whole inside black. If the door can be made to fit against a strip of list so as to make it really dust-tight, so much the better. If plates are to stand upon the shelves, a square groove should be provided to hold their lower edges, or else a little batten—say ¼ of an inch square—should be put on



Hanging Wall Cabinet.—Fig. 1.—Perspective View.

for the same purpose. This makes it possible to stand a plate up against the back or in a corner without any danger of its slipping down. If the workman is skillful in handling his chisel, there are several places where he may indulge in a little carving. In any case this should be sparingly used, and unless he is sure that he can make something good he had better omit it entirely.

By comparing the detail of spindle shown in Fig. 5 with the spindles shown in the perspective, Fig. 1, it will be noticed that there is a difference in proportion and in outline. The judgment and taste of the mechanic who employs the design are to be exercised in choosing that which will be most pleasing in the position in which the cabinet is to be placed.



Hanging Wall Cabinet.—Fig. 2.—Front and Side Elevations and Plan.—Scale, 1½ Inches to the Foot.

Some Cheap Books.

Books for the architect are, in general, high priced, and many a man finds his knowledge limited, and his library small, because he has not money to purchase nor time to visit a city where he can see a stock and so select what he needs. This is especially true of the works on general architectural subjects. Many men do not dream that there are works at small prices which contain general information pertaining directly to the profession. As an example of the cheap literature treating of architecture and its relations to the ordinary workmen, take the case of audience rooms, &c. Carpenters are often called upon to consult in the construction of halls and lecture rooms and the like, yet how many of them, we wonder, would imagine that there is a book, costing only 60 cents, which gives in a compact form the leading facts in regard to the best forms known for constructing audience rooms for public speaking and singing? This little work [1] will not teach how to make speaking and hearing easy in buildings of all sorts and sizes, but it will greatly aid in designing. One whole chapter is devoted to the arrangement of seats so that each person may have a clear view of the speaker. Diagrams are given showing how to lay out the floor curves to obtain this result. Diagrams are also given of some of the best halls for public speaking which had been built at the time the book was written. These are accompanied by hints and suggestions which are very valuable, and, if more generally known and heeded, would give fewer bad audience rooms. There are some suggestions as to the size of a building in which seeing and hearing are perfect which should be heeded by all builders. Although the book is small, there are a number of pages of familiar talk in regard to the science of sound and the laws by which it is governed. We believe it would be a good thing if every man who goes to church would carefully read the book from beginning to end. We should then, at least, have a people trained to appreciate the importance of a room easy to speak and easy to hear in.

People very often complain that the colors selected by the architect or builder do not suit them, and are inharmonious. The result of this is that the owner and painter have to lay their heads together as a sort of committee on color. The owner's lack of knowledge of the subject gives the painter an undue advantage, and he has things all his own way. Here another little book [2] is obtainable, costing $1.20, which is of great assistance —"Field's Grammar of Coloring." It has been enlarged by Davidson, and is a standard work, not only for the artist, but for the general reader. A large portion of the book is devoted simply to colors themselves, as found in the market, their characteristics, composition, durability and other information about them. Of course, the work is invaluable to the painter as a reference book, but it is almost equally valuable to the builder. An older edition [3] of this work, without Davidson's additions, is also in print, the price being less. Although in part these two works are identical, money will not be wasted in buying both of them.

There is a cheap edition of "Vitruvius' Architecture," [4] which enables even the poor man to put into his library as a reference book a good translation of the old Roman. Ancient though he was, one cannot read the works he has left without coming to a conclusion, well expressed by the slang of the day, that we "do not know it all." There are many sound lessons taught in his pages and many good hints given that are as useful to-day as when they were written—2000 years ago. This author takes up not only the subject of architecture itself, but a great many of the problems which are connected with it. For example, he speaks of healthy situations as well as foundations. Further on he treats of water and the means for finding it. Still other practical matters are mentioned. Of course, there is much that has no possible interest, and some things that we cannot even understand at the present day.

There are many men that would like to have some of the choicest scraps out of Tredgold, but the large work is out of the question on account of the price; and yet, for a

[1] Acoustics in Relation to Architecture and Building. The Laws of Sound as applied to the arrangement of Buildings. By T. Roger Smith. 165 pages, 4 x 7 inches. Price, 60 cents.

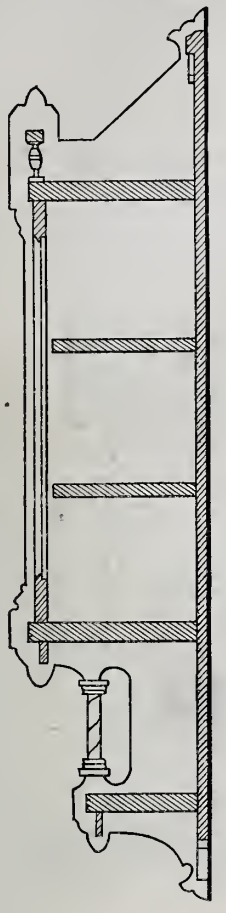
[2] Grammar of Coloring, applied to Decorative Painting and the Arts. By George Field. New edition, revised and enlarged by Ellis A. Davidson. With numerous woodcuts and colored diagrams. 224 pages, 4 x 7. Price, $1.20.

[3] Painting: a Grammar of Coloring applicable to House Painting, Decorative Architecture and the Arts. With colored illustrations. By George Field. 180 pages, 4 x 7 inches. Price, 80 cents.

[4] The Architecture of Marcus Vitruvius Pollio. Translated from the Latin by Joseph Gwilt. Illustrated. 316 pages, 4 x 7 inches. Price, $2.

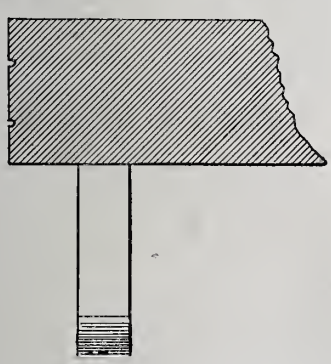
little less than $4, what might almost be called the meat[5] from Tredgold can be obtained, together with an atlas of plates,[6] which are copied from the large work.

The student of architecture at the outset desires to know something about the orders.



Hanging Wall Cabinet.—Fig. 3.—Vertical Section.—Scale, 1½ Inches to the Foot.

Most of the works which treat upon this subject go into it so exhaustively as to make them unsuited to his purpose. Accordingly a cheap work is very desirable, even though later he studies the more elaborate and expensive books which are current. A small book by Leeds [7] is frequently recommended in this connection. Its chief value is found in the fact that it is in one sense a dictionary of classic architecture, though not written in that form. It is provided with a glossarial index at the close which makes

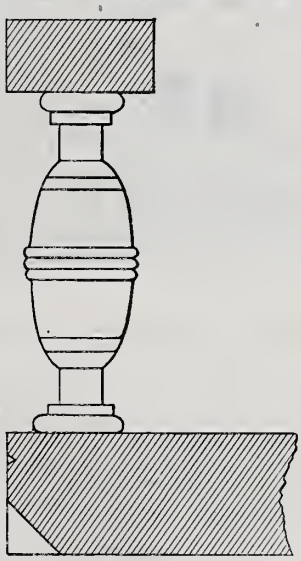


Hanging Wall Cabinet.—Fig. 4.—Detail of Shelf.—Full Size.

the work a unit. Styles of architecture also require an explanation for the young student in the same general way. A little book by T. T. Bury [8] gives a clear and brief account of the various styles of architecture from the earliest times. It is illustrated, the character of the engravings being exceptionally fine for a work of its character. The two books last mentioned are also bound in one,[9] thus giving the student the opportunity to possess them both at a less price than they would cost separately. The principles of design in architecture is something which every architect investigates earlier or later in connection with his profession. A convenient handbook upon this subject is also available at a very low price.[10]

Although the subject of masonry has received considerable attention in our columns, commencing with an early number of *Carpentry and Building*, letters are frequently addressed to us asking for still other papers upon this subject. We presume if our readers generally knew that a desirable work [11] upon this branch of the mechanical trades was available at the low price of $1, they would prefer it to reading such a series of articles as might be published in the paper, extending, as they would, over a number of months. A cheap book treating of limes, cements and mortars;[12] another one concerning the manufacture of brick and tile,[13] and a third on warming and ventilation,[14] are likewise available to the student who desires to investigate these subjects.

We could greatly extend the list of books of this class if we so desired. There is, in

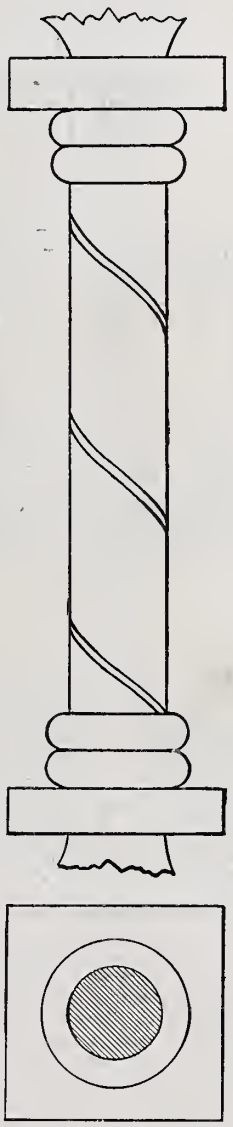


Hanging Wall Cabinet.—Fig. 5.—Detail of Rail above Upper Shelves.—Full Size.

fact, scarcely a subject interesting to the mechanic upon which there are not good and useful reference works, to be had at a small cost. Of course, we do not mean to say that there are low-priced standard text books on all branches devoted to carpentry aad building, but there are on most of the subjects in which the carpenter and builder have incidental interest.

Industrial Secrets.

A century ago, what a man discovered in the arts he concealed. Workmen were put upon an oath never to reveal the process used by their employers. Doors were kept closed, artisans going out were searched, visitors were rigorously excluded from admission and false operations blinded the workmen themselves. The mysteries of every craft were hedged in by thick-set fences of empirical pretensions and judicial affirmation. The royal manufactories of porcelain, for example, were carried on in Europe with a spirit of jealous exclusiveness. His Majesty of Saxony was especially circumspect. Not content with the oath of secresy imposed upon his workpeople, he would not abate his kingly suspicion in favor of a brother monarch. Neither king nor king's delegate might enter the tabooed walls of Meissen. What is erroneously called the Dresden porcelain—that exquisite pottery of which the world has never seen its like—was produced for 200 years by a process so secret



Hanging Wall Cabinet.—Fig. 6.—Detail of Column Below Principal Shelf.—Full Size.

that neither the bribery of princes nor the garrulity of the operatives revealed it. Other discoveries have been less successfully guarded, fortunately for the world. The manufacture of tinware in England originated in a stolen secret. Few readers need be informed that tinware is simply thin iron plated with tin by being dipped into the molten metal. In theory it is an easy matter to clean the surface of iron, dip it into a bath of boiling tin, and remove it, enveloped with a silvery metal, to a place of cooling. In practice, however, the process is one of the most difficult in the arts. It was discovered in Holland, and guarded from publicity with the utmost vigilance for more than half a century. England tried in vain to discover the secret until James Sherman, a Cornish miner, made himself master of the secret and brought it

[5] The Elementary Principles of Carpentry, chiefly composed from the standard work of Thomas Tredgold, and a Treatise on Joinery. Edited by E. Wyndham Tarn. Illustrated. 300 pages, 4 x 7 inches. Price, $1.40.

[6] Atlas of Engravings to accompany and illustrate Elementary Principles of Carpentry, with a Treatise on Joinery. 35 plates. 8 x 11 inches, with descriptive letter-press. Price, $2.40.

[7] The Orders and their Aesthetic Principles, with illustrative engravings. By W. H. Leeds. 144 pages, 4 x 7 inches. Price, 60 cents.

[8] The Styles of Architecture of Various Countries. By T Talbot Bury. Illustrated. 208 pages, 4 x 7 inches. Price, 80 cents.

[9] Orders and Styles of Architecture. The two volumes last described bound in one. Price, $1.

[10] The Principle of Design in Architecture as Deducible from Nature and Exemplified in the Works of Greek and Gothic Architects. Illustrated. By Edward Lacy Garbett. 240 pages, 4x7 inches. 80 cents.

[11] The Rudiments of Masonry and Stone Cutting. By Edward Dobson. Illustrated by 49 woodcuts, 51 illustrations drawn on stone and 4 plates of specimens of Gothic Masonry. 150 pages, 4x7 inches. Price, $1.

[12] Limes, Cements, Mortars, Concretes, Mastics, Plastering, &c. By George R. Burwell. 136 pages, 4x7 inches, Price, 60 cents.

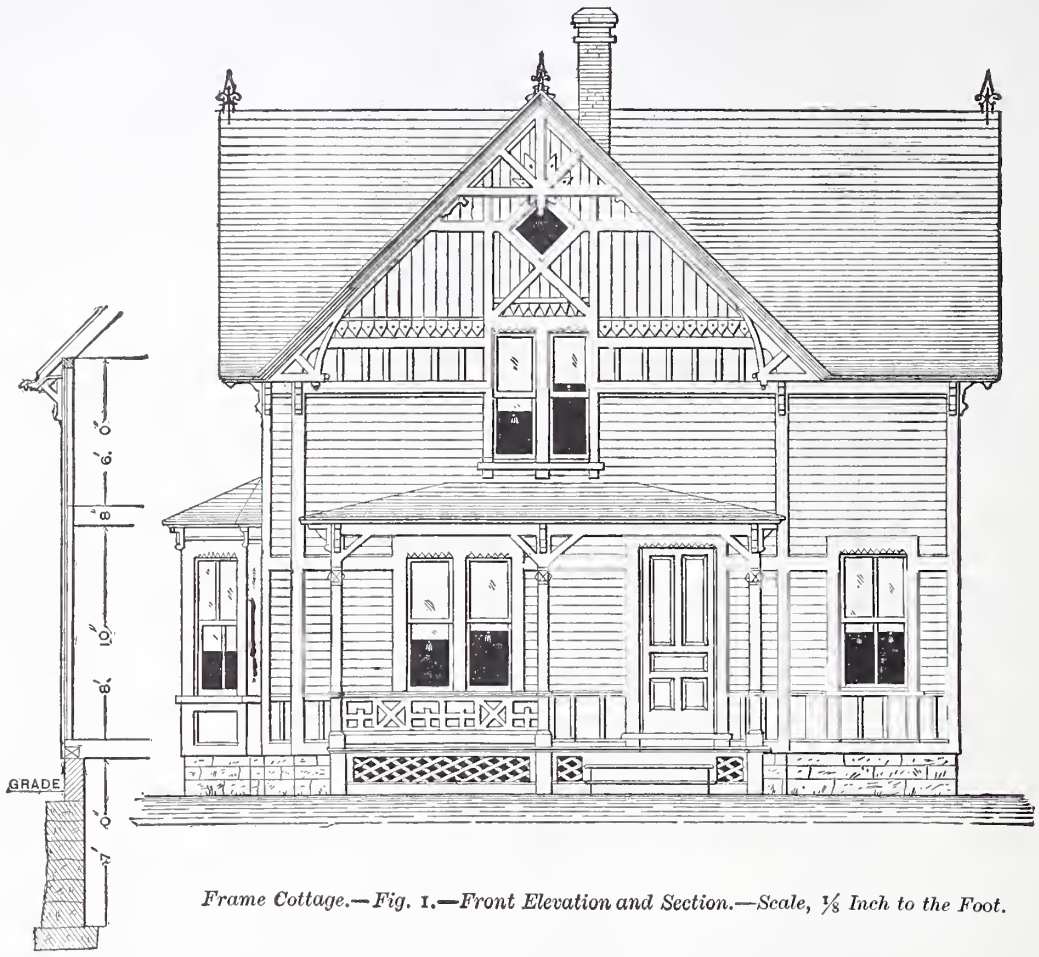
[13] The Manufacture of Bricks and Tiles, containing an Outline of the Principles of Brickmaking. Illustrated. By Edward Dobson. 275 pages, 4x7 inches. Price, $1.20.

[14] Warming and Ventilation. Illustrated. By Charles Tomlinson. 340 pages. Price, $1.20.

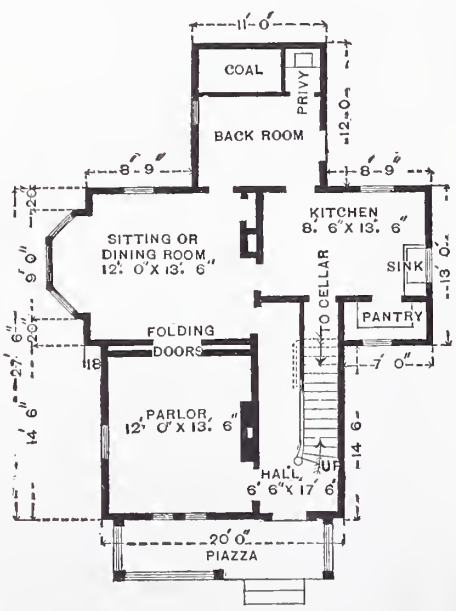
home. The secret of manufacturing cast steel was also stealthily obtained, and is now within the reach of all artisans.

Frame Cottage.

The house plans with which we present our readers this month are by Mr. Albert A. Barker, of the firm of Barker & Nourse, Worcester, Mass. The subject is an inexpensive frame cottage, such as is demanded by thousands of people both in town and country. Buildings of this character, although in greater request than any other (because there are more people able to build cheap houses than expensive ones), rarely receive the careful consideration of architects. There are various reasons for this, principal among which is that the percentage usually paid for drawings, when based upon so small an amount as the cost of a house of this kind, hardly repays the labor and trouble. It is almost as much work to draw the plans for a house of the kind we herewith illustrate as for one costing ten times as much. Another reason why architects seldom pay attention to this kind of buildings, is that there seems to be no opportunity for a display of their talents. There is but little chance for decoration. There is no warrant for attempting grand effects, and hence the task in most cases is quite uninviting. We think, however, that a careful consideration of the problem of designing an inexpensive house, which in all its parts shall combine comfort and convenience with good taste, will demonstrate that there is enough in it to justify the efforts of the very highest order of ability. It may be said that those architects who have a talent for designing public buildings and palatial residences have no ability in the direction of cottages. Possibly this is true, and the converse may be true also. The man who can design a tasteful and inexpensive house may fail in some of the ambitious work to which his fellows aspire. But if this is so he has the satisfaction of knowing that, however much he may be lacking in renown, he is the more useful member of society. Whether it is because there is one talent for designing grand edifices and another talent for designing cheap and useful buildings, and that most architects are in possession of the former, or whether some other equally good reason accounts for the fact, it is certain that the great demand existing for inexpensive buildings is not fairly met. There are some notable exceptions to the rule. Now and then a designer is to be found who gives the same careful consideration to the problem of a cheap house that he would give to one costing twenty times as much. Architects who are disposed to study the wants of the great masses of people and to provide cheap houses which at once meet the demands both of comfort and good taste, are certainly deserving of every encouragement. May their tribe increase. From time to time, in the columns of *Carpentry and Building*, we have presented a number of plans which answer, in a greater or lesser degree, the requirements to which we have referred. Some of them have excelled in one direction and some in others. On this occasion we present one more of the same general class, a design that has many features to be commended, which our readers will not be slow in perceiving. With the full specification which we publish herewith, together with the carefully prepared engravings upon this and the following pages, little or no description is necessary. The architect has so carefully worked out his idea in all its details, and has so thoroughly explained the construction which he would employ, that there is little we could add that would be interesting or profitable. The estimated cost of this house in the neighborhood of New York at the present time is about $1500. In many sections of the country it can be built for considerably less, while there may be some places in which the cost would exceed that of New York.



Frame Cottage.—Fig. 1.—Front Elevation and Section.—Scale, ⅛ Inch to the Foot.



Frame Cottage.—Fig. 2.—First Floor Plan.—Scale 1-16th Inch to the Foot.

Specification for Frame Cottage.

Excavating.—Excavate for cellar under main part of house, including bay window, to a depth of 7 feet from the under side of first-floor joists, said excavations to be sufficient to receive foundation walls, their bedstones and bedstones to chimneys; also, to allow for a space of about 8 inches outside of foundation walls for filling in cinder or coarse gravel from bedstones to grade; also, make all necessary excavations for drains, and dig well in cellar under kitchen of suitable size and sufficient depth to obtain water at all times.

Foundations.—Provide and lay good fair-quarried junk-stone foundation walls (laid up dry) for support of outside walls to house. The foundations to main part of house to be as shown by sections of accompanying drawings, while those for ell of house are to be but 4 feet 6 inches below grade. To be 2 feet 6 inches wide bedstones provided for foundations of main part of house. Ell foundations to have no bedstones. All foundations in cellar to be pointed inside, and the top of the same laid smooth and

level for the reception of brick underpinning. To be a retaining wall built between main part and ell of house to a level with other foundations. Well in cellar to be properly stoned up; also all necessary drains. To be proper bedstones provided upon which to start chimneys.

Brickwork.—To be a brick underpinning to house, 8 inches thick and 2 feet high; this to be of good common brick, well laid and thoroughly bonded. Also to be two chimneys, with 8 x 12 inch flues, built where shown on plans; these to be carried above roof and topped out, as shown by elevations. The bricks for said chimneys above roof (as well as for outside course of underpinning) to be culled, so as to produce as even and uniform a tint as possible. Chimneys to be smoothly plastered inside from bottom to top as they are laid up, and each chimney also to be provided with suitable thimbles and caps, and with 7 x 11 inch cleaning-out doors (iron) at bottom of flues in cellar. Chimneys to be well flashed, so as to thoroughly secure from leakage at juncture with roof. All brick work to be laid in mortar composed of one cask of best cement to two of best fresh-burned lime.

Lath and Plastering.—All rooms in main part of house to be lathed and plastered on walls and ceilings. Laths to be good spruce, laid to break joints every ninth lath, butted and well nailed to bearings. All plaster to be one coat work; brown mortar, thoroughly troweled and smoothed down to make finish coat. Finish to grounds, and all angles square and true. Ceilings to be whitewashed two coats in best manner, with the exception of closets. Mortar to be best fresh-burned lime, sand clean and sharp, and good fresh hair. Mortar to be mixed long enough before putting on to be thoroughly slaked. At completion of mason work all rubbish accruing therefrom to be removed from the premises.

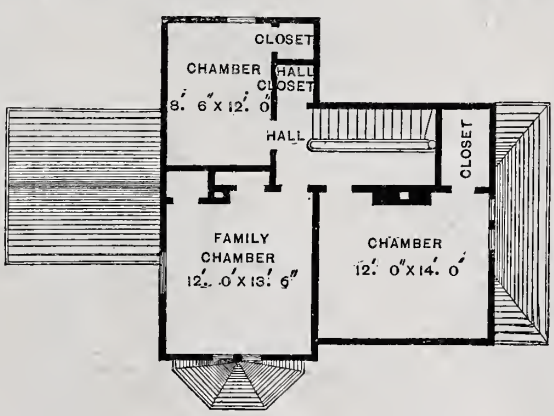
Frame.—Frame to be good fair quality spruce, as well seasoned as the market affords, and to be put together in a good, thorough and substantial manner. Size of frame to be as follows: Sills, 4 x 6 in.; first-floor joists, 2 x 8 in.; first-floor girders, 6 x 8 in.; first-floor trimmers and headers, 3 x 8 in.; first-floor stair trimmers, 4 x 8 in.; second-floor joists, 2 x 8 in.; second-floor stair trimmers, 4 x 8 in.; second-floor trimmers and headers, 3 x 8 in.; chord pieces or ceiling joists, 1½ x 6 in.; ridge piece, 1½ x 9 in.; wall plate, 3 x 3 in.; wall studding, 2 x 3 in.; corner posts, 3 x 5 in.; ledger boards, 1 x 5 in.; partition studding, 2 x 3 in.; bridging, 1 x 2½ in.; rafters, main part of house, 2 x 6 in.; rafters, ell of house, 2 x 5 in.; hip and valley rafters, 3 x 7 in.; piazza sills (laid edgeways), 4 x 6 in.; piazza joists, 2 x 6 in.; piazza rafters, 2 x 5 in. Floor joists and all studding to be placed 16 in. between centers. Floors to be bridged once in center. All rafters and chord pieces to be placed 20 in. between centers.

Inclosing.—All wall and roof inclosing to be of good, square-edged hemlock boards, laid edge to edge, and well nailed on to bearings, said boards to be ⅞ inch thick, well seasoned, and as free from shakes as possible.

Grounds and Corner Beads.—Put on grounds around all windows, doors, bases, &c., to plaster against, and corner beads upon all projecting corners.

Lining Floors.—Lining floors to be second quality spruce, jointed and matched, and well nailed to bearings.

Frame Cottage.—Fig. 3.—Side Elevation.—Scale, ⅛ Inch to the Foot.



Frame Cottage.—Fig. 4.—Second Floor Plan.—Scale, 1-16th Inch to the Foot.

Ledger Boards.—Second floor joists to be notched on to ledger boards, and the latter cut about ½ inch into wall studding.

Cross Furring.—Cross-fur all ceilings where plaster comes, said furring to be leveled up and well nailed to bearings.

Partition Caps and Sills.—Start all inside partitions on 2 x 3-inch partition sills, and where one partition comes over another the same is to foot on 2 x 3-inch cap to partition below.

Outside Finish.—The outside finish of house to be as per elevations and detail drawings. Said finish to be of good quality pine, well seasoned, and put up in a thorough and workmanlike manner. Outside front door to be 2¼ inches thick, five panel, pine, plain molded panels. The two upper panels to be filled with glass. The outside door in ell also to be of pine, 1¾ inches thick. The front door to be painted in imitation of black walnut; ell door some plain, dark color. Front door to be 3 x 7 inches; ell door 2 feet 10 inches by 6 feet 10 inches. The walls of house to be clapboarded with good spruce clapboards, laid 4½ inches to the weather, laid so as to break joints, well butted and nailed to bearings. Outside door casings, face casings to windows, corner boards, &c., to be ⅞-inch thick. The house to be provided with blinds of ordinary construction, the lower half in main part of house being made to swivel.

Roofs.—Main and ell roofs to be shingled with good sawed 16-inch shingles, laid so as to break joints, and well nailed to bearings with shingle nails. All valleys and other places required to be made watertight to be properly flashed. The roofs to piazza and bay window to be tinned in the best manner with best "M F" roofing tin, laid with flat joints and thoroughly soldered. Piazza and bay-window roofs to be provided with gutters, and suitable conductors for conducting water from outlets of said conductors to the ground. Main and ell roofs also to have gutters built in back of crown molding, as shown by section among details. Said gutters to be properly graded to conduct water to outlets, and conductors provided to conduct water from said outlets to the ground.

Inside Finish.—Inside finish to be of good kiln-dried pine, put together in a thorough and workmanlike manner. Casings to in-

side doors and windows to be 7/8 inch thick; those for first story to be 5½-inch molded. The casings to be as shown by sections in Figs. 5 and 11 of details. Second story, 4½-inch plain casings.

Doors.—Inside doors to be 2 feet 8 inches by 6 feet 8 inches for all rooms in main part of house in first story, except sliding and closet doors, the latter and doors in ell of house, also all doors in second story, to be 2 feet 6 inches by 6 feet 8 inches; all inside doors to be 1¼ inches thick, plain, four pan-

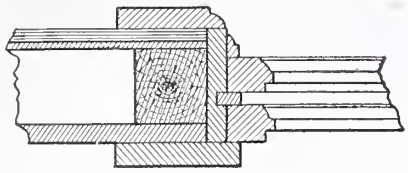


Fig. 5.—Section on Line D E of Fig. 12.—Scale, 1½ Inches to the Foot.

els; doors to have ¾-inch thick pine thresholds. Sliding doors to be 3 feet by 6 feet 10 inches, provided with pulls and track in usual manner.

Windows.—Windows to be made as per section shown on sheet of details, with 7/8-inch thick jambs of common pine. To be 1⅜-inch lip sash, put into frames, with good and approved window springs. All glass to windows to be second quality German, well

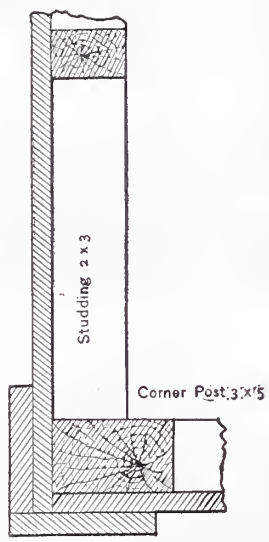


Fig. 6.—Section on Line B C of Fig. 12.—Scale, 1½ Inches to the Foot.

bedded, bradded and puttied into sash. Windows to be two and four lights, as shown by elevations. A suitable number of cellar windows for lighting and ventilating cellar to be built in underpinning; these to be fitted into 2-inch plank jambs and arranged to swing in on suitable hinges, and provided with button for fastening the windows when closed, and with hooks for holding the same when opened. All windows to have 1¾-inch plank sills.

Hardware.—All inside doors to be hung on two proper japanned butts,

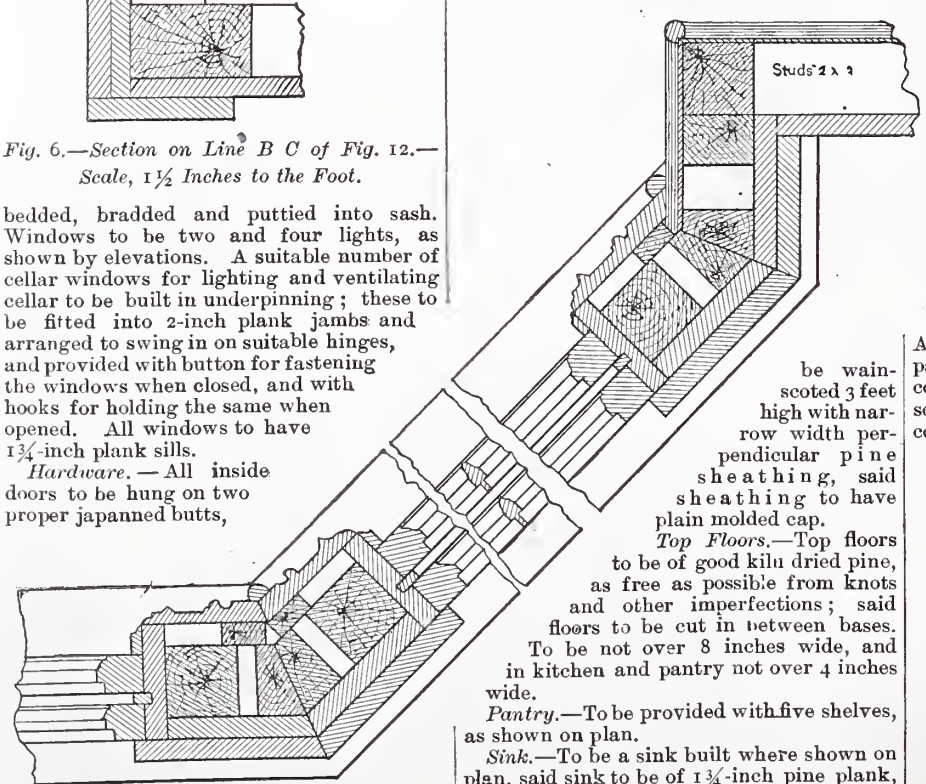
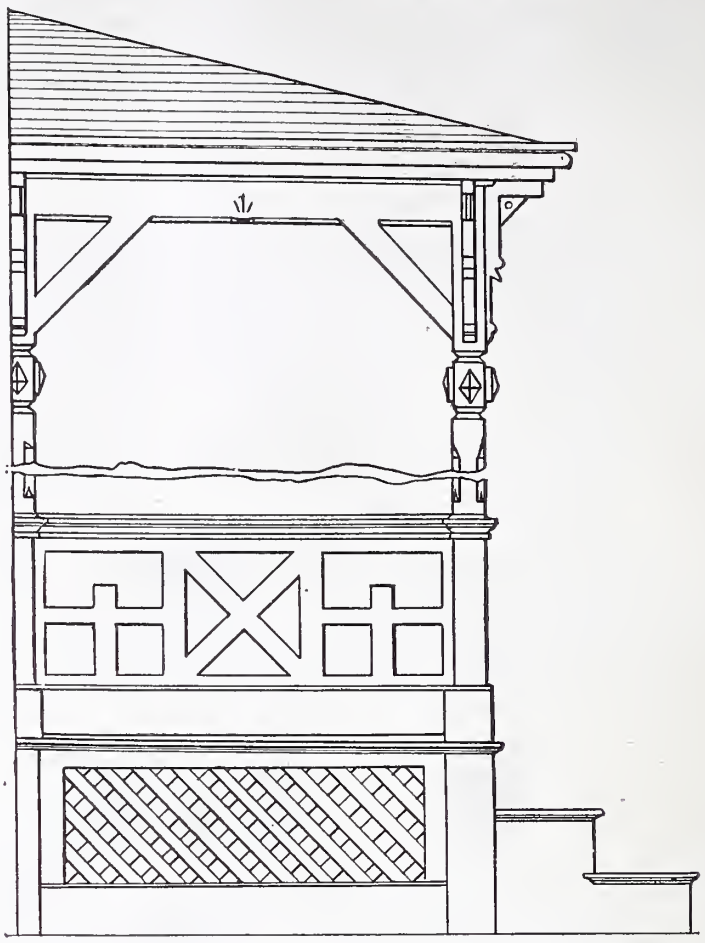


Fig. 7.—Section Through Bay Window.—Scale, 1½ Inches to the Foot.

and provided with suitable mineral knobs. Outside front door to be properly hung, as aforesaid, and provided with silver knob and night lock; outside back door to have ordinary mineral knob lock. To be a bell in kitchen, properly connected with a silvered bell-pull at one side of front door, upon the outside.

Closets.—Closet in sitting or dining room to have 5 shelves; all other closets to have cleats (pine) 2 inches wide and provided



Frame Cottage.—Fig. 8.—Elevation of Piazza.—Scale, ½ Inch to the Foot.

Bases, Wainscoting, &c.—Base in main part of house, first story, to be 8 inches, with plain molded cap; all other bases to be plain bevel top. The kitchen and pantry to be wainscoted 3 feet high with narrow width perpendicular pine sheathing, said sheathing to have plain molded cap.

Top Floors.—Top floors to be of good kiln dried pine, as free as possible from knots and other imperfections; said floors to be cut in between bases. To be not over 8 inches wide, and in kitchen and pantry not over 4 inches wide.

Pantry.—To be provided with five shelves, as shown on plan.

Sink.—To be a sink built where shown on plan, said sink to be of 1¾-inch pine plank, with shelf at one side and cupboard underneath, provided with a door opening into the same, hung on suitable hinges and provided with snap catch. Sink to have a suitable outlet and discharge pipe—the former to have strainer and the latter a suitable trap. To be an ordinary suction pump of approved construction and pattern put in at one side of sink, said pump to be connected with well in cellar by means of galvanized iron piping.

with double clothes-hooks placed 6 inches apart.

Stairs.—To be a straight flight of stairs in front hall from first to second story; also under the same, a plain flight of cellar stairs opening out of kitchen, both flights to be built on three 2-inch plank stringers to each flight. Front hall stairs to have pine risers, and treads 7/8-inch risers and 1⅛-inch treads, with molded nosings and scotias. Cellar stairs to have spruce risers and treads of same thickness as those of front hall flight, with plain nosings slightly rounded. Newel post at foot of front hall flight to be turned, and not to exceed $10 in cost. Balusters to be 1⅛ inches turned, of some neat, tasty design. Rails, which continue around well-hole in second story, to be 2½ inches, of ordinary form. All stair work to be of good clear pine, painted as the owner may direct, with two coats of paint, or grained in imitation of some kind of wood and then varnished one coat.

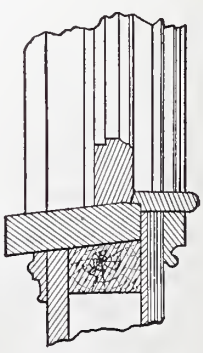


Fig. 9.—Section Through Window Sills.—Scale, 1½ Inches to the Foot.

Outside Steps.—To be front and rear entrance steps, as shown on plan, made from good 2-inch chestnut plank.

Piazza Floor.—Piazza floor to be of narrow widths Southern hard pine 1⅛ inches

thick, smoothed off, blind nailed, and filled in usual manner.

Painting.—All outside and inside standing woodwork, except inside of ell to house, to be painted with two coats of paint, using Masney's ready-made railroad colors in paste form for the purpose. The best linseed oil to be used in thinning said paint. Colors to be such as directed by the proprietor of the house. All closet floors, as well as kitchen and pantry floors, to be also painted two coats as aforesaid. Kitchen and pantry floors to have one coat of varnish after painting. Sash to be

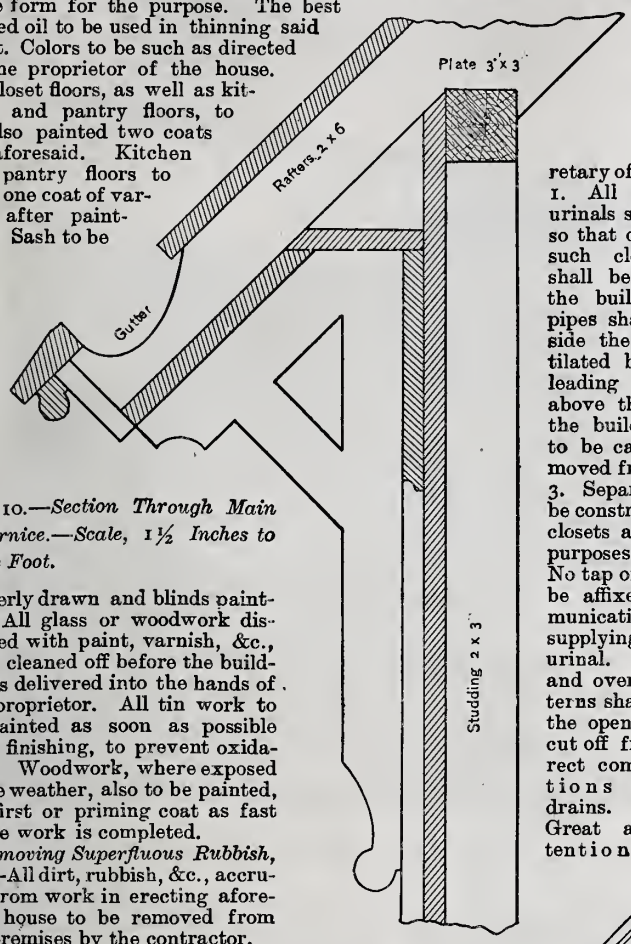


Fig. 10.—*Section Through Main Cornice.—Scale, 1½ Inches to the Foot.*

properly drawn and blinds painted. All glass or woodwork disfigured with paint, varnish, &c., to be cleaned off before the building is delivered into the hands of the proprietor. All tin work to be painted as soon as possible after finishing, to prevent oxidation. Woodwork, where exposed to the weather, also to be painted, the first or priming coat as fast as the work is completed.

Removing Superfluous Rubbish, &c.—All dirt, rubbish, &c., accruing from work in erecting aforesaid house to be removed from the premises by the contractor.

Fig. 11.—*Architrave in First Story.—Scale, 1½ Inches to the Foot.*

Privy and Coal Bin—To be a privy partitioned off in ell where shown on plan, provided with door, seat and small window, in the usual manner. A coal bin also to be partitioned off in ell at one side of privy; this to be about 3 feet high in front. Partitions for privy and coal bin to be of ⅞-inch planed, jointed

Frame Cottage.—Fig. 12.—*Half Elevation of Front Gable.—Scale, ½ Inch to the Foot.*

and matched spruce boards laid horizontally.

Finally.—All work performed to be in as thorough and workmanlike a manner as hereinbefore set forth. Materials to be of such quality as called for, so that when the building is completed everything will be in compliance with and to the perfect satisfaction of the proprietor.

Sewage and Rules for Public Buildings in England.—The following rules, to be observed in the construction of all buildings erected under Her Majesty's Office of Works, have been prepared and issued by the Secretary of the Office of Works. 1. All water closets and urinals shall be constructed so that one wall at least of such closets and urinals shall be an outer wall of the building. 2. All soil pipes shall be carried outside the building, and ventilated by means of pipes leading the foul gases above the highest point of the building. Such pipes to be carried to points removed from chimney stacks. 3. Separate cisterns shall be constructed for the water closets and for the general purposes of the building. No tap or "draw-off" shall be affixed to any pipe communicating with a cistern supplying a water closet or urinal. 4. All waste pipes and overflow pipes of cisterns shall terminate in the open air, and be cut off from all direct communications with drains. 5. Great attention shall be paid to insuring thorough ventilation in all rooms. Rooms so high that their ceilings shall be more than two feet above the top of the windows; corridors, staircases and other open spaces, shall be specially ventilated so as to prevent the accumulation of stagnant air. 6. All main drains should, where practicable, be formed outside the building. In the event of its being necessary to carry a main drain underneath a main wall, then a ventilating pipe must be carried from that point to the highest part of the roof, as under Rule 2.

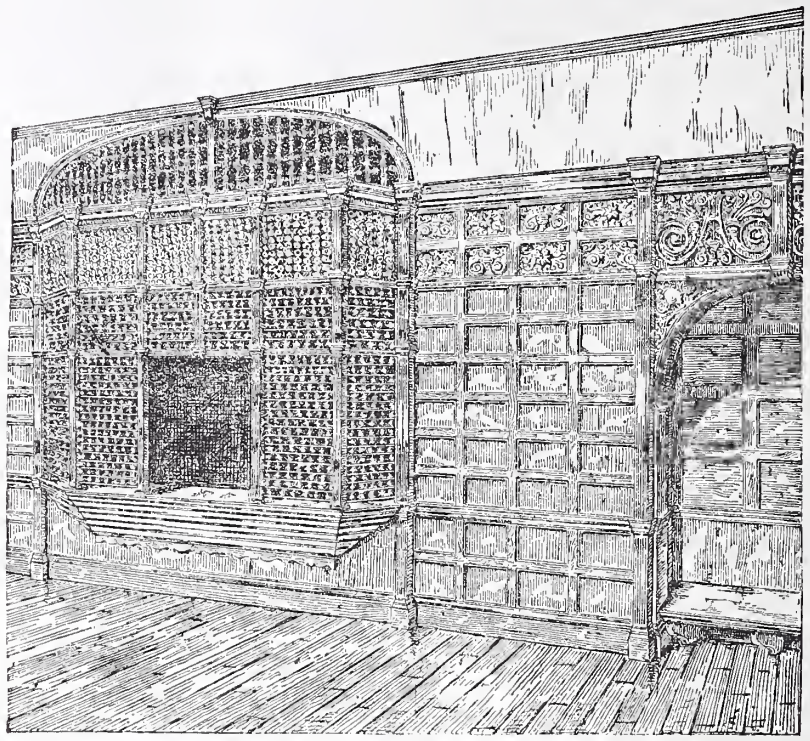
Glass Roofs.—Glass seems to be coming more and more into use as a constructive material. Many roofs are now made of glass and iron that would some little time back have been made of wood, or of iron covered with corrugated sheeting or with wood. When it is realized that a light iron and glass roof can be made as cheaply as a wooden or part iron and wood roof, the advantages of such a transparent and imperishable material are very obvious. For the covering of loading yards and of lean-to roofs in conjunction with factories, such material is a great boon. We note an entirely new adaptation of glass in the construction of brewers' vats recommended by a German expert. The experiment with glass seems to have succeeded admirably. Glass vats are somewhat expensive in first cost, but as they practically last for ever, and are always sweet and clean, they soon save the additional expense.

Bad Designs for Inside Finish.

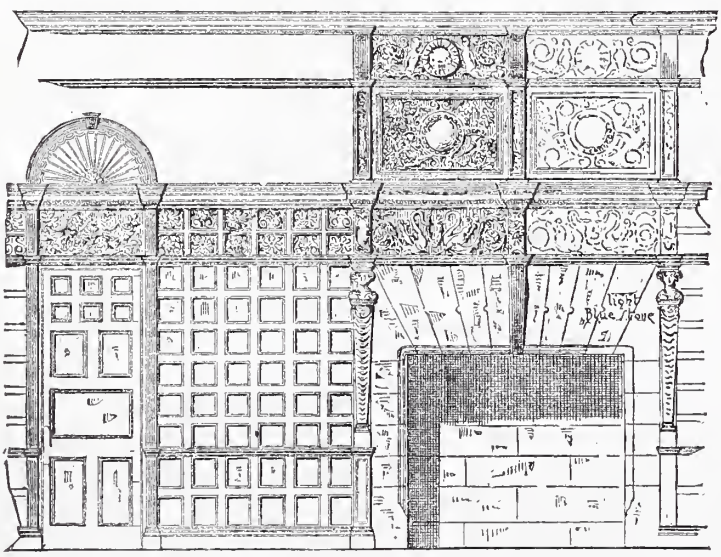
It is hardly possible to enter a new or fashionable building at the present time, or to look over an architect's detail sheet, without finding a profusion of wood finish used in a way that should be condemned, not only for artistic and mechanical reasons, but for more important ones which involve the health of those who occupy the buildings. The present generation has sufficient knowledge of the necessities of healthful life and of the requirements of the future to plan its structures so that they shall be habitable for years to come. In doing this, it is needful, in all constructive features of interior finish, to design with reference to durability. It is inexcusable in a modern builder to finish an interior in such a manner that it will be in a ruinous condition in a dozen years, when the building itself is intended to last a hundred years. There is no excuse for bad art in our buildings, nor for things which are in themselves ugly. While we may not be able as yet to design notably beautiful interior decoration, taste has at least advanced so far that we can avoid that which is positively unpleasant. At the present time, the plea of all designers who produce things which are in bad taste, disagreeable or unpleasing to the eye, is that "it is artistic." This is only another way of saying it is fashionable, and when this is said they are satisfied. The assertion, however, does not prevent their work from being an offense to the lover of the beautiful and an outrage upon art. Rectangular panels spread over the whole side of a room do not lose their unpleasantness by reason of their number, nor is the darkness of wood finish mitigated by the fact that it is caused by the color of the "natural wood." Popularly the styles so much in vogue, and to which our remarks refer, are known as "Eastlake." Architects seldom employ this term, but designate the work by a dozen other names. Experts find all manner of difference between the styles represented by them, but the weary, wandering eye of the ordinary observer sees in them all a wilderness of straight lines, ugly square corners and monotonous panels. Without being cynical, we might include the entire lot in one class and call it the nightmare of the rectangular.

In order to give point to our criticisms, we have introduced some designs of finish submitted in a recent competition conducted by one of our architectural exchanges. The first of three prizes in the competition referred to was awarded to the design submitted by "Essayon," of which Fig. 5 of the accompanying illustrations is a part. The design by "Penates," from which we have taken Figs. 1 and 2 was the first of a number of designs highly commended by the judges, although receiving no prizes. In this selection of examples for criticism we have been influenced by no other desire than to base our remarks upon representative work, and upon designs which have been approved by supposed competent judges. We think our readers will bear us out in the assertion that the most notable characteristics of the designs upon this and the opposite page are to be found in the work of a great many, if not a large majority, of the architects of the present day who design in any of the so-called "modernized styles" of architecture. To show to what extent these designs have been endorsed, we will refer briefly to some of the published comments. That by "Essayon" was described as charming the eye by its "domestic simplicity." Much stress was laid upon its "quiet reserve." It was praised as an agreeable reproduction of the "colonial style," "attractive" by reason of its "*naiveté* and refinement." "Penates" not being a prize design was not so strongly praised, but we are told it deserves mention for the "careful study of mediæval wood finish" exhibited in it. The details are said to be "quaint."

The subject of this competition was supposed to be practical. It was a small suburban hotel, "frequented by the highest classes of society." Imitations of old styles were not asked for, but rather something adapted to use at the present time. We are bound to accept these comments, therefore, in good faith, as indicating the ideal in the minds of the judges of what is fitting for the purpose named. If our readers will examine their dictionaries for definitions of some of the terms of praise used above, in an attempt to perceive the beauties of Fig. 5, they will find them meaningless in this connection, for the design is mechanically bad and artistically atrocious, and, besides, a room finished in this way would not be healthful.



Bad Designs for Inside Finish.—Fig. 2.—Hotel Office Screen, by "Penates."



Bad Designs for Inside Finish.—Fig. 1.—Door, Wainscoting and Chimney Piece, by "Penates."

The only excuse for employing such finish is that it is at present fashionable.

Science teaches us that the air about us is full of germs, which only need to find a proper resting place to start into life. Besides these, floating in unknown quantity, we find scales of skin, powdered stone, excreta of various animals which has been ground to dust, and thousands of other things which we cannot mention. This matter settling wherever it finds a surface, which is nearly or quite horizontal, forms what we call dust. If undisturbed it rapidly accumulates in great layers, and, like all porous substances, in addition to its own inherent filth, collects all manner of exhalations, like those given off from the human body, the steam from cooking, and germs of disease, when, as in scarlet fever, they are of a tangible nature.

The housewife's horror of dust, though often a subject of merriment, is well directed and most proper. The health of our households depends in a great measure upon the banishment of dust accumulations. In public buildings, especially in hotels and similar structures, where the attention to details is not of the best, the greatest care should be paid to excluding dust traps and to introducing light and air into every nook and corner. When practicable, the use of porous materials should be avoided if they cannot be painted or in some way be made non-absorbent.

The whole wall on each side of the office window in Fig. 2 is of panel work, placed without sense and with questionable taste. Every horizontal molding is a dust trap. The office screen is still worse, being made, as shown in Figs. 3 and 4, of small spindles set close to each other. A man could not thoroughly dust such an office in half a day of careful work. In a private house such a construction would be entirely unjustifiable, but in a hotel its proposal, even, is little less than criminal. In Fig. 1 we have a wall taken from another part of "Penates'" design. In addition to the panels which cover the whole of the field and dado, the frieze is made of covered work of an intricate character. The condition of such work in such a place, under the best management,

can easily be imagined. The only attention it would ever have would be that of the long-handled feather duster. The carvings would become veritable whited sepulchres.

In Fig. 5 we have a sample of panel work, not, it is true, as bad a dust trap as those just mentioned, but very bad for other reasons. As in the other cases, the whole room is finished in wood, the greater portion of which is placed with the grain vertical. This wood is framed so that all the panels, which are of considerable size, are held by rails in which the grain is at right angles to that of the panel itself. The panels will shrink and the rails will not. Cracks will be found in all directions or else joints will open. The answer to this, of course, will be that it was intended to use dry wood, and then to frame, so that seams would not open. Wooden screens of such size as the whole wall of a room, are not built in this country in such a manner as not to develop numerous cracks. And there are few workmen who are able to do, from such a design as this, any reasonably good work. The quantity of dust, dirt and filth generally which would accumulate in such work, is enormous. As usually put up, it would be cracking in every direction within less than a year, and every crack would be a little pest-hole. The new

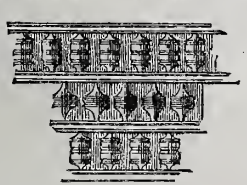
Bad Designs for Inside Finish.—Fig. 3.—*Details of Screen shown in Fig.* 2.

ferry houses at Hoboken, on the North River, are notable examples of what happens to such work, even in a position which is not particularly dry. Here joints are opening in every direction, in spite of the fact that the workmanship was said to be good. The Stevens estate, it is well known, never tolerates shabby workmanship when good can be obtained.

In returning to old-fashioned styles, and attempting to reproduce all the work of our fathers, we are very likely to copy more that was bad than good. In the rage for finishing in natural wood with the surface untouched, save by the thinnest possible coat of boiled or raw oil, we are introducing a practice which is justified by neither the laws of health nor beauty.

Handy Standards.—Weights of Coin.

In compounding recipes, it is sometimes very handy to have standard weights much smaller than are usually to be found, even with small scales. New and bright coin



Bad Designs for Inside Finish.—Fig. 4.—*Details of Screen shown in Fig.* 2.

vary so little in weight that they may be taken, for all practical purposes, at the weights at which they are minted. In gold coin the weights are as follows:

Coin.	Weight in grains.
Double eagle	516.0
Eagle	258.0
Half eagle	129.0
Three dollars	77.4
Quarter eagle	64.5
Dollar	25.8

The silver coins weigh as follows:

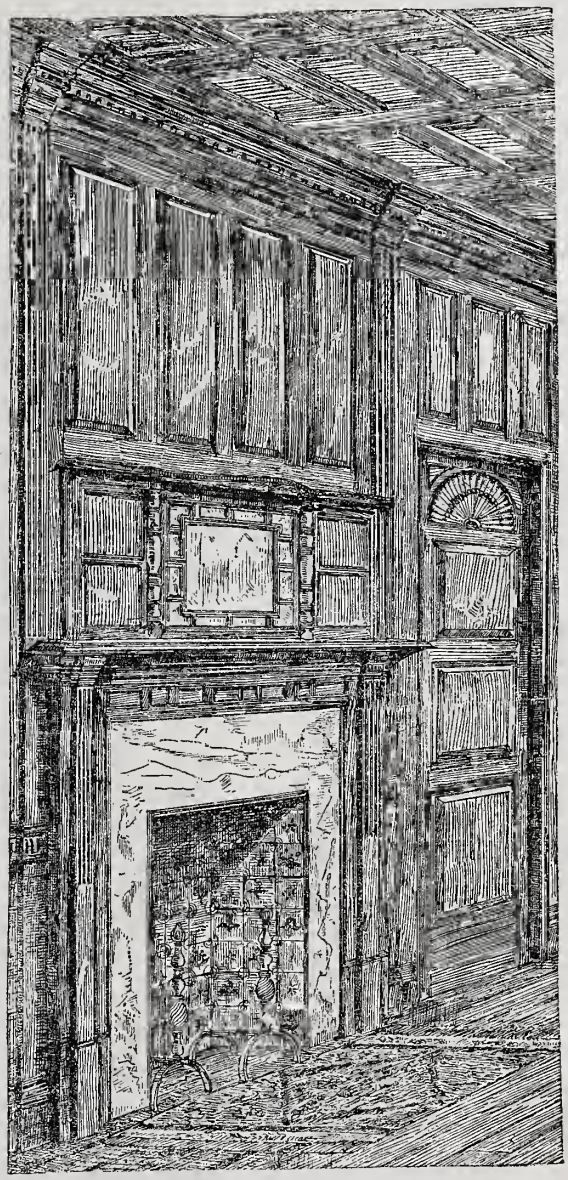
Trade dollar	420.0
Standard dollar	412.5
Half dollar	192.0
Twenty-five cents	96.0
Twenty cents	76.8
Dime	38.4
Half dime	19.2

The old silver three-cent pieces, though common, are so worn that they are of no use as weights. Silver coins of less denomination than one dollar are issued at the rate of 384 grains to the dollar. In the copper, bronze and nickel coins we have the following weights:

Coin.	Weight in grains.
Five-cent nickel	77.16
Three-cent nickel	30.00
Two-cent piece, say	93.00
Old cent	168.00
New cent (thick)	72.00
Bronze cent	48.00

The 5-cent nickel weighs 5 grams of the metric system, and is thirteen-sixteenths of an inch in diameter.

With these coins and almost any form of letter balance or scale, small weights can be very accurately determined. Home-made balances are easily made, either with soft springs, carrying a scale pan, or a beam scale where a fine needle forms the pivots. Even with a comparatively rough apparatus sufficient accuracy can be obtained for



Bad Designs for Inside Finish.—Fig. 5.—*Chimney Piece, Wall Finish, &c., by "Essayon."*

all practical purposes of compounding substances for following directions given in recipes.

The trade dollar, with two nickel 3-cent pieces, gives an ounce—that is, 420 grains, with two pieces of 30 grains each, equals 480 grains, the number of grains in an ounce. Half a dollar or two 25-cent pieces, weighing 192 grains, with one of the present issue of cents weighing 48 grains, equals 240 grains, or half an ounce. Four nickel 3-cent pieces will equal 120 grains, or one-quarter of an ounce. The bronze cent is equal to two penny weights, and ten of them will weigh an ounce. Two nickel 3-cent pieces weigh 60 grains, or one drachm. The silver half dime comes within less than a grain of being equal to one scruple. By taking four nickel 5-cent pieces, three nickel 3-cent pieces and a silver dime we shall have 437.04 grains, or one ounce avoirdupois within say less than one-half a grain. The avoirdupois ounce is 437½ grains, while the Troy and apothecaries' ounce is 480 grains. The nickel 3-cent pieces are not very plenty, and the only apparent use to to which they can be put is to save them for weights of this kind.

When they cannot be had a different combination of coins must be used to get the weights. For the ounce of the apothecaries' weight we have the standard dollar, a cent and a silver half dime. This makes 479.7 grains instead of 480, or 3-10ths of a grain short. Ten pennies should give the weight of an ounce exactly if care is taken to select those which are new. It is to be observed, however, that in the small copper coins there is not as great exactness in the minting as in the larger and more valuable ones.

The silver coin are much more accurate in their weight than the copper. A coin after it has had wear enough to take the sharpness off the impression, is usually several grains lighter than when new.

By taking the weight of a trade dollar and two three-cent pieces, or one ounce, in sand, and dividing the sand into equal portions and continuing to divide the weights thus formed, it is easy to get most of the weights needed in compounding any of the common recipes or for making them up in small quantities.

If liquid measures are not at hand, a fluid ounce may be obtained by balancing the weight of a bottle and then putting in water until the weight of a standard dollar and a bronze cent are balanced. The fluid ounce is equal to about 455 grains of water.

It should be remembered that it is not absolute accuracy, but relative accuracy, that is needed in matters of this kind. The ounce may be light or heavy, but so long as the proportions are kept between the several elements being compounded no inconvenience will follow.

These remarks of course do not apply to the compounding of medicines, which should be done with the greatest accuracy, and when possible by a regular apothecary.

Fire-Proof Buildings.—It is to be remarked that whenever a fire occurs in one of those apparently strong buildings that adorn the great thoroughfares of the metropolis the disaster is complete. In less time than it takes an engine to reach the spot (and we all know how little time it takes), the whole structure is in flames, and no amount of effort, skill and devotion on the part of the best organized and bravest body of men in the world, supplied with the most powerful machinery, can save it from destruction. Repeated instances of such calamities do not seem to impress on our builders the necessity of adopting another principle of construction. Even now, in several parts of the city, on the very spots where fires have occurred that did not leave a wall standing, are to be seen immense buildings in course of erection that may prove no better than huge funeral piles in case of accident. The men who can lay out so much money in marble, granite and iron fronts ought to be able to use something more incombustible than common spruce

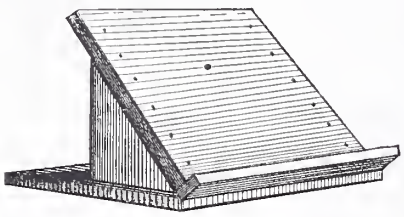
beams to support the floorings. It is to be hoped that a sense of danger may soon open to our iron industries the field which they ought to occupy in the building trade.

Lessons in Carving.—I.

BY W. E. PARTRIDGE.

OUTFIT FOR MODELING IN CLAY.

The interest felt in wood carving has led to the publication in this and other journals of many articles treating upon the subject—giving hints as to the proper tools to be used, the methods to be employed and other details of the art. Most of this has been of an exceedingly elementary character and best suited to the wants of those who, knowing nothing of wood-working and the use of



Lessons in Carving.—Fig. 1.—Stand for Holding the Work.

wood tools, wish to learn to carve. With these elementary steps the carpenter is already familiar. He understands the management of wood and the care of his tools, and there are only a few hints in regard to the special tools used in carving which will be of any service to him. Like a great many carpenters, the writer has carefully read the published articles on this subject, as well as the few books which have been written in regard to it, hoping to find such instruction as would enable him to take a design, put it upon a panel or piece of wood and then produce a carving which should be useful for the ornamentation of some article of furniture. There were an abundance of tools at hand, and there was no lack of skill in their handling, and as in most shops, stones and hones were at hand for keeping them in order. When, however, the pattern was outlined upon the wood and the real work of carving began, we awoke to the fact that the directions stopped short at the most important point. Like ourselves, the carpenter will be surprised to find that, after all his experience, he does not know how to "think in solid wood."

When we have houses and other structures to build, we find ready at hand plans,

Lessons in Carving.—Fig. 2.—Ordinary School Slate Fastened to a Turn-table, to Use on Stand shown in Fig. 1.

drawings, elevations and detail sheets, together with elaborate descriptions. By means of these the carpenter is taught to think in panels, moldings and skirtings. With the framing plan before him it is easy to think in timbers and beams. When the elevation is given it is easy to think in walls and windows, doors, foundations and roofs, and in the mind's eye to bring up an exact image of what the finished structure will be. But when a plain block of wood is laid upon the bench with a pattern drawn upon its face, the carpenter soon realizes, as he begins to cut away the surface to obtain relief, that the published directions have given him no clew which will enable him to think in wood. He has no guide as to the relative elevations and curves of the different parts and surfaces. He has to feel for the effect which will make the pattern look best, and often finds that he has made a leaf hollow which would look far better convex. His only recourse is to take another block and try again. In this way much hard work must be wasted, and in the end it will be found that the result has not been altogether what could be expected from an equal amount of labor intelligently applied under a competent instructor.

The object of the present papers is to give in detail a description of the methods by which the process of "thinking in wood" may be begun, or, to state it in another form, "thinking in relief" or "in the solid." The shortest and most practical way to this result is modeling in clay. Modeling is perhaps the only means by which the learner can attain a knowledge of carving without the assistance of a teacher. It enables him to try experiments in relief, to build up and take down, to spread out or bring together the parts of his pattern until he obtains the best effect. A little practice with plastic material soon enables him to get a knowledge of surfaces in relief. When this is once attained the task of "thinking in wood" is practically accomplished. Knowing this fact, many persons have bought works devoted to the subject of modeling, hoping to find instructions which would enable them to go on without a teacher. After reading the few vague directions contained in these works, they have generally been disheartened, finding the practical part of the subject dismissed with the remark that a few minutes' instruction from a teacher, or ten minutes spent in watching a person at work in clay, is worth more than all the instructions that could be given in a book. This is only too true, yet it was the object of the books to teach, and not to refer to teachers.

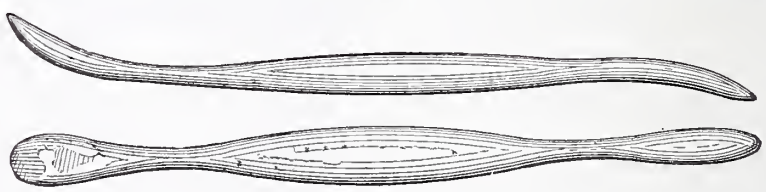
It is possible, however, to teach, by means of directions and engravings, the elementary steps in the art, and it is also possible to give the practical man such directions as will enable him to use the clay as a convenient means for trying experiments, and determining in advance the effect which his work will have when finished in wood.

The necessary outfit is simple and inexpensive. The clay, which is best bought dry and finely ground, costs 5 cents per pound. "Blue clay," or potters' clay, is what is needed for the purpose. If the student takes the trouble to prepare it, some of this expense may be saved. But it is better to buy the ready-made article, as then it will be obtained free from sand and dirt. In fixing the dry clay for use it should be made damp and then kneaded thoroughly with the hands, until it becomes like putty throughout the mass.

The tools and appliances necessary for working in clay are not numerous, and the mechanic who wishes to take up the art need have no expense beyond that of getting the clay. Every necessary article can be made or extemporized in almost any carpenter's shop in the land. The modeling stand shown in Fig. 1 is made of boards, and can

Lessons in Carving.—Fig. 3.—A Chisel-Shaped Tool with Bent Point.

be put together in an odd half hour. Its size depends somewhat upon the size of work to be done. It will be amply large if the top is 2 feet by 18 inches. To prevent warping, a good coat of paint or a couple of coats of shellac should be put upon it. If a large size of a school slate is at hand it may be laid upon the stand and the model made upon it. Slate is one of the best of all foundations for a clay model. It is a convenience if a sort of turntable, like that shown in Fig. 2, is made to hold the slate. This is simply a circle of plank with a pin at the back, which fits into a hole bored in the stand shown in Fig. 1. It can just as well be made square, if the hole in the stand is placed high enough up so as to let the corners clear the shelf at the bottom. If a little extra expense can be afforded, the plank circle may be covered with sheet lead, turned over and tacked at



Lessons in Carving.—Fig. 4.—Double Bent Spatula or Spoon-Shaped Tool.

the edges, or a piece of sheet zinc can be cut out to fit the board. Lines of tinned tacks can be run across the face to keep the metal flat. A table of this kind permits the work to be turned around so as to bring it into different lights and enables the hand to get at all parts of the design.

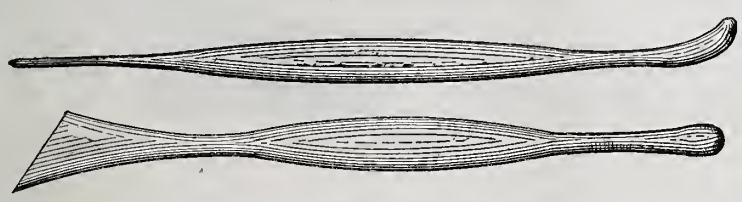
The tools are very simple, and can be made from boxwood, dogwood, beech, maple, or any other hard, close-grained wood of a similar character. All of them can be obtained from those who keep artists' materials. They are to be had in two sizes, 6 and 8 inches long, the smaller size costing about 10 cents each, and the 8-inch 15 cents each. As the work goes on many forms will be suggested as useful. These can be whittled out of a piece of hard wood and finished with a file and sand-paper, and will answer just as well as the most expensive.

Lessons in Carving.—Fig. 5.—Sword Blade and Pointed Spoon Combined.

Of each tool which it is desirable to have in the beginning we have given, in Figs. 3 to 7, two views, so that there will be no difficulty in making them. For small work, 6 inches is long enough, but for designs of any considerable size larger tools are needed. Fig. 3 shows a chisel-shaped tool, having at the opposite end a point which is somewhat bent. Fig. 4 shows a tool bent at both the ends, which in shape are somewhat like the bowl of a spoon. Fig. 5 shows a tool which has one end thin and sword-shaped, while the

other is bent and terminates in a somewhat pointed spoon-shaped form. That shown in Fig. 6 has an oblique chisel edge at one end, while the other is well rounded. Fig. 7 shows a tool having a sword-like edge cut into teeth. It is a useful tool for cutting away the clay and for digging. These ends are not always put together in just the way we have represented them. It is not unusual to find the sword-like blade of Fig. 5 combined with a point like that at Fig. 3, or a knob like Fig. 6. The way they are combined makes no difference save in the convenience of working. If there are two tools in the hand at one time, it is only necessary to turn the stick end for end to make either of them available.

In making the tools, saw the strips of wood roughly into shape, and then work them



Lessons in Carving.—Fig. 6.—Oblique Chisel Edge and Greatly Curved Spoon Bowl.

down with a rasp. Finish with fine sandpaper, and then polish as perfectly as possible.

The crooks in the tools are very valuable, and our own opinion is that the most crooked tool is the most serviceable, other things being equal. It is difficult, in purchasing at the artist material shops, to get tools with much bend in them; hence the workman who makes his own will have certain advantages over the one who buys. All the earlier pieces of work undertaken by the learner will suggest special tools with which to work in difficult places. The time occupied in making and using these tools will be well spent, and though as more experience is gained they will be discarded to some extent, yet they will have assisted in teaching valuable lessons.

Our next paper will be devoted to the materials used and directions for taking the first step in making a clay model which is to form the subject of a carving.

Cements and Glues.

At a recent meeting of the Polytechnic Club of the American Institute, Dr. John Phin read an interesting paper on cements and glues which we condense as follows:

Cements are to be divided into four classes, according as they dry, congeal by oxidation, harden by cooling, or "set" by other chemical changes. First are those which harden by evaporation. Under this head may be classed paste, mucilage and their varieties. Glues, to a certain extent, dry.

The second class includes the oils. These are said to dry, but it is not by evaporation. They lose nothing, but absorb oxygen from

Lessons in Carving.—Fig. 7.—Toothed Sword Blade and Bent Point.

the air. The cement weighs more after hardening than when first applied. Cements which congeal by oxidation cannot be treated in the same way as those of the first class. They require a longer time to handle. The hardening goes on from the outside inward. For example, mend a piece of porcelain with one of these cements. Test it in a few days, and although the outside will be hard the inside will not appear to have dried in the least, and will have no tenacity. Leave it for six months, and it will be very strong.

Thirdly, we have those cements which harden by cooling. These, instead of gaining their strength slowly, like those of class two, become hard at once. Shellac is a good example of a cement of this kind. China put together with melted shellac is extremely strong.

A fourth class of cements may be represented by plaster-of-Paris. This is the type of an extensive class, including the whole line of mortars and hydraulic cements, on which depend our great engineering works and even the houses in which we live. It forms a chemical compound combination with water first, and then more slowly hardens by drying, a part of the water evaporating.

In order to use a cement successfully we must know to what class it belongs and treat it accordingly. Next, we must know how to put it on. In no case should it be used in a large quantity. The less the better is a good rule to follow.

In mortar we mingle sand, which makes the actual thickness of the lime between the stony surfaces in all cases very slight, however much mortar we may employ. In the use of glue this is not practiced or necessary. The joints made by carpenters are good examples of the minute quantity of a cement which is necessary. Place a well-made glued joint on the edge, and it is almost impossible to find the lines of glue. Its position is mainly discovered by the direction of the grain of the wood.

Intimate contact between the cement and the edges is necessary. This is not easy, on account of the layer of air which adheres to all bodies. This layer of air is what causes needles to float when carefully placed upon the surface of water. When an object is warmed the film of air is easily moved. The hot needle sinks, and to the hot body the cement will adhere easily. It is faulty for this reason, that in gluing it is needful to have the work warmed. The rubbing of the surfaces together gets rid of the air, and then not only with glue, but with all cements, the surfaces must be pressed closely together.

Common glue has enormous strength and adhesive powers if it is good. But to be good it must not have been injured in the making by decomposition; not only is the glue itself liable to be injured in this way during the process of manufacture, but the animal matters such as skin, offal from the slaughter houses, hoofs, &c., are peculiarly liable to decomposition. When this happens the quality of the glue suffers in proportion. In the process of manufacture itself, which is a kind of jelly making on a large scale, there are numerous accidents which are liable to injure the quality. All of them seem to be forms of decomposition; in fact, glue is not free from danger in this respect until it is entirely dry. The best glue will be pleasant to both taste and smell, and if it is not so its strength has been impared. If in no way offensive either to taste or smell, it may be trusted to hold wood more firmly than its own fibers adhere to each other.

The strongest known glue is that made from the skins and sounds of fishes; this is known under the name isinglass or fish glue, and the strongest glue of this kind is made by the Laplanders from the skin of a kind of perch. The Laplanders use it in making their bows, which are both strong and durable. In making it their cold climate is greatly in their favor; here a fish-skin will begin to undergo decomposition before it can be dried.

In making it the skins are put into a bladder, which answers for a water bath, and heated in water until a sort of glue results. This glue is, as may be imagined, very elastic. Isinglass is very liable to be spoiled in making by overheating.

The pastes are all made from starch in some of its forms. Gluten is also used for a paste, but starch is the best. All additions of rosin, &c., commonly recommended are a damage to paste.

Dextrine, or "British gum," is of immense value in the arts as a cement. It is derived from starch by roasting or by the action of nitric acid. It was discovered by accidental overheating of starch, and its process of manufacture was for a long time kept secret. Its chief use for some time was in the cotton manufacture. It is the standard gum for postage stamps, though it is said that gum-arabic and cheaper substitutes are used in this country. [Dextrine is one of the most valuable substances which we have for making pastes, &c., and deserves to be more generally known. Its usefulness as a material for sticking paper is much greater than gum arabic, being free from many of the objectionable features of the latter.]

No cement can be fire-proof which contains organic matter, since this is decomposed at a temperature about that of melting lead, or, say, 600° F. Cements containing oils will not be fire-proof.

Silicate of soda mixed with asbestos is the nearest to a fire-proof cement. It will stand a low, red heat. It is decomposed at a bright red.

Water-proof glues are made in two ways. Glue and linseed oil are recommended, but I have had little success with the mixture. The chromates may be used with glue. These, when exposed to the light, render the compound insoluble. Unfortunately, although water will not dissolve a glue thus treated, it still has an action upon it. The glue has in fact been, as it were, tanned by the combined action of the bichromate and the light. It will, like leather, swell up and soften when long exposed to water.

Aquarium cement is the best water-proof cement I know. The formula is:

Litharge	3	Rosin	1
White sand	3	Boiled linseed oil	–
Plaster of Paris	3		

The solids are to be taken by measure in powder and mixed. As it sets rapidly, the set must not be added until it is wanted for use. It is better for being put into a mortar and pounded. It hardens in three days. It will hold glass firmly, and with it glass tanks may be made without frames, if the angles are well filled with cement. It is a kind of mastic, and could be used on brick.

What is technically known as marine glue stands almost by itself. Where it can be put on hot it is admirable. It is composed of india rubber and shellac, dissolved in naptha. Some kinds are hard, some almost liquid. I have seen this glue adhere to glass so firmly as to tear the glass when plates were separated.

In answer to a question the speaker said that stratena, whose wonderful powers are so frequently exhibited upon the streets, is probably only the old Armenian cement. This is so strong that it will hold jewels in place, and is used for this purpose by the Armenian jewelers, who merely flatten the settings of their precious stones and then stick them in place upon the metal with this cement. It is made by dissolving isinglass in alcohol along with gum ammoniac. When well made it is perfectly transparent.

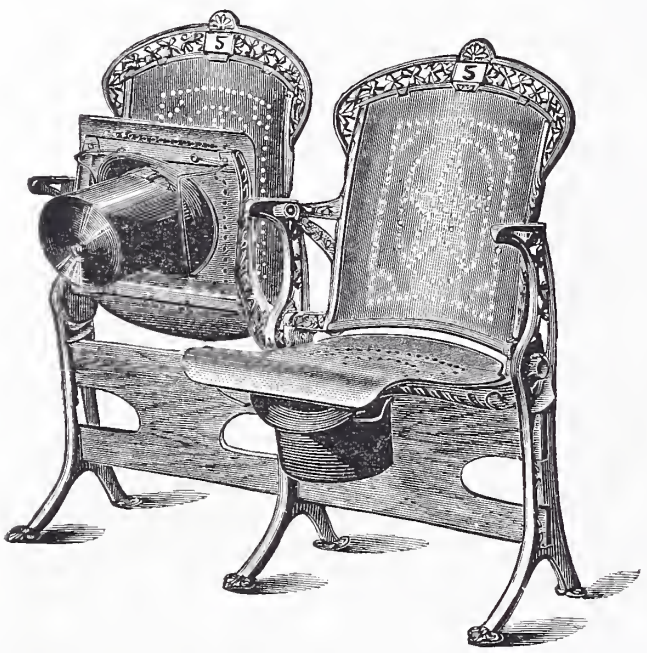
The Covering of Pulleys.—The importance of covering the face of pulleys with leather is realized by but few persons having charge of machinery. Full 50 per cent. more work can be done without the belts slipping if the faces of the pulleys are so covered. Leather belts used with the grain side to the pulley will not only do more work, but will last longer than if used with the flesh side to the pulley. This is owing to the fact that the grain side is more compact and fixed than the flesh side, and more of its surface is brought in contact with the pulley. The smoother the two surfaces, the less air will pass between the belts and the pulleys. The more uneven the surface of the belt and pulley, the more strain is necessary to prevent the belt slipping; for what is lost by want of contact must be

made up by extra strain on the belt. Leather belts, with the grain side to the pulley, can, it is said, drive 34 per cent. more than the flesh side.

NOVELTIES.

IMPROVED PERFORATED OPERA CHAIR.

Much labor and expense have been expended in perfecting what are known as opera chairs, in an effort to produce a comfortable seat which should occupy a minimum of space. Many claimants for favor are in the market, and the general introduction of this style of seat in halls and churches, as well as in opera houses and theaters, seems to be certain at no very distant day. While many persons may think such a seat an innovation anywhere else than in places of public amusement, the fact still remains that a comfortable seat enhances the value of a sermon, and makes a lecture more satisfactory than it would be when heard from a seat which makes the body ache in every joint. In Fig. 1 of our Novelties this month we show a new form of opera chair, recently brought out by Messrs. Baker, Pratt Co., of No. 19 Bond street, New York, which possesses advantages over others of its class. It is not only elegant and comfortable, but is also light, airy and cool. The seat and back are made of three thicknesses of veneer with the grain reversed, thus imparting the greatest possible strength and durability. A pleasing effect in appearance is produced by the use of black-walnut veneer in contrast with bright ornamentation of the crest, which is in bronze. The seat folds noiselessly, which is a great desideratum. Each chair is furnished with a hat-rack, clearly shown in the engraving, and with a foot-rest. The back of the chair is made to tip, which, with its perfect shape, makes the seat quite desirable.



Noveltees.—Fig. 1.—Improved Perforated Opera Chair.

IMPROVED GRINDING REST.

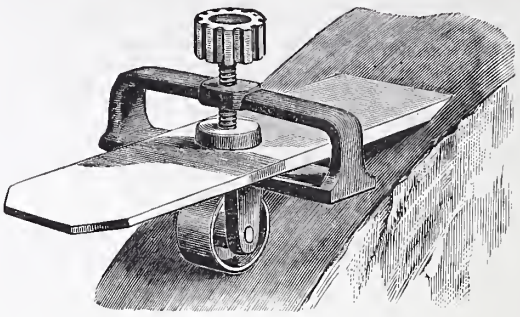
In Fig. 2 is shown quite a novelty, which will undoubtedly interest many of our practical readers. The inventor and patentee, Mr. A. D. Newton, Worcester, Mass., describes it as a grinding rest. It consists of a frame, through which the plane bit or other article to be ground is passed, being held in position by the clamp operated by the thumb-screw shown at the top. The bit is allowed to project through the frame more or less according to the angle desired to be imparted to the edge. A small wheel travels against the face of the stone, thus enabling the person using this device to hold the tool with one hand while turning the stone with the other. It is very simple in its parts and is of a size which can be conveniently sent by mail.

ANTI-FRICTION CASTER.

We illustrate in Fig. 3 what is known to the trade as Payson's Anti-friction Caster, manufactured by the Payson Mfg. Co., of Chicago, Ill. This caster, for ease of action, strength, durability and elegance of form and finish, is claimed by the manufacturers to be unexcelled. It revolves upon a series of iron rollers or disks in an annular chamber concealed from view. There is no leverage or friction upon the stem or spindle, and the parts are so joined together by riveting as to allow free access to the screws, fastening the caster to the woodwork without the inconvenience of taking the plates apart. It is made with a single wheel, but it is claimed to possess the advantages of a two-wheeled caster, with many others never before attained in any article of this kind. Various sizes are made to suit the lightest chair or the heaviest truck. The wheels are of either brass, porcelain or lignum vitæ, as required. Its finish is such as to make it an ornamentation to the finest piece of furniture. By a peculiarity in construction and arrangement of parts, casters of this kind require no oiling, and the longer in use the more sensitive they become to action.

ENDLESS BED DOUBLE SURFACER.

The new pattern of surfacing machine shown in Fig. 4 of our engravings was perfected some time since, and now, after having been tried long enough to demonstrate its actual merits, is being offered in the market. The makers, the S. A. Woods Machine Company, No. 91 Liberty street, New York, have displayed their usual enterprise in its design and construction, and have combined in it several important and very useful features. It is described as an endless or lag-bed double surfacer. Lag-feed planers have always been preferred for doing rapid or heavy surfacing, on account of their strong and sure feed. With the introduction of the combination chip-breaker, peculiar to the machines made by this company, it became possible to do really fine as well as rapid work—a fact which greatly enhanced the value of machines of this character. The present machine was gotten up in an effort to keep pace with the needs of wood-workers, and to produce something which if possible should surpass the machine of the same general class formerly made by this company. We will briefly notice some of the points to which the manufacturers refer as being among the superior devices in this machine. The carrying-out feed rolls are 6½ inches in diameter. They take the lumber after it leaves the traveling bed, and carry it over the under cylinder and completely through the machine without any pulling or pushing by hand, thus avoiding the necessity of the operator following one board immediately after another, or squaring up the boards having irregular ends. Each board takes care of itself. These rolls are strongly geared with expansion gears, and always travel at a speed uniform with that of the bed. The top roll and connections swing around easily, thus giving free access to the under cylinder for sharpening and adjusting the knives. The top cylinder is heavily steel faced, and carries three knives. The under cylinder is driven from a short counter on the floor, thus doing away with the necessity of binders or idlers. It can also be driven from above when necessary. The front pressure roll is in two sections, which is a feature of great importance. It allows two boards of different thicknesses to be planed at the same time. There is no halting of the thin board while the thicker one receives the pressure. The combination chip-breaker and shaving guard, already referred to, is applied in sections, to correspond with the pressure roll, thus effectually preventing the tearing or splitting of cross-grained lumber, and allowing work to be done very rapidly, and in the best manner. There are a number of other valuable points in this machine, but space forbids a more extended description. The machine is thoroughly built, is heavy and strong in all its parts, and is carefully tested at the manufactory before being shipped. It planes 27 or 30 inches wide and 10 inches thick. The total weight is 5550 pounds.

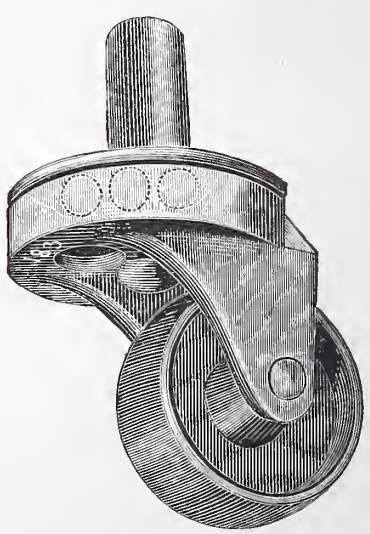


Novelties.—Fig. 2.—Grinding Rest.

NEW PUBLICATIONS.

THE SLIDE RULE, Simplified, Explained and Illustrated. By Robert Riddel. 44 pages, 7½ x 9½ inches; 32 pages of plates. Price, $1.

Without going into the science of the slide rule, this work takes up the instrument itself, and, by means of diagrams illustrating every step and showing the slide in every position, it makes the practical solutions easy, even before the rule for performing the question is understood. Taken altogether, it is the most practical work upon the subject which has so far come within our notice. Everything that the rule is capable of doing seems to be illustrated. If the rule could be made accurately enough, and long enough to give any considerable range in calculation, this work, as a text book, would be invaluable. Unfortunately, however, the slide rule, in the form in which it is commonly found in the shops, is very imperfect. The figures run consecutively only to 1000, and the divisions are so disposed and the slide is so short that great accuracy cannot be obtained. For example, on the slide rule in our office 84 times 9 is 760, and 9 times 84 is just a little less than 760, but how much must be determined by



Novelties.—Fig. 3.—Anti-Friction Caster.

the eye. As the divisions are, in the higher numbers, only a little more than the 32d of an inch apart, accuracy in the units cannot be obtained.

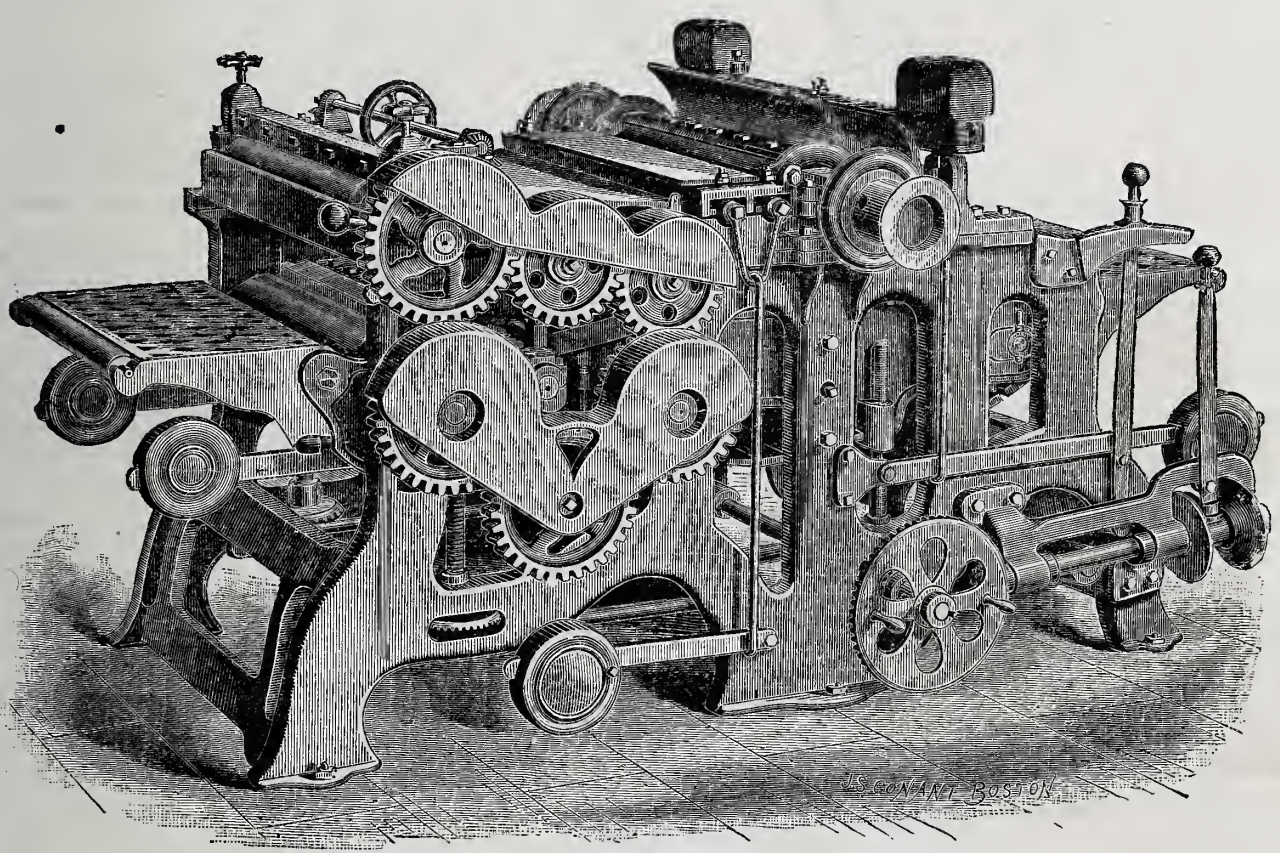
METAL WORKER SHOP CARDS. Nos. 1 and 2. Price 30 cents each.

These cards are the first two numbers of a series issued by *The Metal Worker*, and designed especially for the use of tinners, roofers, &c. They are, however, in many respects well adapted to the needs of carpenters and builders. The first card contains a table which shows the amount of tin plate in boxes and sheets required to cover any given roof, whether of 14 x 20 or 20 x 28 plates, and laid standing seam or flat seam. The second card shows the cost per square of tin for roofing with plates at different prices per box, for both styles and both sizes of tin. It also contains tables showing the number of slate in a square of roofing, the weights of sheet copper and zinc per square foot of surface, and a table of the weights, marks and gauges of tin plates. The practical application of these tables for carpenters and builders comes up in estimating upon contracts and in the management of work. If a builder buys his own material and hires labor—the course which we strongly advise—it is necessary for him to know both the quantity of every kind of material required and its cost, stated in the terms in which it is usually employed. By the first table he learns how much tin he must purchase in order to cover a given roof, thereby having a check upon the mechanics who work the material for him, as well as a guarantee against a shortage or a surplus, which can only be utilized at additional expense. In estimating upon a contract, it is necessary to know the cost of tin per square of roofing. It is comparatively easy to obtain quotations from any dealer in metals upon plates in the box. The item of freight can be ascertained per hundred pounds, which, by knowing the weight of tin plates furnished by one of the tables on this card, is easily reduced to so much per box. The freight, added to the first cost of the plates, gives the price per box, delivered in the locality for which the estimate is being made. With this figure, the cost per square is at once ascertained by glancing at the table. We need not particularize further in order to show the great utility of these cards, and their usefulness to contractors in all sections of the country. We have said enough to warrant their examination by all enterprising builders.

IMPROVED BIBLE-SCHOOL BUILDING AND CHURCH EDIFICE COMBINED. By W. H. Brearley, Detroit, Mich. Twelve pages; size, 6 x 9 inches. Five illustrations. Price, $1.

This pamphlet is an illustrated description of a new plan which Mr. Brearley has for combining church auditoriums and Sunday-school rooms in a single apartment. The main audience room is square in the ground plan, with the speaker's platform at one corner. Two aisles radiate from the desk toward the opposite corner, which is, however, cut off by a vestibule. The seats are arranged on the semicircular plan and are in three bodies. The side sections are much wider than that in the center, and have half aisles running in from the middle of the sides. Right and left from the speaker's platform, and upon the outside of this audience room, are two other rooms nearly as long as the main room, but only half as wide. These have reversible seats parallel to the walls and facing outward during recitation. These two rooms are divided from the main room by sliding doors, which, when run back, convert the whole space into a single audience room.

The rectangular space left behind the speaker's platform is utilized for a pair of church parlors. Each of the three rooms has an independent entrance and vestibule. The gallery runs around three sides of the square, except a triangular space cut off over the parlors. In front of this the organ is placed. This upper portion of the church is between 90 and 100 feet long, while the width from front to back is only 60 feet. The author boasts that none of the audience are more than 40 feet away from the speaker, but he neglects to state the very significant fact that a large proportion of his audience are behind and at the side of the platform. It would have been better for the hearing if those seats in front had been allowed to extend further back and fewer seats been placed at the sides. The location of the sliding doors is such that they take up much space which might have been made available for seats. The audience room is so small that it can hardly be a difficult one to speak in. When we first began the examination of the plan we were pleased with it, but we find that, upon careful consideration, there are difficulties which seem insuperable in the way of making the same room answer for an audience room and for Sunday-school class rooms also. In the latter we need rooms suitable for small numbers, and more suitable for social intercourse than for public speaking. An audience room must be arranged for hearing and seeing a single speaker and for a large number of people. It will not, therefore, answer to cut off small portions of a great room and expect to have any portion altogether satisfactory after the division. If the church is built so that every person can see the speaker's face and hear every word that is said without being annoyed by side-lights or front-lights, we have an end worth attaining. Then we may devote all our energies to making our Sunday-school rooms all that they should be, unhampered by any of the exacting requirements of the auditorium. The author's ideas of the importance of the Sunday school in church work are no doubt good and deserve the highest praise, but we think there are the gravest difficulties in the way of making the architectural combination in the proposed form, in order to unite the work of the church and the Sabbath school.



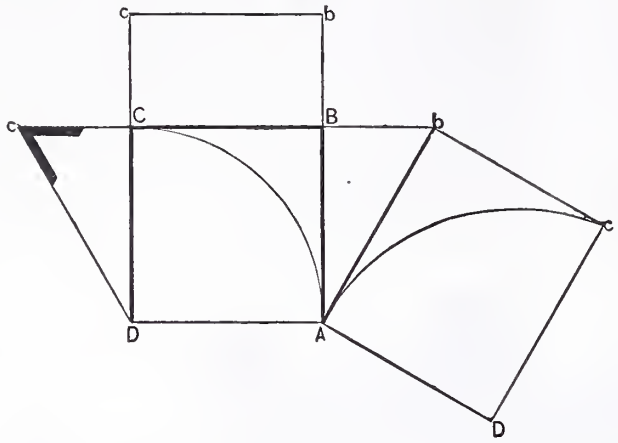
Novelties.—Fig. 4.—New Pattern Endless Bed Double Surfacer.

Making Brickwork Impervious.—According to the *Industrial World*, to make brick masonry impervious to water, there may be employed two washes or solutions for covering the surface, the one castile soap and water, the other alum and water, the proportions being three fourths of a pound of soap to a gallon of water and a pound of alum to four gallons of water, both being well dissolved. The wall must be perfectly clean and dry, and the air at least 50° F. The soap wash should be laid on boiling, with a flat brush, and so as to form no froth. After remaining 24 hours to become hard, the alum wash is applied in the same manner, but at the temperature of 60 to 70 degrees. After another 24 hours a second soap wash is put on, this being repeated until the walls are impervious.

Practical Stair Building.—IX.

WREATH-PIECES HAVING RAKED AND LEVEL TANGENTS UPON QUARTER-CIRCLE AND QUARTER-ELLIPTICAL PLANS.

In our last paper we presented a classification of wreath-pieces, showing under how many different conditions the problems relating to them may occur. We now commence the consideration of the practical operations in connection with their development. The first case we shall examine is that in which the wreath passes through the level to a rake over a plan which has a quarter circle. In Fig. 1, let A C be the center ground line of the quarter-circle plan of the wreath-piece we desire to produce. The first step is to obtain the elevated center line, as explained in our last paper. This elevated center line must have its tangent over B C level and its tangent over A B on a rake. Let B *b* represent the required hight; then join *b* A, and upon this line construct the rectangle A *b c* D, making the distance *b c* equal to B C. Next, draw the curve A *c*, so a to coincide with the line A *b* at A and with the line *b c* at C; then this curved line will be the elevated center line of the wreath-piece. A very simple demonstration of the correctness of this operation may be suggested. Transfer the diagram shown in Fig. 1 to a piece of card board. Score the card on the back upon the heavy lines A *b*, A B, B C and D C, so as to make it fold readily on those points. Turn up the end C *c b* B and the sides D *c* C and A *b* B, making the corresponding letters *b b*, *c c c* and and D D meet. It will then be evident that the line A *c* in the inclined plane coincides with the quarter circle A C in the plan.



Wreath-pieces Having Raked and Level Tangents.—Fig. 1.—Simple Wreath-pieces Over Quarter Circle Ground Plan.

The next step is to draw the face of the pattern of the wreath-piece corresponding to the elevated center line just obtained. For this we proceed as shown in Fig. 2. First, draw the tangent lines A *b* and *b c*. Make the width of the pattern at A equal to the intended width of the rail. Make the pattern at *c* somewhat wider than the diagonal of the square section of the rail, as shown at F. At each end of the pattern draw short lines parallel with the tangents, as shown in the figure. With these lines to serve as guides at starting, draw the intervening curves forming the inside and outside edges of the pattern-piece. Each of these curves is a quarter ellipse, and may be described as such if necessary. For short patterns, however, the curve can be drawn well enough by the eye, or by bending a thin strip of wood to suit the eye, and scribing along it with a pencil. For patterns of this kind, it is found by experience that the outside curve should always be rather full than otherwise, on account of the subsequent operations.

Figs. 3 and 4 are intended to show how the wreath-piece is taken out of the block. Mark pattern, as obtained in Fig. 2, upon a plank of sufficient thickness to form the twist, and cut the lines square through. Place the block in its proper position, as shown in Fig. 3, and stand facing the butt joint at *c*. Now, if the form of the wreath-piece, as finally cut out, could be seen in the block, it would appear as represented by the shaded figure. What remains to be done, therefore, is to remove the surplus wood.

In order to make clear a rule presented in a former paper, we will refer again to the experiments suggested in connection with Fig. 1. Fold up the cardboard figure, as already described; D *c* C in it corresponds with D *c* C in Fig. 3. Now, by the rule alluded to, the plumb bevel of any butt joint is the solid angle of which its own tangent is the vertex. Therefore the angle D *c* C is the plum bevel at the joint at *c*. The plum bevel at the joint at *a* is a right angle, therefore the piece has no twist at the latter end. Fig. 4 corresponds to Fig. 3 already described, save that the position of the wreath-piece is reversed. Instead of using the obtuse angle at D as a plum bevel for the joint at *d*, the inverse acute angle is used, which is more convenient.

The second class of ground plans described in our enumeration in the last paper were quarter ellipses. In Figs. 5 and 6 we show the same problem that we have just described, substituting quarter ellipses in the plan for the quarter circle. The operations in the two cases are identical. The only difference to be noted is that whereas the elevated center line is a quarter ellipse in the first instance, being derived from a quarter circle, the elevated center line in the second case is the quarter of an elongated ellipse, being derived from an elliptical ground plan. The same experiment may be performed with Fig. 5, as was suggested in connection with Fig. 1. Score upon the lines of corresponding letters, the two figures being marked in the same manner.

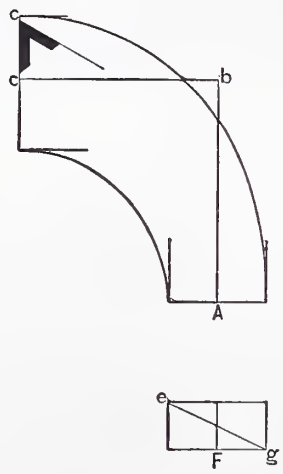


Fig. 2.—Pattern of the Wreath-piece whose Center Line is Shown in Fig. 1.

Lime has never been found in a native state; it is always united to an acid, as to the carbonic in chalk. By subjecting chalk or limestone to a red heat it is freed from the acid, and the lime is left in a state of purity.

CORRESPONDENCE.

The following letter, called out by our discussion of the advantages to builders of buying their own materials and fully controlling their work, even in other lines than that of their own trades, will be read with interest. Contractors are always anxious to learn how money can be made, how expenses can be reduced and how profits can be increased. There are hints in the following communication, and in the articles we have before published, which are well worth careful attention. The writer, for obvious reasons, desires us to withhold his name and address:

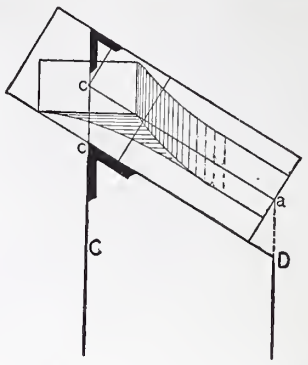


Fig. 3.—The Wreath-piece in the Block of Wood, showing How Much Must be Cut Away.

Builders Controlling their Work.

From BUILDER.—I have read with much pleasure the remarks in the March and April numbers of your journal, on the advantage of purchase by the builder of all the materials used in construction. This has been my plan for more than two years, and I am free to say I can build better houses, for less money, than I ever was able to under the miserable system of contracting with others to furnish both materials and labor. As I operate on a pretty large scale, I find it an advantage to employ men skilled in different departments of building work as foremen. I have a boss mason, a first-class framer, a man especially skillful in interior work, a roofer, a plumber and gas-fitter, and a painter. These men are first-class mechanics in their respective lines, and any one of them is capable of taking charge of all the work in his line which he can find time to attend to. I buy everything I use, and can either make the plumber's and roofer's profit on materials, or, on a close contract and strict specifications, can afford to make a proportionately lower allowance for labor than would otherwise be possible. But the system works equally well on a small as on a large scale. I can always get my own materials put in by contract by good men at a fair price, if I pay the boss a reasonable profit on the labor to compensate him for personal supervision, the use of tools, &c. This I am always willing to do. No man can afford to work for nothing. I won't touch anything myself that I do not see a profit in, and, as a consequence, I have made money where a good many others were losing it. The man who supposes he can get a dollar's worth of anything for fifty cents is a fool, and I flatter myself I am not one of that class.

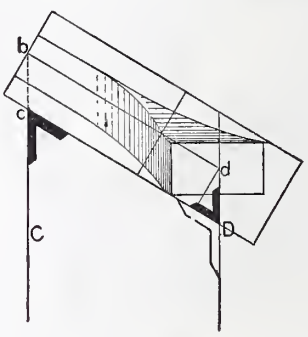


Fig. 4.—Same as Preceding Cut, but Viewed from Opposite End.

You are right in saying that the plumber

is no longer protected, and there is no reason why he should be. I am as much in the business as he is, and a great deal more. I am responsible, and can buy for cash whenever it is advantageous to do so. The dealer wants my trade every time, and is glad to get it; but it is an amusing fact that the plumbers I employ to do work sometimes follow me up and demand from the dealer 10 per cent. commission on the goods I have bought and paid for. This, however, does not trouble me. I buy right every time, and if the dealer in plumbers' supplies is such an ass as to give away the big end of his profit, it is no affair of mine. I should like to see a roofer get 10 per cent. out of the tin-plate importers on the tin I buy, or the carpenter get as much as a chew of tobacco out of the lumber dealers who supply me.

If I do business through a roofer or plumber, leaving him to buy materials and become responsible for them, it is right and proper that he should charge a profit on the transaction. But I can do better buying my own materials, and this is the course every sensible and responsible builder will find it to his interest to adopt. It often happens that I can employ workmen at regular wages and set them at work under my own men. It is the cheapest and best way whenever it is practicable; but in busy times, when most of the good men are employed and only the scrubs are idle, I frequently have so much work of my own on hand that it pays to contract with bosses to furnish supervision and labor. When they get used to the system they like it better than the old one. They get a check every Saturday, pay off their help and pocket what belongs to themselves, without risk or bother.

If all builders would adopt this method the business would become safe and more respectable, and we should have less of the "Jerry" element in our trade. I have all the work I can handle, and have never yet, with good management, found it necessary to take a contract which did not show me a fair and honest profit, and without any skinning either.

Note.—If we were to comment on this letter at any length it would result in a repetition of much that we have said before on the same subject. This communication is especially acceptable, because it shows the practical results arising from the system we have advised. Since upon every building that is erected the carpenter is looked to for suggestions, for necessary help, and in most cases for real superintendence (whether called by that name or not) in all the branches of trade employed, it becomes a necessity that he should be thoroughly informed upon the quality of brick, cement, lime and stone, upon the mixing of mortar, upon systems of ventilation, heating and fire proofing, upon the quality of tin plate, slate, felt and hardware, the merits of the various specialties, and so on to the end of the long list of items that enter into our so-called first-class structures, as well as upon points relating to timber and the means of working it. With this knowledge thoroughly acquired, he is in a better position as a contractor and builder to manage his work, by controlling it himself, than by sub-contracting it, irrespective of the question of profit. Whatever may be the faults of other mechanics, in most cases the carpenter is the one that has to take the blame. He must have this knowledge, therefore, in self-defense. Possessing it he is independent, even as our correspondent whose letter we have printed above represents himself to be. It is from the ranks of the carpenters that the best builders (using that term in its broad sense), contractors and architects are recruited. Hence the encouragement to all in this line to give attention to matters of this character, whatever may be their present positions.

In obtaining knowledge of the kind referred to, as we have had occasion to remark before, much is to be accomplished by close observation. Much, also, may be acquired by careful reading of *Carpentry and Building*, and by perusal of the trade manuals devoted to the several interests under consideration. Auxiliary to these sources of information is that of direct communication with manufacturers of materials, tools, fixtures, &c., and with dealers in goods of the kind employed. Visits to their places of business where possible, and careful examination of catalogues, circulars, &c., should be encouraged. The mere reading of newspaper advertisements has before now communicated many a new idea. We throw out these hints, leaving the intelligent reader to make the best application possible. We shall welcome still other letters upon this question. Because we have championed one side, we do not intend to shut off the other without a hearing, if any wish to speak upon it. Let us, then, have a good number of communications from experienced men in the building business touching upon these points, that all the dark places may be made light, and that the relative advantages of the different systems may be made so clear that all can understand them.

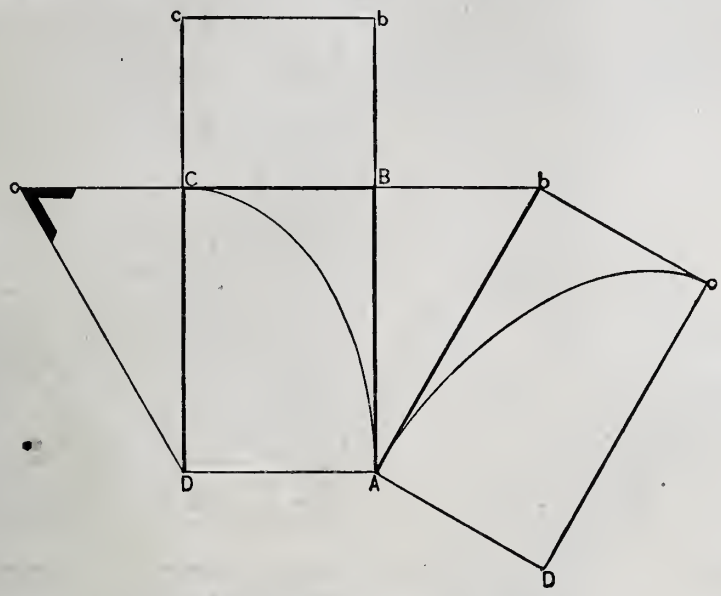


Fig. 5.—Simple Wreath-piece Over Quarter Ellipse in Plan.

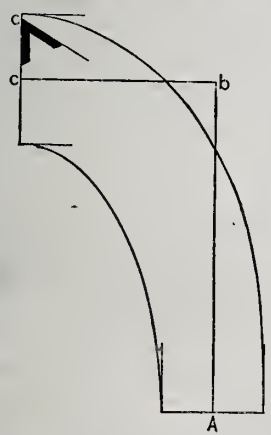


Fig. 6.—Pattern of the Wreath-pieces whose Center Line is shown in Fig. 5.

De Graff's Method.

From F. S. W., *Cleveland, O.*—S. N. W. desires some advice regarding the construction of a hand-rail of peculiar form. The best plan, for a novice in the art, is to use De Graff's method, which gives a "face mold" and "falling mold," making the lower easement twist, and the ramp which joins the straight rail all of one piece.

Note.—We shall be pleased to have our correspondent explain De Graff's method more fully, for the benefit of S. N. W. and others.

Placing Landing Riser.

From F. S. W., *Cleveland, O.*—W. S. D. wishes to know where to place the landing riser on a straight flight of stairs having a cylinder at the top. The riser should be placed so as to correspond with the usual method of getting out the rail piece which is above it. Usually, between 5 and 6 inches should be allowed from the face line of the riser to the back of the cylinder. This varies, however, according to the pitch of the stairs. The object is to provide for using ordinary long balusters on the landing.

French Flats.

From W. F. W., *Cleveland, Ohio.*—The statement was made in *Carpentry and Building* some time since that French flats were in great demand in New York. I would like to see a plan for a house of that description.

Answer.—This subject was discussed at some length in an article entitled "French Flats and Apartment Houses in New York," published in our January number for 1880, to which our correspondent is referred.

Desirability of Uniform Prices.

From W. N. C., *Iowa City, Iowa.*—I have been very much interested in all that has appeared in the correspondence department of the paper. The journal is one especially valuable to carpenters who have to be architect, builder and contractor. I have been particularly interested in the discussion concerning estimates and prices of work. I hope the discussion may be continued until there is a uniform price list established throughout the country. When the difference in bids submitted by different mechanics for both labor and material is taken into account, the inference arises that their judgment as to what is a fair day's work in different departments varies in like proportion. All this is specially illustrated in the shingling discussion.

Durability of Hard Maple.

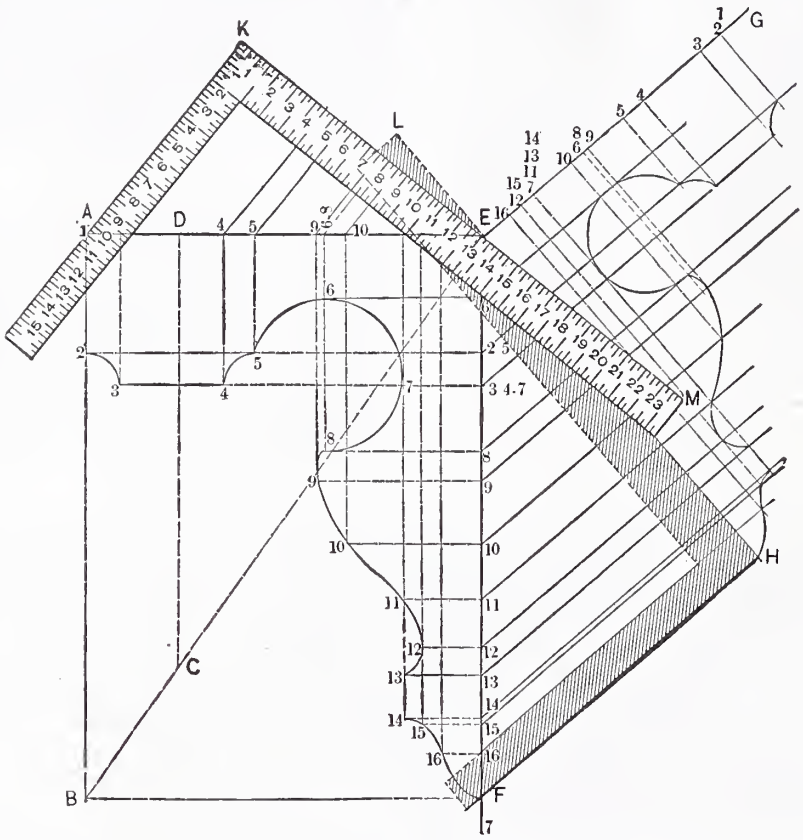
From S., *Waveland, Indiana.*—In a number of *Carpentry and Building* published in the latter part of last year, your correspondent J. P. S., of Hillsboro, Wis., asks information as to the durability of sugar maple for heavy framing in barns, &c. I desire to say that I have worked what we call hard maple, or sugar tree, in barns and other frames for the past 10 years, and from experience think it answers all purposes above the foundations as well as timber usually employed for the purpose.

Drawing a Scroll.

From F. S. W., *Cleveland, Ohio.*—J. A. N. wishes to know how to draw a perfect scroll by mechanical means. The best way is to fasten a pencil to the end of a thread, the other end of the thread being fastened to an upright cylinder or post. Then wind up the thread, describing the scroll with the pencil as you wind up. The pitch of the scroll is varied according to the size of the post.

Proportional Reduction.

From W. B., *Springfield, Mass.*—In answer to E. T.'s request to furnish a method of reducing a bracket in exact proportion, I will say that if I had a job of this kind to do I should probably use the pentograph, but as he has referred to my communication in the December number, I conclude that he wishes to have a method by which it can be done by means of the square. Those of your readers who prefer to do work of this kind with the compasses will readily see how to apply that instrument to the plan I shall describe. I have found that such work as the transferring of lines may be done as accurately, after a little practice, by the square as by the compasses, and, as the former is a constant companion of the builder, I think that he should train himself to accuracy with it. The following method is but one of the many different ways of placing the lines to produce the same results. The drawing I send you is not selected because of any peculiar form or beauty, but one I sketched off-hand during noon-time: First mark off the bracket as shown by A E F. Square out from A and F lines meeting at B. Draw B E, and from E measure off the required projection of the reduced bracket, thus obtaining the point D. Square down from D to the line B E, thus locating the point C. Then the line E D will be the width of the reduced bracket and D C its hight. Now at convenient points, their location and number being determined by the nature of the profile, as 2, 3, 4, 5, &c., square lines to the back edge, and also to the upper end of the brackets, all as shown in the sketch. Take the width E D of the reduced bracket on the blade of the square, and placing it, as shown in the engraving, against the corner E, carrying the tongue of square up until its edge strikes the outer corner A of the original bracket, draw a line along the blade, all as indicated by K E. Square down from points in this line to the points in the upper line of bracket, 1, 3, 4, 5, &c., already obtained. Take the length of the line D C on the square, which is the length of the bracket after reduction, and place it, as shown by the shaded square in the sketch, at E. Carry the square up until the blade strikes the corner at F. Mark along the blade of the square, thus producing the line E H, which is the back of the diminished bracket. From this line square out the line E G indefinitely; also square out the lines 16, 15, 14, 13, &c., from the points in the back edge of the original bracket, extending them indefinitely across the space the reduced bracket is to occupy. Take a straight-edge and place it against the line K E and mark the points that have already been obtained in it. Then transfer these distances on to the line E G. If preferred, this may be done by the compasses, setting one leg at E and describing arcs from the several points in K E, striking the line E G. From the points thus located in E G lines are then to be carried at right angles to it, being produced until they meet the lines drawn from corresponding numbers on the inner edge of the original bracket. Then a line traced through these intersections will produce the profile of the bracket diminished. The number of fixed points in the profile of the original bracket necessary to be used will vary in different cases. Where the lines are long and regular less will be required than where they are short and irregular. To increase the size of a given bracket the process here described is to be reversed. The same general rule may be also applied in drawing the profile of raking moldings. I think it will be seen that I have not here laid down an arbitrary rule. The principle on which it is founded is in laying down a line the length of the required bracket, and dividing that line in the same proportion as the original bracket.



Proportional Reduction.—Diagram Accompanying W. B.'s Reply to the Request of E. T.

If E. T. or any other of your readers wish to test their accuracy with lines, let them take a bracket of any size and increase it one-third. Then reduce the bracket thus obtained one-quarter. Place the one so reduced over the original one, and see how near the two correspond. My first experience in that line reminded me of the story of the little boy who made a three-legged stool. After vainly trying to make it stand squarely on its three legs, by successively cutting off the one that seemed to be the longest until he had got it nearly down to the floor, he asked his mother if she had not told him there was One who saw everything. His mother very solemnly replied, "Yes, my son." "Well," he says, "I guess He'll laugh when He sees this stool." And if E. T. doesn't find it the same, his experience will be different from that of W. B.

Filling Walls.

From A. T. J., *Colorado Springs, Col.*—Referring to the want of W. S. H., of Lewisburgh, Pa., who asks about filling his walls, I concur with the opinion expressed as to labor and expense of doing it now that the building has been plastered. However, if he will make a concrete of the proportions of ½ peck good lime to ½ bushel building sand and 7 bushels of screened river gravel, made wet enough to run well together, he can, with care, fill the spaces with it, and it will form as good a filler as I have any knowledge of. Great care must be exercised not to crush the clinches of the plastering.

Estimating Tapering Timber.

From G. J., *Havre de Grace, Md.*—In answer to the inquiries of G. A. L. and of J. C., in the April number of *Carpentry and Building*, it may be said "the proper way" to estimate tapering timber in board measure is to find the content in cubic inches, and reduce to feet by dividing by 144. Now, the content of a truncated pyramid, called in geometry the "frustum of a pyramid," is equal to that of three pyramids having for bases the lower base of the frustum, the upper base, and a mean proportional between the upper and lower bases of the frustum; and the content of any pyramid is equal to the area of the base, multiplied into one-third of the hight. A mean proportional between two numbers is found by taking the square root of their product, and in problems of this kind we can generally apply a proposition in the theory of numbers, viz.: "The square root of the product of two numbers is equal to the product of the square roots of the numbers."

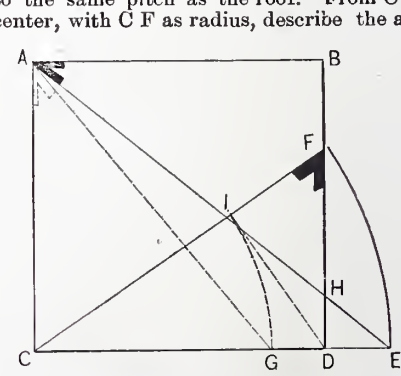
CALCULATION.

Base of first pyramid.....	144 inches	= 12 x 12
Base of second pyramid.....	36 inches	= 6 x 6
Base of third pyramid—the mean proportional.....	72 inches	= 12 x 6
Total of the three bases..	252 inches.	

252 x 120 (one-third of 30 feet in inches) divided by 144 = 210 square feet. By cancellation, the work reduces to 21 x 10, as before.

Using the Square for Getting the Cuts for Raking Moldings.

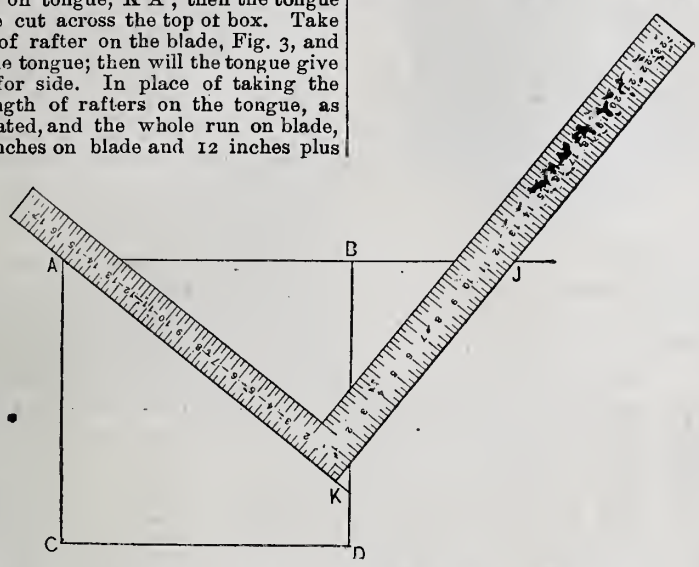
From D. C. H., *Kingwood, W. Va.*—In the November number of the paper a method of getting the form of a raking molding to miter with a given level molding was presented. A plan was also shown by which to get the bevel for the miter box to cut the raking molding. This manner of producing the molding, I believe, is given by most works on carpentry and is very good, but I think the method of getting the cut for mitering the raking molding, as given by Riddell and as shown by the inclosed sketch, (Fig. 1) is more easily comprehended, although the principles are the same in each. Draw the square A B D C, and lay off C F to the same pitch as the roof. From C as center, with C F as radius, describe the arc F E. Connect A and E. Then will the bevel at A be the cut across the top of box, and the bevel at F for side of box. The dotted lines of this figure represent the plan furnished by your correspondent J. O. B., Brooklyn, in the issue of the paper above referred to. It will readily be seen that the results are the same by the two methods. G D is equal to D H; D F shows the gain of the rafter.



Using the Square for Getting the Cuts for Raking Moldings.—Fig. 1.—Riddell's Plan of Obtaining the Bevels for the Miter Box.

In response to the request made in the same number of *Carpentry and Building*

about the use of the square, I inclose a plan of doing the same work; that is, getting the cuts for raking moldings by the use of this instrument. I have not seen the rule given in any work on carpentry, and it is original with me, although it is possible it may be in use by other carpenters. For the sake of comparison the square is shown in connection with the same lines as were used in Fig. 1. Referring now to Fig. 2, take the run of rafter on the blade, K J, and the length of rafter on tongue, K A; then the tongue gives the cut across the top of box. Take the run of rafter on the blade, Fig. 3, and rise on the tongue; then will the tongue give the cut for side. In place of taking the whole length of rafters on the tongue, as above stated, and the whole run on blade, take 12 inches on blade and 12 inches plus



Using the Square for Getting the Cuts for Raking Moldings.—Fig. 2.—Laying Off the Cuts on the Top of Miter Box.

the gain of rafter on the tongue, which gives the bevel. Suppose, for example, the pitch of the roof to be 8 inches to the foot. Take 12 inches of the blade and 8 inches on the tongue. Measure across the square from 8 to 12; then substitute the length thus gotten for 8 inches on the tongue. Then will the tongue show the bevel for the top of box.

Drawing Egg Ovals.

From W. W., *Council Bluffs, Iowa.*—As long ago as 1850 I observed that a point on the crank rod or beam of a steam engine, anywhere between the piston rod and the crank, would describe an ellipse at each revolution of the crank. I set about inventing an instrument for describing a figure upon that principle which, however, I never perfected. I produced egg shaped figures by running a crank through a fixed staple instead of attaching it to a piston rod; by this means I drew figures similar to those from J. P. in the September number of *Carpentry and Building.*

Construction of Right Angled Triangle.

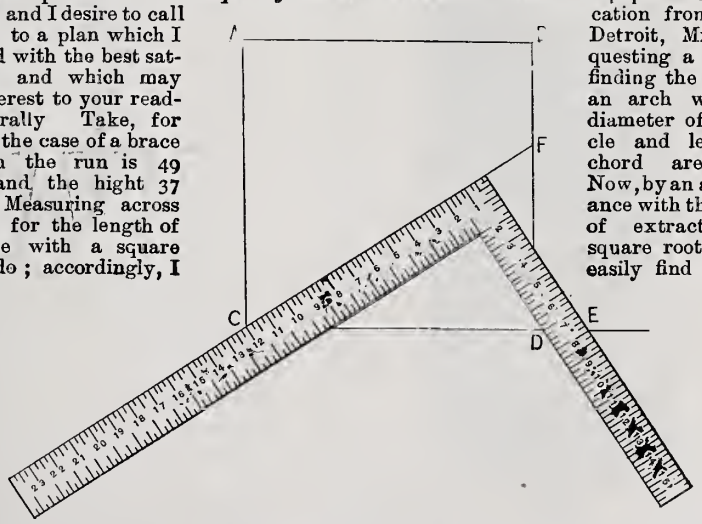
From G. J., *Havre de Grace, Md.*—A tree 70 feet high is broken so that one end of the part broken off may rest on the stump, and the other end on the ground 20 feet from the base of the tree; how high is the stump? That is, having given the base of a right-angled triangle, and the sum of the hypothenuse and altitude, to find the altitude. From the property of right-angled triangles we have the square of the hypothenuse, minus the square of the altitude, equal the square of the base. Now, from the principle that the difference of two squares is the product of the sum and difference of their roots, we have: Square of base, 400 ÷ 70 (the sum) = 5 5-7 (the difference of hypothenuse). And subtracting half of this difference, 2 6-7, from half the sum, 35, we have 32 1-7 for the hight of the stump; and by the addition of the same numbers we have 37 6-7 for the length broken off. This is probably the simplest arithmetical solution. A simple algebraic investigation furnishes this rule: From the square of the sum of hypothenuse and perpendicular subtract the square at the base, and divide the remainder by twice the sum of hypothenuse and perpendicular; thus: 4900—400 = 4500; and 4500 ÷ 140 = 32 1-7, the hight of the stump, as above.

Inaccurate Shop Rules.

From F. W. B., *Glastonbury, Conn.*—I wish to say a few words with regard to rules and methods in use among carpenters and joiners which have been handed down from master to apprentice, many of which serve only to mystify, instead of enlightening the mind upon the subjects under consideration. Take, for example, a common rule for laying out hip rafters by the use of the square. Suppose the roof to pitch 4 inches to the foot. In measuring each foot of run of the straight rafter, the square is laid on at 4 and 12 as many times as there are feet in the run. Then the length and cuts for the hip rafter are obtained by laying the square on at 4 and 17 as many times as at 4 and 12 for the straight rafter. This latter rule, of course, is good only for square roofs all of one pitch. Now, I know of a carpenter who has had 20 years' experience, and yet he could not tell for his life why he used 17 for the hip and 12 for the straight rafter. The point I wish to make is this, don't let us as mechanics, in giving information, turn out any jobs of this kind.

Short Rule for Obtaining Length of Brace.

From C. C. K., *Lima, Ohio.*—I have examined the theories of the brace which have been published in *Carpentry and Building*, and I desire to call attention to a plan which I have used with the best satisfaction, and which may be of interest to your readers generally. Take, for example, the case of a brace of which the run is 49 inches, and the hight 37 inches. Measuring across the space for the length of the brace with a square will not do; accordingly, I reduce the two lengths by four, which gives 12¼ and 9½ respectively. By taking these points on the two arms of the square and measuring across, the required length will be obtained. To do this I take a piece of board, joint one edge and run a gauge mark from the edge the desired width. Then, placing the square so that the figures fall on the gauge mark, I apply it four times, scribing along the blade and tongue respectively for the two ends. This gives the net length of the brace and the proper cuts for the joints. I do not say that this is the best rule which can be employed for the purpose, but it is short and simple. Any ordinary carpenter can work it, and it is undoubtedly correct.



Using the Square for Getting the Cuts for Raking Moldings.—Fig. 3.—Laying Off the Cut on the Side of Miter Box.

Walnut Stain for Pine.

From W. F. W., *Lincoln, Neb.*—In reply to B. H., who inquired in the November number of *Carpentry and Building*, I would say that asphaltum and turpentine, according to the directions published in the October number for 1879, make a very good walnut stain for pine. In some cases it will be found that the pine is made too dark. To remedy this defect I am in the habit of putting in a little vermilion and shaking the mixture well before using. In putting on the finish, care is to be taken not to rub the surface so as to take off the stain.

Simple Method of Preserving "Carpentry and Building."

From W. W., *Pittsburgh, Pa.*—In the January number of *Carpentry and Building* I notice a plan for preserving numbers of the paper. My method, I think, is as good as the one described, with the advantage of being much simpler. I take a common black shoe-lace having a tag at each end, and place the number of the papers in order, having first removed the advertising pages, and then, with a brad-awl, bore four holes through the entire lot and lace through, tying the ends of the lace tight together. A paper cover may be added it desired.

Connecting Cylinders to Straight String.

From YACUP, *Hamilton, Ontario.*—W. J. D., of Patterson, New Jersey, wishes to know how to connect cylinders to straight string. The way to make the neatest job is to leave some straight wood in the cylinder, say 1½ or 2 inches; then the bead on the bottom edge of cylinder joins the bead on string in straight wood, thereby preventing the cripple usually found when the cylinder joins the string at the spring. The position of the risers is generally spaced in large cylinders, though in small ones the riser landing is put in the spring. The most common way is to let cylinders into string, then glue and screw from the back.

Finding the Spring of an Arch.

From J. M. R., *Wilmington, Del.*—I notice in the last number of the paper a communication from A. R., Detroit, Mich., requesting a plan for finding the spring of an arch when the diameter of the circle and length of chord are given. Now, by an acquaintance with the process of extracting the square root, he can easily find the desired length. Take, for instance, the problem he refers to—16 feet diameter, 2 feet chord, to find the spring. First, reduce all to inches; then the radius of the circle is 96 inches. Square 96; then square half the chord, or 12 inches. Subtract the square of half the chord from the square of the radius, and extract the square root of the

remainder. The result will be the distance between the chord and center of circle. Subtract this from the radius, and the remainder will be the spring of the arch.

To Straighten Kinks in Saws.

From G. N. C., *Hancock, N. H.* — To straighten kinks in hand-saws, lay on smooth surface of pine wood, or harder wood if convenient, the kinked side up. Take your nail-set; grind the point square. Use a light hammer and strike lightly, taking care not to dent the saw.

Remedy for Damp Foundations.

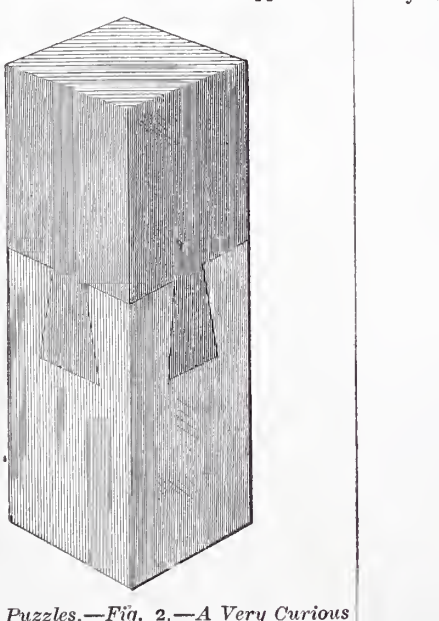
From W. F. P., *Berea, Ohio.*—I think if C. M., St. Louis, who complains of damp foundations, will put a good drain around his walls a little below the cellar bottom, he will find it will help matters materially. Of course it will be better, if not too expensive, to plaster the outside walls with water lime also.

Some Wooden Puzzles.

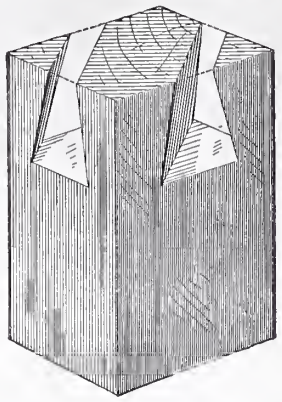
From PUZZLE, *California.*—I herewith send you the solution of three puzzles with which I have been acquainted for a long time, and only one of which I have ever seen in print. With reference to the latter, I may remark that it was so illustrated that no one could tell what it was. Fig. 1 represents a piece of board, say a quarter of an inch thick, with three different shaped holes cut in it, all as may be seen by the engraving. A block is to be fitted in such shape that it will pass through each of these three holes, exactly filling them in the passage. This, at first sight, seems impossible, but is simple enough, as may be seen by referring to the shape shown at A.

Wooden Puzzles.—Fig. 1.—Three Different Shaped Holes, All to be Exactly Filled by One Piece of Wood. The Shape of the Piece is shown at A.

The second puzzle is a square block, on each of the four sides of which appears a dovetail, all as shown in Fig. 2. At first sight it would seem impossible to put two pieces of wood together in this manner, but the same is quite simple, as may be seen by referring to Figs. 3, 4 and 5. Two pieces are prepared, as shown in Fig. 4. The sections are put together by means of two dovetails, as shown. The block is then reduced by cutting off the corners, as shown by the second square in Fig. 5, after which it presents the appearance shown in Fig. 2. Fig. 3 shows how the lower half of the puzzle would look if the upper half were removed from it.



Wooden Puzzles.—Fig. 2.—A Very Curious Dovetail, Each of the Four Sides Appearing the Same.

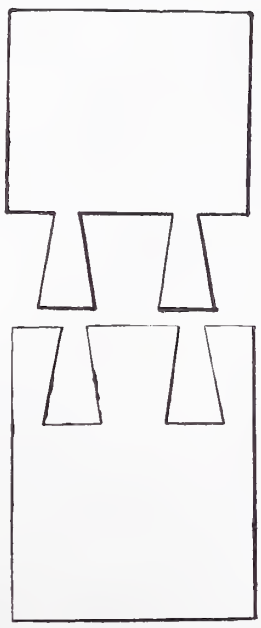


Wooden Puzzles.—Fig. 3.—View of Lower Half of the Dovetail shown in the Previous Figure.

The third puzzle is a sort of cross, which, when put together, shows a dovetail each way. Its construction is shown in Figs. 7 and 8. When put together it looks as if the big end of the piece went through the small opening left for the dovetail. I trust my explanations will be understood, for I think these puzzles will probably amuse some of your younger readers.

Slate Roofing.

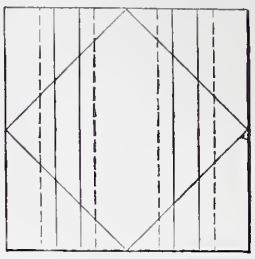
From J. McC., *Springfield, Vt.* —In the November number of *Carpentry and Building*, your correspondent C. C. D., of Waterbury, Conn., asks about slate roofing. I will give him some particulars with respect to measurements, &c. Add 6 inches along all eaves for the under eave. Add 6 inches each way from hips and valleys for waste in cutting slate. No extra is ordinarily charged for top course along combs or ridges. By the above rules a valley 18 feet long adds 18 feet extra measurement to the surface of the roof. A good slater on plain roofs, if well tended, will lay four to five squares, 12 x 20 slates, per day. Of 8 x 16, he will be able to lay from two to three squares. If the roof is cut up by hips and valleys, he will lay about one square less of each size. Sea green and unfading green slate come from Vermont.



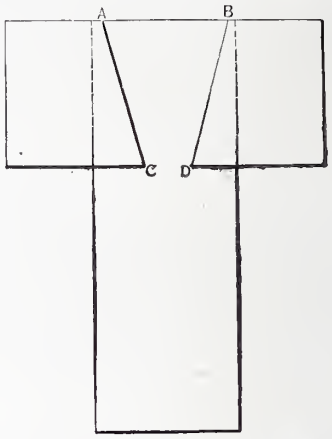
Wooden Puzzles.—Fig. 4.—Manner of Preparing the Curious Dovetail shown in Fig. 2.

The Area of a Segment of a Circle.

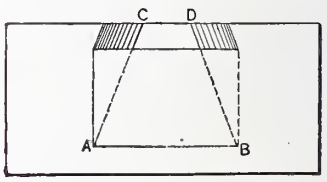
From J. M. R., *Wilmington, Del.*—O. W. D. desires to know how to find the area of the segment of a circle, either by lines or arithmetically. I know of no correct method of solving such problems by lines alone, but it can be done readily by arithmetic, provided it is known what proportion of the arc the chord will reach. If we know the diameter of the circle, by multiplying the square of it by .7854 we have the area. Now, suppose the chord of the segment will reach one-quarter of the circumference, and suppose the line to be drawn from each end of the chord to the center of the circle, we then have a triangular plat, the area of which, including the area of the segment, is one-quarter of the area of the whole circle. Find the area of the triangular plat and subtract from one-quarter of the whole circle; the remainder will be the area of the segment. This rule will apply to any proportion of the circumference the chord may reach.



Wooden Puzzles.—Fig. 5.—The Pieces, after being United as shown in Fig. 4, are Reduced to the Size of the Inner Square here shown by Cutting off the Corners, thus Presenting the Appearance of Fig. 2.



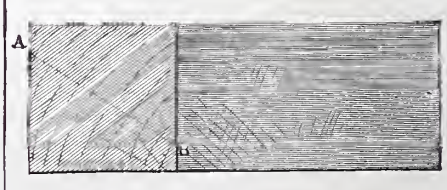
Wooden Puzzles.—Fig. 6.—A Cross which Appears to be Dovetailed in two Directions.



Wooden Puzzles.—Fig. 7.—End View of the Cross shown in the Preceding Figure.

Is Air for Respiration Injured by Passing Over Hot Iron Plates?

From W. F. W., *Lincoln, Neb.*—I desire to inquire if air is not deteriorated for breathing purposes by coming in contact with heated iron stoves? This question is connected with ventilation, so I suppose it is a proper one for the columns of *Carpentry and Building.*

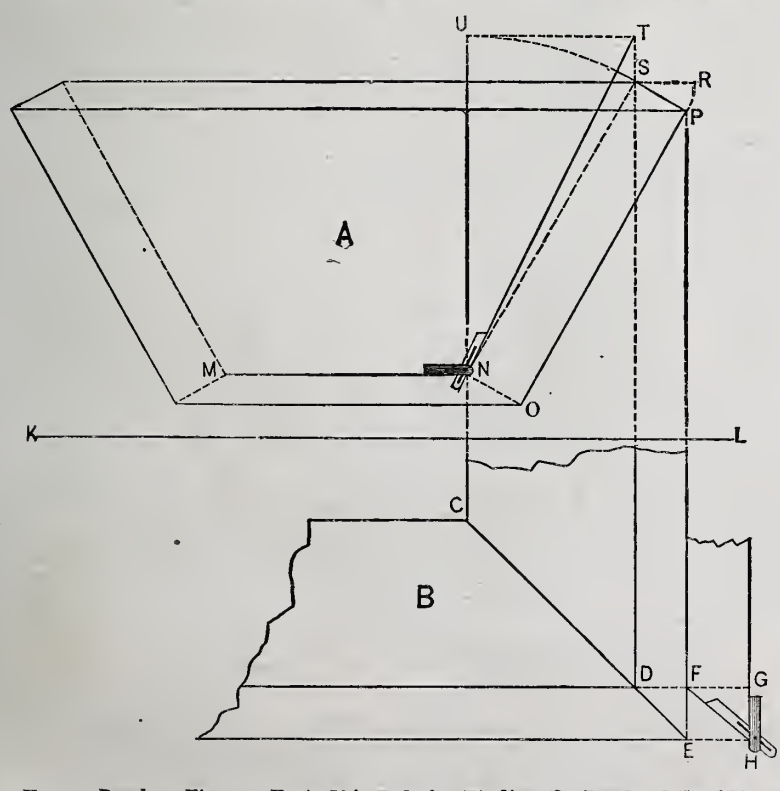


Wooden Puzzles.—Fig. 8.—Side View of the Cross.—A B shows Line of Dovetail.

Answer.—There is a general opinion prevalent which, plainly stated, is somewhat as follows: "Air for purposes of respiration is injured by coming in contact with hot cast-iron plates, the degree of injury depending in some measure upon the heated plates and the vital properties of the air destroyed by the heat of the plates. This is one of the objections offered against cast-iron stoves and furnaces." This is incorrect, as was proved many years ago by passing air through a block of iron heated to redness and placing a bird in the air thus supplied. It lived and suffered no injury, showing that the air was not injured by having been heated. The true state of the case seems to be that the dust contained in the air is partially burned or charred by the heat, and becomes very unpleasant to the smell. Excessive heat, too, is injurious, and the temperature of the air has as much to do with the feeling of oppression experienced with the so-called burnt air, as any chemical effect that the iron may have on the air. It is a notable fact that a stove may be red hot, or a furnace have its plates in like condition, yet no bad effects will be noticed until the room begins to get warm. Upon measurement, it will usually be found in such cases that all the air has passed over the heated surfaces. Instead of running a small stove very hard, it is better to have a large stove, the heating capacity of which is sufficient to warm the apartment without bringing the plates up to a high temperature. It is quantity, and not intensity of heat, that is needed. A large stove will usually be an economical one, while a small one is a fuel waster.

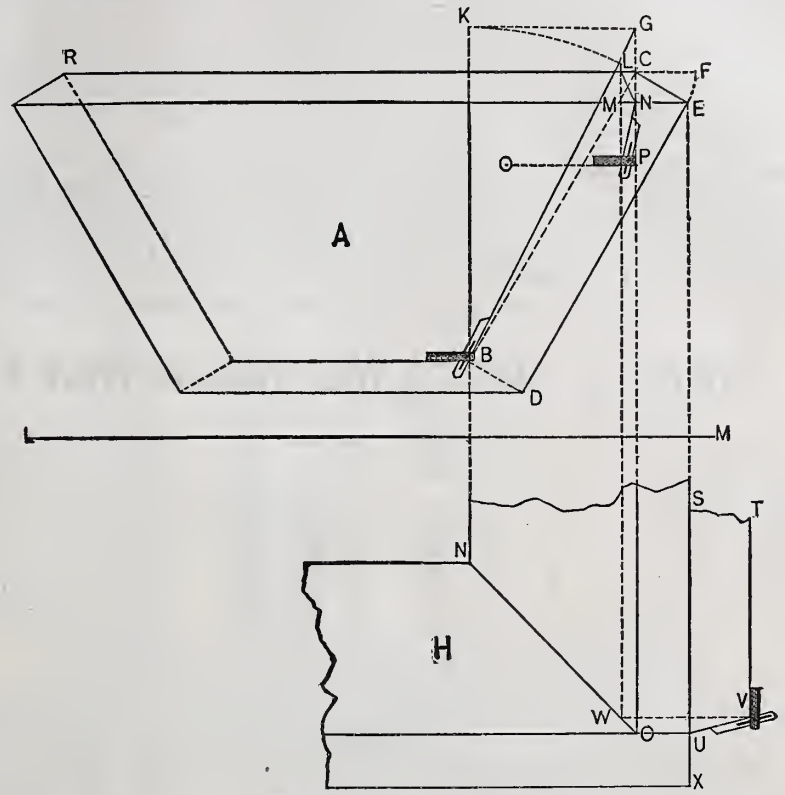
Hopper Bevels.

From F. A. M., *Oneida, New York.*—I desire to show my plan for finding the bevel for the sides of a hopper, and the miter for the joints of the same. In Fig. 1, let A be the elevation of the hopper and B the plan of one corner. The construction is as follows: N S in Fig. I represents the slant of one side, and N S P O the section of one end. Place one foot of the dividers at N, and with N S as radius describe the arc S U, intersecting the right line N U in the point U. At S erect the perpendicular S T, and draw the line U T at right angles to N U. Connect N and T; then the triangle



Hopper Bevels.—Fig. 1.—F. A. M.'s Rule for Finding the Bevels of the Sides.

M N T is the end bevel required. The line N T is the hypothenuse of a right-angled triangle, of which N U may be taken for the perpendicular and U T for the base. To find the miter of which D E is the plan, project S and P, as indicated in the plan by the full lines. With S P as radius and S as center, describe the arc P R. In the plan draw D G, on which lay off the distance S R, measuring from F, as shown by F G. Then G H F is the miter sought.



Hopper Bevels.—Fig. 2.—F. A. M.'s Rule for Finding the Bevels of the Ends.

In Fig. 2 is shown the application of the same general rule for finding the bevels for the sides of the hopper. The construction is the same as already described. From M, the point at which E M intersects B C, or the inner face of the hopper, erect the perpendicular M L, intersecting R F, or the upper edge of the hopper, in the point L. Then L C shows how much longer the inside edge is required to be than the outside. In the plan draw T V parallel to S X, making the distance between the two lines equal to C F of the elevation, or, in other words, equal to the thickness of one side. From the point L in the elevation drop the line L W, producing it until it cuts the miter line N O, as shown at W. From W, at right angles to L W, erect the perpendicular W V, meeting the line T V in the point V. Connect V and U; then T V U will be the angle sought. This bevel may be found at once by laying off the thickness of the side from the line E M, as shown by N P in the elevation, and applying the bevel as shown. This course does away with the plan entirely, provided both sides have the same inclination.

Joining Roofs of Different Pitches.

From H. M., *Morrice, Mich.*—If I was a draftsman I would prepare a plan showing how to join roofs of different pitches, in answer to an inquiry of S. McE. As I am not a draftsman, I will try and explain the way I do such work, and how it is ordinarily performed in these parts. A 16-foot building, with one-third pitch, raises 8 inches to the foot. A 14-foot building raises nearly 9⅛ inches to the foot. If the rafters project over the plates 1 foot, that on the 14-foot part will be 1⅛ inches too low at the outer end; therefore, take from the under side of the rafter on the 14-foot building 1⅛ inches thickness at the lower end, tapering to a point where the rafters lie upon the plate, and place it on the top side in a reversed position, which will make the cornice match, but will cause an angle in the roof and also in the valley. I prefer to make the projection on the narrow building 1⅛ inches narrower than it is on the wide building, which makes a better looking roof with less work, and the difference in the projection is not easily detected.

Why His Paper Is Not Received.

There is hardly a mail which does not bring us some complaint about the non receipt of papers, the lack of answer to inquiries or the failure to receive books ordered. Considering the large number of our correspondents, and the impossibility of avoiding misunderstandings in all cases, to say nothing of the liability to mistakes to which every one is more or less subject, it would, indeed, be strange if errors did not sometimes occur. We find, however, in the great majority of cases that the cause of difficulty is outside of our control, being the fault of the writers themselves. It very frequently occurs that we get letters inclosing money, either deficient in signature or

in statement of what the money is for. We sometimes have to write to parties to ascertain what they want, simply because they have assumed our memory is sufficient to connect their present letter with correspondence or conversation which occurred months before, the date of which they do not even mention. Imperfect post-office addresses, or entire omission of addresses, are perhaps of as frequent occurrence as any deficiency chargeable to our correspondents. Our Canadian friends have a special talent in this direction. This feature, however, is not peculiar to any geographical center, but breaks out periodically in various directions. A short time since we had on hand no less than four letters from one individual, who lives in one of the oldest and most enlightened communities in the Eastern States, to which we could not reply for lack of town and State. Postal cards are seldom complete in the matter of address, the writers seeming to take it for granted that the postmark will be sufficient. Postmarks cannot be relied on. In three cases out of five, especially upon matter coming from country post-offices, they cannot be read at all. To give point to our remarks, and at the same time to afford a subscriber a chance to make good the deficiency in his address, we annex a letter received just as we go to press. We present it in full :

HFD. April 13, 1881.

DEAR SIR: I would like to know why my paper is not sent more regularly, as I have not yet received the numbers for March or April. If you do not intend to send it, send me the money that I sent for subscription, for I think I am entitled to a copy once a month after sending you four extra subscribers. Please to answer one way or the other. Yours Truly, P. A. BROOKS, 15 S. Ann. St., Hfd.

In an attempt to ascertain this correspondent's whereabouts, we examined the official directory of post-offices, looking for names of which "Hfd" might be an abbreviation. We found in the United States sixteen Hartfords, five Hatfields, three Herefords, two Hayfields, two Harfords, two Harpersfields and one Hanford. What are we to do in such cases? Manifestly we can do nothing until the writer pleases to afford us the opportunity by giving his address. Every person, in writing to another, no matter what the subject or what the relationship of the parties, should give his full name and address. It is only courtesy, to say nothing about the liability of misunderstandings and aggravating delays if it is omitted.

Prices of Building Materials in New York, April 20, 1881.

Blinds.—OUTSIDE.

Per lineal, up to 2.10 wide....$ .... @ 0.24
Per lineal, up to 3 1 wide..... .... @ 0.26
Per lineal, up to 3 4 wide..... .... @ 0.28
Per lineal, paint'd and trim'd 0.45 @ 0.55

INSIDE.

Per lineal, 4 folds, Pine..... .... @ .53
Per lineal, 4 folds, ash or chestnut..... .... @ .78
Per lin'l, 4 folds, cherry or butternut..... .... @ .96
Per lineal, 4 folds, bl'k wal't. .... @ 1.06

Bricks.—(Afloat.)

Pale.....₱ M. $2 50 @ 3.00
Jersey..... " 4.57 @ 5.00
Long Island..... " .... @ ....
Up-River..... " 5.50 @ 6.00
Havers'aw Bay, 2ds... " 6.00 @ 6.50
Havers'aw Bay, 1sts. . " 6.75 @ 7.00
Croton—Brown..... " 10 00 @ 11.00
Croton—Dark..... " 11.00 @ 12.00
Croton—Red..... " 11.00 @ 12.00
Philadelphia Fronts .. " .... @ 24.00
Trenton " .. " .... @ 23 00
Baltimore.. .... " ... @ 38.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2 00 for Crotons and $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh.....$35 00 @ ....
Scotch..... 30.00 @ ....
English..... 30.00 @ 32.00
Silica (English)..... 35 00 @ ....
Silica (Welsh)..... 50.00 @ ....
Stourbridge..... 50.00 @ ....
American, No. 1..... ..... @ 40.00
" " 2 .... @ 30.00

Afloat. 500 ₱ M less

Cement.—(Cargo rate.)

Rosendale. ₱ bbl..... $.... @ 1.10
Portland Saylor's American, ₱ bbl..... ..... 2.25 @ ....
Portland (imported) ₱ bbl.. 2.85 @ 3 00
Roman..... " .. 2.75 @ 3.00
Keene's coarse..... " .. 5 75 @ 6 00
Keene's fine..... " .. 10.50 @ 11 00

Add 25 cts. to above rates for yard prices.

Doors.

RAISED PANELS, TWO SIDES.

2.0 x 6.0.....	1¼ in.	$0.90 ....
2.6 x 6 6.....	1¼ in.	1.20 ....
2.6 x 6 8.....	1¼ in.	1.25 ....
2.8 x 6.8.....	1¼ in.	1.30 ....
2.10 x 6.10.....	1¼ in.	1.40 ...
3.0 x 7.0.....	1¼ in	1.62 ....

MOULDED.

Size.	1¼ in.	1½ in.	1¾ in
2.0 x 6 0.....	....$0.48	....	....
2.6 x 6.6.....	.77	2.25	....
2.6 x 6.8.....	.80	2.28	....
2.6 x 6 10.....	.83	2.33	....
2.6 x 7.0	.97	2.36	....
2.8 x 6 8.....	.88	2.39	3.33
2.8 x 7 0.....	2 04	2 46	3.47
2.10 x 6 10.....	1.98	2.54	3.56
3.0 x 7 0....	2.21	2.69	3.80
2.6 x 7 6.....	2.15	2.63	....
2.8 x 7.6	2 25	2.72	3.85
2.10 x 7 6.....	2.36	2 87	4.05
3.0 x 7.6.....	....	3 00	4.22
2.6 x 8.0.....	2.25	2.75	....
2.8 x 8 0.....	....	2.88	....
2.10 x 8. '.....	....	3.02	4 47
3 0 x 8.0.....	.. ..	3.15	4.70

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Bends & Elbows, Each.	—Branches— Sing.	Traps, D'bl. & V.	Each.
2 in..$ .14	$ .40	$ .48	$ ...	$1.00
3 " .. .16	.50	61	...	1.25
4 " .. .20	.65	.75	1.30	1.75
5 " .. .25	.85	.90	1.55	2.50
6 " .. .30	1.15	1.05	1.80	3.50
7 " .. .35	1.50	1.20	2.05	5 00
8 " .. .45	2.00	1.45	2.45	6.00
9 " .. .55	2.50	1.70	2.85	7.00
10 " .. .70	3.00	2.00	3.30	8.00
12 " .. .80	3.75	2.52	4.24	10.00
15 " .. 1.25	5.00	House		Sewer
18 " .. 1.60	7.50	Branches pr. iin. ft.		Branches pr. iin. ft.,
		15x6 $1.75		15 in. $2.25
		18x6 2.50		18 " 3.00

Longer than 1 ft., charged as pipe.

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$8.25	$7 50	$7.00	$6 50
11x14—15x24	9 25	8.50	8.00	7.25
16x24—20x28	10 75	9 75	8.75	7.75
15x34—24x30	12 25	10.75	9.00	8.50
26x26—24x36	13.00	11 50	9 75	9.00
26x36—26x44	14 50	13.25	10.75	9.50
26x46—30x50	15.00	14.00	11.25	10.50
30x52—30x54	16.00	14.50	12.00	...
30x56—34x56	17.25	15.50	13.50	....
34x58—34x60	18.25	17.25	15.00	....
36x60—40x60	20 75	18 75	17.25	....

DOUBLE.

6x 8—10x15....	$12.75	$11.75	$10.75	$10.00
11x14—15x24....	14 50	13 25	12.50	11.25
16x24—20x28....	17 25	15.75	14.00	....
15x34—24x30....	19.75	17.25	14.50	....
26x28—24x36....	21.00	18 50	15.75	...
26x36—26x44....	23.25	21.25	17.25	...
26x46—30x50....	24 00	22.50	18.00	...
30x52—30x54....	25 75	23 25	19.25	...
30x56—34x56....	27.75	25.00	21.75	...
34x58—34x60....	29.25	27.75	24 00	....
36x60—40x60....	33.25	30.00	27 75	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: Single, 70 %; Double, 70&10 %.

French

WINDOW, PICTURE AND CAR GLASS.

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15....	$6.50	$5 75	$5 50	$5 25
11x14—16x24....	7.25	6 75	6 25	6 00
18x22—20x30....	9.25	8 50	7 75	7.25
15x36—24x30....	10.25	9.25	8 25	....
26x28—24x36....	11.00	10 00	9.00	....
26x36—26x44....	11.75	10.75	9 50	....
26x46—30x50....	13.25	12 50	10.50	...
30x52—30x54....	14 00	13.00	11.25	....
30x56—34x56....	15.00	13 75	12 50	....
34x58—34x60....	15.50	15 00	13 25	..
36x60—40x60....	17 50	16 00	15.00	. ..

DOUBLE.

6x 8—10x15....	$8.25	$7.75	$7.50	$7.00
11x14—16x24....	10 00	9.25	8.75	8.25
18x22—20x30....	12 75	11 75	10 75	....
15x36—24x30....	14 25	13 00	11.25	....
26x28—24x36....	15 25	13.75	12.50	....
26x36—26x44....	16 25	14 75	13 00	....
26x46—30x50....	17.50	16.75	14.25	....
30x52—30x54....	18 50	17.25	14.75	....
30x56—34x56....	19 50	18.25	16.25	....
34x58x34x60....	20.50	19.50	18.00	....
36x60—40x60....	23 00	21.00	20.00	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: 60 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS

Per square foot, net cash.

⅛	Fluted plate, case 100; cut to size			16c.
3-16	Fluted plate	"	13c.	" " 18c.
¼	Fluted plate	"	16c.	" " 20c.
¼	Rough plate	"	16c.	" " 20c.
⅜	Rough plate	"	21c.	" " 27c.
½	Rough plate	"	28c.	" " 33c.
¾	Rough plate	"	45c.	" " 55c.
1	Rough plate	"	55c.	" " 65c.

Hair.

Cattle.....₱ bushel, $0.13 @ 0.15
Goat..... " 0.18 @ 0.20

Lath.

Cargo rate..... ₱ M $1.50 @ ....

Lime.

Glen's Falls, or Keenan's common, cargo rate ₱ bbl..... @ .90
Glen's Falls, or Keenan's finishing Joints..... ..... 1.15 @....
Rockland, common ..... 1 00 @....
Rockland, finishing..... 1.25 @....
Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Pine, very choice and ex. dry, ₱ M. ft. thick.....$60.00 @ $65.00
Pine, clear..... 55.00 @ 60.00
Pine, selects..... 45.00 @ 50.00
Pine, pickings .... 35.00 @ 42.50
Pine, selected, box..... 2 .00 @ 22.00
Pine, common box..... 17.00 @ 20.00
Pine, common box, ⅝..... 15.00 @ 16.00
Pine, 1¼x10, 13 ft., matched, each..... .40 @ .43
Pine, 1¼x10, 13 ft., culls.... .28 @ .30
Pine, 1x10, 13 ft., good matched, each..... ... @ .30
Pine, 1x10, 13 ft., common, matched, each..... .23 @ .25
Pine, 1x4½, clear, match'd, each..... .23 @ .25
Pine, 1x4½, merchantable, matched, each..... .17 @ .18
Pine, 1¼x4½, cl'r, match'd, each..... ... @ .35
Pine, 1¼x4½, merchantable, matched, each..... .28 @ .30
Spruce, 1x9, 13 ft., rough... .19 @ .20
Spruce, 1x9, 13 ft. matched, each..... .22 @ .24
Spruce, 1¼x9, 13 ft., rough, .23 @ .25
Spruce, 1¼x9, 13 ft., matched, each..... .25 @ .27
Spruce, 2x9, 13 ft., rough.. .38 @ .40
Spruce, 2x9, 13 ft., match'd, each..... .44 @ .47
Spruce, 2x4, 13 ft..... .15 @ ...
Spruce timber, flat, ₱ M ft 22.00 @ 23.00
Spruce timber, square, ₱ M ft..... 23.00 @ 25.00
Hemlock, 1x10, 13 ft., each. .18 @ ...
Hemlock, 2½x4, 13 ft., each. .16 @ .18
Hemlock, 3x4, 13 ft., each.. .19 @ .20
Hemlock, 4x6, 14 ft., each.. .40 @ .43
Ash, good, ₱ M ft..... 45.00 @ 55.00
Oak..... 45.00 @ 55.00
Oak, quartered .. .... 70.00 @ 90.00
Maple, common..... 25.00 @ 35 00
Maple, good to 2 in..... 40.00 @ 45.00
Maple good thick..... 45.00 @ 55.00
Maple white..... 55 00 @ 60.00
Chestnut..... 45 00 @ 60.00
Bl'k walnut, good to choice 85 00 @ 100 00
Black Walnut 2d..... 55.00 @ 65.00
Black walnut, ⅝..... 75.00 @ 85.00
Black walnut, selected and seasoned..... 100.00 @ 120.00
Bl'k walnut counters, ₱ ft. .12½ @ .20
Cherry, wide, ₱ M ft..... 85 00 @ 100.00
Cherry, ordinary..... 70 00 @ 80.00
Whitewood, or Poplar ⅝ in. 30 00 @ 35.00
Whitewood, or Poplar ⅝ panels..... 35.00 @ 45.00
Whitewood, or Poplar 1 to 1¼ inch..... 40.00 @ 50.00
Whitewood or Poplar. 2 in. and upward..... 45.00 @ 50.00
Shingles, extra sawed pine, 18 in., ... 5.00 @ 6.00
Shingles, clear sawed pine, 18 in., 2 md..... 4.00 @ 5.00
Shingles, cypress, 7x24..... 14.00 @ 18.00
Shingles, cypress, 6x20..... 12.00 @ 14.00
Shingles, Cedar, 6x24, No. 1 — @ 22.00
Shingles, Cedar, 6x14, A's.. — @ 16.00
Shingles, Cedar, 6x20, No. 1 — @ 12.50
Shingles, Cedar, 6x20, A's.. — @ 10.00
Shingles, Cedar Eastern. — @ 3.50
Shingles, Hemlock..... — @ 3.75
Shingles, Pine..... 4.00 @ 5 00
Shingles, Spruce..... — @ 3.50
Shingles, Redwood (California), ordinary, per bunch. — @ .85
Shingles Redwood (California) 6x16 cut..... — @ 1.85
Yellow pine dressed flooring, wide, ₱ M ft..... 35.00 @ 37.00
Narrow ditto..... 35.00 @ 40 00
Yellow pine timber..... 30.00 @ 45 00
Locust posts, 8 ft., ₱ in..... .18 @ .20
Locust posts, 10 ft..... .24 @ .25
Locust posts, 12 ft..... .25 @ .30
Chestnut posts, ₱ ft.... .03 @ .3½
Mahogany, ¼ in. ₱ ft..... .08 @ .07
Mahogany, ⅜ in. ₱ ft..... .08 @ .10
Mahogany, ½ in. ₱ ft..... .10 @ .12
Mahogany, ⅝ in. ₱ ft..... .12 @ .14
Mahogany, ¾ in. ₱ ft..... .14 @ .16
Mahogany 1 in. ₱ ft..... .16 @ .18
Rosewood, ¼ in. ₱ ft..... .11 @ .15
Rosewood, ¼ in. ₱ ft..... .16 @ .20
Rosewood, ⅜ in. ₱ ft..... .24 @ .28
Rosewood, ½ in. ₱ ft..... .40 @ .45
Rosewood, 1 in. ₱ ft..... .60 @ .75
Satin wood, ½ in. ₱ ft..... .25 @ .35
Satin wood, 1 in. ₱ ft..... .35 @ .50
White holley ¼-inch..... .10 @ .12
White holley ⅜-inch..... .15 @ .18
Cedar (Cuban and Mexican) ₱ ft..... .10 @ .14
Cedar (Florida) Less than 1 inch..... .16 @ .24
1 inch and over ..... .25 @ .30
Redwood (California)..... 1 to 2 in., dry, per M..... @ 60.00
3 in. and over, per M..... @ 60.00

Moldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof building, ₱ lb. 16c @ 17c
Rosin Sized Sheating, ₱ lb. 4c @ 5c
Dry Sheating ₱ lb..... 3c @ 3½c
Tarred Felt. ₱ lb..... .... @ 3c

Plaster.

Calcined Clty.....Mill rate..$1 25 @ ....

Sash.—15 to 25 % dis.

GLAZED.

Dimensions of windows.	12 Lights. 1¼pl.	1¼c.	1½c.	8 L's. 1½c.	4 Lights. 1¼c.	1½c.
2.1X3.6.....	$0.90	0.96	....	....	....	....
2.4X3.10.....	.98	1.05	....	....	1.15	....
2.7X4.6.....	1.18	1.25	....	....	1.45	1.54
2.7X4.10.....	1.32	1.38	....	....	1.52	1.62
2.7X5.2.....	....	1.47	....	....	1.77	1.87
2.7X5.6.....	....	....	....	1.86	1.93	2.04
2.7X5.10.....	....	....	....	1.94	2.02	2.16
2.10X4.6.....	1.32	1.41	1.50	....	....	....
2.10X5.2.....	1.49	1.58	1.71	1.90	1.95	2.08
2.10X5.6.....	1.59	1.68	1.84	2.03	2.05	2.21
2.10X5.10...	1.86	1.96	2.12	2.14	....	2.38

c. means counted checked—plowed and bored for weights.

Hot bed sash, glazed.....$2.35

HEAD LIGHT.

Two or three Lights, Glazed.

Size.	1¼	1½	Size.	1¼	1½
2.6X1.0 ..	40	45	2.10X1.0..	45	55
2.6X1.6...	50	55	2.10X1.6..	60	65
2.8X1.0...	45	50	3.0X1.0....	50	60
2.8X1.6...	55	60	3.0X1.6....	67	75

Slate.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're.$5.50 @ $6 00
Green slate..... 5.50 @ 6.00
Red slate..... .... @ 10 00
Black slate, Pennsylvania .. 4.00 @ 4.50
Tiles, 1¼ in. rubbed, ₱ sq. ft. @ .30

₱ sup. ft.

Steps and platforms, 1½ in. thick; Risers, 1 inch thick.....60c
" " 2 " 75c
Red tile and borders.....60c
Coping, 1½ " 40c
" 2 " 45c

Lineal ft.

Window sills, 4x7.....70c
" 3x7..... .....60c
Window caps, 4x10, plain.....1.00
" 4x8, " 80c
" 3x10, " 70c
" 3x8, " 65c

Stair Material.

BALUSTERS.

Black Walnut. 1½ in.	1¾ in.	2 in.	2½ in	
Fancy Turned.....	7c	9c	10c	16c
Neck Turned.....	9c	10c	12c	19c
Fluted or Octagon	12c	14c	17c	25c

OCTAGON PANELED NEWELS.

Panels Veneered with French Walnut.
8-inch Newels, with Cap..... $6.12
9 " " " 6 88
10 " " " 7.60

SOLID NEWELS, WITH CAPS.

Black Walnut.	5 in.	6 in.	7 in.	8 in.
Fancy Turned....	$1 60	$1 90	$2.50	$3 40
Octagon.....	2.10	2.40	3.00	3 90

STAIR RAIL.

Worked out and finished ready to put up. Easements and cylinders counted double. Price per foot Newels and Balusters not included).

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded.....	40c	45c	50c	53c
Toad Back.....	45c	50c	63c	68c

STAIR RAIL, UNFINISHED.

Price per foot.

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded.....	11c	13c	15c	17c
Toad Back.....	12c	14c	16c	18c

Stone.

Cargo rates, delivered at New York.

Amherst Blue..... $0.90
Amherst freestone, in rough, ₱ C ft...1.00
Bay of Fundy, Wood Point, brown..... 0.80 @ 1.00
Bay of Fnndy, Mary's Point, brown..... .. ..$0.80 @ 1.00
Bay of F'dy, Mary's Pt., olive. 0.80 @ 1.00
Berlin Blue .... @ 0.90
Berlin freestone. In rough.... .... @ 1.00
Berea freestone, in rough.... .... @ .80
Brown stone, Portland, Ct... 1.25 @ 1.50
Brown stone, Belleville, N. J. 1.00 @ 1.50
Granite rongh..... .50 @ 1.00
Dorchester, N. B., stone, rough.....₱ foot. .... @ 1.00

BLUE STONE

Rubbed hearth, 10 ft. or under..... 25c
Rubbed hearth, 20 ft. or under..... 35c
Rubbed hearth, 30 ft. or under..... 45c
Rubbed hearth. 40 ft. or under..... 50c
Rubbed sills..... 30c
Sawed & Plaued..... 40c
Sills and lintels..... .... @ 18c
Sills and lintels, fine quarry cut sills..... @ 35c
Coping, 11 to 18 in. wide..... 20c @24c
Coping, 20 to 28 in. wide..... 38c @ 6c
Coping, 30 to 36 in. wide..... 65c @80c
Steps, 8 in..... @ 60c
Steps, 7 in..... @ 55c
Steps, 6 in..... @ 35c
Steps, door, per in. wide..... @ 3c
Platforms, promiscuous, 4 in... @ 32c
Wyoming Valley, promiscuous, per cubic ft..... 1 30@1.35

Vault Lights.—Nominal.

Platform, sq ft..... ....$3.50
Step and risers, sq. ft..... 3.50
Floor light, sq. ft..... 2.50
Roof light, sq. ft..... 2.50
Platform, 2d quality, sq. ft..... 2.60

COVERS.

Diameter.	Round.	Hexagon.
14 inch.....	$3.00	$0.00
16 "	3.75	4.00
18 "	5.50	6.00
20 "	8.00	8.50
24 "	14.00	15.00
26 "	16.00	17.00
30 "	23.50	25.00
36 "	31.00	33.00

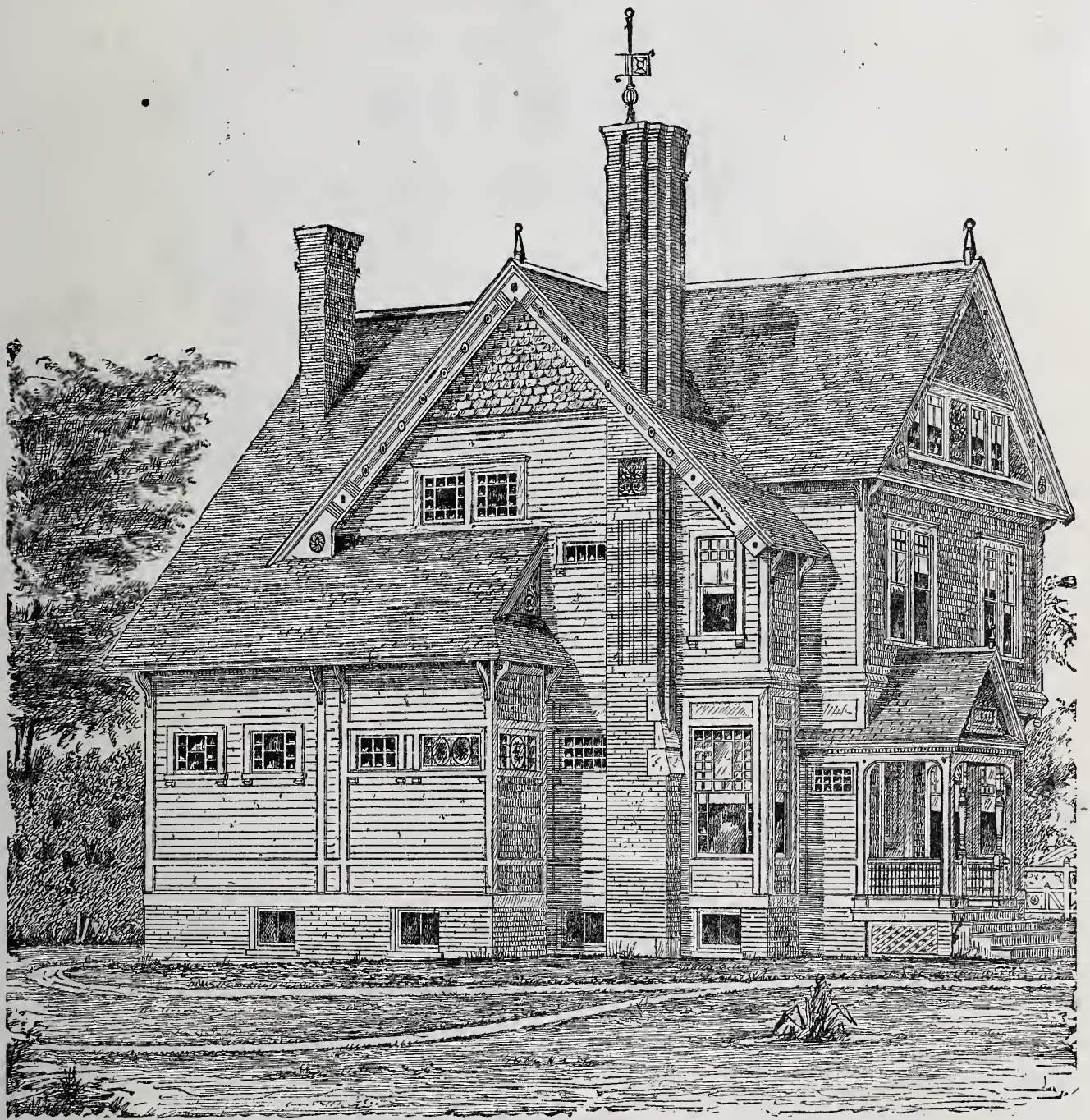
CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

VOLUME III. NEW YORK—JUNE, 1881. NUMBER 6.

An English Cottage.

The accompanying perspective view shows a carefully studied design for an English cottage, or, rather, what might be more correctly described as an adaptation of the present fashion in dwelling-house architecture to the practical wants of our people, and to the requirements of our climate and modes of living. By examination of the first-floor plan, shown in Fig. 3, it will be noticed that the sitting room and hall are combined, constituting what might be described as a reception hall. This is a feature in planning which has come into quite extensive use, and, when well arranged, always proves a very attractive feature. A neatly finished and tastily furnished hall of this character goes a long way toward making a pleasing impression on the mind of one who enters the house for the first time. Certainly it is, by far a better and more sensible way of utilizing the approach to the stairs than that of the old-fashioned narrow hall.



An English Cottage.—Designed by Thos. J. Gould, Providence, R. I.—Fig. 1.—Perspective View.

The arrangement of stairs is an idea perhaps not entirely new to our readers, but it is one that has not, as yet, been commonly employed. Very little cost is put into the rails and balusters. The stairs rise from the first floor only a few steps in view from the hall. From the platform thus reached, through a curtained arch, the passage is up a flight which rises to the second floor in one straight, easy run between partitions. By a short flight from the servants' entry the same stairs are reached, and are thus used by both mistress and maid.

Connection by means of sliding doors between parlor and hall is a pleasing feature, and makes it possible to throw the two apartments into one as occasion may require. An over-mantel and mirror above the hall fireplace, in the furnishing of the house, would add greatly to the apparent extent of the rooms. Care has been taken throughout in the planning that sufficient space should be provided for large pieces of furniture, and that plenty of appropriate wall spaces should be found for choice pictures and artistic cabinets. The corner of the fire-place and window in the dining room add a pleasant unevenness

to that apartment, besides placing the fire in a less awkward position than is usual when the table is extended full length and the Christmas dinner spread.

Specification for English Cottage.

MASON'S WORK.

Excavation.—Excavate for the cellar to a depth indicated by the section drawings of same, and for all footings of walls, piers, steps, &c. Also do the digging for all cesspools and drains where required, and fill in and make good the same at the proper time.

Cellar Walls to be laid up 16 inches thick, of good quality ledge stone, laid straight and true, a dry wall, well boarded and beveled off to receive the underpinning, the top stones being laid in mortar. The foundation stone under walls to be 2 feet long and 6 to 8 inches thick, well bedded in trenches. The foundation for chimneys to be 12 inches thick large flat ledge stone, laid in cement mortar and leveled even with cellar bottom.

Cesspool to be built in rear of house to be 8 feet deep, 4 feet diameter, and built of loose ledge stone and covered with a 4-foot square blue stone, 3 inches thick, with a 16-inch manhole and iron cover.

Drain.—Furnish and lay 6-inch cement drain pipe from inside of cellar wall to the cesspool and connect the same, the drain to be laid on a pitch of 1 inch to the foot.

Underpinning to be laid of selected dark body brick laid in red mortar, and to be laid straight, true, and even in joints, and joints struck with a straight-edge.

Chimneys to be laid up in form as indicated by the plans and elevations; the flues to be well parged up in the inside, and to have a collar in all rooms through which the chimney passes, and one for the pinnace flue. The parts of chimney which are exposed to be laid up with selected body brick, in red mortar, and capped with 3-inch blue stone. The chimney to have red flashings built into the walls where the same cut the roof. Square panel in chimney to be executed in carved brick or terra cotta. Trimmings to be Connecticut brown stone.

An English Cottage.—Fig. 2.—Front Elevation.—Scale, ⅛ Inch to the Foot.

Referring now to the second-floor plan, it will be noticed that abundant space has been provided for placing the beds against blank walls, and, in some rooms, in more than one position. This feature will be approved by all housekeepers who examine the plan, for it is their delight to make changes in the position of furniture and arrange new effects. The plumbing used in this building has been planned with regard to compactness, ready means of ventilation and warmth in winter. The apparatus has been so located as to make it possible to reach sewer or cesspool without passing under the cellar bottom.

The exterior of the house is of a character well suited to the country. It is quite picturesque in its effects from whatever point of view it may be seen, and, whether surrounded by shrubbery or standing in an open lawn, will present an attractive appearance. While this design has been specially studied with reference to a country site, the plan is one that might be easily adapted to a corner lot in town or city. The accompanying specifications very carefully describe the construction of the building and the material desirable for use therein, and so thoroughly cover all points of a mechanical character that further description upon our part is scarcely necessary.

The cost of the house will depend very much upon the locality in which it is built and the style in which it is finished, and may be roughly estimated at $4000 and upward.

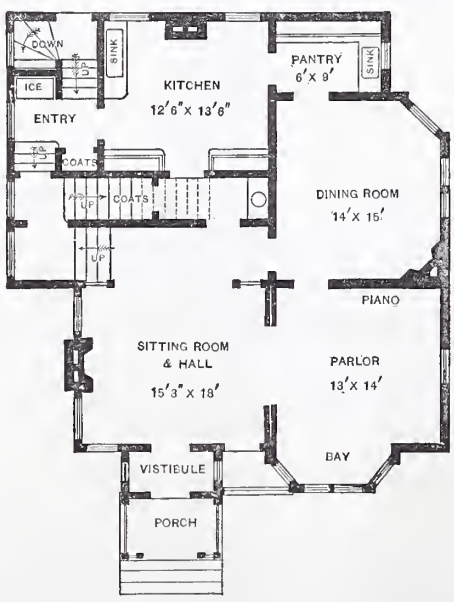


Fig. 3.—First Floor Plan.—Scale, 1-16 Inch to the Foot.

Piers in cellar and under front porch to be 12 inches square, laid up of good body brick, laid in lime and cement mortar, and to have 2-inch blue stone cap on top.

down 3 inches thick, smooth and level. Cold-air duct to be built under cellar bottom, with 4-inch brick walls laid in cement, and the top covered with 3-inch blue stone.

2 x 7, 2 feet on centers, with 3 x 8 valley rafters. All timber not here specified to be the sizes indicated by detail drawings.

Bridging.—All floors to be cross-bridged

An English Cottage.—Fig. 4.—Side Elevation (Right).—Scale, ⅛ Inch to the Foot.

Cellar Window Sills to be 3-inch blue stone.

Fire Places are indicated in the sitting room and dining room, but do not form part of the specifications, and may be put in if desired by the owner.

Lath all the walls and ceilings of every room in the three stories, and the ceiling of the laundry and water closet in basement, with good quality 4-foot spruce laths, four nailings to each, and the end joints broken at every fifth lath, with the horizontal joints ¼ inch open.

Plaster all of the rooms above specified for lathing, one good coat of brown mortar made of well-slaked lime, clean, sharp grit sand, and long cattle hair, well mixed and put on, and rubbed into the joints between laths. The ceilings of the seven principal rooms to be hard-finished, and the walls left trowel-smoothed.

Center Flowers.—Furnish and set eight center flowers, sizes from 12 to 18 inches in diameter.

Repair all cracked and nicked places in walls and ceilings after the wood-work is completed, and leave the work complete in every particular.

Point up and whitewash the inside walls and cement the cellar bottom with coarse screened gravel and hydraulic cement, put

CARPENTER'S WORK.

Timber.—Frame the house with good, sound, straight-sawed hemlock of the following dimensions: Sills, 4 x 6; cross beams in cellar, 6 x 8; posts, 4 x 6; girts and plates, 3 x 4 and 4 x 5; floor joist, 2 x 10, 16 inches from centers; window and door studs, 3 x 4; intermediate studding, 2 x 4; partition studding, 2 x 4, all 16 inches on centers; rafters,

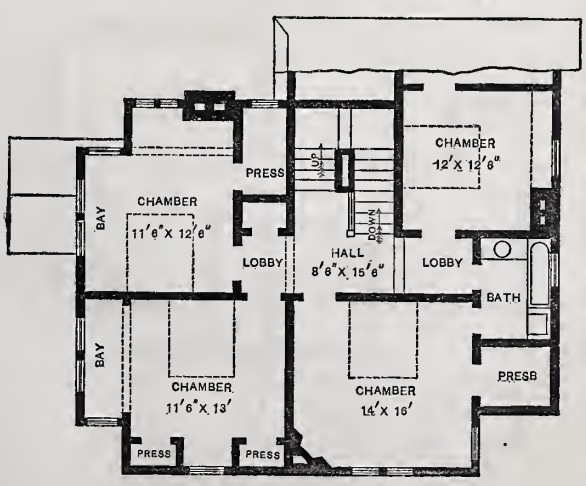


Fig. 5.—Second Floor Plan.—Scale, 1-16 Inch to the Foot.

through center of room with 2 x 2 bridgings.

Boarding of walls and roofs to be 1-inch square-sawed hemlock, surface planed, laid close joints and strongly nailed with 10d. nails.

Flooring.—Under floors to be 1-inch hemlock, surface planed, and strongly nailed and laid close. Upper floors to be 1-inch dry, selected spruce, planed and matched; no boards to be over 5 inches wide, and to be well nailed and laid close joints.

Outside Trimmings to be made with clear white pine, free from sap, loose or large knots, and worked as per detail, and to be well put together, straight, smooth and true, strongly nailed and nail-heads set. All window frames in first and second stories to have first-quality axle pulleys and pockets cut in and halved in to pulley stiles, with a screw in both ends of pockets. Verge boards in gables to be in two thicknesses, one of 1½ and one of 1-inch lumber, worked to 1⅜ and ⅞ inches, respectively. All brackets and turning to be made of white wood or white pine. The floors of porch and balcony to be clear Southern hard pine, 1⅛ inches thick, laid ¼-inch open joints. Put rosin-sized sheathing paper on the outside walls of building.

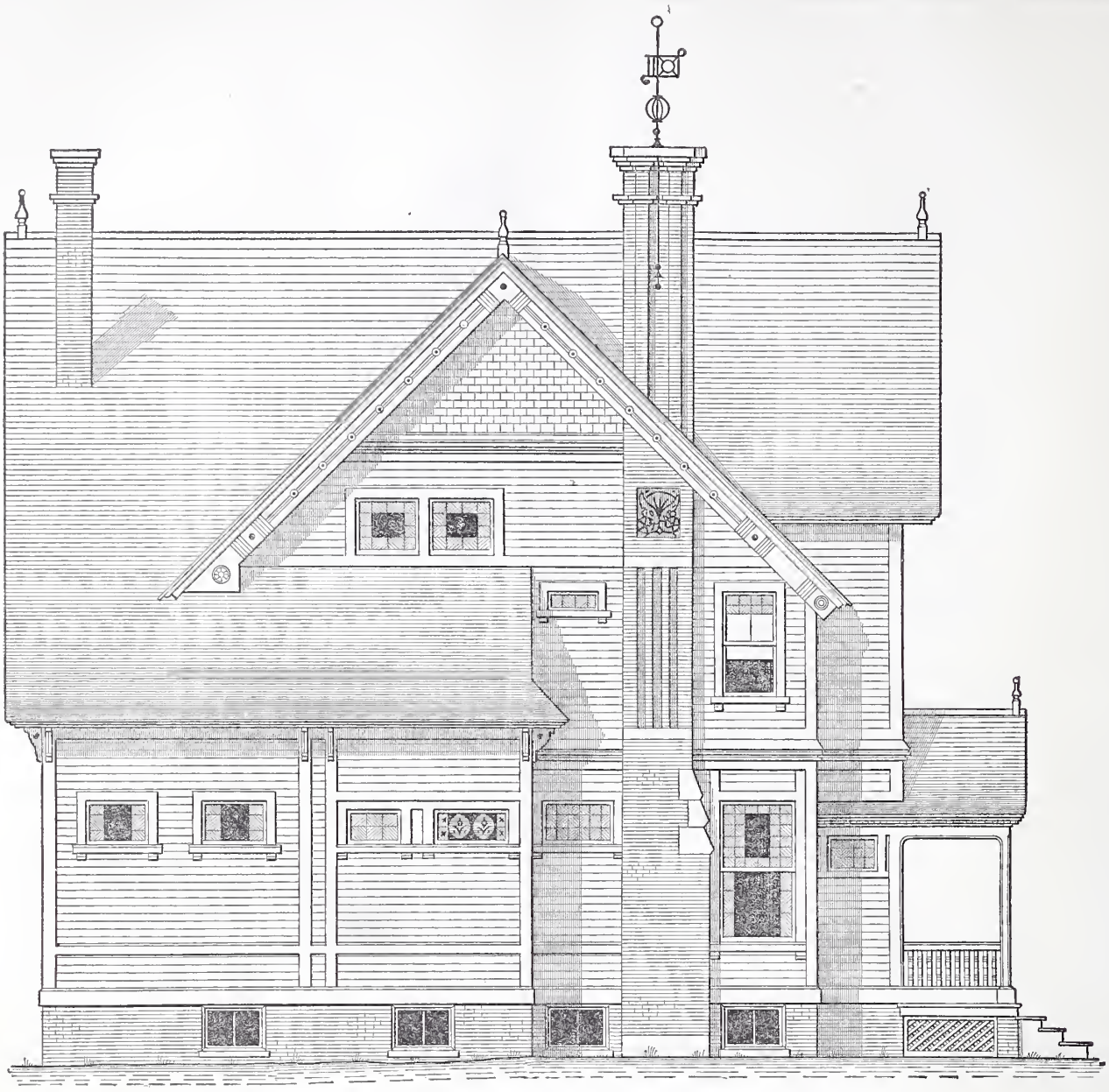
Gutters to be built up on top of roof and lined with best quality I C roofing tin, M F brand, well soldered and to run up under shingles a suitable distance.

have an offset at top and shoe at bottom ends. Conductors from porch to be 2-inch round galvanized iron pipe.

Doors.—Doors to be made the sizes in the door to be 1¾ inches thick, as shown on elevation.

Back Door to have trimmings to cost $3.

Sash that are weighted to have sash locks



An English Cottage.—Fig. 6.—Side Elevation (Left).—Scale, ⅛ Inch to the Foot.

Shingles to be of the best quality of shaved Eastern cedar, laid not to exceed 4¾ inches to the weather, the joints well broken, and to be nailed at every 4 inches, or two to the shingle. The gable ends to have the same quality shingle, selected to 4½ inches width and cut diagonally at corners, laid plumb joints.

Clapboards to be the 4-foot Eastern sawed white pine clapboards, laid not over 4¼ inches to the weather and nailed every 10 inches, and nail-heads set; to be planed and jointed and laid in straight courses.

Ceilings of porch and balcony to be ½ inch narrow, matched and beaded Burlington strips.

Steps to porch to be made of clear white pine, the treads 1⅜ inches thick, and the risers ⅞-inch thick.

Lattice under porch to be ¼ x 1⅜ inches pine strips, crossed at an angle of 60 degrees and laid with 1⅜-inch meshes.

Cellar Window Frames to be made and set in place, and also the door frames in cellar and the frame at the rear entrance.

Saddle-boards on ridges of roof to be of wood, the finials to gables to be white-wood turned.

Conductors from roof to ground to be galvanized iron 3 inches in diameter, and to

list and from good clear white pine. Those in first story to be 1¾ inches thick, with four panels on molded middle rail, sunk

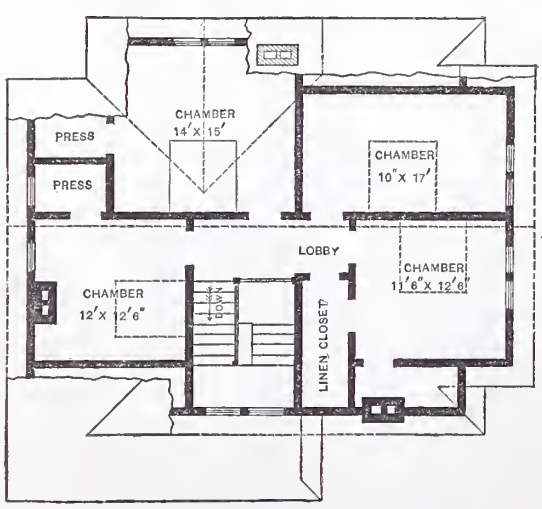


Fig. 7.—Attic Plan.—Scale, 1-16 Inch to the Foot.

molding; second story doors to be four panels, 1⅜ inches thick. Front doors to be 2¼ inches thick, and in form as indicated on the elevation. Back outside

on the middle rail to cost $6 per dozen, and sash lifts on the bottom rail to cost $2.50 per dozen. Sash to be 1½ inches thick, in form as shown on elevations.

Stained Glass.—The sash in windows on landing of stairs from front hall to have stained glass, to cost $2.50 per square foot.

Bath Room to be ceiled up 4 feet high in cherry, and the bath tub, basin and water-closet to be fitted up with black walnut.

Kitchen.—The kitchen to be ceiled up 4 feet high in white pine, and the dressers and the inclosed shelving above to be of white pine; the sash doors to be 1⅛ inches thick, glazed with French sheet glass and hung and trimmed in a suitable manner; the counter shelf of this dresser, and that of the sink as well, will have cupboards underneath.

Pantry to be finished in white pine, with drawers and shelving and cupboards under the counter, and 14 inches inclosed shelving treated in a similar manner to those in the kitchen. The sink to be cased up and to have a recessed door under the same.

Clothes Presses to have two rows of wardrobe strips around the side, with stout Japanned double hooks, and two shelves 12 inches wide above the same.

Gas Pipe the whole of the house on three floors, putting drop and side lights as required; that is, drop lights in the principal rooms and hall, and side lights in all the chambers, lobbies, landings, passageways, and other places necessary.

Thresholds to all doors inside to be ¾-inch thick, of cherry or birch.

Servants' Water-closet, at the foot of stairs, to be fitted up with black walnut, ceiling up the sides of the room 4 feet high with same material.

Trimmings.—The front door to be hung with good stout japanned butts, three to the door and of suitable size, and to have stout front-door lock and night latch combined; bronze 2¼-inch front-door knob, and brass bolt at top and bottom of standing door. The first-floor doors to be hung with 4 x 4 japanned butts, three to the door, and trimmed with lock and knobs to cost $2 for each door. Second-floor doors to be hung with 4 x 4 cast butts, loose joints, two to the door, and trimmed with lock and knob to cost $1.50 to the door.

Flashings over window and door openings, or wherever same may be called for, to be of lead or painted tin, and of suitable size to accomplish the purpose for which they are intended.

Sash.—The sash to be made of the sizes furnished in the accompanying list of such doors and blinds, and to be 1½ inches thick, glazed with best quality single-thick French sheet glass, well bedded, tinned and puttied. The windows to be hung with braided cotton sash lines and cast-iron window weights. The small single sash to be hung to frames and arranged to swing in the usual manner. The cellar and other windows to be glazed with second quality French sheet glass.

An English Cottage.—Fig. 8.—Rear Elevation.—Scale, ⅛ Inch to the Foot.

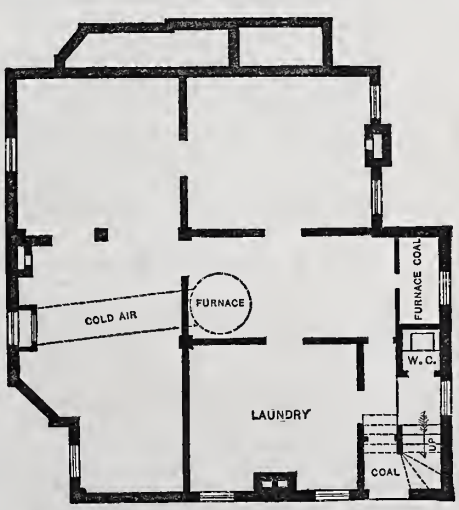


Fig. 9.—Foundation Plan.—Scale, 1-16 Inch to the Foot.

Blinds.—To be twofold all-swivel outside blinds on all the double-casement windows in house (with the exception of those on the bay), and to be hung and trimmed in a suitable manner. The bay window to have threefold, all-swivel, narrow-slat inside pine blind, hung at joints with brass butts, and to frame with loose-joint japanned butts.

Partition to be of 3 x 4 door studs and 2 x 4 intermediate studs, 16 inches on centers, to be trussed over all large openings and to have one row of cross-bridging in same.

Furring—Cross-fur all ceilings with ⅞ x 2-inch spruce furring strips put up straight and true, 16 inches on centers and strongly nailed. Straighten all walls and partitions for lathings, and put on ground around all window and door openings, and at the line of all base boards, &c.

Stairs.—The stairs are arranged so that the front and back flights become one and the same at the level of the first landing. That portion that runs between close partitions will have 1⅛-inch white-pine treads and ⅞-inch risers, and will be without rail or balusters. The only portions of the stairs that will require a rail or balusters is a small piece at the foot of stairs in the hall and at the landing in the second floor. These portions, together with the columns and screen across the hall, as indicated in the details, will be executed in cherry. The columns will be turned from 5 inch stock, the angle posts will be 4-inch and the balusters 1¾-inch, turned and polished in the lathe. The rail will be 3 x 3½ inches, worked straight and true.

Finish.—The entire finish of the house inside, with the exception of the detail above

mentioned, will be of good clear white pine. The architraves around doors and windows will be ⅞-inch thick and 5½ inches wide, and put up with turned angle blocks in the corners. Base boards to be ⅞-inch thick and 7 inches wide, with molding on top of same. Press finish to be plain 4-inch wide by ⅞-inch thick.

LIST OF DOORS.

Outside.—Sunk molding.

1 door, 3 ft. 6 in. x 8 ft.; 2¼ in. thick.
1 door, 3 ft. x 7 ft. 6 in.; 2¼ in. thick.

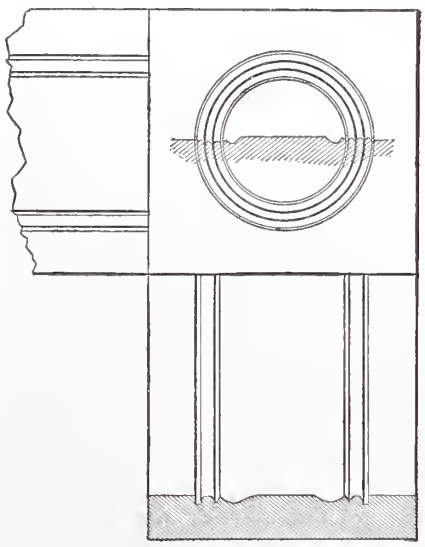


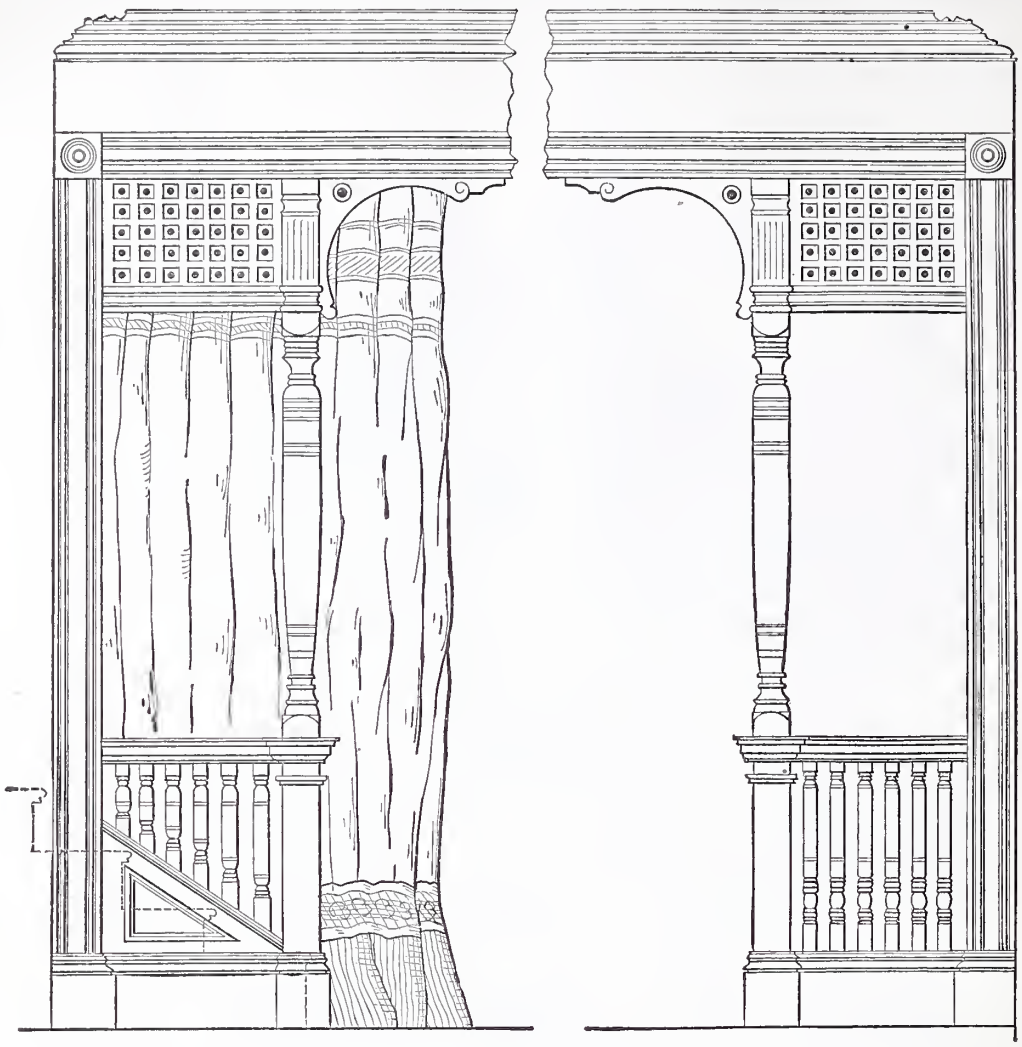
Fig. 11.—*Detail of Corners of Screen.—Scale, 3 Inches to the Foot.*

Inside.—Sunk molding.

1 pair, 6 ft. 6 in. x 8 ft.; 2¼ in. thick.
10 doors, 3 ft. x 7 ft. 6 in.; 1¾ in. thick.
12 doors, 2 ft. 10 in. x 6 ft. 10 in.; 1¾ in. thick.
9 doors, 2 ft. 8 in. x 6 ft. 8 in.; 1½ in. thick.

PAINTING.

Paint all the exterior woodwork of house, excepting roof, two good coats of paint, composed of yellow, lamp black and india red, and linseed oil, in three colors. Putty-stop all nail heads and cracks between the first and second coats. All tin gutters to have two coats pure red lead and oil or good mineral paint. Draw all window sash two coats; the outside in India red and the inside in color to match the rooms. Red stain the pulley stiles of all window frames. Saddle boards on roofs to have two coats, same as other woodwork. Porch and balcony floors to have two coats of raw linseed oil. Paint the interior woodwork three coats pure lead and oil turpentine, and color in such tints as shall be desired; between first and second coats, sandpaper smooth all woodwork and putty-stop all nail heads and cracks, and shellac the work with a good coat of gum shellac dissolved in alcohol. The kitchen and closet work to be painted three coats and varnished. The hard woodwork in hall and staircase to have the grain filled and to have four coats gum shellac, and then polished down in pumice stone and oil. Hard wood in bath-room and water-closets to have four coats of gum shellac, and rubbed down in pumice stone and oil.



An English Cottage.—Fig. 10.—*Elevation of Screen in Sitting Room.—Scale, ½ Inch to the Foot.*

NEW PUBLICATIONS.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. Parts 7 and 8. Bicknell & Comstock publishers. Price, $1 per part.

The contents of the seventh number of "Modern Architectural Designs and Details" gives promise that the latter half of this work is likely to be of more importance to practical men than the first half, although, as we took occasion to remark in commenting upon the early numbers, the first half was well worth the attention of all in need of designs. Part seven commences with plate 49, which contains a perspective view, with the plans, of a seaside cottage. Following this is the water front and side elevation of this design, perspective view of the main hall, with plans of fire-place, shelf, and plan and elevation of drawing room, details of porch, gables, &c. Then follow five designs of seaside cottages or Southern houses, with front elevations, plans, floors, &c. Plate 55 contains six specimens of seaside cottages, being suggestions of designs rather than their finished drawings by which to work. Five designs of lattice work are also contained in this number, and the last plate illustrates the inside finish of

Fig. 12.—*Detail of Base.—Scale, 3 Inches to the Foot.*

a summer cottage, with details of fire-place, staircase, brackets, &c.

Part eight contains four elevations of a lake-view cottage, floor, roof and attic plans, and details; plan elevations and sections of a dining-room closet; plans, elevations and sections of two wash-bowl cabinets; five elevations of low-priced Colonial cottages; and a plate of turned work, containing some 40 designs of posts, balusters, columns, drops, finials, &c. Both of these numbers

are timely in their contents, and should meet a large sale.

DETAIL ORNAMENT. To be completed in from six to ten parts, of four plates each. Published by J. O'Kane; received from Bicknell & Comstock. Parts 1 and 2. Price, $1 per copy.

The title of this work sufficiently expresses its scope to need very little description. Each plate contains a number of designs of borders, scrolls, rosettes, bands, moldings, friezes, dados, &c., all clearly expressed and carefully printed. No text

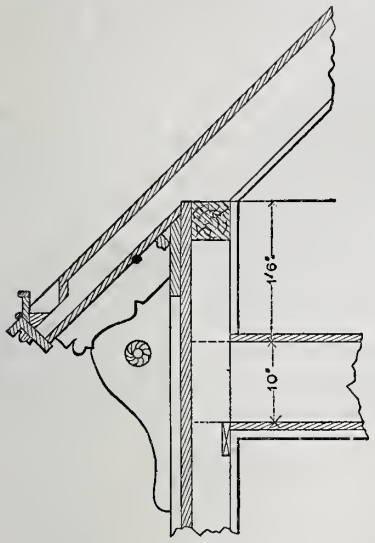
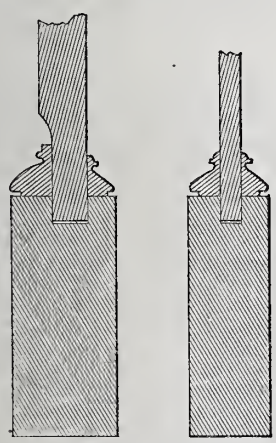


Fig. 13.—*Section through Main Cornice.—Scale, ½ Inch to the Foot.*

accompanies the work, it being simply an album of designs. Plate 6, in Part II, is devoted entirely to birds, while other designs of birds appear in plates preceding and following. Those who have occasion to design flat ornaments for any purpose whatever, will be likely to find useful suggestions in this work.

WORKING DRAWINGS: HOW TO MAKE AND USE THEM. By Lewis M. Haupt. Published by J. M. Stoddard & Co. Price, 60 cents.

The author in the preface to this work says: "The present system of teaching drawing (referring to the common schools) is useful only in so far as it cultivates the faculties of observing the form and position of objects, and the manual skill of representing them, requiring the exercise of the judgment and memory; but is comparatively



Figs. 14 *and* 15.—*Sections of Doors.—Scale, 3 Inches to the Foot.*

worthless for all practical purposes in the trades, except, perhaps, for the designer of free-hand patterns for tapestry, carvings and similar applications. The mere copying of pictures or models, or the construction of perspectives by rules of thumb whose principles are not understood, is no more able to produce a draftsman or artisan than would the copying of any number of sheets of music be able to make a musician, or the reproduction of hieroglyphics a linguist." The present work is a text-book designed for the use of schools and intended to supply the missing link between theory and practice, of which the author complains. The plan of the work is to state the general principles involved in any theorem or problem, giving in the same connection its analysis, construction, and one or more applications, thus fixing the principles much more effectually than could be done by ordinary methods of proceeding. The treatise is limited to a consideration of straight lines and plans, the author promising to provide additional books upon the same plan for those who desire to pursue the course still further. We regard this work as of more than ordinary importance. The necessity for such instruction as it contains is becoming every year more and more urgent, in consequence of the abolition of the system of apprenticeships. As arranged, the book is intended to be used as a text-book in the hands of a teacher. To this end a chapter of suggestions to teachers is provided. There is nothing about it, however, to interfere with self-instruction, and those who employ the work in this way are likely to reap very satisfactory results.

NOTES AND COMMENTS.

AN ELEGANT LIBRARY.—The daily papers of late contain long descriptions of the palatial residences which are at present a feature of the metropolis. The following description of the library in Mr. Pierre Lorillard's house, which we condense from a recently published account, may be of interest to our readers. From the dining room the library is reached through a small ante-room filled with plants. The library is a large square room, in shape being a pleasant variation from the long parallelogram into which city houses are so generally divided. One side of the room is almost filled by a large bay window with three lights. The other sides are entirely paneled with mahogany, no wall surface being visible at all. Book shelves without glass run almost up to the spring of the cornice, and are connected with this latter by a shelf provided with a light balustrade in front, intended for the display of china, the bright decoration of which is needed to lighten the uniform effect of the deep red wood. The cornice, which in general shape is coved, is also of mahogany. The beams, which divide the ceiling into panels, are of the same material, the panels between them being dark gold in color. The chandelier and other lights are of silver metal. On one side of the room the shelves are broken by a deep recess for the chimney-place, the paneling, however, being continued without interruption. Above the fire-place is a small shelf for china, while a wider shelf contains a huge bronze clock.

NOVEL USE FOR FLEXIBLE SHAFTING.—In the Union Insurance Company's building, corner of Third and Walnut streets, Philadelphia, owing to lack of space in the tower, the clock is placed in a separate loft. In order to make proper connections with the dials flexible shafting is employed, and with very good results. Besides economizing room, this plan avoids obscuring the dials by the boxing that is necessary with such apparatus as usually arranged. The builder of the clock, Mr. G. W. Russell, of No. 22 North Sixth street, Philadelphia, claims that this is the first application of flexible shafting to clocks.

BUILDING IN NEW YORK.—Great activity in building matters continues in this city. A very large number of flats, tenement houses, private dwellings, office buildings and stores are in process of erection or about to be commenced. Turn which way the observer may at present, he is sure to find old buildings being torn down to make way for new structures or new buildings partly finished. Of dwellings and apartment houses, the center of activity seems to be on the east side of the city, well up town. The business buildings being erected are to be seen along Broadway and through some of the cross streets near it, but more particularly well down town, near City Hall Park. The old Nassau Bank, on the corner of Beekman and Nassau streets, opposite the Morse Building which, our readers may remember, we illustrated some time since, is, at the present writing, being torn down, and in its place, we understand, an office building, which in hight will rival the Morse Building, now the highest in the city, is to be erected. It would be impossible to mention all the nota-

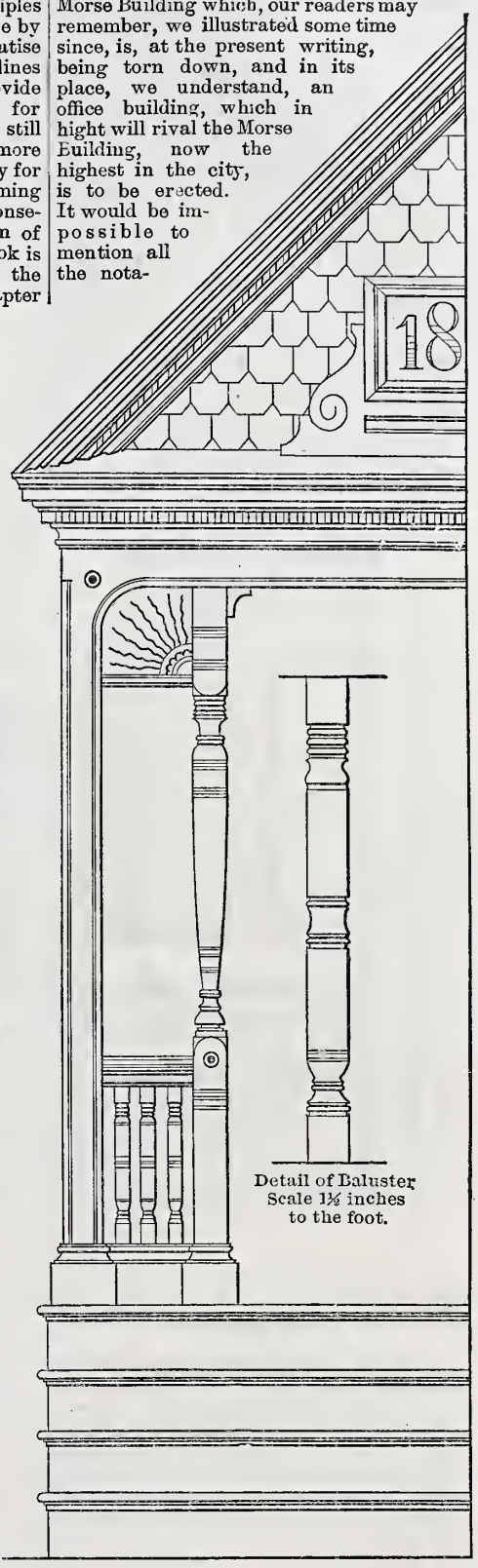


Fig. 16.—*Half Elevation of Front Porch.—Scale, ½ Inch to the Foot.*

ble buildings now in progress in this city. Architects, builders and mechanics are alike busy at present, and will probably have enough to do for a long time to come.

FRENCH FLATS AND APARTMENT HOUSES IN NEW YORK.—Although this style of house is now in very great demand, it is comparatively recently that it was first introduced. In 1869 one French-flat building was erected in this city as an experiment. That it was not considered a success may be gained from the fact that the second was not built till 1872. Three years more elapsed before there seemed to be a real de-

mand for this class of building. In 1875 no less thau 112 were erected. From that day to the present the number erected yearly has been steadily increasing, excepting only in 1878, when the number built fell to 99. In 1879, 253 buildings of this class, costing an aggregate of $10,362,000 were put up. In 1880 the number was 516, costing, in round numbers, $15,000,000.

Mr. Thomas J. Gould, whose design forms our first-page illustration in this number, was formerly of the firm of Walker & Gould, of Providence, R. I., but is now associated with Mr. Angell, another rising young architect of promise, in the firm of Gould & Angell. The design published this month is not the first of Mr. Gould's efforts which we have presented to our readers. Several studies for inside finish, a schoolhouse and one or two dwellings, will be found in back numbers. Mr. Gould's talent is well displayed in dealing with the so-called modernized styles of architecture. He succeeds in an eminent degree not only in pleasing the eye, so far as form and appearance are concerned, but als_ in adhering to desirable construction. Upon practical test his designs are found to work out in a very satisfactory manner. His partner, Mr. Angell, is not less talented,

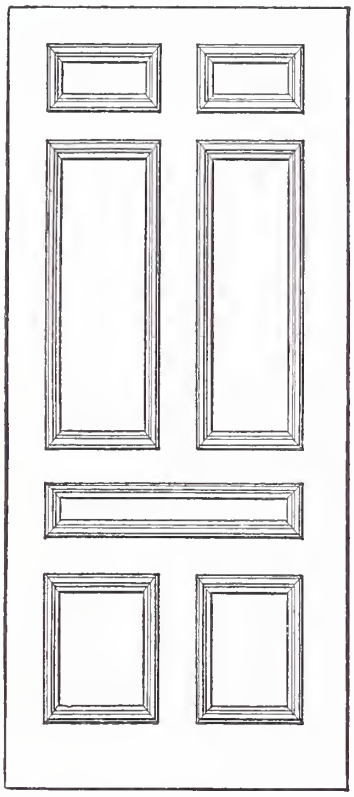


Fig. 17.—Elevation of Front Door.—Scale, ½ Inch to the Foot.

and, together, they constitute an architectural firm before whom there seems every prospect of a prosperous future.

Bicknell & Comstock.—This firm, favorably known to our readers as publishers of architectural books, was dissolved on the 17th ult. The business will be continued by Mr. William T. Comstock, one of the partners, at the same place, 194 Broadway, New York. Mr. Bicknell, the retiring partner, has taken this means of obtaining a season of rest, which his close attention to business during the p_st fifteen years has made very desirable. For a short time to come he does not propose to engage in active business. His address for the present will be the office above named.

Closet Room in Houses.

An exchange contains the following: It matters not what external grandeur, or otherwise general internal conveniences of arrangement may be observed in the construction of residence buildings, if the closet feature is incomplete, either in number or fittings, a very material defect is created and important conveniences abridged. Closets, pantries and store-rooms are essential necessities, and every intelligent architect as naturally considers their value, and seeks their proper location and fittings, as the location of doors and windows. A house without closets is but little better than a

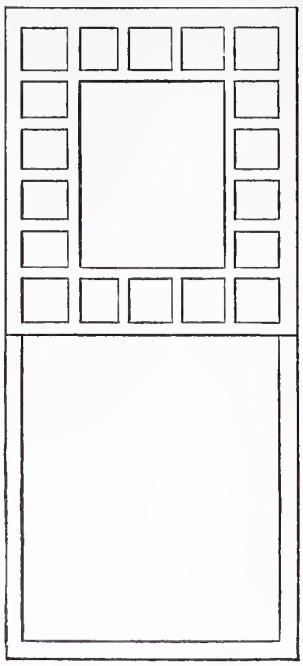


Fig. 18.—Elevation of Sash in First Story.—Scale, ½ Inch to the Foot.

barn, being incomplete in one of its most desirable and convenient features. An architect or builder who neglects to produce them in abundance fails to comprehend positive necessities, and should seek some other line of operations as a business pursuit. Having designed and planned hundreds of buildings of all classes, the omission of ample closet accommodations suggests to us stupidity upon the part of those who fail or neglect to incorporate them in sufficient numbers. It is difficult to imagine an arrangement of building for residence purposes in which "places for closets" do not

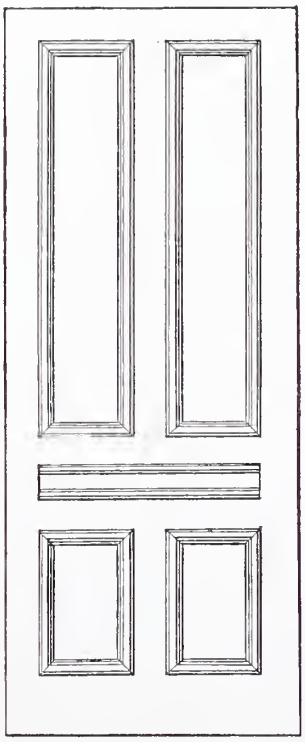


Fig. 19.—Elevation of Inside Doors.—Scale, ½ Inch to the Foot.

occur, or where closets cannot be inserted without compromising other conveniences, so as to provide at least one closet for each room, and others in the halls.

We do not desire to discourage our bachelor or unmarried brother architects; but it is nevertheless a fact that the wedded architect, who has passed through the experiences attending a matrimonial career of a few years, under the tuition of a "good housekeeper" wife, is made to comprehend the value of closets; and such men generally give due importance to these valuable adjuncts to house conveniences.

Not only are closets important as to numbers, but in their arrangements and appointments. The mere inclosing of a space and providing it with a door, is only the first step toward making a complete convenience. Judgment, experience and skill are required in perfecting internal arrangements. We have heard gouty male owners and gruffy architects repudiate "so many closets," but have yet to meet the first lady housekeeper who did not desire "all the closet room possible;" and have yet to see the house in which there are too many closets.

But sometimes the fitting up of closets causes both architects and owners a great deal of trouble. If the mechanic happens to be one of that class who "lives in boarding houses," in which closets are a scarcity, and such as there may be of the most crude and imperfect character, he "caunot see why there is so much fuss about closets," or why so much time and labor should be expended upon them. To him, a shelf or two appears sufficient for all reasonable purposes, and more than these he considers unnecessary. Consequently, such men sometimes reluctantly fulfill owners' wishes and as much as possible oppose the requirements

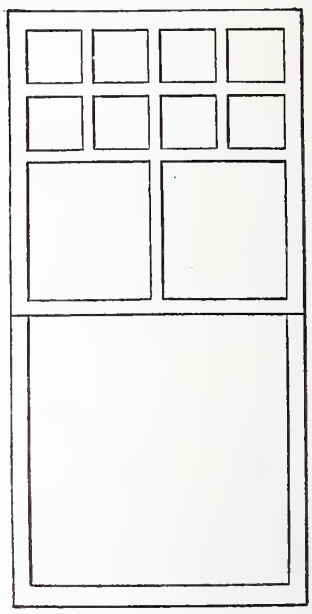


Fig. 20—Elevation of Sash in Second Story. —Scale, ½ Inch to the Foot.

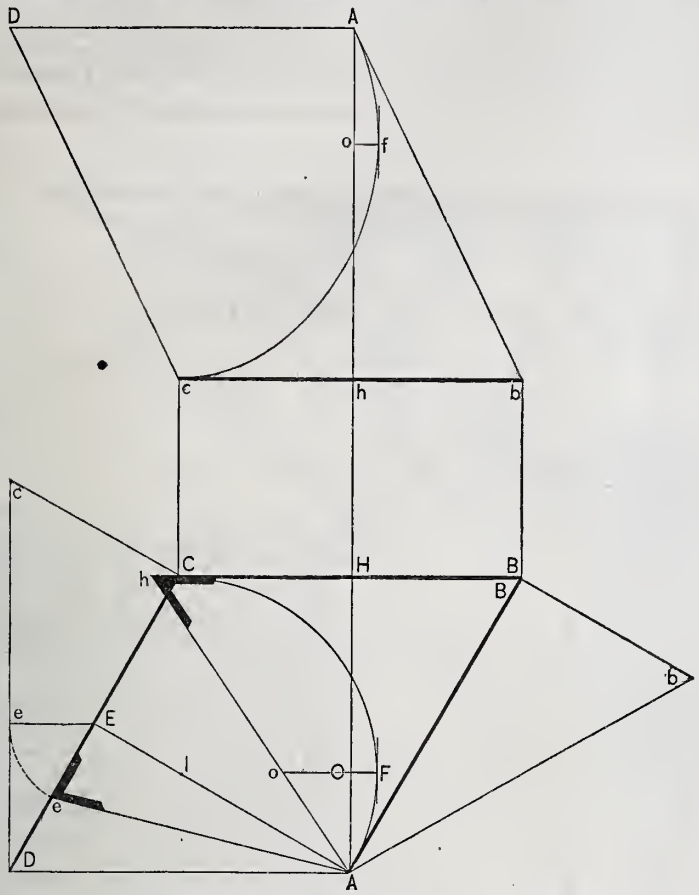
of plans and specifications, and the directions of the architect in cases where nice work, with considerable appointments, are required. But the man of family, who seeks to make his home comfortable, must of necessity understand the value of these little conveniences, and is prepared to appreciate the wishes of those who "want nice closets." There is quite a difference among mechanics in this particular; some giving due and proper consideration to this department of house convenience, while others fail to appreciate their necessity beyond a few shelves and a pin rail; and architects are often required to enforce the staruest exercise of their authority in securing good closet work.

But sometmes even the architect engaged is deficient in this department of house construction, and many a good home otherwise, is made less convenient thau it might have been had the architect schooled himself in the art of providiug abundant closet accomodations. We do not say this reflectingly or reproachfully; but some men of fixed notions "cannot see the necessity" for certain things, and therefore they imperfectly devote themselves to the development of such features. And, as a word of advice to all brother architects, we suggest to one and all that they study well the matter of closet construction and fittings, as a good reputation among wives and good housekeepers depends largely upon the perfectness of these "great conveniences."

Practical Stair Building.—X.

WREATH-PIECES WITH RAKED AND LEVEL TANGENTS, WITH GROUND PLANS OF MORE THAN A QUARTER CIRCLE.

The next class of practical problems to which we shall give consideration are those in



Wreath-pieces having Raked and Level Tangents, with Ground Plans of more than a Quarter Circle.—Fig. 1.—Method of Obtaining Tangent Lines, &c.

which simple wreath-pieces occur over plans which are more than a quarter of a circle. The necessary lines for obtaining measurements by which to lay out the pattern of a wreath of this kind are shown in Fig. 1 of the accompanying illustrations. The heavy lines in these engravings, as in those which appeared in our last number, show where a card-board model may be folded by which to demonstate the accuracy of the rule presented. We suggest to our readers, and to the younger mechanics among them especially, that patiently working out the problems which we shall describe by means of models of this kind, will be greatly to their advantage. A still better plan in many cases, where it is possible to put such a scheme into execution, would be to work out the rules in actual material such as might enter into the construction of a staircase. Studying, however, must be done at night and at odd intervals when work-bench and tools are not always accessible. A substitute, therefore, which may be made to answer a useful purpose, and which is always in reach, is that of the card-board models to which we have before alluded.

Referring now to Fig. 1, the curved line A C is the center line of the ground plan shown in connection with its tangents, A B and B C. Complete the parallelogram A B C D. Let the triangle A *b* B represent the elevation of the raking tangent A *b* over A B. Draw the rectangles C *c b* B showing the elevation of the level tangent *c b* over C B. From A draw A H at right angles with C B; produce H C; make H *h* equal to B *b*; join A *h*: produce A H through *h* upward, making *h* A equal to *h* A of the lower part of the figure; join A of the upper part of the figure, and *b* of the elevated level tangent, and complete the paralellogram as shown by A D *c b*. The lines *c b* and *b* A thus obtained are the elevated tangents of the wreath-piece joined at the upper angle at *b*.

To draw the elevated center line A *c* proceed as follows: First draw parallel with A H a short tangent to the ground center line A C, as shown by F. From the point of contact draw F O *o* at right angles with A H. Take the distance A O and set it off from A in the upper parallelogram on the line A H, as shown by A O. At right angles with A H, through the point thus obtained, set off *o f* equal to O F. Through *f* draw a short line parallel with A H. Now, with the tangents A *b* and *c b*, and the short tangent through *f* just described to serve as guides, draw the curved line A *f c*. This then will be the elevated center line required.

Let it now be required to draw the face pattern of a rail to correspond with this elevated center line.

Referring to Fig. 3, first draw the tangents as there indicated. Make *c b* equal to C B of Fig. 1. Make *c h* equal to C H of Fig. 1, and at right angles with *c b* draw *h* A, equal to *h* A of Fig. 1. Join *b* A, which will be the raking tangent. Set off from A the distance A *o* equal to the distance A o in Fig. 1. Draw *o f* at right angles to A H, equal to O F Fig. 1. With the compasses set to a little more than half the width of the rail, from *f* as center, describe two short arcs, as shown in the figure. At each end of the pattern make the width equal to the diagonal of the square pattern, and, as shown in the engraving, draw the inside and outside curved lines of the pattern. The angle at *h* is the plumb bevel for the joint at *c*. To find the bevel for the joint at A, draw the triangle C *c* D of Fig. 1 equal to the triangle B *b* A. Draw A E at right angles with C D. From E draw E *e* at right angles with D C. From E as center, describe the arc *e e*. Connect *e* A; then the angle at *e* is the bevel for the joint at A.

In the demonstration of this, prick through the drawing upon a piece of card-board the triangles A E *e* and A H *h*. Cut this out.

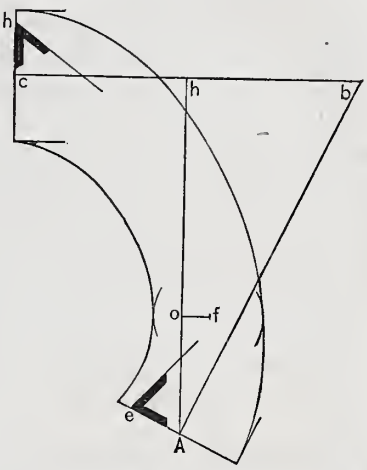


Fig. 3.—Laying Out the Pattern of the Wreath-piece.

Fold up the figure at the heavy lines A B, B C, D C, and *b c*, at the same time placing the separate triangles in their proper places so that *h h* and *e e* coincide; then it will be seen that their bevels represent the solid angles desired. The solid angle *h* represents the solid angle which is formed at the lines *b c*, and the angle *e* represents the solid angle which is formed at the line *d c*. The angle at *d c* is used instead of the obtuse angle at *A b*.

Fig. 2 shows an abbreviation of the operations illustrated in Fig. 1. It contains in small space all that is essential from which to compose the rail pattern shown in Fig. 3. The part which is drawn above the line C B is the same as the lower left-hand corner of Fig. 1. Its position, however, is transposed in order to save room upon the drawing board. In applying the measurements and angles of Fig. 2 to form the rail pattern, as shown in Fig. 3, follow the same general directions as we have given for performing the same operations by the use of Fig. 1.

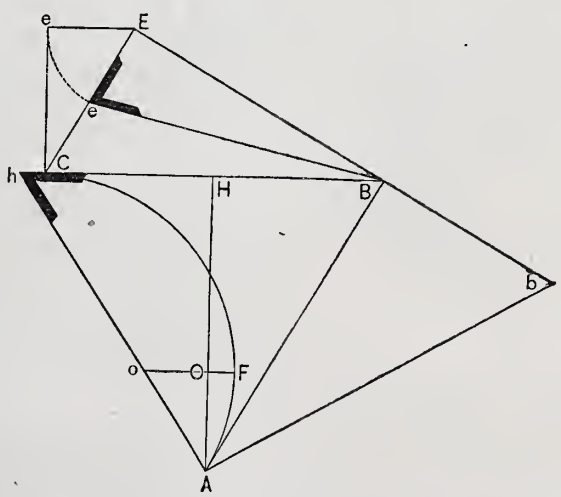


Fig. 2.—A Shorter Method of Accomplishing the Same Result.

Cement for Rubber.—Powdered shellac is softened in ten times its weight of strong water of ammonia, whereby a transparent mass is obtained, which becomes fluid after keeping some little time without the use of hot water. In three or four weeks the

mixture is perfectly liquid, and, when applied, it will be found to soften the rubber. As soon as the ammonia evaporates the rubber hardens again—it is said quite firmly—and thus becomes impervious both to gases and to liquids. For cementing sheet rubber, or rubber material in any shape, to metal, glass and other smooth surfaces, the cement is highly recommended.

Lessons in Carving.—II.

BY W. E. PARTRIDGE.

MODELING IN CLAY.

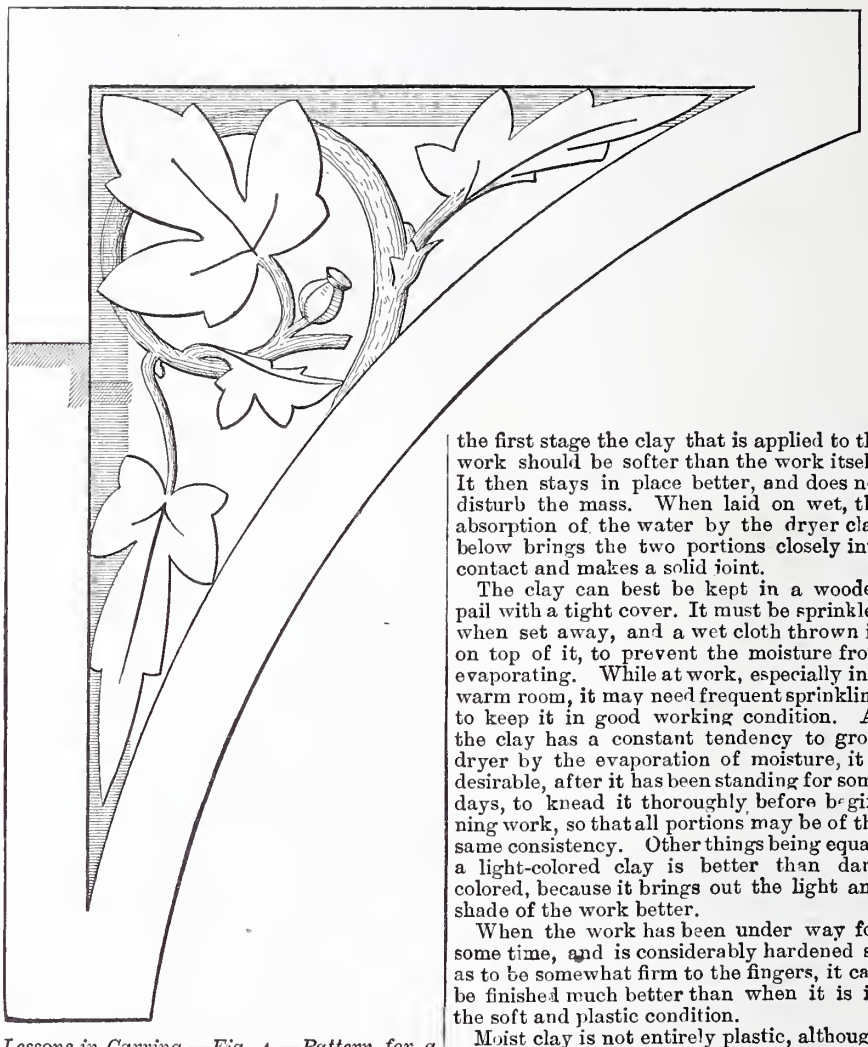
Clay is a very peculiar substance, and when one first begins to handle it in a plastic condition a great many difficulties will be encountered which will be insurmountable, unless directions for overcoming them are given and carefully attended to. By this means, however, its management may be made quite easy and its use attended with very little trouble. Perfectly pure clay, like kaolin, or porcelain clay, is much too soft and greasy for use. It must, therefore, be tempered by the addition of various substances which render it smooth and pleasant to work with. Clay has so many good and pleasant qualities that, although numberless efforts have been made to find a substitute for it for making models of work in relief, none have yet been discovered which at all approach it in its almost numberless advantages.

In order to trace all the steps, it will be necessary to describe the progress of a piece of work. A bracket which is not to be perforated will be a very good lesson. In actual practice the design will probably be given in some such form as shown in Fig. 4—at least, no more than this will be found in a tracing or the outline patterns usually furnished to work from. This design consists of a spray of leaves. There is little or no indication of relief; the whole of this portion of the work is to be left to the carver. In the first place, the design must be transferred in lead pencil to the slate or board on which the modeling is to be done. White marble slabs are very nice for modeling, as they show lead-pencil marks so plainly. Lead pencils may also be used upon slate. Be careful to have the whole outline on the slab before beginning work. Little inaccuracies need not be noticed, as they can be corrected during the progress of the work. When this has been done the work is ready for the clay. The design is intended to be carved in a panel; no portion of it will, therefore, rise above the general level of the sides, as shown in the profile. The size is supposed to be about 9 by 10 inches.

After getting a bowl of water and an old whisk broom, with which to sprinkle the work and clay from time to time to prevent it from drying too rapidly, the learner is ready to begin work. Take a piece of clay and roll it into a little cylinder between the thumb and finger, as shown in Fig. 5; lay it along some portion of the outline, and with the forefinger press it down firmly upon the slate, but at the same time prevent it from spreading over the line by means of the chisel-shaped tool (Fig. 3 in the last article), which is held against the slate upon the outline. Fig. 6 shows just how this is to be done. In this way the whole outline can be easily followed in all its details. Be sure that the clay is packed down upon the slate, so that no air bubbles are left and no cracks or edges are to be seen. If the leaf is wide, and the roll of clay does not spread all the way across, the margin will appear in section as shown in Fig. 7. Both edges, when they meet the slate, are squeezed down solidly. Fig. 8 shows the wrong way, and when clay is put on thus it is liable to crack off, and cannot be firmly united to anything that may be put on afterward. In making the stems, where a rough roll of clay, when pressed firmly, will extend all the way across the stem, the tool can be used first on one side and then on the other, and so it can be kept within bounds while being pressed down upon the slate.

In joining two pieces of clay together, or putting a piece upon work already begun, make the surfaces smooth that are to come together and a little more moist than the other portions. Then, after they are joined with the tool or fingers, smooth up and obliterate any trace of the joint. They will thus adhere firmly. If the line of joining is not obliterated a crack is begun, and the added piece is always liable to come off or the work break at that point.

When the outline is all finished and no more can be done to perfect it, the work is ready for the next step. Here it is necessary to observe that in modeling no two steps should ever be mixed; all parts of the work should be in the same stages. The



Lessons in Carving.—Fig. 4.—Pattern for a Bracket to be Modeled in Clay.

reason for this the learner will find out to his sorrow whenever he violates it. Have all the outline filled before the following step of building up is begun, and there will be no interference of one with the other. No portion will have to be destroyed because it has been modeled without a suitable foundation.

After the outline is solidly fastened to the slab or board, the building up may be begun by applying little rolls of clay along the middle or sides, as the case may be. How this is done is shown in Fig. 9. After the roll is pressed down in place, the chisel-shaped tool will serve to smooth the edge and obliterate the mark where the clay joins upon the edge of the work, and the finger can do the same work for the seam upon the surface.

This 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 bottom of the panel deep. When a leaf or a stem is raised to a proper hight, smooth it up, giving it vertical sides and a flat top, as if it were intended to have it in this condition.

In order that the beginner may have as little trouble as possible, he should attend to the following items in regard to the management of his material:

Do not hold pieces of clay too long in the hand. They soon become warm, and the water rapidly evaporates from them. This should be noted, and the piece in the fingers frequently changed, throwing that which has hardened back into the bowl or box where the supply is kept.

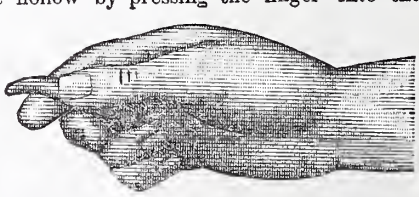
Clay absorbs water with great rapidity and in very considerable quantities. During the progress of the work the beginner must be constantly on his guard to have water enough, and, at the same time, not too much. The consistency of soft putty is what should be aimed at.

When the work is begun 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 dryer 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. It must be sprinkled when set away, 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 to keep it in good working condition. As the clay has a constant tendency to grow dryer 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 dark colored, 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.

Moist clay is not entirely plastic, although it seems so at first touch. In working the clay after the model has been blocked out, do not attempt any alteration of form by pressure. Do not try to make a hollow by pressing the finger into the



Lessons in Carving.—Fig. 5.—Making a Roll of Clay.

mass, or an elevation by squeezing the material up. An attempt to work in this way always results in the distortion of neighboring parts. When hollows are wanted cut out the clay, and when a projection or elevation is required, obtain it by building up with new material. If the clay 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 a subject is well advanced.

A Home-Made Lightning Rod.—An exchange recommends the following: Measure from the top of the highest point or chimney to 10 feet below the surface of the earth by the most direct route over the roof, and allow 14 or 15 feet more. Then procure

three strands of No. 9 or 10 telegraph or fence wire of the proper length, ascertained as above, stretch them together and secure the ends in metallic clamps or vises. Twist them together well, and secure every 10 feet by a ring or small wire twisted around the rod, leaving 6 inches or a foot intended for the tip. Spread the wires at the top, and sharpen each to a fine point. In placing this rod, begin at the top, securing it with insulators, and carry it along the roof as directly as possible to the earth, fastening every 6 feet. The ground connection should be made to water, if possible. If not, dig a hole 4 or 6 feet in the earth,

Lessons in Carving.—Fig. 6.—The Outline Transferred to the Slab. Packing on the Clay and Filling up the Figure.

pour in some water, and work the rod down in it, using water to keep it soft. A rod can easily be worked down 10 feet more in this way. Fill up the large hole with fine charcoal, or refuse from a blacksmith's forge. Such a rod, properly put up, will last a lifetime.

Modern Street Architecture.

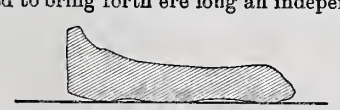
The *Real Estate Chronicle*, in discussing the more striking features of New York street architecture, as manifested in some of the buildings recently erected, says:

The general progress made in this country, within the last four or five years, regarding

Lessons in Carving.—Fig. 7.—Section of Clay, Filling Outline on Slab. Clay Properly Applied.

the general appreciation of combining beauty and taste with more usefulness, also manifests itself in our latest street architecture. Where monotony prevailed, and even was contemplated as "aristocratic" not very long ago, in building whole streets with an almost infinite repetition of one and the same house front, at present the utmost variety is aimed at, which taxes the architect's inventive faculties, his productiveness and imagination to an unusual extent, and thus inevitably leads to a richer organization and ornamentation of our present street fronts. With the almost uniform width of our building lots, and the mostly conventional interior arrangements of our private dwellings, as well as our flats and apartment houses, which require a certain given number and grouping of door and window openings, the principal distinguishing features must necessarily lie in the different styles of their exterior decoration and ornamentation, not taking into consideration, of course, the large number of public buildings and palatial residences of our rich that are constantly added to New York's list of remarkable works of architecture. Under such conditions it is quite natural that architects try to surpass each other in originality and novelty of design and construction; and not less natural is it that, besides many first-class productions which favorably compare with the masterpieces of architecture in other leading cities of the world, on our walls through the newly built-up portions of this city we also behold quite a number of buildings where the architects aim at outdoing what was done before, and endeavor to overdo it at the cost of fundamental principles of art and good taste. Sometimes to the thoughtful critic the question may arise: "What are the future aspects of architectural progress in this city? Is there not a danger that such craving for originality must destroy every organic and healthful development of architecture in its bud, particularly since there is missing in this new country the direct influence of those old traditions of art which are embodied in the numerous monuments of the Old World, dating as far back as one and even two scores of centuries and more?"

It is just this latter point which leads us to believe that this country is the one destined to bring forth ere long an independent



Lessons in Carving.—Fig. 8.—Clay Badly Applied to Outline and Liable to Break Away.

and leading new style of architecture. Architecture in Europe is so intimately connected with the past, its present vocabulary of forms is so closely based upon that of the past, that any new departure from traditions and old-established rules can take place only by degrees and very slowly.

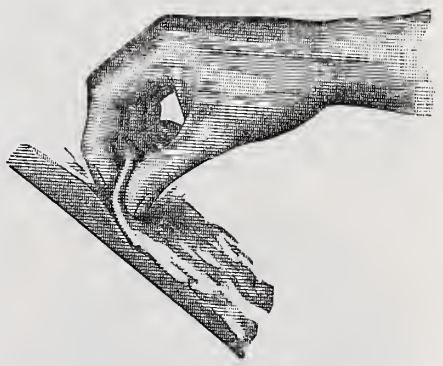
American architecture is just entering into the prime of its life, fresh and bright, free, unprejudiced and unencumbered by old schools. Of course, she cannot dispense with their fundamental teachings, but their scene being so far remote, their influence reaches our architects in a greatly condensed form, which enables them to enjoy those teachings in an objective way, without obstructing a free development of their subjective tendencies, their individuality. This individuality, however, cannot help being governed more or less by the general taste of the public, by the general requirements for any distinct class of buildings, by the building materials available, and by other numerous influences which in their totality contribute toward imprinting upon the architectural works of a period certain uniform features. And this is just what constitutes a style in architecture.

The general taste of the public corresponds to the prevalent characteristic features and inclinations of the individuals. We Americans are an assiduous, active people, and particularly in a city like New York, where the large business interests of the country are concentrated, the prevailing characteristic feature of its inhabitants must necessarily be a certain dashing boldness of action that is free from pettiness in every respect. Now, is not the most striking feature of our modern architecture in this city just boldness of conception? Are not our architects endeavoring to treat even a naturally monotonous object, like stores of six or seven stories high and a whole block in length, in such a way as to divide and subdivide those tediously extended fronts in pleasing groups and largo masses, quite in contrast to what was done hitherto, when one certain pattern of window and its surrounding architecture was repeated without end, upward and sideways, as often as the dimensions of the front required?

As to the influence of building material upon the style of architecture, the recent so extensive introduction of brick into the street fronts of even very costly buildings, must tend to promote that aiming at boldness and to prevent our architects, in their striving at originality, from getting lost in petty details of ornamentation, the nature of that material confining the use of ornaments to such places as are in themselves prominently distinguished from the masses, as for instance, friezes, cornices, moldings, belt-courses, window and door trimmings.

Keys and Locks.

A writer in the *Magazine of Art* gossips as follows about keys: The history of keys



Lessons in Carving.—Fig. 9.—Building up an Edge with a Roll of Clay.

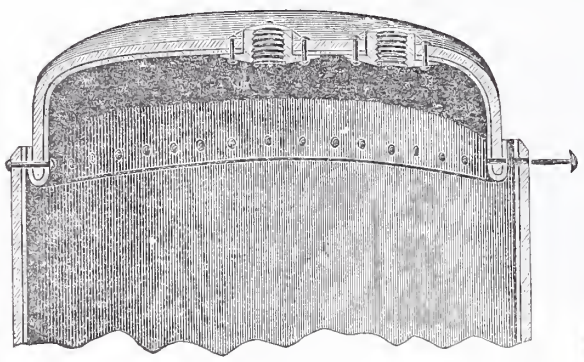
abounds with interesting matter, and takes us back to the beginning of civilization. The exact place and date of their first use has not yet been determined, but their origin has been variously attributed to Egypt, Phœnicia and Greece. We find in Homer's "Odyssey" a simple appliance in the shape of a leathern thong inserted through a hole in the door, which, with the help of a ring or hook attached to it, would fasten or unfasten from the outside a bolt within. This was probably the precursor of the key. Those who have examined Dr. Schliemann's famous collection will not have failed to notice a very ancient fragment of bronze, somewhat in the form of a key, which is

supposed to have secured nothing less than the Trojan treasure itself. But when we come down to Roman times, we arrive at a period in which locks and keys were established in constant use. It was a general custom for a Roman bride, on first entering her husband's house, to be presented with the keys of the household, except that of the cellar, which, prudently or imprudently, was always left in custody of the husband. The museums of Europe possess manifold specimens of this epoch which all bear a strong ancient character, though differing in many varieties of pattern. They are generally made of bronze, but sometimes occur also in iron—or rather, perhaps, the former metal has lasted the longest. Unfortunately, the locks to which they belonged, having been made chiefly of iron, have not withstood decay, and so do not enable us to judge of their mechanism. But the bronze keys are not infrequently found in a very perfect condition, and the evidence of their construction is sufficient to show that the handiwork of the Roman locksmith was not unworthy of comparison with that of our own time. Many have been discovered in London itself, some of which may be seen at the Guildhall Museum, and specimens have not been wanting among the *scavi* at Pompeii and Herculaneum.

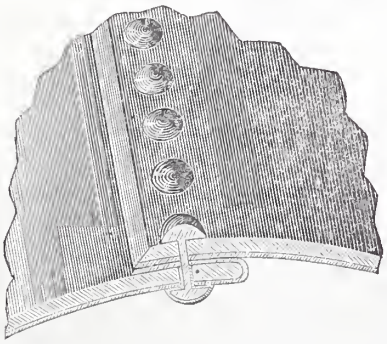
NOVELTIES.

IMPROVED RANGE BOILER.

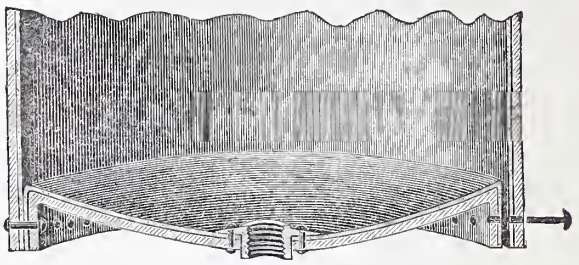
To casual observers all range boilers appear somewhat alike, and at first thought it would seem that there is very little choice between them. A little investigation, however, shows that this is a mistake. A number of varieties are to be met, of different materials and of different construction. There is the ordinary copper boiler, the iron boiler galvanized, and various improved forms partaking more or less of the general style of one or both of these common types. The accompanying engravings show the construction of an improved range boiler which possesses features of special interest to those builders who desire to equip their houses in the best manner. The shell of this boiler is of iron, the material which is the most desirable for use in that place on account of its great strength and stiffness, by which the boiler is made to resist almost any amount of pressure that may be exerted upon it. It also possesses the requisite strength to enable the boiler to resist collapsing strains. Since iron, though very desirable on account of the qualities we have enumerated, is quite liable to rust, to make a perfect boiler the entire inside requires to be lined with some other material. In the present instance tinned sheet copper is employed, and the construction of the boiler, including this lining, constitutes the special features to which we shall direct attention. The copper lining is so arranged, as may be seen by our engravings, as to cover all the joints and exposed edges of the iron. By a peculiar process in the manufacture of these boilers, the lining is put as closely to the surface of the iron as though it were soldered upon it, thus excluding all air from between the shell and lining. In Fig. 1 the upper head is shown, by which it will be seen that the lining is turned over the edge and brought outside of the joint, thus completely protecting the iron. In Fig. 2 a section is presented indicating the manner of making the side seam. It will be noticed that the portion of iron which laps inside is as thoroughly protected as that which is otherwise placed. The bottom head is constructed in the same general manner as shown in Fig. 3. The rivets which it is necessary to employ have their heads, which come on the inside, capped with copper. The side seam is tinned after the plate is formed into shape, and riveted. Wherever it is necessary to perforate the shell of the boiler, as for a coupling, a thimble is used which has a flange upon the inside. This is riveted fast, so that when the boiler is done the entire inside surface is of tinned copper. Boilers constructed in this manner have all the strength of iron and all the advantages of copper in furnishing water free from rust. They have the additional merit of being cheaper than copper boilers of ordinary construction. The exterior finish of the boiler after it is in place may be of paint in any desired color, or of bronze. The manufacturers are Messrs. A. C. Keeney, Clark & Creque, 54 Cliff street, New York.



Improved Range Boiler.—Fig. 1.—Sectional Diagram of Boiler Head.



Improved Range Boiler.—Fig. 2.—View of Side Seam.



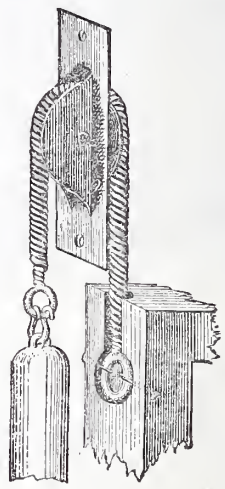
Improved Range Boiler.—Fig 3.—Sectional Diagram of Boiler Bottom.

THE CLIMAX SASH CORD.

A new sash cord is now being put upon the market, which consists of a coiled steel wire. It possesses several important merits, among which may be mentioned its extreme durability, its noiseless action and the fact that it costs less than chain, wire rope, &c., which have been heretofore employed for the purpose. The engraving shows how the cord is intended to be used. It is shipped in coils and is cut to lengths, as may be required. A screw eye, identical with or very nearly resembling those commonly sold in the market, is screwed into one end of the cord and forms a means of fastening to the sash. A hook of peculiar form made of wire, and another screw eye applied in the same manner, connect the opposite end of the cord with the weight. A screw through the eye into the sash, or, as shown in the engraving, a pin passed in front of it through the sash, fastens it securely in place. There is a certain amount of elasticity to this cord which is a desirable feature in its use in connection with heavy sash and correspondingly heavy weights. It is very handsome in appearance, and we have no doubt that when generally known will find many friends among builders. Several different sizes of the cord are manufactured, suitable for sash of 25 pounds up to 250 pounds. The same general style of cord is also manufactured adapted to use in connection with curtains. The same idea is carried still further and applied to belts for running light machinery. We understand that belts have been made which answer the purpose very satisfactorily up to 4-horse power. The Perpetual Tension Propelling Belt Co., of 328 and 330 Seventh avenue, New York City, are the proprietors and manufacturers of this article.

IMPROVED DOOR SPRING.

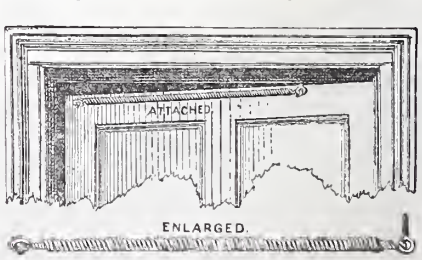
The accompanying illustrations represent what is known as the "Perfect" door spring, manufactured by the Door Spring Manufacturing Co., No. 328 Seventh avenue, New York City. As may be seen by the engraving, its purpose is to close doors. It consists of a steel wire coiled, one end of which is fastened to the lower side of the frame, while the other end is fastened to the stile of the door near the front. Ordinary screw eyes are used for the purpose, thus making it very easy and simple of attachment. There is nothing about the spring liable to get out of order, and its action is such that it closes the door with less noise than is attendant upon the use of other springs. It may be detached from or attached to a door in a very small space of time without the use of tools. It may be placed so as to close the door slowly or quickly by simply moving one of the screws to the right or left, as the case may require.



The Climax Sash Cord.

THE "PERFECTION" WATER CLOSET.

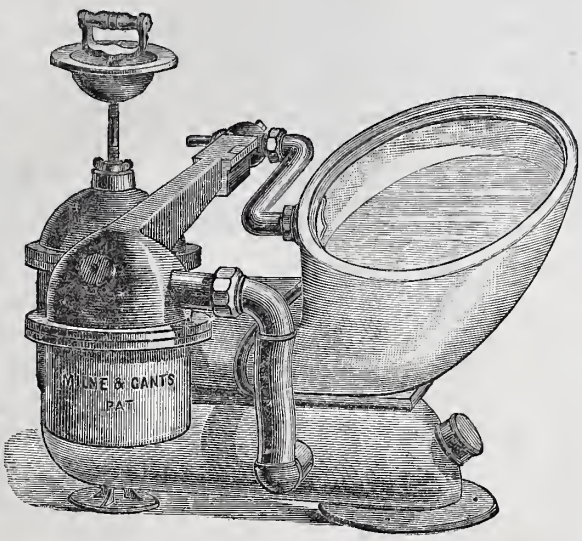
We show, by means of two engravings, a new water-closet which Messrs. Waefelaer & Duysters, of No. 95 Beekman street, New York city, are manufacturing under the patents of Milne & Gants, of San Francisco, Cal. It is altogether new in its general features, and has much about it to recommend it as a sanitary appliance, and, there-



Improved Door Spring.

fore, it merits notice. It seems to have been designed with special reference to the known requirements of a good closet. Our illustrations show its construction so clearly that nothing but the briefest description is necessary. From the manufacturers' announcement we obtain the following:

"It is universally conceded that a water-closet, to be sanitary, must be so constructed as to retain a large body of water in the porcelain bowl, and have an automatic valve, so that in case the body of water is removed, either by leaking or syphonage, the valve will again fill the bowl automatically. It must also have an overflow, so that in case of any disagreement of the supply valve the water will be carried off instead of overflowing. The water-closet we offer has not only all these advantages, but we consider it the most perfect and most simple ever invented. It is so constructed that there is no fouling chamber, and architects and plumbers can see at a glance that no closet is more hermetically sealed, with or without a trap, against all smell and sewer gases. The rubber ball is made for steam, and will last ten years. The working of the float, shutting and opening the valve, is so gentle and smooth that nothing can get out of order. The iron part inside is enameled, and we will sell none but enameled ones, as all iron, after some time, will absorb the soil, and is bound to produce more or less smell in the room. This advantage will make it, besides, perfectly sweet and clean."

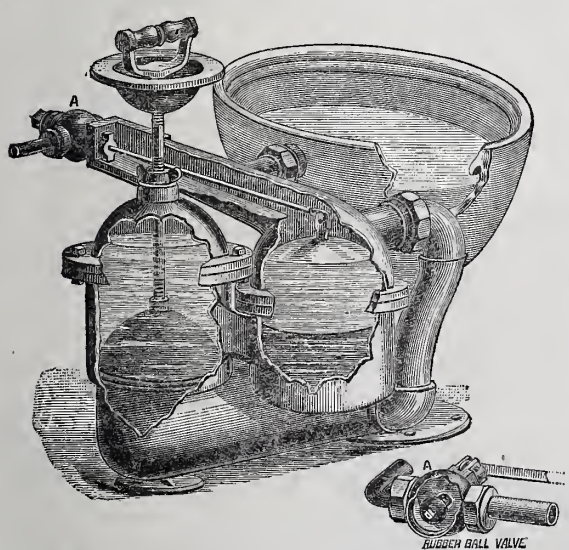


Perfection Water Closet.—General View.

There is much about the design and arrangement of this closet which pleases us, and, while we have not given it that critical examination in practical operation which alone would justify a commendation implying intimate personal knowledge, we are glad to bring the matter before our readers, believing that it will be of general interest.

The Advantage of Business Knowledge to the Builder.

It may seem altogether unnecessary to advance arguments in support of the assertion that business knowledge is of the greatest advantage to the contractor and builder. On looking around us, however, we see in many directions the lack of business knowledge in very important particulars—a lack which goes far toward explaining the remarkable discrepancies in bids which are occasionally noted, and the absence of uniform standards among those engaged in the building trades, of which complaint is so frequently made. Those builders who possess a business knowledge are very generally successful, where others not well posted fail. Many important advantages are to be derived from a knowledge of materials outside of the staple items of brick, stone and lumber, and frequently the success of a contractor depends entirely upon his acquaintance with prices in markets away from those in which supplies are ordinarily purchased. An instance which some time since came under our own observation is in point. A block of store buildings was to be let in one of the towns of Western Pennsylvania. The job was an important one for the locality, and as it occurred at a season when building operations were at a standstill, all the more enterprising builders within a radius of 50 miles were present, carefully working out their estimates preparatory to bidding. The job required a pressed-brick front, tin roof and galvanized-iron cornice, iron lintels and columns in the first story, and plate glass in the show windows. Several subcontractors or specialists were present representing all the more important lines of trade, and there seemed little chance of any builder having any marked advantage over the others. Accordingly very close figures were expected to rule. One of the owners of the new block was in the hardware business, and, with a view to securing as much trade as possible, busied himself in talking nails, paints, glass and general hardware among the builders.



Perfection Water Closet.—Working Parts.

The item concerning which he was specially solicitous was the plate glass for the show windows. Upon this he had obtained quotations through a New York correspondent, and he was very anxious to make such arrangements as would enable him to sell the glass to the successful contractor. Most of the builders, having no better source of supply, readily accepted the proposal he tendered them, which was conditioned upon their buying at the figures named in case they secured the contract. One of them, however, declined to take the bid upon any such terms, and explained to the merchant that his acquaintance in the trade was such that in all probability he (the builder) could buy the glass at even lower figures than the merchant would have to pay, leaving out of the count the latter's profit, and that, therefore, he could not take the bid unless it was made unconditional. At the same time he was free to say he would buy of the merchant in preference to sending away, provided prices were equal. The result was that the merchant's figures on the glass were given to him, and they proved to be some 25 per cent. higher than he was in the habit of paying. Since the other builders were using this local bid, this contractor knew at once what advantage he possessed, and shaping his estimate accordingly he put in the winning figures for the job, securing it at what was considered by him a fair price.

This is but one incident out of many which we might relate from our own observation, all pointing in the same direction, and all illustrating the advantage that the man who is thoroughly posted possesses over his competitors. Plate glass is only a representative item. We have seen the scale turned in a similar manner by inside figures on iron beams, corrugated iron, iron roofing, tin roofing, slate roofing, galvanized iron cornices, tiling, plumbing, steam heating, ventilating apparatus, &c., to the end of the long list of items which go to make up a modern building. According to our observation, the most successful builders are those who are so thoroughly posted in all these matters as to be practically independent of all subcontractors. It is notorious that jobs are sometimes controlled by rings. A general contractor and his following of subcontractors combine, and by keeping the understanding in the background, and by the subcontractors furnishing all competing general contractors who will accept their bids propositions which are above a fair valuation, they frequently succeed in controlling work which they could hardly secure upon their merits as builders. The man who is thoroughly posted is a match for all such rings, so far as their ability to run up prices upon him is concerned. He is not liable to fall into any of the pits that subcontractors may prepare for him.

Plate glass is an article which, owing to close competition not only between rival manufacturers and importers, but also between foreign and domestic production, is sold from first hands upon very close margins. Accordingly, the builder who possesses sufficient business knowledge to enable him to buy without the assistance of middlemen, secures figures upon it greatly to his advantage. In the case cited above, the merchant, not being a regular buyer of plate glass, probably obtained his quotations through the house of which he bought his common window glass. This firm, realizing that the merchant was not in the plate-glass trade regularly, very likely felt justified in quoting him prices which would afford them a good profit, although they would simply place the order. The merchant, in turn, allowed liberally for freight and expense of handling, and added his customary profit. The result was a figure which, though not unreasonably high as such material is commonly sold, was altogether too high for one who was accustomed to buy direct from first hands.

The moral of all this is that shrewd builders will employ every legitimate means in their power of becoming informed concerning prices and markets. While it is undoubtedly good policy to patronize local dealers, provided always prices are as low as can be obtained elsewhere, it is not good policy for a builder to buy his supplies in a careless way at common retail prices. The convenience of this method of doing business is dearly paid for, and it has nothing else than convenience to recommend it. The more items a builder can buy at bottom prices, that is, at the lowest prices from first hands, the cheaper he can work. He possesses a material advantage over the man who buys of second or third hands and who, therefore, pays one or two intermediate profits. It is not a difficult matter for a responsible builder to obtain the proper introduction to first hands, to enable him to buy in the manner we have been describing. Wholesale dealers and manufacturers' agents in all the distributing centers of the country are anxious for his trade. They advertise in order to attract his attention. When they once get his name and address they send him circulars. Sometimes they even send a traveler to call upon him. A responsible builder's trade is desirable because it is a cash trade. It is safer than trade with merchants and dealers. Builders should bear these points in mind and make the best possible use of the opportunities that surround them.

When it comes to descending a ladder the bravest of us generally back down.

CORRESPONDENCE.

Construction of a Right-Angled Triangle.

From T. H. C., *Buffalo, N. Y.*—Your correspondent C. presents a problem concerning a right angle the perpendicular of which is 70 feet and the base 20 feet; required to find the point in the perpendicular where, if the upper portion be broken off, it will form the hypothenuse of a right-angled triangle the base of which is 20 feet. He prefers an arithmetical rather than an algebraic solution, and as probably the majority of your readers would prefer a simpler way than either, I suggest that we try the common steel square for the purpose. Draw the angle to any convenient scale, as shown by A B C in the annexed diagram, making A B 70 feet and B C 20 feet. Join A C; bisect A C at E with a perpendicular, which produce until it cuts A B in the point D; then D is the point required. The length of B D or D C may be determined by measuring the same scale by which the original distances were set off. This, I trust, will be considered a satisfactory answer to your correspondent. It is simpler than either an arithmetical or an algebraic solution.

From J. E. W., *Royalton, Wis.*—In answer to C.'s problem of the tree, I inclose you a diagram and submit the following demonstration. Lay off A B the full hight of the tree. Lay off B C for the base 20 feet in length. Draw the hypothenuse A C. Bisect A C in E and draw E D at right angles to A C. Connect the points D and C. Then D C represents the length which it is desired to obtain. Square 70 = 4900. Square 20 = 400; add together, and we have 5300, the square root of which is 72 8-10, which equals the length of A C; one-half of $72\frac{8}{10}$ is $36\frac{4}{10}$, which is equal to the length C E. From this we have the proportion 70 : $72\frac{8}{10}$: : $36\frac{4}{10}$: $37\frac{85}{100}$, which is the length of D C. A E D and C E D are equal and similar triangles; therefore C D equals A D, the distance from the top the tree must break in order to have the end strike 20 feet from the stump.

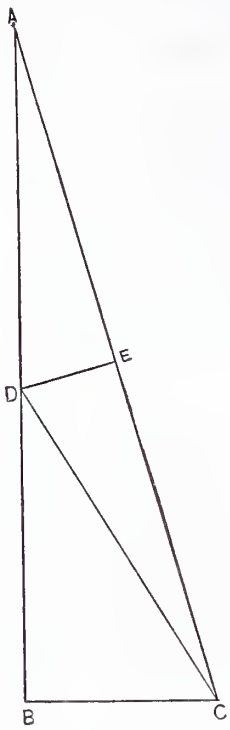
Note.—The diagram sent in by this correspondent being the same in all particulars as that contributed by T. H. C., we have not engraved it, but have employed the latter correspondent's illustration instead.

From J. W., *Fall River, Mass.*—Let A B of the inclosed diagram represent the unbroken tree, and B C the base of the triangle to be constructed. The square root of the sum of the squares of A B and B C divided by 2 must equal C E and E A, which, by calculation, is found to be $36\frac{4}{10}$. Then A B : A E :: B C : E D, or, expressed in figures, 70 : $36\frac{4}{10}$ :: 20 : $10\frac{4}{10}$ equals E D. Again, the square root of the sum of the squares of A E and D E equals A D, which, by calculation, we find is $37\frac{86}{100}$. This subtracted from 70 leaves $32\frac{14}{100}$ feet, the hight of B D, or the part standing.

Note.—The diagram inclosed by this correspondent being also substantially the same as that sent by T. H. C, we have employed the latter for his demonstration by simply changing reference letters.

From W. S., *Penn Yan, N. Y.*—The problem proposed by C., of Patterson, Ohio, may be solved by the following rule: The square of the hight plus the square of the base, divided by twice the hight, will give the part broken off. The square of 70 feet, the hight plus square of the base or 20 feet, equals 5300; 5300 ÷ 140, or twice the hight, equals 37 6 7 feet, the part broken off.

From F. W. S., *Green Castle, Ind.*—Your correspondent C., on page 79 of the current volume, proposes a conundrum and asks for an arithmetical solution. While I am free to confess that my muddy brain fails to find any connection between the supposed tree and any possible problem in carpentry, I will send along a solution which I hope he will be able to "C" through without much trouble. The tree in breaking forms the hypothenuse and perpendicular of a triangle. By the nature of a right-angled triangle the square of the base (20 feet) is equal to the difference of the squares of the perpendicular and hypothenuse. $20^2 = 400$, which is the difference of the squares and is also the product of the sum (70 feet) and the difference (?) of the two pieces. This product 400 divided by the sum 70 feet gives $5\frac{5}{7}$ feet as the difference in length of the fractions. One-half of the length of the tree, 35 feet, added to one-half the difference, $2\frac{6}{7}$ feet, gives $37\frac{6}{7}$ feet as the hypothenuse. This sum subtracted from 70 feet leaves $32\frac{1}{7}$ feet as the hight of the stump. By way of comparison I will give an algebraical solution. Let x equal the length of the top. Let y equal the length of the stump. Then $x + y = 70$ feet. $x^2 - y^2 = 20^2$, or 400 feet. Factoring we have $x^2 - y^2 = (x + y)(x - y)$. Substituting values we



Problem of Right-Angled Triangle.—Sketch from T. H. C.—The Same Engraving Illustrates Letters from J. E. W. and J. W.

have $(x + y)(x - y) = 400$. Since $x + y = 70$, by eliminating $x + y$ from the last quotient we have $x - y = 400 \div 70 = 5\frac{5}{7}$ feet. Since $x + y = 70$ and $x - y = 5\frac{5}{7}$, by addition we find that $2x = 75\frac{5}{7}$, from which we ascertain that $x = 37\frac{6}{7}$ feet, which is the answer. $y = 70 - 37\frac{6}{7} = 32\frac{1}{7}$ feet.

From S. R. K., *Grand Rapids, Mich.*—Answering C., of Patterson, Ohio, the arithmetical rule asked for is as follows: From the square of the whole length of the tree or pole subtract the square of the base, and divide the remainder by twice the length of the pole, thus: $70^2 - 20^2 = 4500$; $4500 \div 2 \times 70 = 32.142$ feet, the hight of the stump. This rule is susceptible of demonstration, both by algebra and geometry.

From W. F. P., *Berea, Ohio.*—I will endeavor to answer C., of Paterson, with regard to the construction of a right-angled triangle. I shall employ letters to represent the different sides of the triangle: H equal hypothenue, P equal perpendicular and B equal base; then the arithmetical solution is as follows: H + P = 70; $H^2 - P^2 - B^2 = 400$, from which we derive that H—P = $5\frac{5}{7}$; H = $37\frac{6}{7}$ and P = $32\frac{1}{7}$; hence the tree should break at $32\frac{1}{7}$ feet from the ground. In this solution I assume that your correspondent understands the rule formulated as follows: $B^2 + P^2 = H^2$.

An algebraic solution of the same problem is as follows: Let $x = P$, then $70 - x = H$ $x^2 + 400 = (70 - x)^2 = 4900 - 140x + x^2$; $140x = 4500$ $x = 32\frac{1}{7}$ feet. I consider the algebraic method the better of the two, and I presume C will agree with me.

From M. W. T., *Clarksburg, W. Va.*—In answer to C concerning the tree problem I submit the following rule. From the square of the hight of the tree subtract the square of the base of the triangle. Divide the remainder by twice the hight of the tree. Solving the problem by this rule we find the stump to be $32\frac{1}{7}$ feet and the broken-off piece $37\frac{6}{7}$ feet.

Correction in Dimensions of Ceiling Tongs.

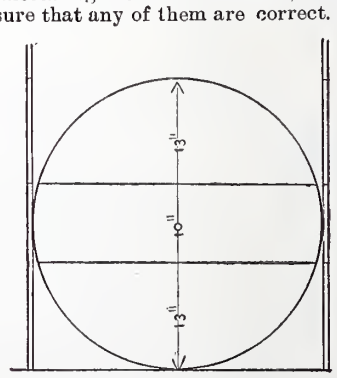
From J. D. H., *Bel Green, Ala.*—The description of ceiling tongs contributed by me for the March number I find to be wrong in one of the dimensions. I intended to say that the extreme bend was 1½ inches in length, instead of which it is printed ½ inch. By making correction you will greatly oblige.

He was Pleased with the Answer.

From "ODD SHAPE," *Leroy, N. Y.*—I desire to thank you for the solution given to the problem of fitting a board to a corner which I proposed several months ago. I began to fear that something had been omitted which prevented your answering it more promptly. However, if anything was omitted you have kindly supplied the missing link. I feel perfectly satisfied with the solution. It is correct, and whatever views are taken by others, no one can say it is rotten or even shaky.

Three Men Sawing Off a Log.

From T. H. C., *Buffalo, N. Y.*—Set a stake on each side of the log, as shown in the figure. Mark a line on each stake level with the top of the log. Mark down from that line two others at 13 inches and 23 inches respectively from the first line. Let two of the men saw down to the first mark; then let one of them "lay off" and the third man take his place, the two sawing down to the second mark. Then let the third man and the one who has been laying off saw the remainder. By this division each man will have sawed his one-third of the log as near as it can be figured. To calculate this problem exactly is impossible, even supposing that a section of the log be a true circle. There are numbers of rules for calculating the area of a circle, but I am not sure that any of them are correct. By



Three Men Sawing a Log.—Diagram from T. H. C.

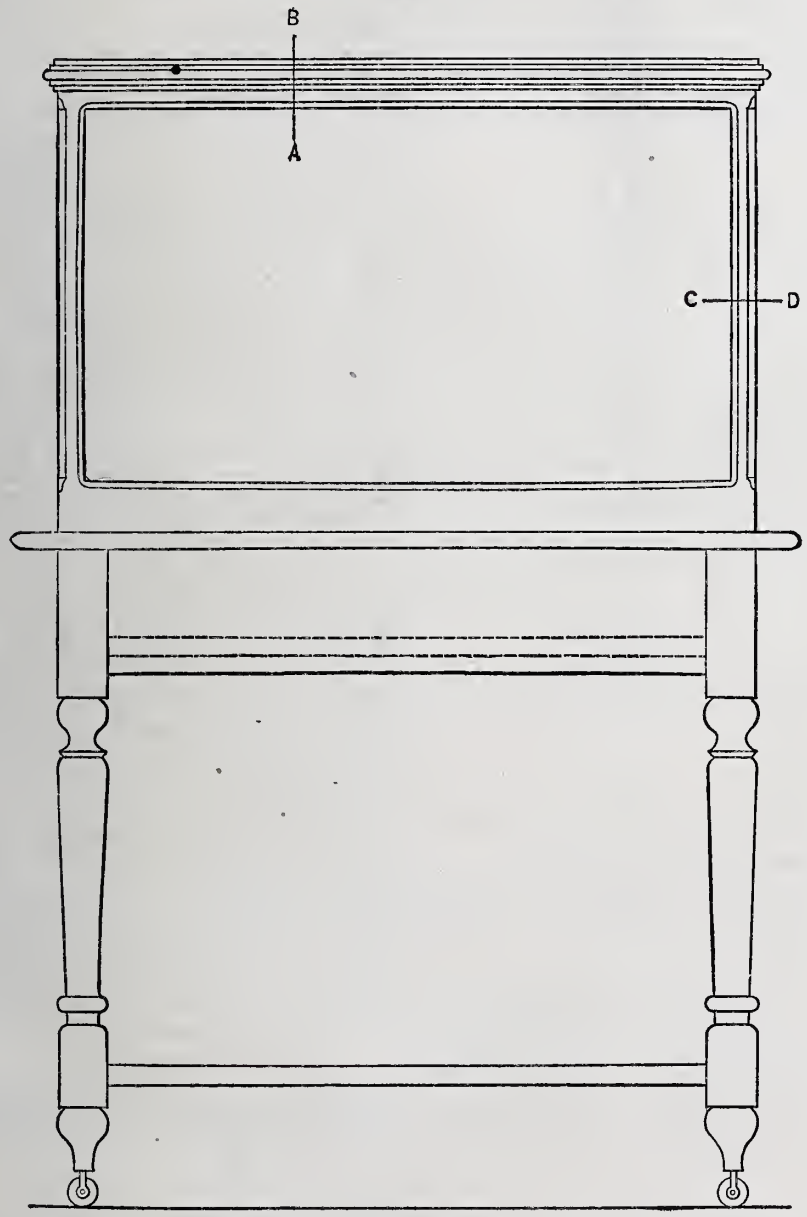
one of these rules, having the diameter given (36 inches) we find the area to be 1026 square inches. Divide this by 3 gives 342 square inches as the area of either segment or zone. Given the area of a segment, by calculation we find the hight to be about 13 inches; hence the dimensions set forth above.

C. A., Cleveland, Ohio, in answer to the question sends a diagram accompanied by a large number of figures, but without a written demonstration. The singular part of his solution is that he requires each man to saw clear round the log. He does not divide the straight cut through into horizontal sections, assigning each man his proper share. We presume some of our practical

readers would smile if we published this solution, and therefore we merely refer to it, thanking our correspondent for the labor he has expended upon his solution, and asking him to try once more. The evident intent of the correspondent asking the question was to know how to divide the labor between three men in making the cut directly through the log, in the same manner as though it had been sawn in one sawing.

Fern Case.

From A. G. S., *Chattanooga, Tenn.*—In response to the request of B. D., I send you herewith a sketch of a cheap but pretty fern case. In constructing this article, the lower part is lined with zinc in order to hold the dirt. The frame is provided with a shelf near the floor for receiving flower pots. The glasscase is portable and is kept in place on the stand by two dowel pins. The lid is



Fern Case.—Contributed by A. G. S., Chattanooga, Tenn.—Fig. 1.—*Elevation.—Scale,* 1 *Inch to the Foot.*

constructed so as to be removable also. The glass in the top and sides of my case is 16x26 and 16x16 inches. Your correspondent can, of course, vary these dimensions to suit himself. The accompanying full-sized sections show the construction I have employed. I trust this will be of service to the correspondent asking the question and also to others of your readers.

Books on Chemistry.

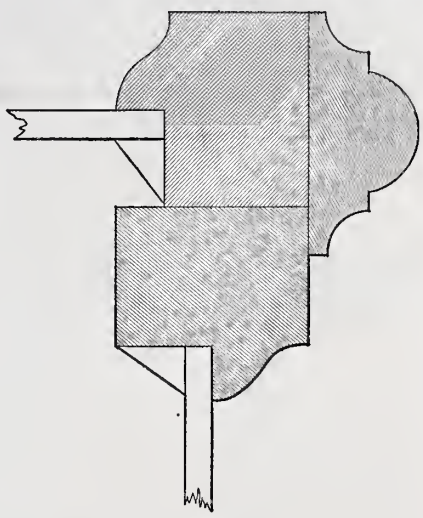
From SUBSCRIBER, *Nashville, Tenn.*—Will you please advise me as to the purchase of a book treating on chemistry. I am entirely ignorant of this subject, but desire to become acquainted with it and also with electricity.

Answer.—Probably there is no better elementary book for our correspondent's use than "Roscoe's Lessons in Elementary Chemistry," the price of which is $1.50. If our correspondent proposes to investigate the subject of electricity, we suggest as an elementary work leading up to a proper understanding of that subject, that Balfour Stewart's "Lessons in Elementary Physics" will be a desirable book for him to possess. Price of this is also $1.50. They may be ordered through this office.

In both of these books the metric system of weights and measures is used and the temperatures are given by the Centigrade thermometer. Although elementary in character, they may still be somewhat more advanced, especially in the department of organic chemistry, than is necessary. One of the best books for a beginner who wishes to study both natural philosophy and chemistry, is Pynchon's "Introduction to Chemical Physics." This work goes carefully over all the ground which must be covered by the student before he can make any progress in chemistry or natural philosophy. This book, which is very freely illustrated, is more costly than either of the others, the price being $3. Its 500 pages are devoted to light, heat and electricity, subjects which it treats in a popular and most interesting manner.

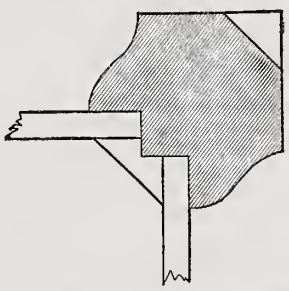
Filling the Walls of a Frame House.

From J. B. T., *Fond du Lac, Wis.*—I recommend W. S. H., who in the March number described his cold frame house, to put in some gravel between the outside and inside covering, say to the extent of 4 inches. Upon this fill up with dry sawdust or tan bark. The gravel will keep the sill from staying wet, and the sawdust above the gravel will soon dry out again. Filling a building after it is completed does not help as much as one would suppose, because it is mostly around doors and windows that the wind comes in, and these places get none of the filling—for example, between the studding and the jams below the windows and above the headers. In building a common frame house it is very important to sheet it on the outside and put on paper. The paper



Fern Case.—Fig. 2.—*Section on Line A B. Full Size.*

should in all cases cover all from sill to plate. Put strips under casings, corner boards and angle pieces, and lap the larger pieces on these strips. Do not leave the space between the outside and the inside open all through the house, so that if a little wind or cold gets in it can circulate through this space from sill to roof, up and down partitions, along between joists, &c., until the whole plastering is cool. Half way up the first story fit in blocks between the studdings. Repeat this again below and above the joints at their ends. One block will do where the joist lies along the side of the building. The same air-tight block should be employed between the joists, so that air cannot circulate from the west side of the



Fern Case.—Fig. 3.—*Section on Line C D. Full Size.*

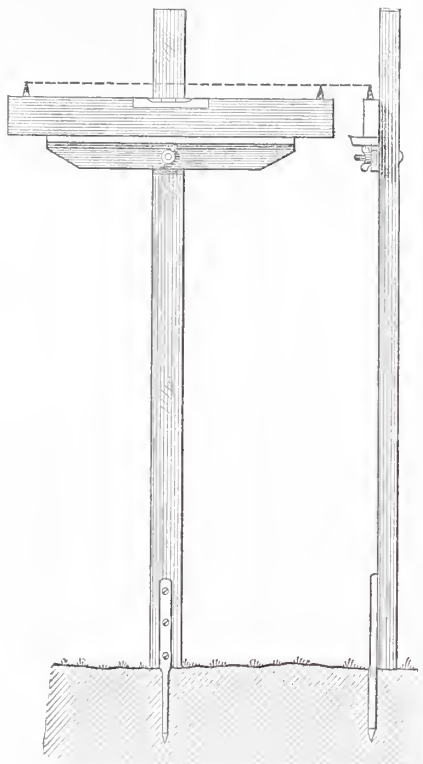
house, when a west wind is blowing, to the opposite side. In the wing part make a double ceiling with two separate coats of plastering, or one of boards matched. The extra expense of this is little, while the benefit is very considerable. My opinion is that builders should give more attention to the construction of common houses than is at present customary. Five times as many people live in houses costing less than $1000 as live in better houses.

Why Brick Fronts Become Streaked.

From P. S. R., *New York City, N. Y.*—Clay used in brick contains a portion of soda ash; the lime of the mortar acting on the clay in the brick liberates the soda, which, escaping to the surface, causes the spots alluded to by your correspondent. The best remedy perhaps is to apply acid to the walls with a brush. This gives freshness to the surface for a long time. If the wall is to be painted, this will better prepare the surface for the paint.

Leveling Instrument.

From R. M., *Glastonbury, Conn.*—I have in use a very simple but effective instrument for taking levels—rise and fall of land, &c.—which any mechanic can make at small expense. I inclose sketches representing the same, which I think will be understood by any interested in this subject. The instrument itself consists of a standard furnished with an iron point or spike at the bottom. Four feet from the ground, fastened by means of a bolt with thumb-nut, is a shelf or ledge, upon which is placed an ordinary carpenter's level provided with necessary sights. The target standard is a square stick six feet in length, one edge of which is grooved to receive the rod to which the target is fastened, being held in position with the hands. The target,

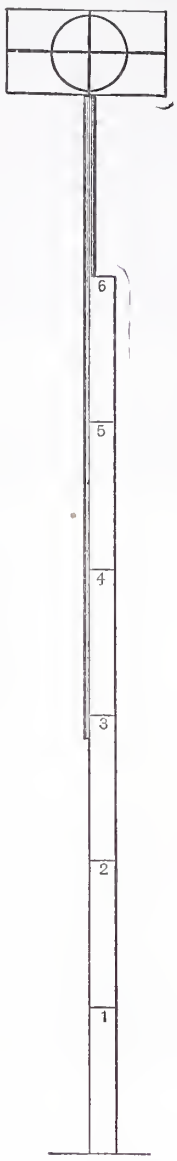


Leveling Instrument.—Fig. 1.—Front and Side Elevation of Standard, showing Level in Position.—Scale, ¾ Inch to the Foot.

which is shown in Fig. 2, of the accompanying sketches, has a white field with red circle and cross-lines. Since the target and staff are both marked in feet and the level is just four feet from the ground, it is a very simple matter to determine the rise and fall of a given surface. The parts throughout should be made of pine wood, so that they will be light for handling. In using the instrument the thumb-nut, which fastens the level rest, should be turned just tight enough to allow of easy adjustment. I think from this description the readers of the paper will have no difficulty in constructing the instrument in case they so desire.

Recipe for Rubber Cement.

From A. R. D., *Reading, Pa.*—The "useful recipe" for rubber cement published in the March number of *Carpentry and Building*, in addition to its ambiguity, may prove the cause of accident. The direction to melt one ounce of raw gutta-percha in bisulphite (or bisulphuret, not bisulphate) of carbon, might be understood to infer the use of heat, which, in this connection, would be highly dangerous, as that liquid is inflammable and explosive. Further, pure camphor is a solid body, not to be measured by the pint. What effect camphor may have in the cement in question I am not prepared to say, not having experimented with it. I would suggest, as a working formula, the following: Gutta-percha, sheet or shred, 1½ ounces; bisulphuret of carbon, 1 pound; dissolve the gutta-percha in the liquid in a closely-stopped bottle and without the aid of heat. This cement is largely used in this part of the country by cobblers in fastening invisible patches. If camphor is a desirable addition, it will, in all probability, dissolve

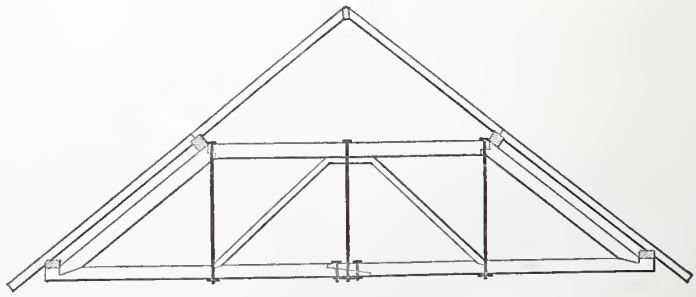


Leveling Instrument.—Fig. 2.—The Target. Scale, ¾ Inch to the Foot.

in the carbon. This material, however, is not named by the authorities as a solvent for camphor.

Roof Trusses.

From W. E. L., *Everett, Mass.*—I have read all that has appeared in *Carpentry and Building* with regard to truss framing. I notice in the January number, page 15, that two ways of framing a truss are shown. I inclose herewith a plan of framing a similar truss, which represents the method generally adopted in this vicinity. I am disposed to submit it to the practical readers of *Carpentry and Building*, with the question—Which of the three designs is best calculated to resist the weight and strain that falls upon a roof of this character, the sketch that I inclose or one of the two published in the January number?



Plan for Framing a Roof Truss.—From W. E. L.

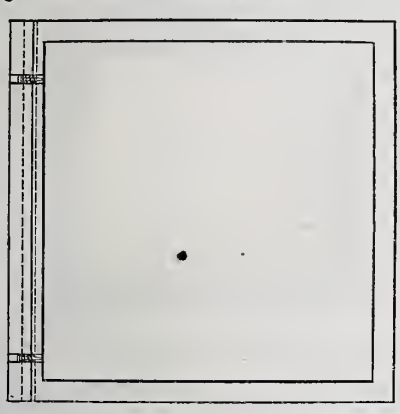
Why He Likes the Paper.

From S. W. H., *Russell, Kan.*—I have been waiting ever since the first issue of *Carpentry and Building* to see if you would accomplish, in the management of that paper, what you promised at the outset. I now desire to inform you of the conclusion to which I have arrived. You have more than kept your word, and all of us old chips feel grateful toward the paper for the benefits we have derived from it. Everything has been made plain and simple, both in the engravings and in wording the descriptions. Any one can comprehend and understand the meaning of all that has been published. I have failed to notice anything that was not practical and beneficial. A good mechanic is always ready to learn anything that is practical—that will advance him in his profession, and nowhere can he find so much of the real requirements as in this paper. Above all else, you have given each and every reader an opportunity to let his light so shine that its rays may fall upon the mind of some down-hearted mechanic who is striving to understand the principles of his trade. The mutual self-help thus fostered by the paper I regard as one of the greatest advantages which the trade derives from it. There have been many magazines published that claim to be in the interest of mechanics, but, unfortunately, their illustrations of buildings represent structures that are too costly to be of any interest to the workman. When parties contemplate building such costly structures, they necessarily employ architects; therefore the engravings in the paper are of little value. To be sure, a picture of the costly building makes a handsome show, but it is not the mere show that we as contractors and journeymen carpenters are after. The series of articles now being published on stair building, so far as they have appeared, have made the subject so simple that they cannot fail to be appreciated by all your readers. In conclusion, I desire to say a word to the correspondents of the paper. Do not be so hasty in calling each other bad names. Don't forget that there was a time when, as mechanics, we did not know how to file a saw or sharpen our planing iron. Keeping this in mind, if any one in expressing his views through the paper should err, do not get angry with him, but in turn show him where his mistake is, just as though he was in your employ and working under your instructions. Using such hard words as do some of the correspondents will have a tendency to deter many from writing, more especially the young men who are in need of information. It is our duty to encourage such and not repulse them. Old as we are in the trade a child might lead us, comparatively speaking, and there is much for all of us yet to learn. Therefore let us employ discretion and cherish a friendly feeling toward each other. By so doing we shall prosper and shall make the most of our advantages.

Placing Landing Risers.

From W. P. E., *New York City, N. Y.*—In the May number of *Carpentry and Building*, on page 95, I notice a communication under the head of "Placing Landing Risers." Allow me to say that I think the points of your correspondent are not clearly stated. Many years ago, as I well remember, when the science of hand-railing was, so to speak, in its cradle—in fact, I might say not yet born—the rule was to place the landing riser of straight flights one-half a tread from

the center of rail at back of cylinder. This was done to bring the rail on the landing of proper hight. It was not then known how to do it in a different manner. When small cylinders were used, the twist or turn was so cramped that the hand—or, rather, the fingers—could not be passed round the inside of the rail. Afterward, when the science of hand-railing was fully brought to light, no difficulty was experienced in that regard. By having the riser as the commencement or spring of the small cylinder, a gradual fall of the rail all around the cir-

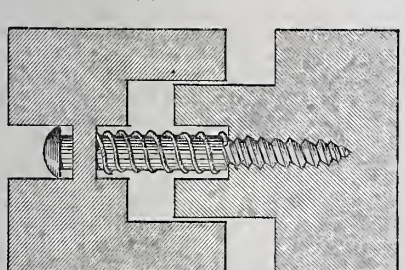


Window Screens.—Fig. 1.—Elevation of Screen, showing the Left Hand Stile Double.

cular part not only produces a graceful curve, but one that can be followed by the hand. The true position of the landing riser on a straight flight is at the commencement of spring line of the cylinder. In case of large cylinders, it is well to place the riser in the cylinder, and I have before now, when cramped for room, placed the riser within 2 inches of the back of the cylinder. In the case of circular or elliptical stairs, of course different treatment is required.

Window Screens.

From D. H. J., *Danielsonville, Conn.*—As window screens have been under discussion, I have thought I would say a word in regard to this subject. When I built my house I plowed the box casings, as we call them here, in the same way as represented by your correspondent A. S. C. Instead of grooving the stile of screen I insert two lugs on each side, near the top and bottom, to work in the grooves. The only difficulty about these screens is this: We have to take off the box casing in order to put the screens in place, or else have the lugs run through the stile and pull them through from the inside to take out the screen. By this latter plan we save taking them off. About two years ago, however, my attention was called to a screen that was just right in every respect, and I now inclose a very rough sketch of its construction. I think, however, you will understand it from



Window Screens.—Fig. 2.—Full Size Section through Double Stile.

the description I shall make. Fig. 1 represents the screen with the left-hand stile double. The dotted lines on the outside piece is to indicate that it is grooved to that depth, and the dots on the other indicate that it is rabbeted on both sides in order to fit together. Two holes are bored in the outside piece and the screw put through, screwing into the inside as indicated. This construction is better shown in Fig. 2, which represents a full-size section through the stile. A spiral spring is placed around each screw, a proper opening in the wood being made to receive the spring. When the screens are put in the two parts of the stile are crowded together. After the screen is in place the springs push the two parts of the stile apart, so that it always fills the window, even though the opening varies in width. The screw-head is sunk deep enough to be out of the way, when the two pieces are pushed together, for either putting in or taking out the screen.

Utility of the Slide Rule.

From D. M. McC., *Florence, Pa.*—Is the slide rule of any practical use to carpenters? If so, what is it used for?

Answer.—In the March number of *Carpentry and Building*, page 56, in answer to a correspondent who asked us to write up and illustrate the slide rule, we gave our estimate of its utility, to which this correspondent and other of our readers who are interested in this subject are referred. If our readers differ from us concerning this instrument, we shall be pleased to have communications from them showing wherein we are wrong, and illustrating the practical application of the tool to every-day work.

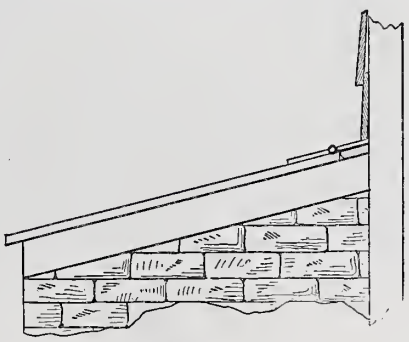
Scales on a Slide Rule.

From D. M. McC., *Florence, Pa.*—I have a slide rule, and upon it are four rows of figures, extending from the 8-inch mark to the end of the rule. The rows are marked ¼ inch, ½ inch, ¾ inch and 1 inch. What are they for, and how are they used?

Answer.—So far as we can make out from our correspondent's description, the scales that he refers to are architectural scales, being, respectively, ¼ inch, ½ inch, ¾ inch and 1 inch to the foot. By examination we think he will find that in the first ¼ inch is the unit, and that each of the spaces in turn is subdivided into 12 equal parts or inches. We have a slide rule before us, but of different make, however, from that which our correspondent mentions, which has scales as above described.

Cellar Door Joint.

From J. P. P.—I inclose herewith a sketch of the method which I employ to prevent



Cellar Door Joint.—Contributed by J. P. P.

water from running through the joint of a cellar door or window cover that opens against the house. The knuckle of the hinges is put ½ inch on the door from the joint and the joint flashed with tin. The flashing at the upper edge is finished under the siding, as clearly exhibited in the sketch. The lower edge of the door requires to be rounded somewhat on the corner, so as to allow it to pass in, revolving on the center hinge. I have found this quite a convenient construction in my own practice, and I trust it may be of service to some of the readers of the paper.

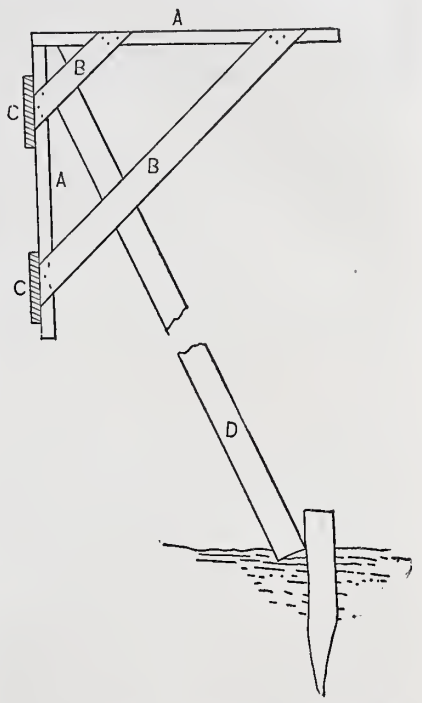
Blackboards.

From G. T., *Delphi, Ontario, Canada.*—I desire to learn the best method of painting a blackboard for school-houses. If some reader will furnish me with practical directions for the same he will confer a favor.

Note.—With reference to our correspondent's inquiry concerning this subject we would refer him to pages 85 and 185 of Vol. I and page 178 of Vol. II of *Carpentry and Building*.

Staging Brackets.

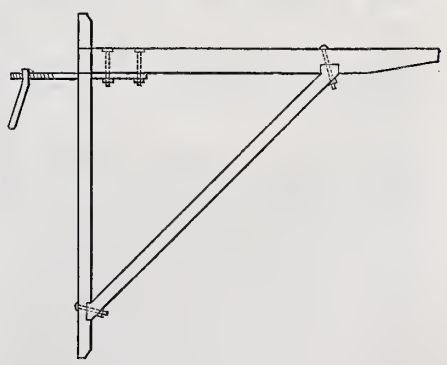
From A. H. V., *Leroy, N. Y.*—A number of staging brackets have been illustrated in *Carpentry and Building*. While I have no desire to find fault with any, the one we are in the habit of using in this locality I think is better than any yet shown. There is less loss of time in making the bracket and in



Staging Bracket.—Contributed by A. H. V.

using it. I inclose some sketches. If you think it worth while, I shall be glad to see them published. In the sketches, the parts A A are 2 x 4; B B and C C, 1 x 8, and D, 3 x 4. These sizes, however, may be varied to suit the user. We seldom find it necessary to use side stays to the scantling D.

From D. H. J., *Danielsonville, Conn.*—I inclose a drawing of staging bracket like the ones I am employing, which may possibly be of interest to the readers of *Carpentry and Building*. The upright piece is of 2 x 4 stuff, laid flatwise. The arm is also 2 x 4, placed edgewise, with an inch-thick tenon through the upright. The brace is 2 x 3, placed edgewise, with a tenon one inch long fitted into a mortise one inch deep at both ends, and fastened in position with a ⅜-inch carriage bolt, as shown in the sketch. A piece of round iron, ¾ inch in diameter and 18 inches long, provided with thread 5 inches long and with two holes for fastening bolts, forms the fastening by which the bracket is attached to the building. This iron is bolted under the arm, as shown in the sketch, and projects 8 or 9 inches through the upright for bolting into the building. This length is sufficient when

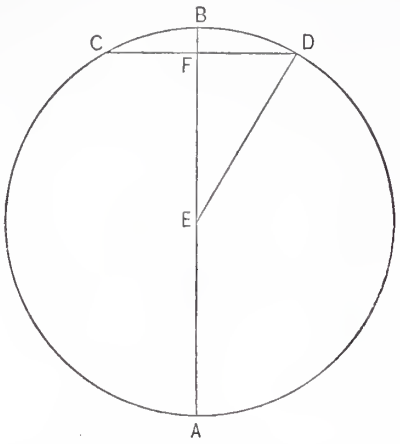


Staging Bracket.—Contributed by D. H. J.

4-inch studs are employed. The construction of this staging bracket is such that a man can place his weight upon it without fear of accident. I have never seen any brackets which I considered as good as that indicated in the sketch.

Determining the Rise in a Segment, Chord and Diameter being Given.

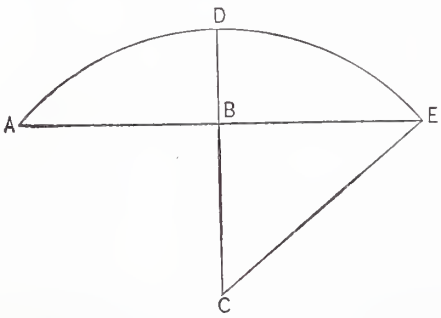
From T. H. C., *Buffalo.*—This problem amounts to nothing more than finding one side of a right-angled triangle, the hypothenuse and the other side being given. The inclosed diagram clearly shows this. A. R. gives the diameter 16 feet and the chord 2 feet. Referring to the sketch, A B = 16 feet, and C D = 2 feet. Then, in the triangle E F D, we have E D (radius or half diameter) = 8 feet, and F D (half chord) = 1



Determining the Rise in a Segment, the Chord and Diameter being Given.—Diagram from T. H. C.

foot. Then, by two rules common for the solution of this problem, we have E F = $\sqrt{(8^2 - 1^2)} = 7.9373$. Or E F = $\sqrt{(8+1)} \times (8-1) = 7.9373$. Finally, 8 feet (the length of E E) — 7.9373 (the length of E F) = .0627 feet, or .5124 inches, the length of F B, which is the required rise. The accompanying drawing does not scale the dimensions used in the demonstration.

From J. W., *Brooklyn.*—In reply to the inquiry of A. R. in the March number, I would say that the hight of a segment may be found, the chord and diameter being given, as follows: Referring to the accompanying sketch, from the square of the radius C E subtract the square of half the chord B E. Extract the square root of the



Determining the Rise in a Segment, the Chord and Diameter being Given.—Diagram from J. W.

remainder, which will give B C. Then, to find B D, the hight of the arc, subtract B C from C E.

From S. R. K., *Grand Rapids, Mich.*—In answer to A. R., of Detroit, I would say that he can solve his question by the rules given for the right-angled triangle. One-half of the diameter of the circle is the radius of the circle, and is also the hypotenuse of the triangle, while one half the chord is the base of the triangle. From these facts the following rule is derived: From the square of the radius subtract the square of the base, and extract the square root of the difference. The difference between the radius and this root is the spring of the arch.

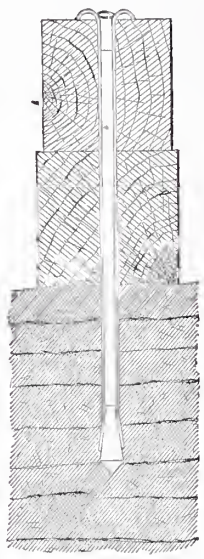
From F. J., *Lowell, Mass.*—In response to to A. R., Detroit, Mich., concerning the calculation of the spring of arches, I would say that when the diameter and chord are given the rule is as follows: From the square of the diameter subtract the square of the chord and extract the square root of the remainder. Subtract this root from the diameter and divide the remainder by two.

From M. W. T., *Clarksburg, W. Va.*—To find the hight of a segment, the diameter of the circle and length of chord being given, proceed as follows: From the diameter subtract the square root of the difference between the square of the diameter and the square of the length of the chord, and divide the remainder by two.

Answer to the above was also forwarded by Y., Hamilton, Ontario.

Anchoring Timbers to a Rock Foundation.

From S. E. J., *New York.*—I inclose a sketch clipped from one of my papers, show-



Anchoring Timbers to a Rock Foundation.

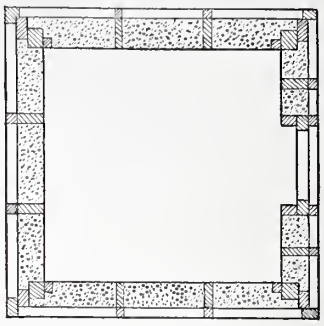
ing an idea in anchoring timbers to a rock foundation which possibly may be of interest to some of the readers of *Carpentry and Building.* In brief, the plan is to bore the timbers and drill the rock, and let in a piece of ordinary gas pipe the exact size of the hole. A double taper plug is dropped to the bottom of the hole, over which the pipe is driven, which expands it in a way to hold the lower end fast. The upper end is expanded by a taper plug and carried down flush with the timber. This method of fastening is so secure that it may be said that the cheapest way to get the fastenings out is to saw them off and leave them in.

Cutting a 9 x 16 Board to Fill a 12 x 12 Opening.

Since publishing solutions to this problem in the April number of *Carpentry and Building*, we have received answers from the following correspondents, being the same as one or other of those already published: W. K. U., Philadelphia, Pa; M. L., Prarie City, Mo.; A. H., East Manchester, Ohio; F. B., Lincoln, Mo.; D. W., Greenville, Ohio; I. J. C., Hart, Mich.; D. S. M., Mercer, Pa.; N. W. W., Washington, Ark.; E. H., Uxbridge, Ont.; A. B. C., Swarthmore, Pa.; A. D. O., Cherrytree, Pa.

Plan of Ice House.

From J. W. P., *Maryland, New York.*—I notice in Vol. I of *Carpentry and Building*, page 217, a plan for an ice-house which I like very well, but I think it can be improved. My way of building an ice-house is to put up the frame and board it over inside and out with rough hemlock. I then nail on 2 x 2 strips over each stud, as shown in the inclosed sketch, outside of which I put on siding the same as with any other ordinary building. This construction gives a free

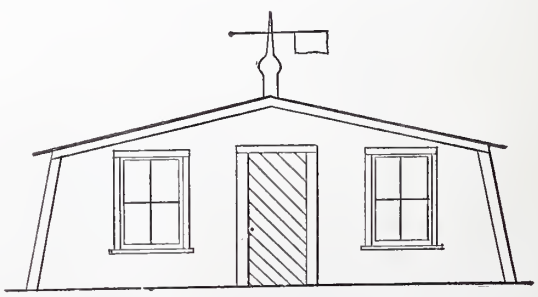


Plan of Ice House.—Contributed by J. W. P.

circulation of air in the space between the sheeting and the rough siding. The result is that ice keeps any length of time even in the hottest of weather.

Hennery.

From A. D. N., *Worcester, Mass.*—One of your correspondents, a year or more since, asked for plans for a hen-house. He has probably built the hen house before this and retired from business. However, there may be others who wish to invest in a few birds and build a coop for them. Now, it has been the custom to build a sort of small barn, very short, very narrow, but very high, with shelves up the sides for the birdies to live in. I discarded this idea to start with when I came down with the hen fever. My idea is that the hen wants to live on the ground just as much as ducks want to live in the water. Plenty of air and light and dirt to scratch in are as needful as the right kind of food. I inclose a rough sketch and view of a hennery designed to be 20 x 30. The foundation timbers may be 4 x 6, and the studding plates and rafters 2 x 4 inches. As one of the qualities of this hen-house is cheapness, the roof may be covered with tarred paper. This covering will last a long time when properly put on. The paper should be lapped a little, as it will shrink in hot weather. Pine strips ½ inch in thickness and 1½ inches wide are just right for cleating the paper down. A coating of hot tar, thinned with petroleum or turpentine, is next applied, and then some coarse sand is sifted on. The sides of the hennery may be clap-boarded or covered like the roof. A cupola will be found quite valuable in the way of a ventilator. It is expected to have the end shown in the plan front to the east or west. The side fronting to the south should have a row of windows. It is quite convenient to have a corner partitioned off for keeping grain and other feed. Five feet of the north side is reserved for passageway and nests. Four tiers of nests are built against the wall. The rests stand lengthwise with the house, two feet from the ground, and are suspended from the roof. A very good yard in which to keep the fowls in summer time may be made by inclosing the necessary land with

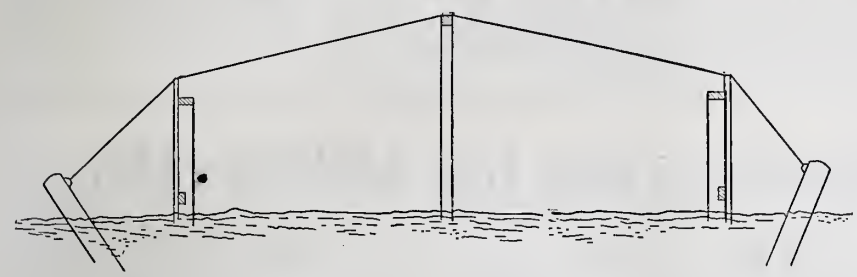


Elevation of Hennery.—Contributed by A. D. N.

a plain slat fence and stretching wires from side to side, about four inches apart. The fence can rest on the ground and be supported by the wire, as shown in the sketch.

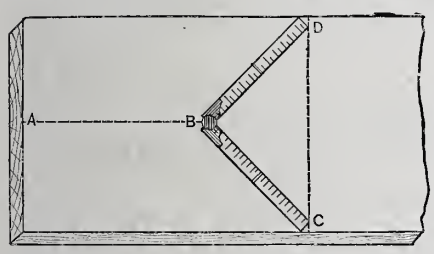
Squaring a Board by Use of a Pocket Rule.

From F. W. B., *Glastonbury, Conn.*—I would like to ask G. W. P., whose novel rule for squaring a board or timber was published in the June number of *Carpentry and Building* for 1880, if he did not leave out the most important part of the rule. It seems to me that it is very important that the point B of



Method of Confining Poultry in Yard.—Contributed by A. D. N.

the rule used should be placed in the exact center of the board, for the reason shown in Fig. 1 of the accompanying sketches. Let D C be the line drawn square across the board. Now, it is very evident that if the point B be anywhere but at the center of the board, the distance B C cannot equal B D; therefore the rule presented, as I understand it, must be incorrect. Perhaps the following is the rule your correspondent tried to illustrate: First, mark the middle of the board as at A B, Fig. 2; then placing the rule at an angle of about 45 degrees, mark the points C and B, which are cut by the rule. Now measuring the distance from B to C, mark D, making B D equal to B C; then a line drawn from D to C will be square



Squaring a Board by Use of a Pocket Rule.—Fig. 1.—Plan Proposed by F. W. B.—Joint of Rule in Center of Board.

with the board. There is, I trust, no question with regard to the accuracy of this rule.

Note.—Those of our readers who recollect the rule presented by G. W. P. on page 119 of the volume for last year, will at once perceive that this correspondent has misunderstood the principle involved. In order to set him right and for the benefit of those who may not have the last volume of *Carpentry and Building* at hand, we republish the sketch illustrating the rule. The directions given by G. W. P. were as follows: "First apply the rule to the board or stick of timber in the manner shown by A B C (Fig. 3), pricking the edge of the board at C. Next hold that part of the rule indicated by A B fast. Straighten it out until it is in the position indicated by A B D; then a line drawn by the straight-edge brought against the points D and C will be at right angles to the edge of the board." By a comparison of our correspondent's sketches above and the rule as here stated, it will be seen that he is not applying the rule in a way to make it of any particular benefit to him.

Criticisms on First Prize Design—$3500 Dwellings.

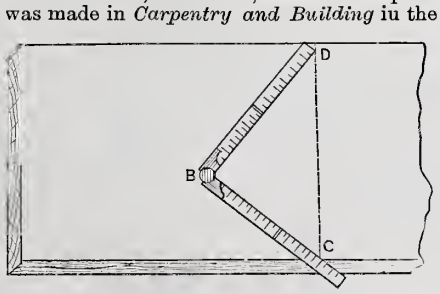
From A. C., *New Rochelle, N. Y.*—I desire to say through your columns to Mr. Morrison, author of the first prize design, that his explanation with regard to the head-room of his staircase, as published in the April number, is very unsatisfactory. He says that the trimmer below is to be coved out, as indicated in the sketch and engraving which you publish. I cannot see that this will make sufficient difference. The distance from the platform to the ceiling will remain the same. The defect, in my judgment, is enough to condemn the design, for it certainly will be next to impossible for a man of ordinary hight with a hat on to walk upright through this stairway.

Criticisms on Second Prize Design for $3500 Dwellings.

From W. S. E., *Morristown, N. J.*—I feel it to be a duty that I owe to the readers of *Carpentry and Building* to indulge in a little fault-finding. In the April number of the paper was submitted to the subscribers the plans and specifications of a building, together with an estimate, which bore the caption of "The Second-Prize Design for $3500 Dwellings." I do not find fault with the design itself, but confine myself at present to the estimate. Under the head of sheeting in the specification, the architects call for outside timbering and planking to be of the best selected 1¼-inch white pine, free from knots, sap and other imperfections. This material they estimate at $30 per 1000 feet. It has never been to my knowledge worth less than $45 per 1000 feet. For this large house there has only been allowed 1000 feet of this stuff, when in fact it will take nearly 3000 feet. There has been no allowance whatever for hardware, which upon a house of this kind will cost not less than $150. Blinds have been estimated, but are not called for in the specification; neither do the plans show them. There has been no allowance for tin-work, leader pipes and other work of this description. Three hundred and forty-seven dollars has been allotted for the carpentry work, when in reality it is worth $800 with labor at $2 per day. Such estimates as these do the greatest injustice to honest work. People come to architects and builders with estimates and plans of this kind in their hands, and want buildings erected of a similar description at the same price. All practical architects and builders know that such a thing cannot be done. If one says so, his customer will point triumphantly to the design of Smith & Howe, and to the certificate of Mr. Donovan.

Designs for Houses in the South.

From W. S., *Lawrence, Mass.*—A request was made in *Carpentry and Building* in the early part of last year for designs for Southern homes, to which as yet I have seen no response. I would like to see some designs of two-story houses, of from two to six rooms each, and suited to such a climate as that of Florida. Building to be constructed either box fashion, with perpendicular boards and bottoms, or else with balloon frames, covered with clap-boards only. The roof laid of cypress shingles 18 inches long, steps 5 or 6 inches to weather. No inside finish is needed, but generous verandas are essential. I noticed a building constructed upon this general plan in Orange County, Florida, some time since. They are taking the place of log cabins wherever saw mills are to be found.

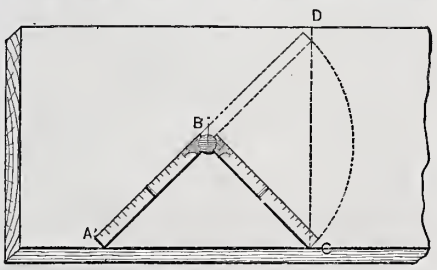


Squaring a Board by Use of a Pocket Rule.—Fig. 2. Application of F. W. B.'s Rule.—Joint of Rule out of Center.

Note.—We trust some of our Southern readers will act upon the above suggestion and send us sketches and description of typical Southern houses. We shall be pleased to publish the same for the benefit of our readers. If our correspondent, who gives a very good description of the house he has noted, had made a sketch of what interested him so much in his Southern trip and forwarded it to us for publication, he would undoubtedly have conferred a benefit upon our readers and have started a discussion which might have contained ideas of value both to himself and others. As it is, we are obliged to him for the general idea he has conveyed of the kind of houses that are adapted to our Southern States.

Contents of Tapering Log.

From W. F. P., *Berea, Ohio.*—In answer to the correspondents who inquire for the correct manner of figuring a stick of timber, I would say the shape in question is a frustum of a right pyramid. The problem can be worked out by the following formula: V = volume, b and b^2 = bases, a = altitude, then $V = \frac{1}{3}a\frac{b + b^1 + \sqrt{b \times b^1}}{144}$; or, stated otherwise, find the areas of the two bases, also of a mean base equal to the square root of the



Squaring a Board by Use of a Pocket Rule.—Fig. 3.—Rule as Originally Presented by G. W. P.

product of the other two. Take the sum of the three and multiply it by one-third the altitude or length in inches; the product will be the solidity in cubic inches. Then divide it by 144, the number of cubic inches in 1 foot, board measure.

This rule, applied to the problem in question, gives the following: Area of larger base, 144 square inches; area of smaller base, 36 inches; then $144 \times 36 = 5184$; $\sqrt{5184} = 72$; $144 + 36 + 72 = 252$; $252 \times 120 = 30{,}240$ cubic inches; $30{,}240 \div 144 = 210$ feet, board measure.

From S. R. K., *Grand Rapids, Mich.*—In answer to G. A. L.'s inquiry I would say that most arithmetics give rules for finding the solid contents of pyramids and also of frustums of pyramids, of which this question is an example. The simplest method of solution is to ascertain how long the stick would require to be in order to taper to a point; then find the contents of the full pyramid having 12 inches as a base and also the pyramid having 6 inches as a base, and subtract the one from the other. The rule is, multiply the area of the base by one-third of the perpendicular hight. Thus, the stick tapers 1 inch in every 5 feet of length, and to taper to a point it would require 30 feet more, making the pyramid 60 feet. Then $12 \times 12 \times \frac{60}{3} = 2880$; $2880 \div 12 = 240$ feet; $6 \times 6 \times \frac{30}{3} = 360 \div 12 = 30$ feet; $240 - 30 = 210$ feet, which is the board measure of the stick.

From C. R. J., *Georgetown, Del.*—In answer to the question concerning the contents of a tapering log I would say: Find the contents in cubic inches and divide by 144.

One-third of the length in inches equals 120. Area of large end equals 144 and area of small end equals 36; $144 \times 36 = 5184$, the square root of which is 72, the mean proportional; $144 + 36 + 72 = 252 \times 120 = 30{,}240$, the contents in cubic inches; $30{,}240 \div 144 = 210$ feet, which is the board measure of the timber.

From T. H. C., *Buffalo, N. Y.*—A tapering log of the description referred to by your correspondents G. A. L. and J. C. is termed the frustum of a square pyramid, and the following is the usual rule employed for finding its contents. Add the areas of the two ends and the mean proportional between. Multiply one-third of this sum by the perpendicular hight (or length); the product will give the solidity. Thus $12 \times 12 = 144$, the area of the large end; $6 \times 6 = 36$, the area of the small end; $12 \times 6 = 72$, th mean proportional; $\frac{144 + 36 + 72}{3} \times 30 = 210$ feet board measure.

From J. W., *Fall River, Mass.*—The rule is as follows: To the areas of the two ends add the square of their product. Multiply this sum by one-third the hight, which will give the solidity. When the operation is performed in inches divide by 144, and the quotient will be feet in board measure.

From E. M. L., *Cooksport, Pa.*—Take one-half the sum of the squares of the two ends, multiply this by the length in feet and divide the product by 12. Thus: $12^2 + 6^2 \div 2 \times 30 \div 12 = 225$ feet board measure.

From J. D. H., *Bel Green, Ala.*—My rule for finding the contents of a tapering log, say, 30 feet long, 12 inches square at one end and 6 inches at the other, is to ascertain the mean diameter and then proceed as in a stick of regular size. In this instance the mean diameter is 9 inches, which, multiplied by 9 inches, gives 81. This, multiplied by 30, the number of feet in the length of the log, makes 2430 inches, which, divided by 12 (the number of inches in 1 foot), gives the feet board measure contained in the log—in this case 202½.

Note.—We suggest to E. M. L. and J. D. H. that they give this problem still further consideration, comparing their results with those of the other correspondents who have carefully investigated the subject.

Prices of Building Materials in New York, May 20, 1881.

Blinds.—OUTSIDE.

Per lineal, up to 2.10 wide	$	@	0.24
Per lineal, up to 3.1 wide		@	0.26
Per lineal, up to 3.4 wide		@	0.28
Per lineal, paint'd and trim'd	0.45	@	0.55

INSIDE.

Per lineal, 4 folds, Pine		@	.53
Per liueal, 4 folds, ash or chestnut		@	.78
Per lin'l, 4 folds, cherry or butternut		@	.96
Per lineal, 4 folds, bl'k wal't.		@	1.06

Bricks.—(Afloat.)

Pale	₱ M. $2.00	@	2.50
Jersey	" 5.00	@	5.50
Long Island	"	@	
Up-River	" 5.75	@	6.50
Havers'aw Bay. 2ds	" 6.50	@	6.75
Havers'aw Bay, 1sts.	" 7.00	@	
Croton—Brown	" 10 00	@	11.00
Croton—Dark	" 11.00	@	12.00
Croton—Red	" 11.00	@	12.00
Philadelphia Fronts	"	@	22.00
Trentou	" "	@	22 00
Baltimore	"	@	38.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2.00 for Crotons and $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh	$35.00	@	
Scotch	30.00	@	
English	30.00	@	32.00
Silica (English)	35.00	@	
Silica (Welsh)	50.00	@	
Stourbridge	50.00	@	
American, No. 1		@	40.00
" " 2		@	30.00

Afloat. 500 ₱ M less

Cement.—(Cargo rate.)

Rosendale. ₱ bbl	$	@	1.10
Portland Saylor's American, ₱ bbl	2.25	@	
Portland (imported) ₱ bbl	2.85	@	3 00
Roman	" 2.75	@	3.00
Keene's coarse	" 5.75	@	6.00
Keene's fine	" 10.50	@	11 00

Add 25 cts. to above rates for yard prices.

Doors.

RAISED PANELS, TWO SIDES.

2.0 x 6.0 ... 1¼ in.	$0.90	
2.6 x 6.6 ... 1¼ in.	1.20	
2.6 x 6 8 ... 1¼ in.	1.25	
2.8 x 6 8 ... 1¼ in.	1.30	
2.10 x 6.10 ... 1¼ in.	1.40	
3.0 x 7.0 ... 1¼ in	1.62	

MOULDED.

Size.	1¼ in.	1½ in.	1¾ in
2.0 x 6.0	$0.48		
2.6 x 6 6	.77	2.25	
2.6 x 6.8	.80	2.28	
2.6 x 6.10	.83	2.33	
2.6 x 7.0	.97	2.36	
2.8 x 6 8	.88	2.59	3.33
2.8 x 7 0	2.04	2 46	3.47
2.10 x 6.10	1.98	2.54	3.56
3.0 x 7.0	2.21	2.69	3.80
2.6 x 7.6	2.15	2.63	
2.8 x 7.6	2 25	2.7	3 85
2.10 x 7 6	2.36	2.87	4.05
3.0 x 7.6		3 00	4.22
2.6 x 8.0	2.25	2.75	
2.8 x 8.0		2.88	
2.10 x 8.0		3.02	4 47
3.0 x 8.0		3.15	4.70

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Bends & Elbows, Each.	Branches Sing.	Branches D'bl. & V.	Traps, Each.
2 in.	$ .13	$ .40	$ .48	$ ...	$1.00
3 "	.16	.50	.61	...	1.25
4 "	.20	.65	.75	1.30	1.75
5 "	.25	.85	.90	1.55	2.50
6 "	.30	1.15	1.05	1.80	3.50
7 "	.35	1.50	1.20	2.05	5.00
8 "	.45	2.00	1.45	2.45	6.00
9 "	.55	2.50	1.70	2.85	7.00
10 "	.70	3.00	2.00	3.30	8.00
12 "	.80	3.75	2.52	4.24	10.00
15 "	1.25	5 00	House Branches pr. lin. ft.		Sewer Branches pr. lin. ft.,
18 "	1.60	7.50	15x6 $1.75		15 in. $2.25
			18x6 2.50		18 " 3.00

Longer than 1 ft., charged as pipe.

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$8.25	$7 50	$7.00	$6.50
11x14—15x24	9.25	8.50	8.00	7.25
16x24—20x28	10.75	9.75	8.75	7.75
15x34—24x30	12.25	10.75	9.00	8.50
26x28—24x36	13.00	11 50	9.75	9.00
26x36—26x44	14 50	13 25	10.75	9.50
26x46—30x50	15.00	14 00	11.25	10.50
30x52—30x54	16.00	14.50	12.00	
30x56—34x56	17.25	15.50	13.50	
34x58—34x60	18.25	17.25	15.00	
36x60—40x60	20.75	18.75	17.25	

DOUBLE.

6x 8—10x15	$12.75	$11.75	$10.75	$10.00
11x14—15x24	14.50	13.25	12.50	11.25
16x24—20x28	17.25	15.75	14.00	
15x34—24x30	19.75	17.25	14.50	
26x28—24x36	21.00	18.50	15.75	
26x36—26x44	23.25	21.25	17.25	
26x46—30x50	24.00	22.50	18.00	
30x52—30x54	25.75	23.25	19.25	
30x56—34x56	27.75	25.00	21.75	
34x58—34x60	29.25	27.75	24.00	
36x60—40x60	33.25	30.00	27.75	

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 81 united inches, will be charged in the 84 united iuches' bracket.

Discounts: Single, 70 %; Double, 70&10 %.

French

WINDOW, PICTURE AND CAR GLASS.

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x13	$6.50	$5 75	$5 50	$5.25
11x14—16x24	7.25	6.75	6.25	6.00
18x22—20x30	9.25	8 50	7.75	7.25
15x36—24x30	10.25	9.25	8 25	
26x28—24x36	11.00	10 00	9.00	
26x36—26x44	11.75	10.75	9 50	
26x46—30x50	13.25	12.50	10.50	
30x52—30x54	14.00	13.00	11.25	
30x56—34x56	15.00	13 75	12 50	
34x58—34x60	15.50	15 00	13 25	
36x60—40x60	17.50	16.00	15.00	

DOUBLE.

6x 8—10x15	$8.25	$7.75	$7.50	$7.00
11x14—16x24	10 00	9.25	8.75	8.25
18x22—20x30	12.75	11 75	10 75	
15x36—24x30	14 25	13.00	11.25	
26x28—24x36	15 25	13.75	12.50	
26x36—26x44	16 25	14 75	13 00	
26x46—30x50	17 50	16.75	14.25	
30x52—30x54	18 50	17.25	14.75	
30x56—34x56	19 50	18.25	16 25	
34x58x34x60	20 50	19.50	18.00	
36x60—40x60	23.00	21.00	20 00	

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not makiug more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: 60 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS

Per square foot, net cash.

⅛ Fluted plate, case 10c; cut to size				16c.
3-16 Fluted plate	"	13c.	" "	18c.
¼ Fluted plate	"	16c.	" "	20c.
¼ Rough plate	"	16c.	" "	20c.
⅜ Rough plate	"	21c.	" "	27c.
½ Rough plate	"	28c.	" "	33c.
¾ Rough plate	"	45c.	" "	55c.
1 " Rough plate	"	55c.	" "	65c.

Hair.

Cattle	₱ bushel, $0.12	@	
Goat	" 0.16	@	

Lath.

Cargo rate	₱ M $2.00	@	

Lime.

Glen's Falls. or Keenan's commou, cargo rate ₱ bbl		@	.90
Glen's Falls, or Keenan's finishing Jointa			1.15 @
Rockland. common			0 90 @
Rockland. finishing			1.10 @

Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Pine, very choice and ex. dry, ₱ M. ft. thick	$60.00	@	$65.00
Pine, clear	55.00	@	60.00
Pine, selects	45.00	@	50.00
Pine, pickings	35.00	@	42.50
Pine, selected, box	20.00	@	22.00
Pine, common box	17 00	@	20.00
Pine, commou box. ⅝	15.00	@	16.00
Pine, 1¼x10, 13 ft., matched, each	.40	@	.43
Pine, 1¼x10, 13 ft., culls	.28	@	.30
Pine, 1x10, 12 ft., good matched, each	...	@	.30
Pine, 1x10, 13 ft., common, matched, each	.23	@	.25
Pine, 1x4½, clear, match'd, each	.23	@	.25
Pine, 1x4½, merchantable, matched, each	.17	@	.18
Pine, 1¼x4½, cl'r, match'd, each	...	@	.35
Pine, 1¼x4½, merchantable, matched, each	.28	@	.30
Spruce, 1x9, 13 ft., rough	.19	@	.20
Spruce, 1x9, 13 ft. matched, each	.22	@	.24
Spruce, 1¼x9, 13 ft., rough	.22	@	.24
Spruce, 1¼x9, 13 ft., matched, each	.24	@	.26
Spruce, 2x9, 13 ft., rough	.36	@	.38
Spruce, 2x9, 13 ft., match'd, each	.42	@	.45
Spruce, 2x4, 13 ft.	.15	@	....
Spruce timber, flat, ₱ M ft	20.00	@	....
Spruce timber, square, ₱ M ft	22.00	@	....
Hemlock, 1x10, 13 ft., each	.16	@	.18
Hemlock, 2½x4, 13 ft., each	.16	@	.18
Hemlock, 3x4, 13 ft., each	.19	@	.20
Hemlock, 4x6, 12 ft., each	.40	@	.43
Ash, good, ₱ M ft	45.00	@	55.00
Oak	45.00	@	55.00
Oak, quartered	70.00	@	90.00
Maple, commou	25.00	@	35.00
Maple, good to 2 in	40 00	@	45 00
Maple good thick	45.00	@	55.00
Maple white	55 00	@	65.00
Chestnut	45 00	@	60.00
Bl'k walnut, good to choice	95.00	@	110.00
Black Walnut 2d	65.00	@	75.00
Black walnut, ⅝	85.00	@	95 00
Black walnut, selected and seasoned	120.00	@	140.00
Bl'k waluut couuters, ₱ ft.	.15	@	.25
Cherry, wide, ₱ M ft	95.00	@	105.00
Cherry, ordinary	75 00	@	85 00
Whitewood, or Poplar ⅝ in.	30.00	@	35.00
Whitewood, or Poplar ⅝ panels	35.00	@	45.00
Whitewood, or Poplar 1 to 1½ inch	40.00	@	50.00
Whitewood or Poplar. 2 in. and upward	45.00	@	50.00
Shingles, extra sawed piue, 18 in.	5.00	@	6.00
Shingles, clear sawed pine, 18 in., 2 md	4.00	@	5.00
Shingles, cypress, 7x24	14 00	@	18.00
Shingles, cypress, 6x20	12.00	@	14.00
Shingles, Cedar, 6x24, No. 1	—	@	22.00
Shingles, Cedar, 6x14, A's	—	@	16.00
Shingles, Cedar, 6x20, No. 1	—	@	12.50
Shingles, Cedar, 6x20, A's	—	@	10.50
Shingles. Cedar Easteru	—	@	3.50
Shingles, Hemlock	—	@	3.75
Shingles, Pine	4.00	@	5 00
Shiugler, Spruce	—	@	3.50
Shingles, Redwood (California), ordinary, per bunch	—	@	.85
Shingles Redwood (California) 6x16 cut	—	@	1.85
Yellow pine dressed flooring, wide, ₱ M ft	35.00	@	37.00
Narrow ditto	35.00	@	40.00
Yellow pine timber	30.00	@	45.00
Locust posts, 8 ft., ₱ in	.18	@	.20
Locust posts, 10 ft	.24	@	.25
Locust posts, 12 ft	.25	@	.30
Chestnut posts, ₱ ft	.03	@	.3½
Mahogany, ¼ in. ₱ ft	.05	@	.07
Mahogany, ⅜ in. ₱ ft	.08	@	.10
Mahogany, ½ in. ₱ ft	.10	@	.12
Mahogany, ⅝ in. ₱ ft	.12	@	.14
Mahogany, ¾ in. ₱ ft	.14	@	.16
Mahogany 1 in. ₱ ft	.16	@	20
Rosewood, ⅛ in. ₱ ft	.11	@	.15
Rosewood, ¼ in. ₱ ft	.16	@	.20
Rosewood, ⅜ in. ₱ ft	.24	@	.28
Rosewood, ½ in. ₱ ft	.40	@	.45
Rosewood, 1 in. ₱ ft	.60	@	.75
Satin wood, ½ in. ₱ ft	.25	@	.35
Satin wood, 1 in. ₱ ft	.35	@	.50
White holley ¼-inch	.10	@	.12
White holley ¾-inch	.15	@	.18
Cedar (Cuban and Mexican) ₱ ft	.10	@	.14
Cedar (Florida) Less than 1 inch	.16	@	.24
1 inch and over	.25	@	.30
Redwood (California) 1 to 2 in., dry, per M		@	60.00
3 in. and over, per M		@	60.00

Moldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof buildiug, ₱ lb.	16c @		17c
Rosin Sized Sheating, ₱ lb.	4c @		5c
Dry Sheating ₱ lb	3c @		3½c
Tarred Felt. ₱ lb	.... @		3c

Plaster.

Calcined City	Millrate. $1 25	@	....

Sash.—15 to 25 % dis.

GLAZED.

Dimensions of windows.	12 Lights. 1¼pl.	1½c.	8 L's. 1½c.	4 Lights. 1¼c.	1½c.
2.1x3.6	$0.00	0.96	....	....	....
2.4x3.10	.98	1.05	....	1.15	....
2.7x3.6	1.18	1.25	....	1.45	1.54
2.7x3.10	1.32	1.38	....	1.52	1.62
2.7x5.2	....	1.47	....	1.77	1.87
2.7x5.6	....	....	1.86	1.93	2.04
2.7x5.10	....	....	1.94	2.02	2.16
2.10x4.6	1.32	1.41	1.50	....	....
2.10x5.2	1.49	1.58	1.71	1.90	1.95	2.08
2.10x5.6	1.59	1.68	1.84	2.03	2.05	2.21
2.10x5.10	1.86	1.96	2.12	2.14	...	2.38

c. means counted checked—plowed and bored for weights.

Hot bed sash, glazed			$2.35

HEAD LIGHT.

Two or three Lights, Glazed.

Size.	1¼	1½	Size.	1¼	1½
2.6x1.0	40	45	2.10x1.0	45	55
2.6x1.6	50	55	2.10x1.6	60	65
2.8x1.0	45	50	3.0x1.0	50	60
2.8x1.6	55	60	3.0x1.6	67	75

Slate.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're.	$5.50	@	$6.00
Green slate	5.50	@	6.00
Red slate	....	@	10.00
Black slate, Pennsylvania	4.00	@	4.50
Tiles, 1¼ in. rubbed, ₱ sq. ft.		@	.30
₱ sup. ft.			
Steps and platforms, 1½ in. thick; Risers, 1 inch thick			60c
" " 2 "			.75c
Red tile and borders			60c
Coping, 1½ "			40c
" 2 "			45c

Lineal ft.

Window sills, 4x7			70c
" 3x7			60c
Window caps, 4x10, plain			1.00
" 4x8, "			80c
" 3x10, "			70c
" 3x8, "			65c

Stair Material.

BALUSTERS.

	1¼ in.	1¾ in.	2 in.	2½ in
Black Walnut				
Fancy Turned	7c	9c	10c	16c
Neck Turned	9c	10c	12c	19c
Fluted or Octagou	12c	14c	17c	25c

OCTAGON PANELED NEWELS,

Panels Vencered with French Walnut.

8-inch Newels, with Cap	$6.12
9 " " "	6 88
10 " " "	7.60

SOLID NEWELS, WITH CAPS.

Black Walnut.	5 in.	6 in.	7 in.	8 in.
Fancy Turned	$1.60	$1.90	$2.50	$3 40
Octagon	2.10	2.40	3.00	3.90

STAIR RAIL.

Worked out and finished ready to put up. Easements and cylinders counted double. Price per foot Newels and Balusters not included).

	3 in.	3½ in.	4 in.	4½ in
Black Walnut.				
Molded	40c	45c	50c	53c
Toad Back	45c	50c	63c	68c

STAIR RAIL, UNFINISHED.

Price per foot.

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded	11c	13c	15c	17c
Toad Back	12c	14c	16c	18c

Stone.

Cargo rates. delivered at New York.

Amherst Blue			$0.90
Amherst freestone, in rough, ₱ C ft			1.00
Bay of Fundy, Wood Point, brown		@	1.00
Bay of Fundy, Mary's Point, brown	$0.80	@	1.00
Bay of F'dy, Mary's Pt., olive.	0.80	@	1.00
Berlin Blue		@	0.90
Berlin freestone. in rough		@	1.00
Berea freestone. in rough	0.85	@	.90
Brown stone, Portland, Ct	1.25	@	1.50
Brown stone, Belleville, N. J.	1.00	@	1.50
Granito rough	.50	@	1.00
Dorchester, N. B., stone, rough ₱ foot.	....	@	1.00

BLUE STONE

Rubbed hearth, 10 ft. or under			25c
Rubbed hearth, 20 ft. or under			35c
Rubbed hearth, 30 ft. or under			45c
Rubbed hearth, 40 ft. or under			50c
Rubbed sills			30c
Sawed & Planed			40c
Sills and lintels		@	18c
Sills and lintels, fine quarry cut sills		@	35c
Coping, 11 to 18 in. wide			20c @24c
Coping, 20 to 28 in. wide			38c @ 6cc
Coping, 30 to 36 in. wide			65c @ 80c
Steps, 8 in		@	60c
Steps, 7 in		@	55c
Steps, 6 in		@	35c
Steps, door, per in. wide		@	3c
Platforms, promiscuous, 4 in		@	32c
Wyoming Valley, promiscuous, per cubic ft			1.30@1.35

Vault Lights.—Nominal.

Platform, sq ft			$3.50
Step and risers, sq. ft			3.50
Floor light, sq. ft			2.50
Roof light, sq. ft			2.50
Platform, 2d quality, sq. ft			2.60

Diameter.	COVERS. Round.	Hexagon.
14 inch	$3.00	$0.00
16 "	3.75	4.00
18 "	5.50	6.00
20 "	8.00	8.50
24 "	14.00	15.00
26 "	16.00	17.00
30 "	23.50	25.00
36 "	31.00	33.00

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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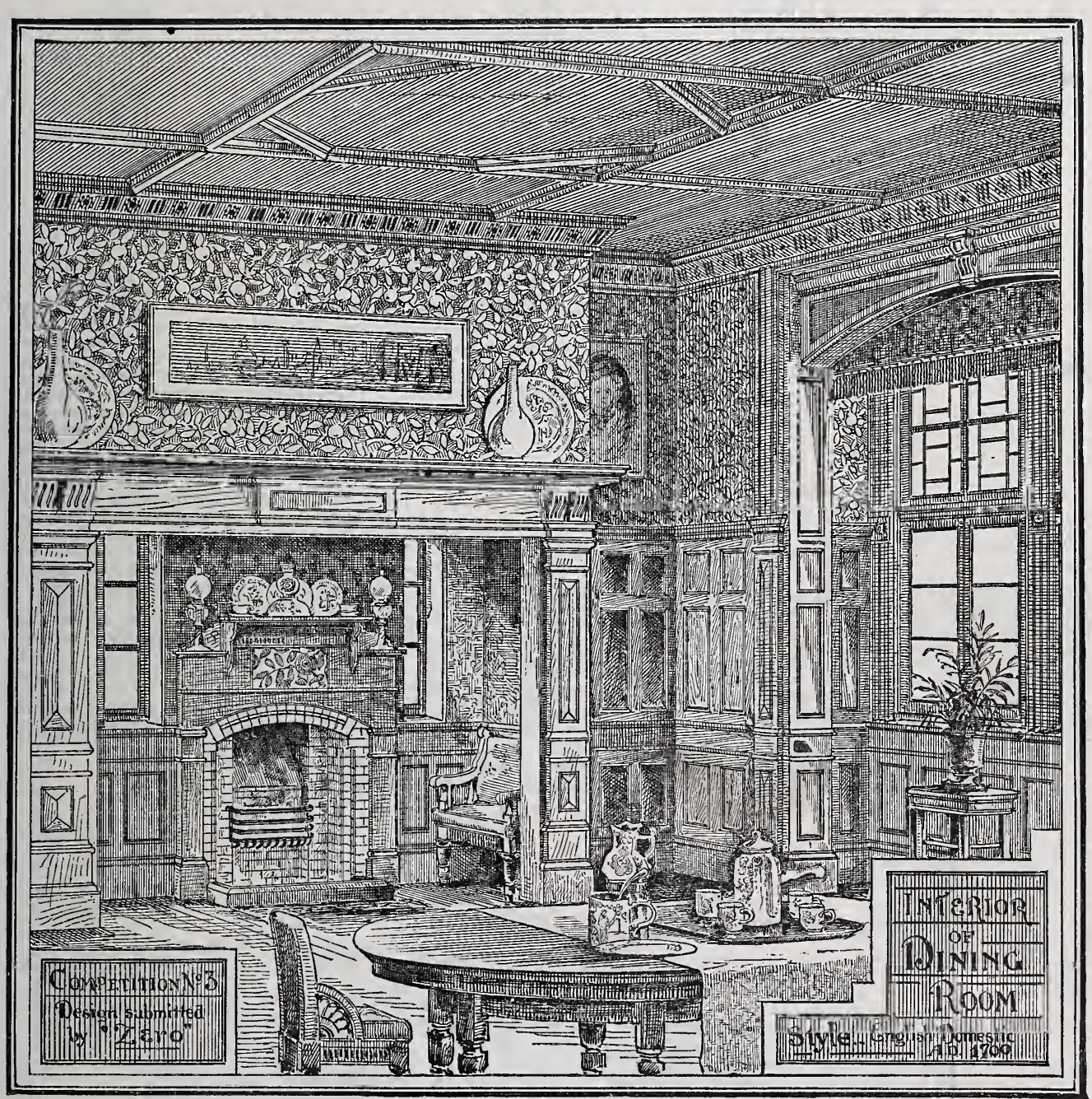
Interior of Dining Room.

Our first-page illustration this month is one of the pair of designs submitted by John W. H. Watts, Ottawa, Canada, of interior dining-room finish, to which was awarded the second prize in our competition as announced in the March number. Mr. Watts has detailed his work so fully that we have found it impossible to present the two companion designs at one time, without consuming more space than could be spared for the purpose. In giving one design at a time we do not think the interests of our readers will suffer in the least, as each is a complete study in itself, and comparisons and contrasts can be made at a later date when the second is presented. This design is what may be called "English Domestic," and in point of time dates about the year 1700. By examination of the floor plan, which will be found on the following page, it will be seen that a large chimney breast is built out into the room, within which are provided some comfortable seats, being lighted by two narrow windows. This large chimney piece is finished in the general manner prevalent a century ago, while the chimney proper within is provided with a modern grate, surmounted by a mantel-shelf of pleasing design. The bay window at the right, communicating with the room by a flat arch adorned with a piece of drapery appropriately arranged, is a feature that adds life and spirit to the apartment. The architect's idea of the finish of the room may be gained from the following description, which is an abridgment of his specification:

The whole of the woodwork, comprising chimney-piece, recess, wainscoting, archway, bay window, cornices, architrave, pilasters and skirting to be executed in butternut, a wood entirely suited to the style of design and almost as readily worked as pine. The construction to be employed is indicated upon the scale, drawings and details. The character of the molding may also be obtained from the same source. The wainscoting of walls to be 1¾ inches thick, paneled, the framing mortised and tenoned, and the



Interior of Dining-Room.—Fig. 1.—View from Door on Entering.—John W. H. Watts, Ottawa, Architect.

molding worked upon the stiles and mitered as shown. Wooden pins to be used where practicable in putting the work together, and wherever screws are employed the same to be countersunk and the holes plugged to match the pins. The chimney recess to be sealed with ¾-inch board, with 1-inch rolls at the intersections. A suitable ventilator is to be provided in this recess, which shall connect with the flue. The chimney-piece to be framed as shown, and the ornamental panel filled in with a piece of muralis decoration suitably tinted. Doors to be 2 inches thick, framed in a manner similar to the wainscoting, as above described, and fitted with brass finger plate and furniture. The cornice to be perforated as shown in the detail, and the space behind it connected, by means of openings between joists, to a ventilator in outside wall. The details fully explain the windows. The fire-place to be constructed of white molded bricks and fire-brick back, and to be provided with an ordinary iron fire-basket and hooked into iron eyes built into the wall, all

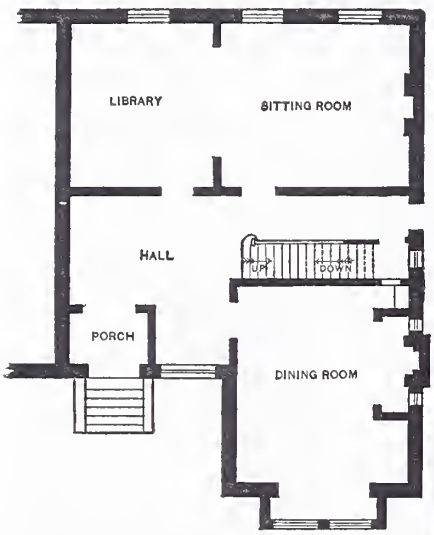


Fig. 2.—Floor Plan showing Location of the Dining-Room.—Scale, 1-16 Inch to the Foot.

as fully indicated by the details Figs. 9 and 11. The space between the top of wainscot and the ceiling to be papered with paper of a character indicated in the perspective view, Fig. 1. The ceiling between ribs to be tinted a light cream color. Woodwork throughout should have three coats of raw linseed oil, allowing sufficient time between the coats for the oil to sink well into the wood, the receive the wood finish, that it is plastered and floored with ground, block frames, &c., ready in position, and of a character to suit the design, is as follows:

ESTIMATE ON DINING-ROOM FINISH.

1000 ft. b. m. butternut (dressed) at $120	$120.00	
40 days' work, carpenter, at $2 50	100.00	
40 days' work, carpenter's assistant, at $1.50	60.00	
60 yards wax finish to woodwork, at 35 cents	21.00	
Cost of wood finish		301.00
Five rolls paper and hanging, at $2.50	$12.50	
Stone fender	8.00	
Coloring ceiling	5.00	
Iron fire basket	5.00	
Brick for fire-place, and setting the same	10.00	
Cost of paper, &c		40.50
Total cost		$341.50

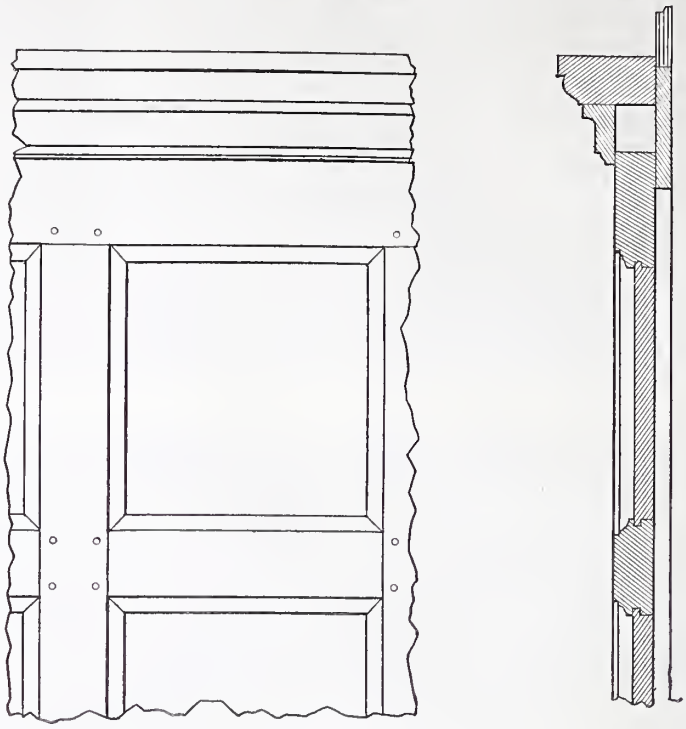
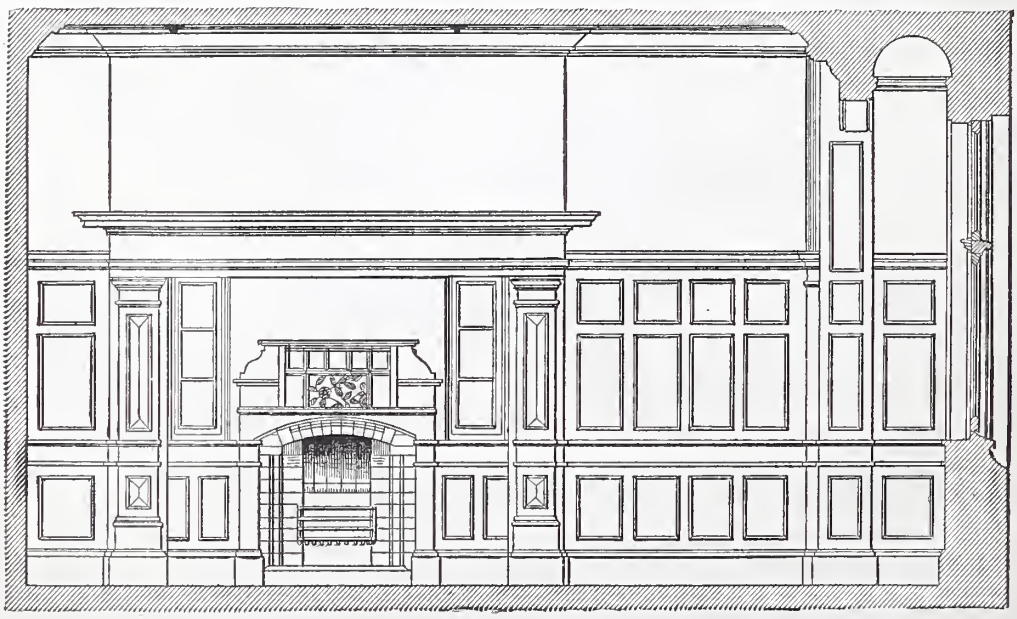


Fig. 4.—Detail of Wainscoting.—Scale, 1½ Inch to the Foot.

Metals and Paint.

A writer, who signs himself "J. E. W. C.," in one of our exchanges thus discourses upon paints for metal work:

The subject of painting metallic bodies is not generally understood by many painters or architects, and as in this climate there is a great necessity for the proper covering of all metallic surfaces to shield them from the elements, the subject will bear investigation with profit. Metallic paints and many other compound chemical mixtures are heralded as the paint for all work, whether wood or metal. It is true of these and many other kinds, that they are good for painting, but not for preserving metals from oxidizing. All fine preparations of the carbonates and oxides of lead or copper are unsuitable for this purpose, for the reason that a pure oxide, when applied to other metals, will assist in the action of the elements to oxidize the metals they cover. The vehicle of all good paint is boiled or raw linseed oil, and this, when thickened with pigments, covers a less given space; and the material being an oxide, holding more oil than is imparted to the surface to be painted, soon throws off its share and is ready to absorb the air and convey it to the body of the metal, where natural corrosion will take place, and then the two oxides unite chemically. In other words, all paints, in the absence of a solvent, which time soon releases them of, act upon iron or tin as a filter, feeding the porous spots with moisture, like a porous plaster of rust; and as like pro-



Interior of Dining-Room.—Fig. 3.—Elevation of Side of Room.—Scale, ¼ Inch to the Foot.

whole to be finished with wax. The floor should be hard wood, laid to some simple pattern. The estimated cost of work, in accordance with the foregoing specification, assuming that the room is in a condition to

duces its kind, the decomposed metals work like a happy family and roll in beds of rust. This fact is observable on flat surfaces, or in gutters where inequalities occur. Here the fine dust or powder collects and keeps the

water in them until the oil is decomposed; then the work of oxidation commences. There is another fruitful source from which rust on the upper or under side of roofing tin comes, and that is mixing paints in common cheap oils of kerosene containing sulphuric acid. This oil never dries. It may harden the film of paint so as to allow the acid it contains to corrode the tin, and the best paint in the world on the opposite side cannot prevent the acid-eaten holes

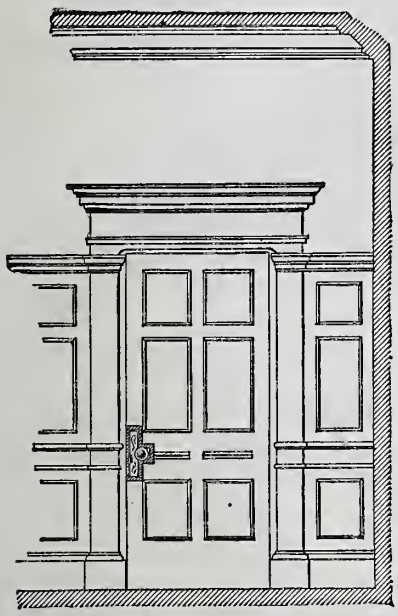
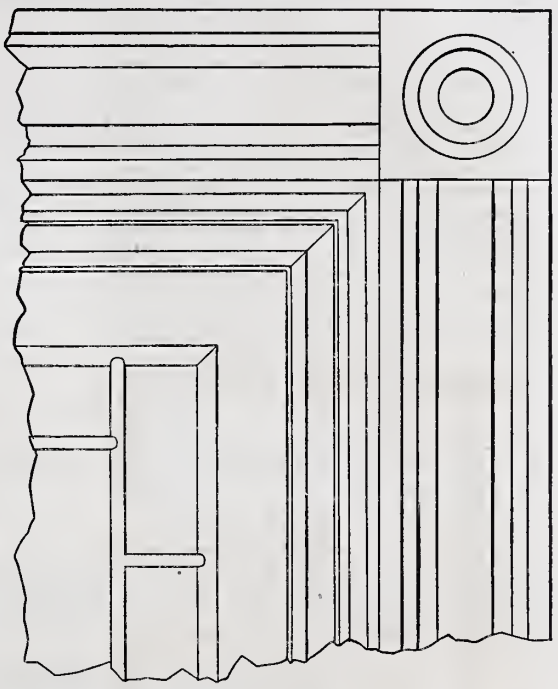


Fig. 5.—Elevation of Door.—Scale, ¼ Inch to the Foot.

from coming through; and judge the effect, where both sides happen to receive the same potent mixture. The best paint for tin or iron is composed of pure linseed oil and earthy ochers, red or yellow. The coarser granulated powders are best as a pigment, as they offer less air holes and give a firmer hold for the oil on the grits, and thus bind them to the metal. The oil in this manner gets close to the metal, and offers resistance to the air in removing the atoms from its cohesion. Beware of all metallic oxides or mineral paints, especially on lofty towers or inaccessible coverings of metal. Roofing tin should, when laid, be kept clean from wind-falls of dust, and painted once in every two or three years, by the day—never by contract. Metals applied in the angles of roofs as flashings, where shingles are laid behind parapet walls, should be well painted on both sides, and the exposed crevices between the laps puttied and painted, and thus cut off leaks in corners "which no feller can find out." I have known of a case where leaks in an outer wall from an A No. 1 tin roof were undiscovered for years. Carpenters were called, imperfect boards were removed from the exterior wall side, and the whole repainted. Still, there was the leak, unabated for years; and, at last, the painter being called upon to find out the source of the trouble, found upon examination that the clap-boards on the inner side extended down to the tin, or nearly so, thus preventing the paint from reaching the angle of the tin back of the boards. There the dust collected and dampness had eaten through, and a ruinous leak was discovered by simply sliding a putty knife under the edge of the siding. Woodwork never should be allowed to close down on the metal, but instead, a space of one or two inches should always be left, so that the paint can be easily applied to all flashings on all sides, and where the dust can be easily swept out. Many troublesome leaks occur from the base of balustrades shutting down so close that dirt is completely imprisoned, and, consequently, in time decomposition sets in, and the metal coverings are ruined. Bay windows, with balconies or with other ornaments, if put on with an idea of permanency, should leave ample room for the painter's brushes to reach every angle, nook or corner, and thus save a thousand leaks.



Interior of Dining-Room.—Fig. 7.—Detail of Window.—Scale, 1½ Inches to the Foot.

Acoustics.

In a recent number of an exchange some very interesting experiments were detailed concerning the best methods for improving the acoustic properties of lecture rooms and churches. The direction in which the experimenter was working was to use wires and plates of metal suspended or stretched in various portions of the room, and arranged in such a manner as to reinforce the sound.

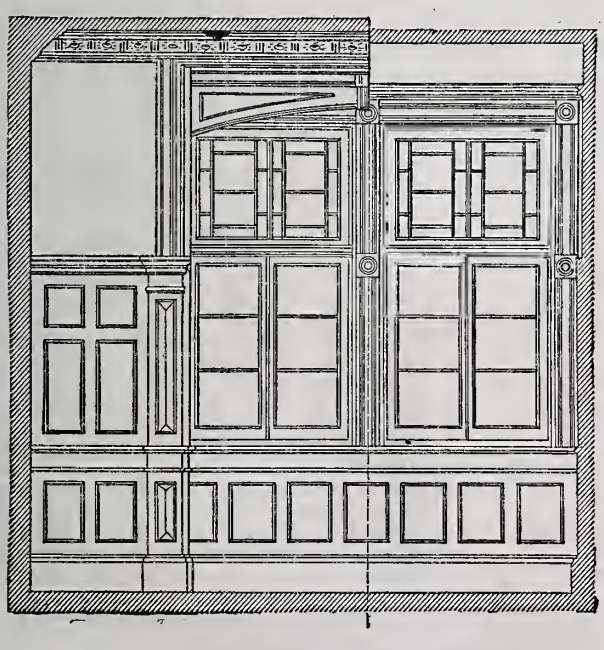


Fig. 6.—Half Elevation of End of Room.—Scale, ¼ Inch to the Foot.

The most gratifying results were claimed by those interested. The comments made by outside parties seemed to point to the fact that the improvement was more in theory than in practice. Practically, we think that the art of making rooms in which it is easy to speak is not only undiscovered, but undiscoverable. The principles upon which a room is built so as to make speaking easy are at the present time, to a great extent, unknown. In fact, our knowledge of sound and its laws is in a very elementary and unsatisfactory stage. We may almost be said to know so little that we do not know enough to invent or discover. To state this more clearly, it is necessary to say that the laws of sound are exceedingly complex, and it seems almost impossible, with our present knowledge, to analyze them. One architect may finish an audience room in some peculiar shape in which speaking is delightfully easy, and the speaker's voice clearly audible in every portion, yet we cannot say of the several elements which have entered into the design which one is essential or which one could be omitted without detriment. Another room may be finished almost identical in its general features with the one just mentioned, and be found to give only moderately good results. Proportions, of course, have been slightly altered, and some changes made in little matters. Hence, it would appear that minor details frequently have more influence upon the acoustic properties of a room than is generally imagined.

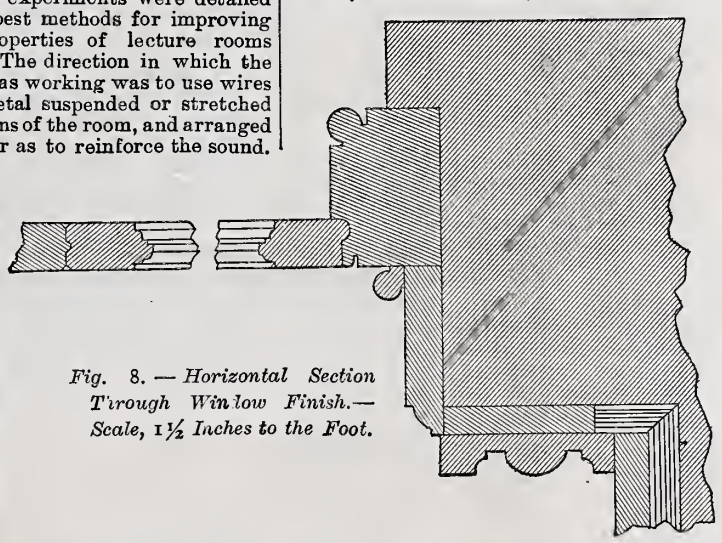


Fig. 8. — Horizontal Section Through Window Finish.—Scale, 1½ Inches to the Foot.

Much progress could be made in this knowledge if it were possible to build a great number of rooms of about the same cubic capacity, but with largely differing dimensions and with great variations in details, and to experiment with them, modifying their forms until the best was found. This, unfortunately, is impossible; hence we cannot, even by the experimental method, arrive at satisfactory results, and until the phenomena of sound and hearing are more thoroughly investigated and their laws put into intelligible form, we shall not be able to reach definite conclusions by the study of principles.

In all parts of the country, and especially in the newer sections, there are quacks

sometimes supposed to be architects, but more frequently avowing themselves to be outside of the profession, who promise to fit up audience rooms which shall be satisfactory in the matter of acoustics, or to remedy existing defects and make any room perfectly easy for speaking. Men of this class have a sort of local reputation, obtained, perhaps, by some doctor-work performed upon a court room or town hall. When the particulars can be obtained it will be found usually that the halls they have so successfully altered were originally as bad as they could be, and any alteration whatever in shape or interior construction was likely to make a marked change, if not improvement. This class of men are fond of boasting of their ability to build anything under the heavens that may be desired in the way of an audience-room, and have it perfectly satisfactory both for speaker and hearer. They profess to do this regardless of shape or proportion, and affirm that they can make the acoustic properties of any room all that can be desired. Their claims are generally so great as to be their own refutation, and yet they find abundant opportunity for the exercise of their powers. Usually they express regret that they have never had an opportunity to do all that they think themselves able to do, because of the stupidity of building committees. This, however, is fortunate for those who have the bills to pay.

Much as is usually said about the value of failures in teaching what to avoid, we are inclined to think that the only method by which improvement in the construction of audience and other similar rooms must come is in the study of those which are unusually good. The causes which will spoil a room for easy speaking are so many in number that it appears to be a hopeless task to undertake to learn them. It is much less troublesome to attempt the copying of something which is good.

We do not wish to be understood as saying that we think this method a particularly hopeful one, for we call to mind two audience rooms in churches which are easy for both speaker and audience, and yet are apparently as unlike as rooms can be. One might be likened in shape to a pair of round clam shells or two deep saucers laid together, while the other is long and high and recessed at the back. One has a flat floor and the other a floor that rises sharply away from the speaker's platform. Both are large. We presume that our readers can call to mind rooms of a similar design that are conspicuously bad, the principal difference, so far as can be determined, being the dimensions.

First Principles.

There is such a harmony in science, its various departments are so closely connected and correlated, says an exchange, that the knowledge of first principles is not only a necessity, but, if properly understood, forms the means of an extensive and correct practical application. Without the understanding of the principles which underlie a science or practice, the most practical of men will enact or repeat the grossest blunders. Practice forms a not-to-be-underrated means of teaching principles, but it often requires a long experience, great practice, and at all times good judgment, to deduce principles which an intelligent study of the theory of the science will convey to us in a shorter time and more satisfactory way. Practice should constitute the embodiment of known principles and the means of deducing new ones, but not, as now is often the case, a method of teaching or verifying old, well-known principles which have long been accepted, and a knowledge of which would have prevented a useless expenditure of time and money. The greater portion, if not the whole, of the work of finding the necessary strength of bridges can be reduced to an application of principles of moments, and similarly the strength of the working parts of the steam engine is, to a great extent, an application of this same principle. The numerous failures of roofs of buildings are solely due to lack of knowledge of first principles. As a general thing, the architect scorns the use of the formulæ of mechanics, of which he is too often grossly ignorant. The "rule of thumb" is the favorite rule adopted, and consequently, when a roof is designed for a building of a form and size which has not come within his previous experience or that of his immediate advisers, the proper additional and required strength, or "the extra inch of timber," is guessed at in a slipshod manner, instead of being calculated, and a truss constructed fully able to successfully withstand the strain to which it is subjected. "Accidents" like that of the Hippodrome and of the Post-office, New York, where one might have expected the best talent would have been secured, were due to the fact that, instead of applying the fundamental laws of mechanics to compute the required strength, the architect thought the roof was strong enough—a matter of guesswork, and not positive knowledge, as it was within his power to have. The Tay bridge disaster was, in the main, due to the neglect of not considering the effect of the pressure of the wind. In the construction of the Hudson River tunnel, attention was not paid to the universal law that the portion of a structure which is most constantly used, and upon the strength of which the safety of the remainder of the structure and its occupants

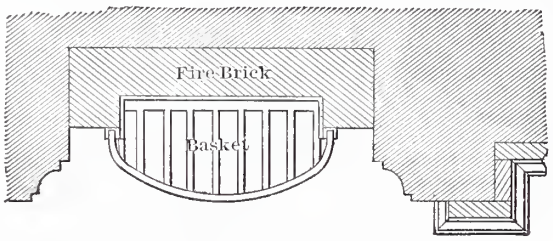


Fig. 9.—Plan of Fire-place.—Scale, ¾ Inch to the Foot.

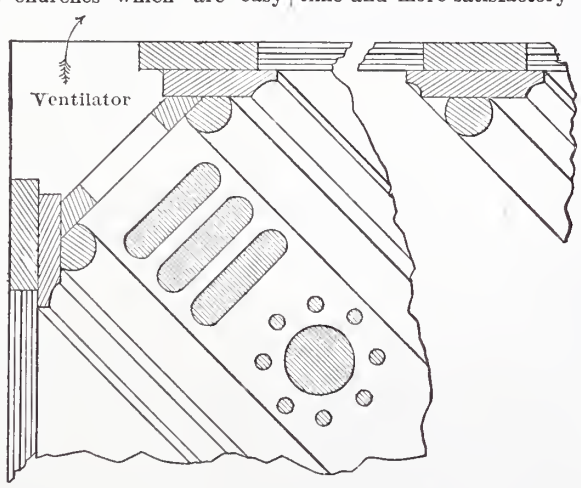


Fig. 10.—Detail of Cornice, &c.—Scale, 1½ Inches to the Foot.

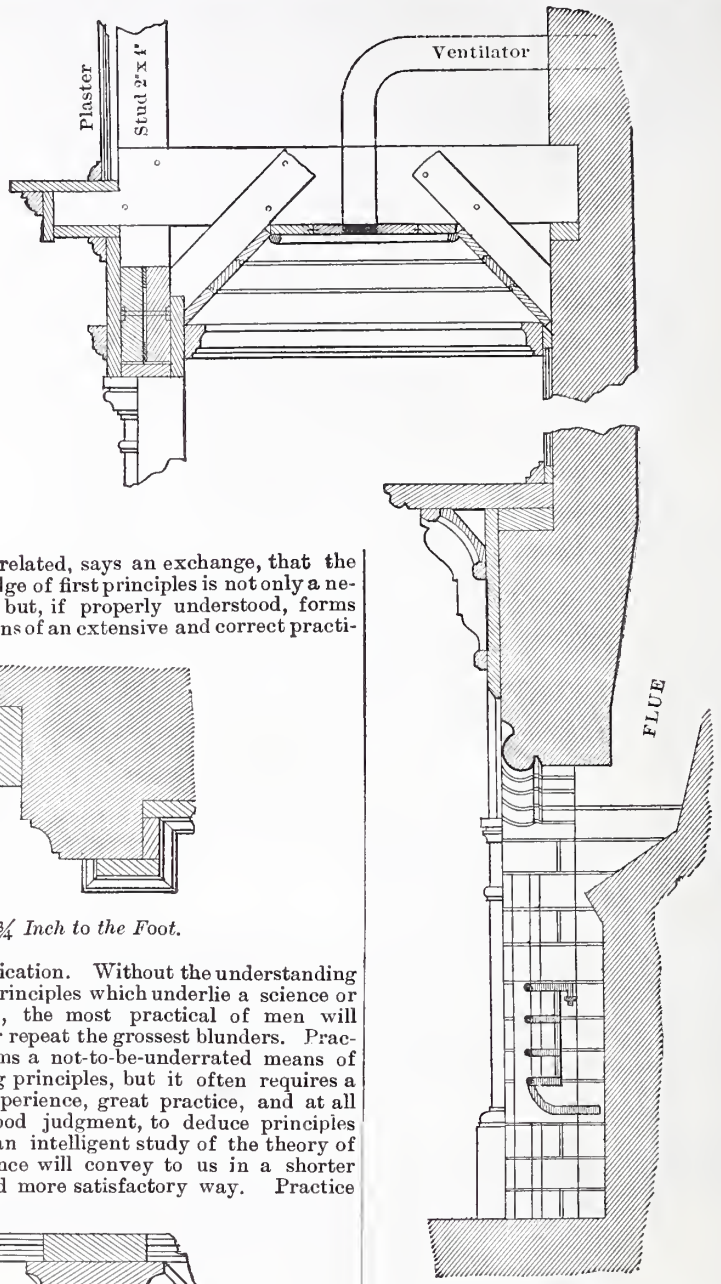


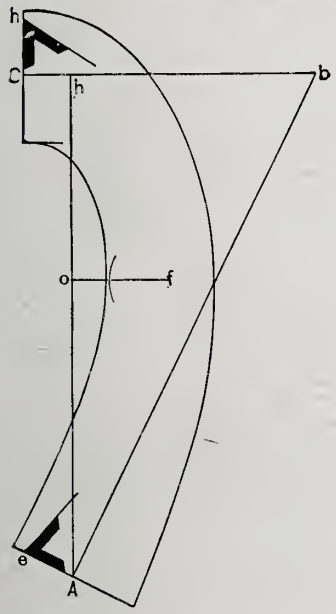
Fig. 11.—Vertical Section Through Fire-place.—Scale, ¾ Inch to the Foot.

depends, should possess sufficient strength under the most adverse conditions possible. The principles of the conservation of energy are the basis of our reasoning relative to the transformation of energy in various modes of motion, and without knowledge of these principles we must inevitably fall into error and indorse valueless schemes for realizing fabulous power. In ordinary discussions in technical journals, especially in communications, this general lack of fundamental principles is being constantly exposed.

Practical Stair Building.—XI.

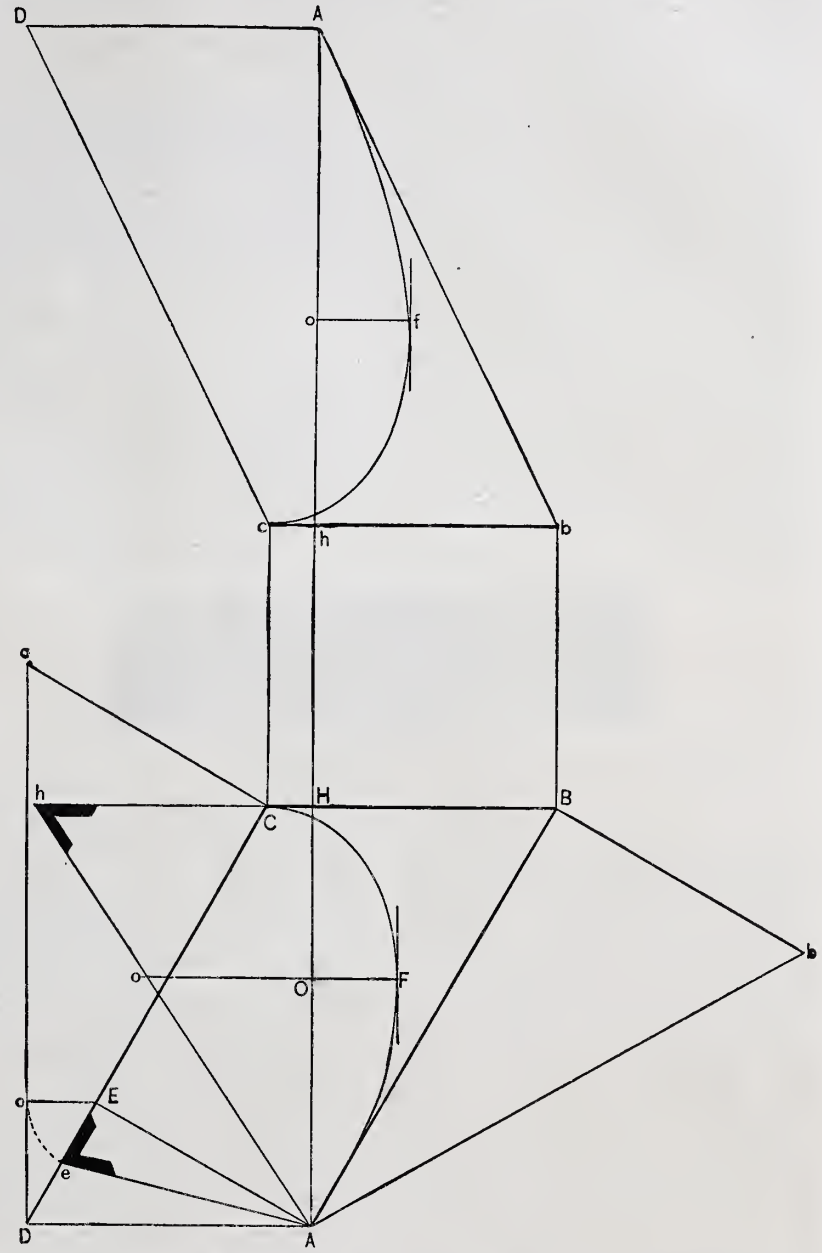
WREATH-PIECES WITH RAKED AND LEVEL TANGENTS OVER GROUND PLANS THAT ARE MORE THAN QUARTER ELLIPSES.

Having in previous numbers considered the development of wreath-pieces having raked and level tangents, the ground plans of which were a quarter circle, more than a quarter circle, and a quarter ellipse, we will



Wreath-pieces with Raked and Level Tangents, over Ground Plans that are More than Quarter Ellipses.—Fig. 1.—Laying Out the Pattern of the Wreath.

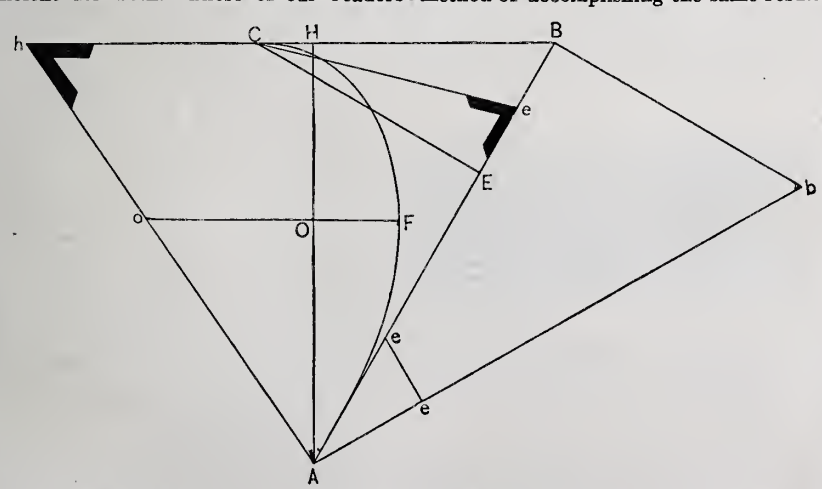
next give attention to the same class of problems, the parts occurring over plans which are more than quarter ellipses. It will not be necessary to weary our readers with a specific description of the accompanying diagram (Fig. 3), which illustrates the rule in detail, because the case presented is so nearly like that described last month as to make the description then given sufficient for both. Those of our readers who mastered the preceding problem will have no difficulty with the present one without a description, while those who for any reason require a description, can supply the want by referring to the last number. Corresponding parts are indicated by like letters.



Wreath-pieces with Raked and Level Tangets, over Ground Plans that are More than Quarter Ellipses.—Fig. 3.—Method of Obtaining Tangent Lines, &c.

In connection with the problem presented last month we described an abbreviated method of accomplishing the same result as was shown in the principal diagram. Another illustration of the many short cuts which may be employed in problems of this kind is shown in Fig. 2 of the illustrations this month. It may be described as follows: Let A C be the elliptical curve, with its tangents C B and A B forming an acute angle at their junction at B. It is required to draw the face pattern for a wreath piece having its raking tangent over A B, inclined as shown by A *b*, and its level tangent over B C, joining with the raking tangent at the hight B *b*. From A draw A H perpendicular to B C. Produce B C, making H *h* equal to B *b*. Draw *h* A. Consider the curve line A C in its relation to the vertical line A H. From near the highest point in the curve draw such a line as F O *o* at right angles with A H. To form the rail pattern as shown in Fig. 1, draw *c b* equal to C B of Fig. 2. Make C *h* equal to C H, and at right angles with C *b* draw *h* A equal to H A. Connect A *b*. From A set off the distance A o equal to A O, and at right angles with A *h* draw o *f* equal to O F. From *f* as center, with radius equal to a little more than one-half the width of the rail, draw two short arcs as shown in the figure. Make the width of the pattern at A and C a little more than the diagonal of the square section of the rail. Draw the inside and outside curve lines, uniting the short arcs drawn from *f* as shown in the engraving.

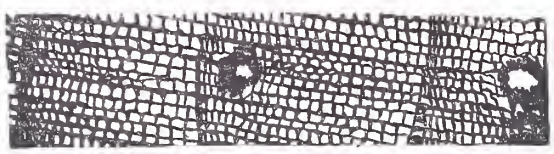
The angle at *h*, Fig. 2, is the bevel for the joint at C. The bevel for the joint at A may be found as follows: From C draw C E perpendicular to A B. On the line A B take A *e* equal to E B. Draw *e e* at right angles with A *b*. From E toward B set off the distance E *e* equal to *e e*. Draw *e* C. The angle at *e* is the bevel for the joint at A.



Wreath-pieces with Raked and Level Tangents, over Ground Plans that are More than Quarter Ellipses.—Fig. 2.—An Abbreviated Method of Performing the same Operation shown in Fig. 3.

Finishing Woodwork.

The fine work turned out by the carpenter, whether it be in the shape of inside finish or of furniture, usually differs from that of the cabinet maker more in the finish than in any other respect. The cabinet maker gives his work a polish or gloss which the carpenter does not try to imitate, whether it be "dead" or bright, French polish or oil. Every one who has attempted to give a good, smooth surface to any such wood as ash, chestnut or black walnut, knows the difficulty of making the grain seem fine and perfect, and has contrasted his work with that of the cabinet maker, and has noted the very different result which the latter obtains when he does a fine job. Perhaps it is on account of these difficulties that it is so fashionable to have natural woods in the finish of houses; but though these are pleasant to look at, they are not altogether pleasant in wear. When finished in oil, they are rough to the touch and usually have an unpleasant odor for a long time. The lighter shades almost always discolor easily, and it is practically impossible to clean them—at least, the task is never undertaken in the household. Some authorities recommend the use of wood in its



Finishing Woodwork.—Fig. 1.—End Section of Typical Board cut Radially. Photographed under the Microscope.

natural state, because it is "so much handsomer" than if varnished or oiled, and has an opportunity to darken and grow richer with age. We do not wish to recommend simply varnishing any kind of wood, because even the hardest varnish, when applied to tables or chairs, is easily scratched or marred. When injured, a varnished surface is repaired with great difficulty. It is, we think, a mistake to suppose that woods protected by oils do not turn darker with time. Practically, the coating does not retard these changes in color in a perceptible degree.

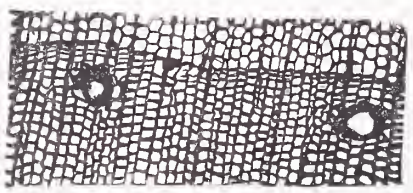
No wood is fit for use in any part of the house until it is rendered impervious to air and moisture. A perfect finish upon wainscoting is usually difficult to obtain, even in the cities, and is almost always costly. It need not be so, however, because a little labor, which a boy can be taught to perform well under proper direction, will make the finish nearly as good as that of the best cabinet work. Even the woodwork of a whole house could be finished in the same way at a moderate expense for labor.

Aside from the improved appearance of a wood surface well filled, there are many very important reasons for giving wood a complete non-conducting coating, which shall fill the pores and present a smooth surface to both sight and touch. The substance of wood consists of a multitude of small tubes lying side by side. These tubes or cells are not continuous from top to bottom of the tree, but are comparatively short, and taper out to points, so that they are thickest in the middle and have closed ends. Most of the common woods have the walls of these tubes so thin in certain places, that liquids are readily absorbed and carried into the substance of the timber for some distance. Fig. 1 shows a cross section of a piece of pine wood. The cut is photo-engraved directly from a photograph made under a microscope from the wood itself. Three annual rings are shown, and two of the little pitch tubes so familiar to all who have anything to do with white pine. At the edges of the cut, which may be taken to represent a small board, it will be noticed that the cells are opened at the sides, so as to form little grooves. In Fig. 2, which was taken from another photograph, the thinness of the cell walls, as compared with the sizes of the cells, is particularly well shown. If the two diagrams are supposed to be the ends of boards, Fig. 1 will show how the grains come to the surface in boards having their edges toward the pith and bark—that is, cut radially; while Fig. 2 shows the arrangement when the faces of the board are toward the pith and bark—that is, boards cut like slabs. In both these are portions where the cells are cut in such a way as to expose large openings. Figs. 3, 4 and 5 show the wood still further magnified. No attempt is made in these to show details of structure, but only the position of the cells. Different kinds of wood differ from pine in the shape, size and arrangement of these cells, but the openings which they present at the surfaces of the pieces are only modified; they still exist.

The importance of filling these cells—or dust traps, as they may well be called—can be seen at a glance by any one. Wood allowed to get a perfect surface by wear or use, as is frequently the case with handrails, becomes inexpressibly foul. Perspiration, dust and foulness of every sort are worked into the wood, and form a filling too disgusting to think of and too unhealthy to be tolerated.

When a person not familiar with the operation attempts to thoroughly fill a piece of wood, he meets with a great many difficulties in getting the surface to appear perfectly solid without a trace of grain. Indeed, until within a comparatively recent date there has been no easy and perfect method known, even in the trade, for doing this work.

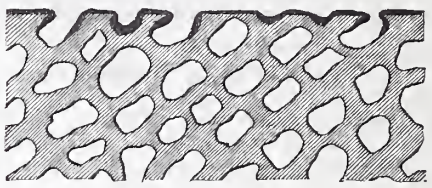
If we undertake to use oil and fill the cells by rubbing it in until a certain amount has been absorbed, a small quantity will remain in these little furrows and at first be level with the surface. As it dries, however, it shrinks, and ultimately we shall have a series of partly filled hollows like those shown in solid black in Figs. 3, 4 and 5. The black represents the coating of oil after it has contracted in hardening. In the deeper hollows the oil seems to be entirely absorbed by the wood, the greater body keeping it longer in the liquid state and giving it time to pass into the very body of the wood by capillary attraction. Formerly, when a very perfect finish was needed, a filling varnish was applied, coat after coat, until all the pores were at last filled up. When this was accomplished the varnish was scraped off, leaving the surface of the wood bare and perfectly level. The under side of Fig. 4 illustrates, in a rough way, the form taken by the successive coats of varnish. The quantity removed is, of course, much greater than the amount that remains in the wood. The successive varnishings and rubbings took much time and cost a great deal of money, and after they were



Finishing Woodwork.—Fig. 2.—Section of a Typical Board cut Slab Fashion. Photographed under the Microscope.

done the final finish had still to be applied. As many as six coats of this "scraping varnish," as it was called, were applied to pianos and other fine work for filling alone.

A great deal of time and money has been wasted in attempting to find a good "filler" for wood, and a great variety of substances like chalk, plaster-of-Paris, corn-starch, &c., have been mixed with oil and rubbed into the wood. Most of them labor under the disadvantages of forming chemical compounds with the oil, which shrink very much on drying, so that though the surface may appear smooth when they are first put on, waves and hollows make their appearance as they dry. These waves having round edges, as in Fig. 5, are difficult to fill, the second coat building up as much or more upon the level spaces as in the hollows, as shown by the line above the solid black.



Finishing Woodwork.—Fig. 3.—Wood Section Highly Magnified, Illustrating Oil Filling.

It sometimes seems almost impossible with these fillers in the latter coats to make the hollows hold any substance, the filler clinging chiefly to the surfaces.

We have been thus careful in mentioning the failings of the old processes, in order that our readers may understand the reasons for our particular description of the only filler which can be successfully and easily employed by those not expert in the art. Ground silica, "silex," as it is called in the trade, or quartz, when mixed with oil, probably shrinks less in drying than any other similar known mixture. If a surface of wood be covered with this and then rubbed, the sharp and angular particles of the silica imbed themselves in the pores of the wood, closing them up, while the oil cements them fast. This is the foundation of what is known as Wheeler's wood filler, an article that, in the estimation of some of the best painters in the country, is superior to anything yet discovered for the purpose, and which accordingly we recommend for use by those of our readers who desire to experiment in wood finish. When the pores have been filled with the silica, and are cemented fast by the proper mixture of gums and oils, the difficult part of the work is done. The wood seen in section would then present somewhat the appearance shown at the bottom of Fig. 5.

Having thus described the theory of wood filling, we will next give some attention to the practical part of wood finishing. After a good surface has been made upon the article it is ready for the filler, which is to be selected according to the color desired. In putting the filler on it is thinned with turpentine until about like flowing varnish, and is applied with a brush. Only so much of the surface is covered as can be cleaned off before it hardens. When it has set so that the gloss has left the surface, it is at once rubbed off with "excelsior" or shavings, going across the grain with the strokes. If the filler dries too fast or too light a little raw linseed oil may be used in it.

For a nicer job the filler is rubbed in with a rubber, made by gluing a piece of sole or belt leather on the face of a block of wood and trimming the edges flush with the block. The rubbing is done after the filler has set and before it is cleaned off. If it dries off too light, a little white Japan may be added on nice work. The light-colored filler should be used on all work where light and dark woods are used together. The filling, it must be understood, is done by the silica, which will often be found in the shape of a sediment in the bottom of the mixture. Eight hours is generally considered a sufficient time for the filler to dry. In our own work we have always allowed it to stand over night and sometimes longer.

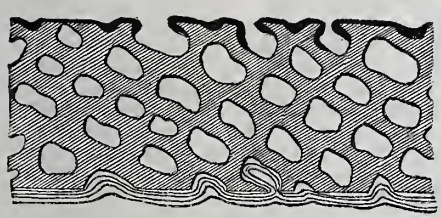
When the work with the filler is done the surface of the wood ought to be like so much ground glass. Such portions of the wood as show a solid grain need very little filler. On Georgia pine, after the filler is dry, a little rubbing in the direction of the grain with very fine sand-paper is an advantage. If the filler has been properly used the desired results will be obtained with little labor.

The wood is now in a condition to receive the final coatings. Whether the work is to

be polished or "dead finished," do not employ shellac or "French polish." This is too difficult of application for any one save a professional to attempt. If a "dead" surface is wanted, wax finish is easily put on, and as easily rubbed to a good surface. In our own practice we have used F. W. Devoe & Co.'s prepared wax finish, which is a convenient preparation of wax and gums, that can be applied with a brush and then rubbed down with a woolen cloth, tied up to make a hard rubber, until a fine lusterless surface is obtained. With mahogany and similar woods this greatly improves the color of the wood. When this has dried, which will be in the course of a few hours, the work is ready for use. The wax finish, like many of the furniture creams, has the advantage that it can be put on in a few minutes at any time to brighten up work when it has become dull. A piece of work prepared in this way, after four operations, will present as fine an appearance as the best cabinet work found in our furniture stores.

The materials which we have described, it will be noticed, are both manufactured articles. The prepared filler is indispensable; the wax finish can be made by mixing together, by the aid of heat, white wax and spirits of turpentine until they are of the consistency of thick paste. Another wax finish is made of beeswax, spirits of turpentine and linseed oil in equal parts. The addition of two drams of Alken's root to every 20 ounces of turpentine darkens and enriches the color. The root is to be put into a little bag and allowed to stand in the turpentine until it is sufficiently colored.

An altogether more durable surface can be made by a little change in the treatment. When the wood is filled, instead of applying the wax, take some "hard oil finish," a preparation manufactured by Messrs.

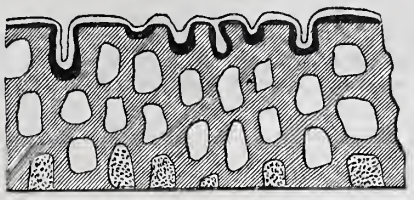


Finishing Woodwork.—Fig. 4.—Wood Section Highly Magnified, Top Illustrating Oil Filler, Bottom showing Varnish Filling.

Berry Bros., and put it on with a brush precisely like varnish. The coat should not be too heavy, especially on vertical surfaces, and the brush used ought to be a good one. This material gives a most brilliant polish. By rubbing it down with a woolen cloth and pumice stone powder it can also be made dull. Hard-oil finish does not spot with hot or cold water, is slightly elastic and is not injured by pretty severe soaking in water. It gets hard in 12 hours or less in warm weather and over night in winter time. It is one of the best surfaces which we have ever used, and has the advantage of working very well in the hands of one who is not an expert in the art of finishing wood or handling varnish. It will make a very fair surface applied direct to the unfilled wood, in which case it is a good substitute for shellac.

Wax finish has the advantage that scratches can be easily repaired without sending to the cabinet maker or the painter. Here a word of advice to the carpenter who does any work of this character may save him some trouble and make way for the further use of the same kind of finish. When the woodwork of a house is treated in this way, be sure and leave a little bottle of the wax polish with the housekeeper, with directions as to the method of using it. In sending out a "what-not," bookcase, or any other article of similar kind, put up a little bottle of the polish and show the owner, or, preferably, the lady of the house, how to repair any little scratch and make the work look "as good as new." The fresh appearance of the work will be a good advertisement, while it will prevent complaints and dissatisfaction that often follow the use of work which, when injured, cannot be restored.

It may be said that either of the methods of finishing involves a great deal of labor. This is true; but the amount is not much greater than is needed for three coats of paint, and the cost of the paint would probably be more than the cost of the finish. The labor in one case can be of a cheap character, and in the other an experienced



Finishing Woodwork.—Fig. 5.—Section Illustrating Common Fillers and Wheeler's Filler.

painter must be employed. The profit upon the "dead finish" can go into the pocket of the carpenter, while that of the painting must in any event be divided between carpenter and painter, or belong to the latter altogether.

NEW PUBLICATIONS.

ARCHITECTURAL DRAWING COPIES. By W. Busbridge. Published by E. & F. N. Spon.

This is a series of lithographed working drawings of the most important details of building construction, drawn to a large scale and clearly showing how work is put together. As their name indicates, they are intended as drawing copies for students of architecture and building. A table of reference in each plate gives the technical terms applied to the parts. Mr. Busbridge, the author, is a teacher of reputation and standing in the science and art department at the Royal Arsenal at Woolwich, England. He is also head master of the Metropolitan Drawing Classes and Instructor in Mechanical Drawing in the same institution. These plates have been approved and recommended by various professional examiners, and are used in the leading colleges and science and art schools of England. We feel certain that their introduction in this country will be attended by the best results. As being of special advantage to the younger readers of *Carpentry and Building*, we have made arrangements for supplying these plates, as may be seen by the advertisement in this number of the paper. Used as auxiliaries to any good text-book on architecture and architectural drawing, they cannot fail to be of the greatest usefulness to the students who employ them. The price at which they are sold is so low as to bring them within the reach of all. A list of the plates will be found in the advertisement, to which we refer all who may be interested in this subject.

FOLDING DIAGRAM FOR STAIRCASES AND HAND RAILS. Published by R. S. Perry. Price, $2.

Mr. Perry, in his circular addressed to carpenters and joiners, says that he hopes to meet the approval of all in the effort he is making to introduce a new and distinct method in the manner of teaching the correct principles of hand-railing. He says, further, that after years of patient effort he has reduced the art to an exact system, and has practically illustrated it. By an improved method he has placed all the various parts of a spiral staircase in perfect position. From a superficial drawing he is able to show the staircase in proper elevation plumb over its floor plan, representing all its parts in comparative solids. The author says that this scheme has never been even attempted before to his knowledge, and that if it had been discovered, it would to-day be the only method employed in teaching the principles of hand-railing, because of its special advantages. It presents the principles of construction in two different positions. First, in the superficial, and then in the comparative solid. We have quoted this much from Mr. Perry's circular in order to convey an idea of his scheme. We do not, however, agree with him in the assertion that he is the first to employ a folded diagram for the purpose of teaching the art of hand-railing. Although it is probable that he has carried this idea a little further than those who have preceded him, and probably is the first to have put up a model in the form in which the present one is prepared, others have worked in the same direction and with gratifying results. Several text books on mechanical drawing, and also upon stair railing, have been prepared with folding diagrams placed in pockets throughout the book, instead of simply plates as contained in other works. In various articles on stair railing which have appeared in *Carpentry and Building*, we have called the attention of our readers to the advantage to be derived from drawing the diagrams presented upon stiff cardboard and then cutting them out, scoring one side upon certain lines indicated, and folding the parts so that the relative position of the lines in the flat and upon the face of the solid could be studied. This scheme of illustration, which has proven so satisfactory to our readers, was devised before we heard of Mr. Perry's improvement. With all this said, however, we do not detract at all from the value of the diagrams which Mr. Perry is providing. To any one who cares to study the subject exhaustively, they are certainly of value. If we were to offer any criticism, it would be that he has started with a a very complex problem, and that in showing all that is involved in a spiral staircase he has been led to a confusion of lines which will be bewildering to the beginner, although undoubtedly easily understood by those who have had some experience in this general direction. The use of such terms as plumb ordinates, pitch tangent, pitch chord, elliptical length, spring-bevel, base-bevel tangent blocks, &c., which we find upon the model without definitions, is likely to be very confusing to all except experienced stair builders.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. Part IX. William T. Comstock, publisher. Price, $1 per part.

The eight plates embraced in the ninth part of this serial present a perspective view, elevations, interior and exterior details and floor plans of a house at Fairmount, N. J., designed by Messrs. Rossiter & Wright, architects. Following this is a story-and-a-half cottage, which comes from the far West, having been recently erected in California. This design is presented by front and side elevation, first and second-story plan and details of exterior and interior finish. The number also contains a dwelling house showing what are called Eastlake features. This house, in some respects, may be considered quite a novelty in the way of an architectural design, and we have no doubt that many of our readers will enjoy a study of its peculiar features. A plate showing designs of verge boards, and another showing ventilators and cupolas, complete the number.

Cement for Labels.—1. Macerate 5 parts of glue in 18 parts of water. Boil and add 9 parts rock candy and 5 parts gum arabic. 2. Mix dextrine with water and add a drop or two of glycerine. 3. A mixture of 1 part of dry chloride of calcium, or 2 parts of the same salt in the crystallized form, and 36 parts of gum arabic, dissolved in water to a proper consistency, forms a mucilage which holds well, does not crack by drying, and yet does not attract sufficient moisture from the air to become wet in damp weather. 4. For attaching labels to tin and other bright metallic surfaces, first rub the surface with a mixture of muriatic acid and alcohol; then apply the label with a very thin coating of the paste, and it will adhere almost as well as on glass. 5. To make cement for attaching labels to metals, take 10 parts tragacanth mucilage, 10 parts of honey and 1 part flour. The flour appears to hasten the drying and renders it less susceptible to damp. Another cement that will resist the damp still better, but will not adhere if the surface is greasy, is made by boiling together 2 parts shellac, 1 part borax and 16 parts water. Flour paste, to which a certain proportion of nitric acid has been added, and heat applied,

makes a lasting cement, but the acid often acts upon the metals. The acid converts the starch into dextrine.

Lessons in Carving.—III.

BY W. E. PARTRIDGE.

MODELING IN CLAY.

The beginner will go on with his work of blocking out and building up stems, branches and leaves until each portion has reached about the level which it is expected to have when finished. In attempting to make clean square edges, an annoying difficulty will be met 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. By making the strokes as shown in Fig. 11, this tendency to form a burr is entirely overcome, and as the tool cuts against a mass of clay and inward away from the edge, the cut is smooth and the edge is left clean and sharp.

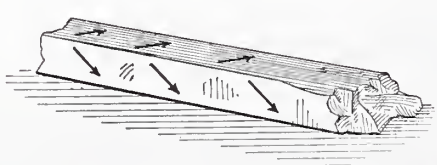
It will be of interest to know that this pattern was the first one given to a novice in the art, and as his work progressed, time was taken at each step to make the drawings directly from the model. When a difficulty was met a note was made and a sketch made to show how it could be avoided. If our readers meet with trouble in following our directions we shall be glad to hear from them, and will endeavor to show them the way out of their perplexities. It was for the purpose of making the process of building up, as well as taking down, perfectly familiar that this particular mode of producing the pattern was selected. It will be seen at a glance, Fig. 10, that it would have been as easy to have taken a sheet of clay and pressed it down upon the slab, and then, by laying pieces of wood of the proper thickness upon each side, so bring the whole to the required thickness by a straight-edge swept across the space. On a sheet so obtained the pattern might be traced with a point, and relief obtained by carving the clay away to the proper depth. For the beginner this only gives half of the lesson, omitting a very important part for the woodworker, who gets ample practice in the cutting-away part of the art and very little in the building up.

The pattern is now in a state not very unlike that in which it would have been left by a scroll-saw working on a piece of wood. Every part is roughly finished to a rectangular section. Before this stage has been completed the workman will be struck with the fact that the pattern fills up faster, appears more elaborate and richer in the solid than on paper. Even the rough square lines begin to be highly decorative, and the pattern which seemed simple and even plain on the slate, is pleasing in the clay to an unexpected degree. Our drawing, though carefully made from the model, when in this condition conveys very little of this idea, which, except with the most elaborate engraving, can hardly be reproduced upon paper. The deepest black used in printing and the purest white of the paper itself come very far from being as dark as the dark shadows, or as bright as the high lights, found on all irregular objects in diffuse daylight. Any object in relief shows a greater amount of graduation than can be given in a representation of the same object in an engraving. In carved work of any kind we can get a wider range of contrasts and a greater amount of modulation and detail than by any system of flat decoration. The simplest carved or incised design has a richness apparently out of all proportion to its elaboration. It is to this fact that carving owes its superior beauty and richness as a means of decoration. A very little of it, properly bestowed, is sufficient to make a whole article very beautiful. A narrow band across the front of a cabinet gives a richness of effect which we think cannot be obtained by any other means of decoration.

When the clay model has reached the stage shown in Fig. 10, it is perhaps in its most interesting condition. Then the woodworker finds himself face to face with the difficulty which he met in beginning to carve. How shall the surface be formed? What parts shall be in relief and what sunken? Here it is that the plastic clay invites the workman to do just as fancy or whim may dictate, without prejudice to any work that may follow. If, for the sake of seeing how it will look, he wishes to roll a corner of a leaf back or to place a wrinkle across it, the leaf can be rolled or the wrinkle made and the model restored to its original state by a very little work. The surface can be built up, taken down, curved this way and that at pleasure. For the building up, clay is added; in cutting down, the tools with cutting edges are usually most convenient.

Lessons in Carving.—Fig. 10.—The Clay Model Blocked Out.

Returning to our model in the state shown, and taking the largest leaf, we find upon examination that each of the three lobes into which it is divided is resting upon the branch from which its stem grows. Each of the lobes will, therefore, naturally be elevated higher at these points than at any others.



Lessons in Carving.— Fig. 11. — Showing Direction of Strokes to Avoid a "Burr" Upon the Edge of the Clay.

Here, then, is a starting point. Taking this as a basis, the beginner will find that he can profitably spend a long time over this one leaf, modeling its surface either in convex or hollow forms, and at the same time keeping these portions elevated under which the stems pass. As it is easy to make experiments of all kinds, he may also try the effect of raising the center of the leaf and depressing the portions which are shown as elevations in the cut. The edges of division or clef between the parts of this leaf are shown as raised or slightly curled outward. This makes the edge of the leaf thicker than the center. To find out why this is done, let the beginner build up the center of the leaf until it is higher than any other portion, and then make it curve away downward to the edges. Taking the long, narrow leaf in the lower corner, he will observe that it commences low and then rises into a wave which extends diagonally across the leaf. This is followed by depression, which is also diagonal. Let him try the experiment of making these waves go squarely across the leaf.

The student will find, after he has changed his model in the ways suggested, 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 rather the effect 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 may find very beautiful models. In the example given, the most that we have attempted to do is to rudely indicate an approach to a circle. In the larger stem some slight roughness of bark may be given, but on no account should an 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 of 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.

We have said nothing 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 will feel as did the student from whose work the sketch was taken—that there was but one way in which they could be put in to look well.

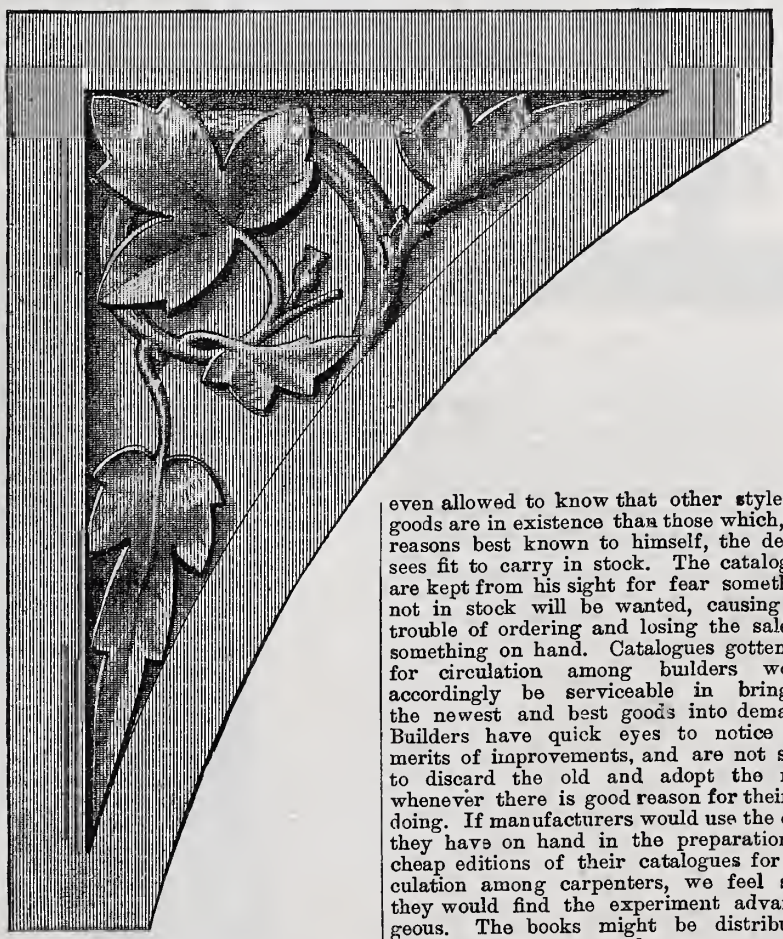
The beginner may be content for some little time to go on without attempting to put on a finish. If his work is rough, no matter; remember that the science of all that has gone before is to teach form, to enable the imagination to comprehend ornamental form in relief, and when this is done the main subject for which the modeling in clay has been undertaken will be accomplished. There is another reason which should be kept in mind. Without a a teacher to explain all the various little dodges 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 by experience, but they are not easily explained upon 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 a sufficent finish to make it worth while to take a cast, and so keep a permanent record of what he has done.

NOTES AND COMMENTS.

Stove Design Competition.—*The Metal Worker* for May 28 contained an account of the result of the second competition in stove designs, mention of which was made in our columns at the time of its first announcement. The subjects were—a design for a heating stove for wood, design for the side of a low-reservoir cook stove, and a design for the top and top ornament of a heating stove. The Committee of Awards decided that none of the designs submitted in the last two classes were of sufficient merit to entitle them to prizes, and therefore no awards were made. Mr. Edward Dewson, of No. 28 State street, Boston, was the successful competitor in designs for a heating stove to burn wood, receiving the $100 cash prize offered. Designing in cast iron is beginning to receive more attention than formerly, and we suggest to artists generally that a little study in the direction of its limitations and capabilities will prove of advantage to them.

Paneled Work.—There are other and pleasanter ways of using woodwork, we think, than making it up in rectangular panels and holding strictly to the rules of the old classic styles in forms of moldings and proportions of parts. While there is something stiff and formal about designs of this character, which is at once uncomfortable and repulsive to a person of fine sensibilities, there are also objections to them on account of constructive qualities. Paneling is not the best form in which to work wood in this climate. Put together in an ordinary way, it will be but a very short time before unsightly cracks will appear, while, if constructed in the very best manner, a period of five or six years at most serves to make it look almost like an ancient wreck. Architects who design in wood will do well to consider these facts before giving a too ready approval to some of the modernized old styles, now becoming so popular. The constructive uses of wood should be carefully studied, and it should always be borne in mind that what has been successfully used in England and on the Continent is not necessarily adapted to employment here, where climatic conditions are very different.

French Polishing.—*Apropos* of the article on wood finishing, which appears in another part of this issue, we give the following directions for French polishing, from the pen of a practical man, which may be of interest to our readers. French polishing, he says at the outset, "is nothing more than the distribution of a solution of lac in spirits of wine—by means of a rubber made of cotton, wool and calico rag—over the surface of wood, using pressure, until the pores are entirely filled, and the strata of deposited resin adhering forms a smooth, hard and brilliant glaze. The first operation in polishing is called 'filling in'—that is, some substance, other than polish is rubbed into the pores of the wood to economize time and materials; in fact, this is the foundation on which the superstructure is built; consequently, it is of no small importance, as good beginnings generally make good endings. The general modes of filling in are truly multiform, the following being a few of them: Plaster-of-Paris is the most common ingredient, and is thus used: Roll up a piece of rag into a rubber, saturate it with water, dip it into the plaster, taking up a goodly supply, and rub it well into the pores, bit by bit, until you have, as it were, plastered or whitewashed the article of furniture all over, taking care, however, to wipe off the superfluous plaster



Lessons in Carving.—Fig. 12.—The Sketch in Clay.

with another piece of dry rag before it sets; otherwise there will be difficulty of getting an even surface without much papering. When this is done let it stand until thoroughly dry. Another method is to beat up some plaster in water, sufficiently thin to prevent setting too soon, and go over the wood with this as before. Some beat up plaster in linseed oil, and use that alone; while others add a little polish stirred into the above to cause it to settle a little quicker. Another compound is Russian fat, plaster-of-Paris and pigment to suit the wood it is intended for; these are heated together and laid on hot, wiping off the superfluous mass with a rag—the only advantage in the two last being that polishing can be commenced upon them directly, whereas the others have to dry first. Some even utilize mutton suet in its solid form to rub into the pores; others melt size and stir in plaster, using this hot, which is as good as any, for, when dry, it does not absorb as much oil as the plaster-and-water methods."

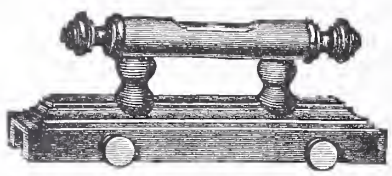
Hardware Catalogues for Builders.—Every little while subscribers write us inquiring if we cannot obtain for them catalogues of general hardware, or of locks, or some other special class of building supplies. In many instances they detail the efforts which have been made in trying to get such books for themselves before writing us. There seems to be a general demand upon the part of enterprising builders for catalogues of this kind, which, we regret to say, manufacturers and dealers do not seem to appreciate, for, with perhaps one or two exceptions, there are no establishments which are ready to supply wants in this direction. We call attention to the matter at this time as a suggestion to the hardware trade upon which it may act advantageously. Large sums of money have been spent in getting up elaborate illustrated catalogues for the use of the regular trade, but so far nothing of any account has been done in the way of helping the builder to an intelligent understanding of the hardware of which he is the buyer and user. He is left entirely dependent upon the local dealer for the information he requires, and it is very rarely that he is even allowed to know that other styles of goods are in existence than those which, for reasons best known to himself, the dealer sees fit to carry in stock. The catalogues are kept from his sight for fear something not in stock will be wanted, causing the trouble of ordering and losing the sale of something on hand. Catalogues gotten up for circulation among builders would accordingly be serviceable in bringing the newest and best goods into demand. Builders have quick eyes to notice the merits of improvements, and are not slow to discard the old and adopt the new whenever there is good reason for their so doing. If manufacturers would use the cuts they have on hand in the preparation of cheap editions of their catalogues for circulation among carpenters, we feel sure they would find the experiment advantageous. The books might be distributed through the regular trade, as many copies being sent to each local dealer as he could place advantageously with his regular customers. They might bear his card on the back of the cover, thus giving him an incentive to distribute them. Or the publication of such a catalogue might be advertised in *Carpentry and Building*, for example, with the invitation for all to send for a copy who could use it advantageously. This latter plan would give the work general circulation, and although consuming more copies, would make the line of goods described much more generally known than the plan first suggested. The advantage to the manufacturer of a builder having a catalogue of his goods to refer to evenings at home, and at a moment's notice in the shop, whenever a question arises in the planning of a building or drafting a specification should not be underrated. A catalogue is a thing to be studied. Every page should be familiarized. This requires time, and, therefore, so far as causing the sale of certain goods is concerned, a catalogue in the hands of a builder, to be examined at his convenience, is a matter of importance to the manufacturer.

The plumber brigade is said to be like the Balaklava Light Brigade—they can "charge" like thunder.

NOVELTIES.

IMPROVED LEVELS.

Figs. 1 and 2 of our engravings represent new forms of carpenters' levels recently introduced by C. E. Jennings & Co., of 96 Chambers street, New York. Fig. 1 shows an improved form of this instrument adapted to use upon squares and straight edges, which, we think, will be a very acceptable addition to the chests of carpenters generally. Those who are familiar with the old and cheap form of this article, which was inaccurate in many cases, besides being dependent upon a single screw for attachment to the blade of the square, will appreciate one which is carefully and accurately made, and which has two thumb-screws for fastening in position, besides being adjustable. The engraving gives a very fair idea of the article, which is 3 inches in length. It can be used as either a plumb or level in connection with a square, and if a level of any considerable length is required, it may be applied to a straight-edge. Fig. 2 shows what is described as an adjustable iron double plumb and level, which is made in various sizes. This article, which in price competes with the ordinary wooden-stock levels, is made of gray iron, with a steel

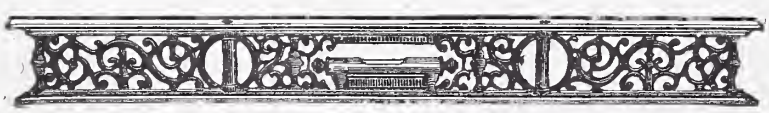


Novelties.—Fig. 1.—Iron Bench Level for Attaching to Square or Straight Edge.

bar running through each column from one parallel to the other, thus giving the instrument a light and graceful appearance, while adding greatly to its strength. All carpenters who have learned to like iron planes, now becoming so popular, will undoubtedly be pleased with this tool. The article, besides being well made, is provided with means for adjusting to correct any possible inaccuracies, and the tubes are removable and can be replaced in the event of their being broken.

HAND VISE.

The Millers Falls Co., of No 74 Chambers street, are now putting upon the market an improved hand vise, a general view of which is presented in Fig. 3. The jaws are of forged and tempered steel. The screw and cross bar are also made of steel, while the handle is made of hard maple, with a lignumvitæ cap. The handle is hollow and serves to hold the small tools which are shown in Figs. 4 and 6. The bent tool, shown in Fig. 6, by being placed in the long groove in the jaws, and the awl, shown in the same cut, placed in the short groove for a center spur, form a very convenient and serviceable washer cutter. The vise jaws are 1¼ inches wide, and open 1⅛ inches. They will center and hold tools of any shape firmly. The tools in the cuts are shown full size, and the vise about two-thirds full size. By unscrewing the handle and putting in place the bit shank, shown in Fig. 5, a very convenient chuck is obtained for using in an ordinary brace or in a lathe. The handle and the bit shank can also be used at right angles to the vise when circumstances make such an arrangement desirable. The tool is a very



Novelties.—Fig. 2.—Adjustable Iron Double Plumb and Level.

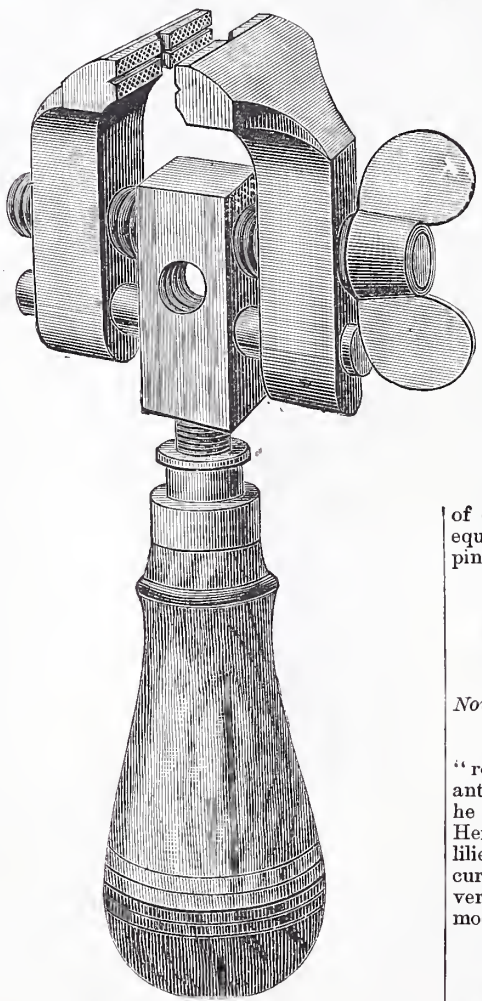
convenient one for use in many places, and as it is very reasonable in cost, it should find general favor among mechanics.

IMPROVED WINDOW BLIND.

The novelty illustrated in Fig. 8 consists in the method of operating the rolling slats in a window blind. The slats are pivoted upon wires, thus insuring accurate fits, and are stopped at both ends against the head molding running just inside of the stiles. This molding on the right is divided lengthways in the center, and to the half of it, which is made movable, one edge of each slat is connected by means of a suitable pin. A handle or knob, which may be seen in the engraving, is provided for operating the part. By this construction the slats are opened and shut quite as readily as by the old, while a desirable uniformity of appearance in the sides of the blind is maintained. The unsightly rod in the middle of the slats peculiar to the old method is done away with. The features of this improvement, which is the property of William Morstatt, No. 332 Seventh avenue, New York, are so clearly shown in the engraving that more extended description is unnecessary. The head molding on the side opposite from the movable part is also divided in the center, and the front half is held in place by screws, thus making it possible with very little trouble to remove and replace the slats in case of breakage or other injury.

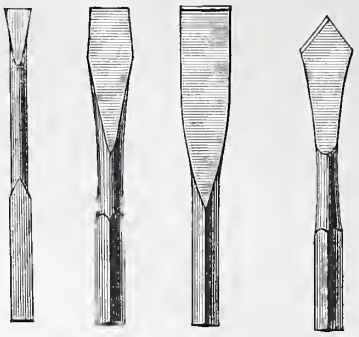
HAYDEN'S BLIND FASTS.

Two forms of an improved blind fast, manufactured by Messrs. Reed & Co., of



Novelties.—Fig. 3.—Improved Hand Vise.

Higganum, Conn., are shown in Figs. 7 and 9. The first is an approved style of screw fast, the catch in which is operated by a flat brass spring, shown in the engraving, in place of a double wire spring heretofore in common use, and which is very liable to get out of order. The second differs from the first principally in that the catch is operated by gravity alone. The manner of attaching the fasts to the blinds is self-evident from inspection of the engravings. Two lengths are made, being respectively 1¼ inches and 1½ inches long. The style shown in Fig. 7 is also made with single and double-jointed hooks, thus adapting it for use in



Novelties.—Fig. 4.—Tools Furnished with the Hand Vise.

various positions upon both wood and brick buildings.

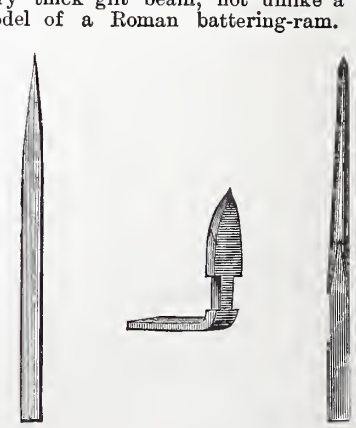
Modern Furnishings.

That the behests of fashion in the matter of furnishing a modern house are a serious matter is thus set forth by a writer who evidently understands his subject. Although prepared for English readers it will not be the less appreciated in this country:

The heavy and the weary weight of modern furniture is beginning to be somethiug more than a minor misery. Twenty years ago, when people took a house, the man left the furnishing to the woman, much as rustic and savage persons leave the cares of agriculture and of work in general to the other sex. The lady had what she considered a good time—she passed many hours in shops, she bought just what she liked. She never dreamed of going to a series of lectures on tables, chairs, and "horses for towels." She was not made unhappy by the difficulty of reconciling usefulness and art in an umbrella stand. A lady got what she liked, and what her neighbors had. Her only doubt about a coal-scuttle was whether it should be adorned with a colored copy of one of Landseer's big dogs, or with an equally brilliant study of a pretty girl with a pink parasol. Her dining-room carpet was

Novelties.—Fig. 5.—Bit Shank Accompanying Hand Vise.

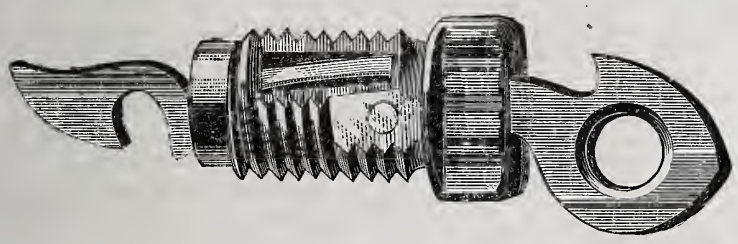
"roses, roses all the way," like the triumphant career of Mr. Browning's patriot, before he came to grief at the next general election. Her drawing-room carpet was adorned with lilies of the valley on a green ground. The curtains were green, too, and hung from a very thick gilt beam, not unlike a large model of a Roman battering-ram. Her



Novelties.—Fig. 6.—Washer Cutter and Awls Furnished with Hand Vise.

chimney pieces were of plain black or white marble, and on these she arranged vases of pink and white glass, the gifts of her excellent friends. In the middle of the drawing-

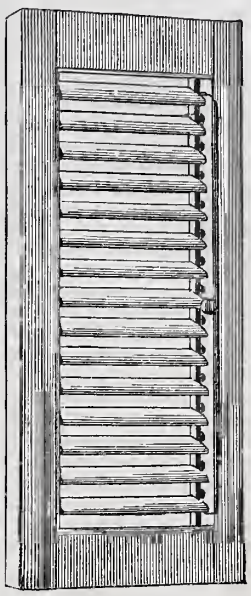
room was a large round rosewood table, on which illustrated Christmas books were arranged in a circle. Most of the drawing-room chairs were tiny gilt ones, on which large men invariably sat down with ruinous results. The mirrors were big enough to have practiced figure skating upon if they could have been laid on the floor. The walls were usually papered either with a velvety kind of "flock" paper, or with a light lavender tissue, on which roses and blue dahlias were repeated regardless of expense. The fender was made of shining steel contorted into patterns. When these arrangements had been rapidly completed people settled down among their effects and thought no more about the matter. Men never gave the subject a thought from first to last. Since those early days we have survived several revolutions in furniture. First the Gothic business came in. Our tables were to be of oak, with little things like small church windows in the legs. Our chairs were like those of the end of the twelfth century. Everything was "pointed" to the last degree. We were instructed to have our crests and bearings emblazoned and embroidered on our curtains. Small houses were made as far as possible to resemble baronial halls about the date of Front de Bœuf. Coal scuttles were huge oak chests with brazen joints and fittings. Whatever was not oak was brass, *robur et æs triplex*, in the domestic furniture of an advanced person, say fifteen years ago. Then came that great and sacred movement the Renaissance of Queen Anne. Probably Mr. Thackeray and "Esmond" were the great unconscious causes of this revival. It was natural that a writer who knew the Augustan age by heart should admire its architecture, furniture and plate. But people less acquainted with the nymphs Kneller drew, and the books Bentley read, went in for Queen Anne. They produced such a mixture of dates and styles, as Mr. Thackeray described in the account of Button's Coffee House, in "George de Barnwell." "Queen Anne" was a general term for any furniture remotely resembling what was produced between the death of King William and the accession of the Regent. The influence of Mr. Morris then made itself felt, an influence which combines much beauty and careful workmanship with a suspicion of melancholy and mildew. This was exaggerated by "the Passionate Intense," if we may coin a double term on the model of the "Fair Impertinent." Then the cheap upholsterers rushed into the field, and flooded the market with flimsy things in black wood and shám Japanese drawing, which they styled "Queen Anne," or "High Art," or "Early English" furniture, at random. People now buy a brass coal scuttle, and an ebonized what-not, and think themselves authorities on the decorative arts. The whole affair is overdone, and too much talked about. There is nothing natural or spontaneous in taste. Mr. Du Maurier, aided by some heavy moralists, and some imbecile fribbles, male and female, has made household furniture almost the leading question in modern ethics. If a man or woman prefers to be surrounded by walls and floors that are not glaring in color, or shares Charles Lamb's liking for china, or for prints, or for old books, he or she is apt to be spoken of as an "æsthete," and reviled as a kind of stealthily corrupt person. On the other hand, people who are either destitute of taste, or who conceal their possession of that quality, give themselves insufferable airs of moral robustness. They are always feeling their moral biceps, and thanking heaven that they are not as other men, even as these æsthetic characters. The great thing in these purely domestic and personal matters surely is that people should leave each other alone. At present a sensible person who has arranged his house as he likes to have it is subjected to a double annoyance. He is claimed as an ally by the die-away dowdies of the mouldy school, or by the gaudy frumps who boast of their own indifference to taste. It seems a most absurd and puerile thing that people should go to books and lecturers to learn how to buy chairs and tables, curtains and wall papers. There can be no natural taste while these topics are debated with the ardor of religious controversy. Buy what you like, what you can afford, what will last, as good workmanship should do, and what you can easily carry away with you when you change your house, is the only advice that is worth offering. It is said that a great many people do not know what they like. This is because they have been so disturbed and worried by the exaggerated earnestness of artistic affectation on one side, and of pharisaical morality on the other. The consequence of this want of naturalness and certainty of taste is a demand for "Cantor Lectures" on furnishing and for books on decoration or furniture. Such books may do some people good—the rich, ignorant people who put themselves in the hands of an expensive fashionable upholsterer. The tradesman is sure to fill their houses with all the newest rubbish in the shape of Japanese work and sham antiquities. But perhaps his victims are beyond hope, even from books. They generally belong to the large class which is incapable of reading at all; and, as they like to be deceived, deceived let them be. They are the born prey of upholsterers.



Novelties.—Fig. 7.—Hayden's Screw Blind Fasts. Form operated by Flat Brass Spring.

Building Operations and Wages.

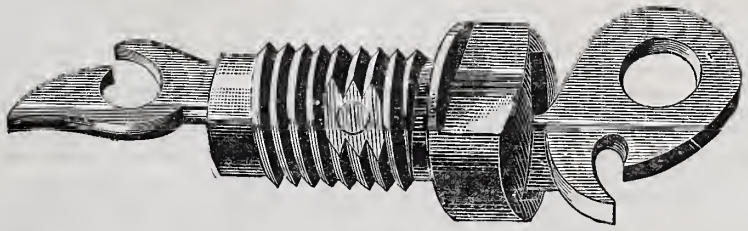
In the belief that nothing would be of greater interest to our readers at this time than some account of what is going on at present in the way of building operations, we have taken measures, since our last number went to press, to obtain accurate information from all parts of the country bearing upon this subject. In the limited space which we can devote to a report, it will be a somewhat difficult task to present a comprehensive view of the entire field, and yet that is what we desire to lay before our readers. We have before us as we write the responses to upward of two thousand circulars of inquiry, coming from every State in the Union and from several of the territories. We have a report from nearly every city and town of importance in the country. We have also reports from many of the smaller towns and villages which are remote from the large business centers of the country, and whose importance therefore is greater than their population would seem to indicate. In addition to all this we have reports from some of the notable agricultural districts of the country, independent of the towns and villages to which they are tributary. Our reports come from men actively engaged in the work described, and in most cases receiving the wages they declare is being paid in their several communities. It is from such information as this that we are prepared to judge of the present state of the building trades in different localities and under varying conditions.



Novelties.—Fig. 8.—Improved Window Blinds.

To give the result of our survey in the fewest possible words, we might say that the "boom" extends all along the line. The building business is brisk. Mechanics in general are fully employed. Wages are fair, and in many directions there is an upward tendency. All the building that it is reasonable to expect can be completed before the bad weather of the fall and winter sets in, has been undertaken in nearly every community. In short, there has never before been such a season of general prosperity in the building trades in the history of the country.

Wages vary according to localities, being for the most part lowest where living is the cheapest, and highest where living costs the most. The ratio, however, is not maintained in all cases, and if close estimates were to be made we think it would be discovered that those who live and labor in communities where rents, provisions and supplies generally are cheap, have the advantage of their fellows in the larger cities, even though the wages of the latter are considerably more in amount. It would be impossible to present a detailed report of wages, though we restricted it to the more important cities, even if such a thing were desirable. We cannot do more at this time than summarize, giving occasional items by way of illustration and comparison. The three trades to which we have directed attention are those of the carpenter, the mason and the house painter. We asked our correspondents for the average wages of journeymen mechanics in their several communities in each of these branches, and such results as we may present are to be considered with these facts in mind. The average of nine principal cities situated in the East and on the Atlantic seaboard, considered together, shows that carpenters are receiving about $2.50, masons a trifle over $3, and painters about $2.50 per day. By this comparison it appears that Boston is paying the average prices of the cities named, while New York and Philadelphia are paying above the general average,



Novelties.—Fig. 9.—Hayden's Screw Blind Fasts. Form operated by Gravity.

A like calculation made for nine of the principal cities of the Western States gives a very similar result, the exact figures being carpenters, $2.44; masons, $3.11, and painters, $2.33. Of these cities, Chicago and St. Louis are paying considerably above the average, the figures for the first named being carpenters, $3; masons, $3.50, and painters, $2.50, and for the latter, carpenters, $2.75; masons, $3.75, and painters, $2.50. Omaha reports carpenters, $2.75; masons, $3, and painters, $3. Going still further West, the general average shows an increase. When we get to some of the mining towns the figures reported are apt to fill mechanics in the older parts of the country with envy. Four dollars per day for carpenters and masons is not an exceptional rate. The average of all the towns in Colorado from which we have replies indicates high prices generally. They are as follows: Carpenters, $3.25; masons, $4.25; painters, $3 25 per day. The few towns in New Mexico where building operations are being carried on pay wages even higher than the figures last named, and the same may be said of Arizona. We do not anticipate that this announcement, however, will cause a stampede of mechanics to the region named, for many of the inhabitants of these districts, in the simplicity of their hearts, consider a wigwam or an *adobe* hut entirely sufficient for all purposes. Our figures from Utah are lower than those last quoted, and the reports show a little more of the enterprise of civilization. Salt Lake City, in spite of Mormonism, is building actively, and carpenters command $3; masons, $3.50, and painters, $3 per day. The report from California is not as cheerful as from most of the States. A number of large blocks are going up in San Francisco, but building operations cannot be called brisk in the sense in which that term is employed in the East. Quotations of the labor market from this State may, therefore, be declared to be nominal, for in almost all cases less than the full number of mechanics are employed. Carpenters are receiving all the way from $2.25 to $4 per day; masons from $3 to $4.50, and painters in about the same proportions. The highest figures are paid in the mining towns. Far-off Oregon reports a fair activity in her towns and cities, with wages for carpenters at $3.50; masons, $4; and painters, $3 per day.

Returning eastward and to the South, all the reports we have from Texas show that mechanics are generally employed in that State. The lowest quotation for carpenters is $2 per day and the highest $3. Masons' wages range from $2 to $4 per day. The average of the State by the reports received is as follows: Carpenters, $2.32; masons, $2.82; and painters, $2.50 per day. Galveston pays the highest prices in the State, the rates being: Carpenters, $3; masons, $4; and painters, $3.50 per day. From Louisiana the general report is that mechanics are fairly employed, and that building operations are moderately active. At Shreveport carpenters are getting $3.50; masons, $4; and painters, $3 50 per day. Along the Mississippi River prices are much lower—$2 for carpenters, $3 for masons and $2 for painters being near the average. Only one town in Arkansas reports building operations dull, the prospect not encouraging and mechanics only partially employed. The wages reported seem to account for this condition of affairs. They are as follows: Carpenters, $3; masons, $5; and painters, $2. The general average through the State is about $2.50 for carpenters, $2.75 to $3 for masons and $2.50 for painters. Our returns from Mississippi show about the same average as last quoted. From this State we have reports of both white and colored labor, the latter being about 25 per cent. lower than the former in places where both are given. In Alabama the general average also appears to be about the same. Mobile reports building operations very slow, with wages nominally $2.25 for each of the trades quoted. There is no special activity reported in Florida. In Georgia there is more doing. Mechanics are quite generally employed, and the prospects for the immediate future are promising. Wages average lower than in States last named, and are about the same as rule in North and South Carolina. They may be quoted as follows: Carpenters, $1.50 to $1.75; masons, $1.75 to $2; and painters, $1.50 to $2. Savannah reports carpenters, $1.75; masons, $2.50; and painters, $3, from which we infer the people of that town appreciate paint more than they do foundations and superstructure. Throughout Virginia the outlook is reported as promising. Wages are at neither extreme. In Richmond they are said to be carpenters, $2.25; masons, $2.50; and painters, $2. At Hampton, where several important buildings are in progress, the rates are a little higher. Crossing the mountains we find about the same general conditions prevail in West Virginia. In Maryland mechanics are very generally employed—$2 for carpenters, $2.50 for masons, and $2 for painters being about the general average. From Baltimore the report is carpenters, $2.25; masons, $3.50 to $4; and painters, $2.25. Delaware is fairly active, with rates somewhat less than reported for Virginia.

Coming back to our original starting point, the Eastern Atlantic States present unusual activity in building matters in almost all sections. The smaller towns vie with the large cities in the variety and extent of their enterprises. Maine, New Hampshire and Vermont are perhaps less active than Massachusetts, Connecticut, Rhode Island and New York, although they are by no means dull. For Maine the general average of rates indicates that carpenters are receiving $1.75 to $2; masons, $2 to $2.75; and painters, $1.75 to $2 25, according to location. Rates are a little higher in New Hampshire, and about the same in Vermont. The average for Massachusetts is about $2.25 for carpenters, $2.75 for masons and $2.25 for painters. These are the exact figures reported for Providence, and are also about the general average for both Rhode Island and Connecticut. Reports from 96 different points in New York show that mechanics are very generally employed throughout the State at present, and are likely to remain so until bad weather sets in. In almost every town of any importance a church, a hotel, a factory, a school-house, or some other important building enterprise is reported. In the smaller places wages average about $2 for carpenters, $2.75 for masons and $2 for painters. In the larger cities rates are from 25 to 50 cents per day higher. It would require more space than we can devote to this entire article to give a detailed account of building operations in this city. It is estimated that the work now in progress represents an expenditure of upwards of $25,000,000. The building activity of the present season is unprecedented. The business structures being erected are remarkable for hight and amplitude of dimensions, and the dwellings are notable for the elaborateness of ornament employed and their costliness beyond the work of any other period. It seems to be settled that the down-town streets are to be lined with rows of buildings from eight to ten stories high. Ground-room grows dearer every year, but sky-room costs nothing. The suburbs of New York also present scenes of activity. Among them Orange, N. J, a city which by the last census shows the most rapid growth of any in the country, is especially busy in adding new dwellings for New York's business men. Wages in this locality are reported as follows: Carpenters, $2.50; masons, $3; and painters, $2.50. New Jersey is generally active, wages, however, ranging somewhat below those just quoted.

Turning our bird's-eye view again Westward, we find Pennsylvania well up to the general average in building enterprises. Many of the smaller towns report fine dwellings, showing that some of the money which has been made in the past few years is now being expended. Taking the State as a whole, wages average about $2 for carpenters, $2.25 to $2 50 for masons and $2 for painters. Ohio, Indiana and Illinois are all very busy. Opera houses, town halls, school-houses, churches, court houses, business blocks and costly dwellings seem to be the order of the day throughout the regions named. There is hardly a town of any importance but sends in an account of some such enterprise. Wages through Ohio seem to average about $2.25 for carpenters, $2.75 to $3 for masons and $2 to $2.25 for painters. The general average for Indiana is 12½ to 25 cents per day less. The smaller places throughout Illinois show about the same results, with higher figures in the cities. The figures in Tennessee and Kentucky are lower, averaging not over $2 for carpenters, $2.50 for masons and $2 for painters. Building operations are less active in these States than northward across the Ohio River.

Missouri and Iowa are scenes of activity in building matters at the present time. What we have said about Ohio, Indiana and Illinois, applies as well to them. Wages in Missouri average $2.25 for carpenters, $3 for masons and $2.25 for painters. In Iowa the average is slightly above these figures, with rates considerably in excess at those points where operations are unusually extensive. The lower peninsula of Michigan is quite active, with wages averaging about as quoted for Ohio. Wisconsin does not seem to manifest equal enterprise, although building matters for the State at large cannot be declared dull. Wages average about $2 for carpenters, $2.50 for masons and $2 for painters. In Minnesota business is better and rates are higher, the average being something like $2.25 for carpenters, $3 for masons and $2.25 for painters. We might prolong this account still further, but enough has been presented to give our readers a general idea of the present condition of the industries in which they are especially interested—the end we set out to accomplish.

STRAY CHIPS.

A PRESBYTERIAN CHURCH is being erected at Manti, Utah.

A SCHOOL-HOUSE, to cost $23,000, is being built at Danbury, Conn.

A FLOURING MILL, to cost $15,000, is in progress at Conrad, Iowa.

A DWELLING HOUSE costing $10,000 is being built at Woodfords, Me.

A WOOLEN MILL costing $25,000 is being built by citizens of Abbott, Me.

A PAPER MILL, 40 x 200 feet, has been built recently at Pawtucket, R. I.

AT RATON, New Mexico, a number of store buildings and a hotel are being built this season.

A BRIDGE OVER the Green Brier River, at Alderson, West Virginia, to cost $12,000, is now in progress.

A. R. SMITH, of Academy, W. Va., is engaged upon a store and dwelling for W. H. Overholt, of that place.

A THEATRE BUILDING, 98 x 128, costing $30,000, is being erected at the National Soldiers' Home, at Dayton, Ohio.

AT DECORAH, IOWA, a new post office building, to cost $5000, is being erected. J. Jackson, of that place, is architect.

A SCHOOL HOUSE and depot building are being erected at Rootstown, Ohio. A new railway is passing through that place.

AT NEWPORT, R. I., a two-story school-house, to cost $18,000, is projected. William E. Crandall, of that city, is the architect.

A BAPTIST CHURCH, costing $8000, is being built at New Vienna, Ohio, to plans prepared by W. R. Brown, architect, of Cincinnati.

E. E. MEYERS, architect, of Detroit, was in this city recently on business connected with a residence he is building for his own use.

A DWELLING, to cost $8000, is being erected at Seymour, Conn., for Mr. James Swan. L. W. Robinson, of New Haven, is the architect.

CINCINNATI PRODUCED nearly $1,000,000 of builders' hardware in the year 1880, which was five times that manufactured in 1860.

STAIR BUILDING in Cincinnati is carried on by five establishments, and work to the extent of $63,500 was produced in the yea. 1880.

A COUNTY JAIL is in progress at Bandera, Tex. J. A. Courtney is the contractor for the stonework, and F. W. Ellis for the woodwork.

JAMES G. HOLLAND, of Ada, Ohio, is the architect and builder of an opera house in progress in that city estimated to cost $15,000.

MESSRS. KOHLER & HELDENFELZ, of St. Mary's, Texas, have prepared drawings for a dwelling for Mr. T. Flemings, of that place, to cost $6000.

A WAGON FACTORY costing about $45,000 is being built at Fort Wayne, Ind. George Trenam is the architect. Milening & Paul are the builders.

AT ORANGE, CAL., 13 dwellings and one church have been completed the present season—a large amount of buildings considering the size of the place.

A NUMBER of dwellings and business blocks are now in progress at La Veta, Colorado, a part of them being under the management of B. A. Arnold, builder.

A CITY HALL is being built at Delaware, Ohio. The estimated cost is $125,000. F. F. Schnitzer, of that place, is the architect, and Adam Wells the builder.

THE CLIMATE IN some parts of Texas is such that tight buildings are not required. Few or no cellars are dug, so that foundation work is reduced to a minimum.

A NUMBER of stores and factories are in progress at Ansonia, Conn. Samuel Scott, builder, of that place, has the contracts for a number of the improvements.

NOW THAT WE have a "Chip" department, it is hoped every subscriber will send along his contributions to it. Let the chips be fresh and crisp and plenty of them.

AT PLAINFIELD, CONN., the Bristol Brass and Clock Company is putting up a large shop for the manufacture of lamp burners. David Hall, of Bristol, is the builder.

AT DECATUR, IND., a church costing $10,000 is being built to plans prepared by Benj. D. Price, of Philadelphia. Moon & Christen, of Decatur, are the builders.

A COURT HOUSE costing $100,000 is in progress at Hannibal, Ohio. J. W. Yost, of Bellaire, Ohio, is the architect, and Hall & Son, of Zanesville, are the contractors.

THOMAS F. MABIE, of Eastport, Me., has prepared the plans for a three-story residence, 60 by 40 feet, for Mr. A. Michener, of that place. John Coggins is the builder.

THIRTY-NINE FIRMS in Cincinnati supply brick for that community, employing 422 hands, while 33 firms are engaged in the business of bricklaying, employing 225 hands.

SIX BUSINESS ROOMS are being built at Logansport, Indiana, from plans prepared by Indianapolis and local architects. Joseph Crane and J. Eagle, of Logansport, are the builders.

AT MARYSVILLE, CALIFORNIA, an addition to a woolen mill is being built. Our correspondent reports that mechanics find employment only about four months out of the year.

PLANS PREPARED BY Messrs. McKeog & Haist, of Virginia City, California, have been accepted by the Board of Commissioners for an insane asylum to be erected at Reno, to cost $60,000.

AT HANNIBAL, Mo., a union depot and opera house, to cost $40,000, is proposed, to be built by the consolidated railroads entering that place. A $50,000 hotel was put up there last season.

ARMSTRONG, LYON & CO., well-known hardware dealers at Middletown, N. Y., are putting up a fine building, which will afford them needed facilities for accommodating their growing trade.

THREE BRICK store rooms, 40 by 60, 50 by 90 and 20 by 80, respectively, are being built at Columbus Grove, Ohio. The estimated cost is $25,000. P. Shuyler, of Lima, Ohio, is the architect.

DWELLINGS, STORE BUILDINGS and churches, costing in the aggregate $150,000, are being erected at Winsted, Conn. Maddra & Edwards, E. B. Parsons and H. N. Sweet are the builders.

A BUSINESS BLOCK, 80 x 130 feet, three stories high and costing $16,000, is in progress at Frankfort, Ind. J. W. Hammond, of that place, is the architect, and De Long & Palmer are the builders.

DR. P. R. BENNETT, JR., of Urbana, Ohio, is about to build an opera house covering 48 by 122 feet area. Lon Krider, of Springfield, Ohio, is preparing the plans. The builder has not yet been selected.

THE NEW CHAPEL and library buildings for Columbia College, this city, have been commenced. The structures are to be of brick, with fire-proof apartments for valuable books, and will cost $75,000.

THE LITTLE TOWN of Wharton, Ohio, is building several dwelling houses, a number of business rooms and a church. A number of the designs have been prepared by Mr. Philip Will, architect, of that place.

A REPORT FROM the committee of one, the appointment of which is recorded in the second column of page 135 of this issue, is requested by the tenth of each month. Postal cards may be used for the purpose.

IN 1877 CINCINNATI employed 1000 carpenters; in 1878, 893; in 1879, 1100, and in 1880, 1200. The relative number of mechanics employed in other building trades during the same period was about the same.

MR. WILSON WADDINGHAM is building a dwelling at New Haven, Conn., the estimated cost of which is $150,000. Messrs. Brown & Stilson, of New Haven, are architects, and James Scott is the builder.

A CORRESPONDENT in North Louisiana writes that there are few first-class workmen in that region. Wages are from $2.50 to $3 per day. Time, from sunrise to sunset. There is no definite system of labor in practice.

A HOTEL, a public hall and a store building are in progress at Lake Benton, Minn. The hotel is estimated to cost $5000, and is the property of D. Hasly. The store building will cost about $3000. J. R. Taylor is the builder.

GALVANIZED SHEET-IRON work to the amount of $600,000 was manufactured in 1880 in Cincinnati alone. This was nearly twice as much in volume as was produced in 1870, and nearly seventy times as much as that produced in 1860.

BY A RECENT report of the Cincinnati Board of Trade and Transportation, we learn that 167 firms in that city are engaged in carpentering, having an invested capital of $276,000, employing 1200 men and doing a business of $1,450,000 annually.

E. S. GARDINER, of Springfield, Mass., has prepared plans for dwelling houses for Mr. E. S. Boss and Mayor William E. Barrows, of Willimantic, Conn. The estimated cost is from $15,000 to $20,000 each. Dwight E. Petter, of Willimantic, is the builder.

HENRY N. BODWELL, of Castine, Me., has prepared the plans for a town hall and a hotel; also for a number of seaside cottages to be erected in that place this season. The Castine Lumber Company are the contractors for a part of the improvements.

TWO NEW HOTELS are contemplated in the place of the old one burned some time since at Skowhegan, Me. An addition to a woollen mill, a large canning factory, a Catholic church and a number of dwelling houses are among the buildings now in progress.

AN APARTMENT HOUSE, to be known as "The Graham," having a frontage of 175 feet and a depth of 100 feet, and to be fireproof throughout, is now being erected in Twenty-third street, near Seventh avenue, this city, for Mr. F. G. Hyatt. The cost will be $69,000.

A CHURCH, 50 by 110 feet in size, to cost $10,000, is being erected at Emmetsburg, Iowa, to plans prepared by B. J. Bartlett, of Des Moines. A store building, costing $8000, and a hotel, costing $4000, are also in progress. Messrs. Bostwick & Armstrong are the contractors of the latter.

WEST UNITY, OHIO, suffered severely from fires a short time since, there being two destructive conflagrations, which consumed the larger portion of the business part of the town, including the Masonic Hall. A number of new buildings are to be erected this season to replace those destroyed.

G. H. H., OF PHILADELPHIA, who has contributed so acceptably to our correspondence department in the past, says, concerning our special enterprise this month: "A good idea—will try to do more for you in the future." We desire to remind him that he is continued on the committee of one.

AT WATERBURY, CONN., Dr. Rodman is building a residence to cost $30,000. Kimball & Wisedell, of 824 Broadway, New York, are the architects. Floyd Smith, of Waterbury, is the builder. The Waterbury Clock Co. are about to add a large shop, four stories high, to their present capacity.

THE "HOTEL DEL MONTE," at Monteray, Cal., is said to be a fine specimen of the Eastlake style of architecture. The total cost was about $100,000, and nearly the same amount was expended on the grounds and the bath house, making it one of the finest health and pleasure resorts in the West.

AT SAN JOSE, California, the State normal school, covering about 19,000 square feet in area, four stories high and costing $150,000, has just been finished. D. Goodrich, of San José, was the architect. The work was done by the day under the superintendence of S. H. Kent, of San Francisco.

OUR OLD FRIEND "Wood Butcher," well-known to the readers of this journal, paid us a visit a short time since. He is looking well for a man of his years. Some new shingles seen protruding from his pocket lead us to believe that we are likely to have another characteristic letter from him before long. It will be welcome.

IN SOME of the seaport towns of Maine, says a correspondent, the carpenter is the architect, builder and superintendent of all the improvements projected. It is necessary for him not only to be acquainted with all the parts, from digging the cellar to topping out the chimneys, but occasionally, for lack of help, he must perform many of these offices himself.

THE BUSINESS of manufacturing architectural iron work, for which Cincinnati has been noted for years, seems to be on the decline. The demand for cast iron for building purposes has been diminishing for several years past. The volume of trade for 1880 shows a falling off from that of 1870, and the prospects for the future are not considered promising.

THE TEN-STORY bank and office building which is to rise on the site so long occupied by the Nassau Bank, this city, will have a superficial area of 100 by 103 feet. It will be of granite up to the third story, and above that of Philadelphia brick. The trimmings will be of Dorchester stone and terra-cotta. The owner is Mr. Eugene Kelly, and the cost is estimated at $1,000,000.

THROUGHOUT THE SMALLER towns of California and some other portions of the extreme West bricklayers and masons are very scarce, there being little or no work in their line performed. Most of the buildings erected are of wood. What little painting is done is performed by the carpenters, unless very fine work is required, in which case painters are brought from the larger cities.

AMONG THE NOTABLE buildings down town in New York city, now in progress of erection, is the Mills Building, facing on Wall street, Broad street and Exchange Place. This structure is 163 by 100 feet in plan; it will be 10 stories high, and fire proof throughout. Above the basement, which is of granite, it will be built of brick and Belleville stone. The cost will be $1,000,000.

A TEN-STORY ADDITION to the *Tribune* Building, this city, is now in process of erec-

tion. This will complete that structure as originally contemplated by the architect, and will go far toward improving those features which have made it grotesque, and which have caused so much newspaper comment in the years since it was erected. The addition is to be fire-proof and will cost $228,000.

Capt. D. F. Giddinger, architect and builder of the National Homes for Disabled Volunteer Soldiers, has recently furnished a set of plans for a dining hall to be erected in connection with the Home at Fortress Monroe, Va. The first floor will contain a dining room large enough to seat 800, with kitchen facilities to correspond. The second floor will be used for a theatre and billiard room, the theatre having a seating capacity for 1000, with complete stage and scene attachments.

A quarter of a million of dollars is a large sum to put into a house, but if the money is wisely expended the result is not exclusively the delight of the owner, but a joy to every passer-by. Some of the fine houses on Fifth avenue, this city, wonderfully refresh the eye fatigued with the monotonous miles of brown-stone "palaces" of the conventional pattern. They differ agreeably in form and material from their neighbors, and represent something more than the power to hew out square stone blocks and lay them one upon another.

"H. McG.," of Paterson, N. J., was disposed to be facetious in sending his reply to the circular of inquiry addressed to him. His report, somewhat condensed, is as follows: The present condition of building is "bang up," prospects are "bully," mechanics are generally employed and "more too." To the question, "Are important buildings contemplated in your vicinity?" the reply is "lots of 'em." To the next question, "For what purpose intended?" the reply is "for everything except the gospel." Approximate dimensions are given as "30 or 40 acres." To the request for name of owner, the reply is "about 200 of them; your blank is too small." The architects are declared to be "mostly carpenters," the addresses of which are "all over town." As to builders he reports the "woods full of them."

A number of new theaters are being erected in New York city at the present time. Prominent among these may be mentioned Mr. Lester Wallack's, at the corner of Thirtieth street and Broadway. The dimensions are 75 feet front by 155 feet depth. The building is to be surmounted by a mansard roof of vitrified tile or slate. The cost is estimated at $100,000. The new opera house at Broadway, Seventh avenue, Thirty-ninth and Fortieth streets is to cost, including the price of the lots, about $1,000,000. Messrs. Miner & Canary have begun a three-story brick theater at Nos. 312 and 314 Eighth avenue, to cost $30,000. A new theater is also contemplated on the site of the Aquarium, and still other up-town enterprises of a similar character are talked of, about which nothing definite is known.

The Pullman Palace Car Co. some time since bought 6000 acres of land on Calumet Lake, 14 miles south of Chicago, for the purpose of erecting factories and establishing homes for their workmen. Pullman was the name given to the place, and all necessary arrangements were commenced for making a city. Communication with Lake Michigan was established by means of a canal. Buildings were commenced about a year ago, one of the first structures erected being for offices and shops for sleeping cars. In size this building was 200 x 800 feet. Other buildings of about the same dimensions, some of them three stories high, have also been built. Power is furnished by the celebrated Corliss engine which was exhibited at the Centennial. Water works, gas works, a large hotel, churches, a school house and about 600 dwellings have been completed; 2000 additional houses are contemplated during the present season. A post-office building, depot and several store buildings are at present in progress.

Builders' Sheet Metal Work.

BY A. O. KITTREDGE.

QUALITY AND GAUGES OF SHEET IRON.

Of all that has been published about sheet-metal work, I am not aware that anything has yet been prepared expressly for the guidance and instruction of builders by writers who are practically familiar with the subject. It is true that the series of articles which appeared in one of the earlier volumes of this journal, entitled "Tin Roofs," presented many facts of value to builders, to which their attention had never before been directed. But even they described the art of making tin roofs in about the way information would be conveyed to a novice in the tin trade, rather than in a way to make a builder understand tin work so as to buy well, and manage tinners understandingly in the interest of the buildings he constructs. I fear much was left unsaid in them which might have been said to the advantage of the builder. It is not my purpose, however, at this time to review or rewrite those articles. I allude to them only to explain my purpose in what follows, and to indicate a reason for the method pursued. I propose now to consider other branches of sheet-metal work, which are of scarcely less importance than tin roofs. From experience I know that careful attention to the details of any part of the sheet-metal trades will amply repay the builder for his trouble.

It is hardly necessary to remind a builder, who is by force of circumstances more or less acquainted with a half dozen trades, that every trade has its secrets, so called. He knows what this signifies when applied to his own business, and, therefore, can form an opinion of what it means when applied to another. These trade secrets consist for the most part of a knowledge of materials, a familiarity with processes of manipulation, means of manufacture, &c. They are frequently embraced in what is called a practical experience in the trade named. If a builder's customer, for whom a house is to be built, understands the building business practically himself, his ability to order just what he wants, and to know when he gets what is specified, is as ten to one comparing him with a man who has had no experience whatever in that direction. So with the builder; if he understands tin work, slate work, galvanized-iron work, plumbing, and so on to the end of the list, his ability to manage the mechanics whom he employs in these several lines is greatly superior to that of the man who has no experience in this direction. The possession of trade secrets, therefore, by any one outside of a trade, enables him to control that trade to his own advantage. It is not my object to reveal trade secrets for the sake of telling them. But I shall endeavor, in the course of these articles, to put the builder in possession of such facts connected with the various branches of the sheet-metal trades as will enable him to manage work in this line to his advantage. What little I shall reveal of the tinner's and cornice worker's arts will not damage these two classes of mechanics and manufacturers in the least. Whenever their trades are better understood by the community at large, their importance will be more appreciated, and sheet-metal workers, from being called tinkers, a term of derision and reproach, will advance to their proper place in the front ranks of the building trades. It is well oftentimes to throw a gleam of light into dark places.

Let me first direct the builder's attention to the kinds and qualities of sheet iron commonly met in his work, as being quite important considerations. There are two general qualities of sheet iron made, and whether used in the black or galvanized, or called by one name or another, there is no excuse for confounding them. Employing the most familiar terms, these two qualities may be designated as good and bad. This, however, may lead to a misapprehension, for both are good for the purposes intended, and to which they are adapted. The bad is developed only when the inferior is made to do the work of the superior. The common or lower grade of iron is known in different sections of the country by different names. In some places it is called "common iron." In others it is known as "boiled iron." The term "refined iron" is applied in some cases. Its principal use names it in still other places, and, therefore, it is known as "stove-pipe iron." The better quality is also variously designated. It is known as "charcoal iron," "best bloom," or "B B," "Juniata," &c. These terms are not always applied in the same sense, different manufacturers giving different significance to the names, according to the quality of their own product. Still other terms besides those I have mentioned are also in vogue, but it will not serve the builder's interest to define them in detail. The quality of iron is not determined by the brand which is applied to the bundle, but by an actual test. A builder can prove the quality of sheet iron as well as a tinsmith.

The tinner's test for all sheet metals, for toughness and tenacity, is making a double seam, as he calls it. To turn an edge upon a piece of sheet iron flat against itself, may, for lack of a better term, in this connection be termed a single seam. To turn a second edge—that is, to bend the piece so that the first edge will be folded within the second—very nearly resembles a double seam, or, rather, tests the metal as it would be tested if a double seam were actually made. Now, if the parts be pressed closely together by the use of a wooden mallet against a solid metal surface, and no sign of fracture is shown along the folds, it is pretty fair evidence that the iron is possessed of a considerable degree of tenacity of fiber and toughness, which indicates that it belongs to the better of the two classes I have described. A still further test is to straighten out the piece thus folded together, and after smoothing it under the mallet, examine it again for fractures. It is only the very best iron that will endure this second test.

So much for the quality of iron, whether black or galvanized, as regards toughness. The surface of the sheet is also to be considered. A sheet having a very smooth surface is sometimes quite poor in other particulars, while, in other cases, a sheet very rough and uninviting in general appearance will develop under trial a quality altogether unexpected. All things being equal, a sheet of iron with a smooth surface is to be preferred, for whatever purpose employed, to one with a rough, uneven surface, more or less disfigured by scale. When it comes to considering the surface of galvanized iron, the thickness of the coating and its adhesion to the sheet are to be examined, as well as all the other points to which attention has been called. In some irons it will be found that the galvanizing presents a bright appearance, pleasingly diversified by large crystals, while in others a mottled gray look, rather dull, than otherwise, will be displayed. These differences in the appearance of the sheets are no indications of the quality of the iron, and in most cases form no guide as to the character of the galvanizing. They refer rather to the composition of the coating in unimportant details. A good coating is so thick that it can be readily estimated by cutting into the surface with a pocket knife or a sharp-pointed tool of any kind. It adheres so closely to the iron that it does not readily scale when the piece is repeatedly bent backward and forward. A poor galvanized iron—that is poor in quality of coating—would be entirely stripped of its zinc by double seaming, as described above. On the other hand, I have seen galvanized iron on which the coating was so good that but little fracture was caused in it by the second or extreme test referred to. A good coating may be put upon poor iron, and *vice versa*.

I will close the present paper by a few observations concerning gauges in connection with sheet iron. The term gauge is used to designate thickness. It is frequently expressed "wire gauge," which indicates exactly what is meant. A sheet of iron that is just thick enough to enter the slot of a wire gauge, numbered 26, for example, is called No. 26 iron, and so on for other thicknesses ranging from, say 14, the thickest in common use, to 29, the thinnest that is ordinarily em-

ployed. Wire gauges are quite arbitrary in their divisions, and in many cases are inaccurate, so that applying a gauge to the edge of a piece of iron is not in all cases a satisfactory test. Accordingly, tables have been prepared of the weight in ounces of a square foot of iron of the different gauges. No. 26 iron, for example, at present is understood to mean iron which weighs 15 ounces to the foot, rather than sheets which exactly fill the slot numbered 26 in some wire gauge. The number branded upon a sheet of galvanized iron or printed upon black iron, no more determines the gauge than a painted brand determines the quality. It is notorious that much of the iron sold is improperly branded, so far as concerns the gauge numbers. Different thicknesses of iron are sold at different prices, and as the lighter gauges command the higher prices per pound, the tendency of errors in marking is in the direction of branding heavy sheets with a light gauge number. This is greatly against the interest of any one who buys by the pound and sells by the square foot, which is practically what is done by every one who works sheet iron. Take it in the case of a roof—a hundred squares, for example, are to be covered. The iron is purchased by the pound, and the quantity required is calculated by the weight per foot of the gauge selected. Suppose No. 25, which weighs one pound to the foot, is to be used. The calculation is made that 10,000 pounds plus the amount in joints are required, and the order is sent accordingly. The iron comes to hand branded No. 25. It is passed upon because the correct brand appears, but actually weighs, we will say, 17 ounces to the square foot. The roofing is commenced. But for some unexplained cause there is not enough iron to cover the surface (100 squares). There is a shortage of some six squares. The deficiency is a surprise, and very generally the first impression is that too little iron has been shipped from the mill, and that, accordingly, there is a just claim against the manufacturers for a reduction. This is met, however, by the shippers with a detailed list of weights of bundles, clearly proving that the correct number of pounds was shipped. The calculations upon which the order was based are reviewed and are found correct. It requires considerable experience before the actual character of the error is discovered. What is here explained to the builder, I have reason to believe, is not thoroughly understood by one tinner or roofer in a hundred.

The table given below will facilitate calculations in matters of this kind. Weigh specimen sheets of the iron, selected at random, and, calculating their superficial area, determine their weight per square foot, or count the number of sheets in the entire lot and calculate the number of square feet of surface contained. Divide the entire weight by this number of feet and thus ascertain the weight per square foot. Quotations are ordinarily made at so much a pound for a specified gauge. If the gauge of the iron shipped is by this test proven to be something else than that named and priced in the invoice, there are good grounds for claiming a correction.

GAUGE NUMBERS AND WEIGHTS OF SHEET IRON.

Gauge No.	Wt. per sq. ft. bl'k or gal'd. ounces.	Gauge No.	Wt. per sq. ft. bl'k or gal'd. ounces.
14	60	23	19
16	48	24	17
17	43	25	16
18	38	26	15
19	33	27	14
20	28	28	13
21	24	29	12
22	21		

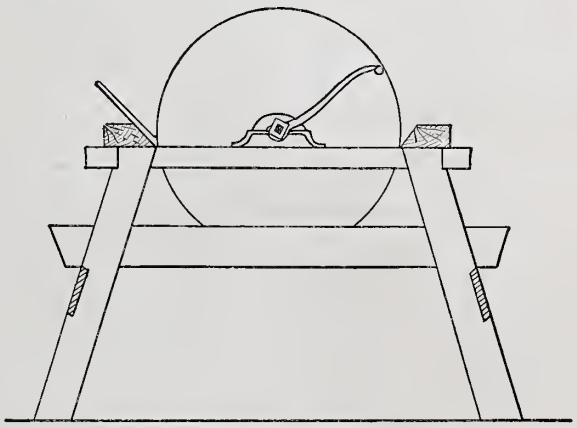
An impression prevails in some directions that galvanized iron is estimated by a different scale of weights from black iron, or, in other words, that No. 26 galvanized iron is heavier than No. 26 black iron by the amount of the coating applied. If a sheet of No. 26 iron were to be galvanized it would undoubtedly be thicker than No. 26 black iron. The facts of the case are, however that for No. 26 galvanized iron a gauge enough lighter is employed, so that the coating added will bring it up to the proper thickness. Hence the table above given is correct for use with both black and galvanized sheets.

CORRESPONDENCE.

In order to successfully launch our new department of building operations and wages, which is made a prominent feature of the paper this month, we communicated by circular and postal card with upward of two thousand of our subscribers. The response to our request for information was general and of the most hearty kind, and the mass of matter which it brought to our desk was sufficiently bulky to be appalling when the labor of examining and sifting it was considered. We performed the work, however, and our readers have the result upon another page. We trust all who have aided us in this compilation will feel repaid for their trouble in the pleasure and profit they may derive from a perusal of the portion of the paper to which we have referred. We take this occasion to express our obligations to our correspondents. All who have taken the trouble to answer our questions have our thanks for their co-operation. Those who, in addition to filling out the blank report sent them, have written letters detailing current building operations in their neighborhood, have conferred still further favors; while those whom we did not call upon at all have our thanks for the feeling of willingness to help which is in their hearts as they read this. They may be of service at other times. We have found it impossible to use more than a small portion of the news items sent in, but there were no responses addressed to us that were not appreciated. We propose making a column of building intelligence a regular feature of the paper for the future, and to this end shall be pleased to have each of our subscribers and readers consider himself a special committee of one to report for his immediate neighborhood. The items most desirable for our purpose may be briefly enumerated in this connection. We desire the names of the prominent buildings being erected or in contemplation, and the purpose for which they are intended; their approximate ground dimensions; number of stories; general features of architecture and material used in construction; approximate cost; name and address of owners, architects and builders, and any other items of interest that may occur to the correspondent. In sending reports of this kind we urge the greatest care in writing and spelling names of persons and places, and in giving correct initials and Christian names to the persons mentioned. It is very annoying to print a name either wrongly spelled or prefixed by an erroneous initial. Do not fail to date the letters, nor to give town, county and State. Of the reports just received, we find that several hundred give no town or post office, making us dependent entirely upon the postmark for information as to the source. A very large number are without dates, while a few are unsigned. By a little co-operation upon the part of our subscribers in the matter of reports, we shall be able to maintain another interesting and profitable department in *Carpentry and Building*. Many who have aided us in the present instance have expressed their liking for the paper and their appreciation of our efforts. All such words of encouragement do us good and stimulate us to renewed exertion. In proposing this new departure, we do it in the hope of making the paper still more useful. All we need to make it a success is a corps of willing correspondents who will forward the items as they occur. We will attend to the rest.

Using the Grindstone.

From F. S. W., *Cleveland, Ohio.*—The inclosed sketch shows an easy method of using the grindstone for hand tools. It consists of placing across each end of the frame a block of wood 2 x 4 inches in size, beveled to suit the desired pitch for plane irons, chisels, &c. The iron to be ground is held face side down upon the beveled block with either the right or the left hand, as the case may be, the other hand turning the stone. Whenever the stone becomes glazed by turning in one way, change hands and turn the stone in the opposite direction, or it may be turned backward, if preferred. When the stone gets a little out of true, I change the handle one-quarter of the way around. If the stone is even grit, this will cause it to work true again. It is really a luxury for me to grind by this method, so much so that, although I have steam power which I run part of the time, I seldom employ it for grinding. It happens that I am usually otherwise occupied when power is running; hence the convenience of the method which I describe.



F. S. W.'s Method of Using the Grindstone.

Area of a Segment of a Circle.

From S. R. K., *Grand Rapids, Mich.*—In answer to O. W. D., of Hornellsville, I would say that the most simple means for finding the area of the segment of a circle is first to find the area of a sector whose arc is equal to that of the given segment, and if it be less than a semicircle subtract the area of the triangle formed by the chord of the segment and radii of its extremities. If it be more than a semicircle, add the area of the triangle to the area of the sector and the remainder, or sum, as the case may be, will be the area of the segment. This may be formulated in rules as follows:

1. Multiply the length of the arc by one-half the radius, and the product will be the area of the sector.

2. Multiply the length of the chord by one-half of the perpendicular distance from the chord to the center of the circle, and the product will be the area of the triangle.

3. If the segment be less than a semicircle, subtract the area obtained by rule 2 from that ascertained by rule 1; the difference will be the area of the segment. If the segment is greator than a semicircle, add the areas determined by rules 1 and 2. The sum thus attained will be the area of the segment.

From W. I. D., *Paterson, N. J.*—In answer to O. W. D., who asks for the area of the segment of a circle, I will give him a rule which I found in a book, conditioned that he will not call upon me for a proof of it. The expression for the area is $\frac{2\,C\,V}{3} + \frac{V^3}{2\,C}$ in which C is the chord and V the versed sine. Multiply the chord by the versed sine, or half the chord; then to two-thirds the

product add the quotient arising by dividing the cube of the versed sine by twice the chord.

From F. J., *Lowell, Mass.*—O. W. D.'s problem of finding the area of the segment of a circle by lines may be performed as follows: Divide the base into any number of equal parts and erect perpendiculars to touch the arc. Ascertain their lengths and divide by their number, which will give the mean breadth. Multiply the mean breadth by the base (arithmetically). First, find the area of a sector whose arc is equal to the given segment. If it be less than a semicircle, substract the area of the triangle found by the chord of the segment and the radii of its extremities. If it be more than a semicircle, add the area of the triangle to the area of the sector, and the sum, or the remainder, as the case may be, is the required area. If this answer is not satisfactory and diagrams are required illustrating the rule, I will be pleased to send them. The mechanical rule here stated is only an approximation; the more perpendiculars employed the nearer the answer will be correct.

From M. W. T., *Clarksburg, W. V.*—In answer to O. W. D., who requests a rule for finding the area of the segment of a circle, I would refer him to the following, when the chord and hight are given. To two-thirds the product of the base multiplied by the hight, add the cube of the hight divided by twice the length of the segment. The same will be the area nearly.

The Art of Saw Filing.

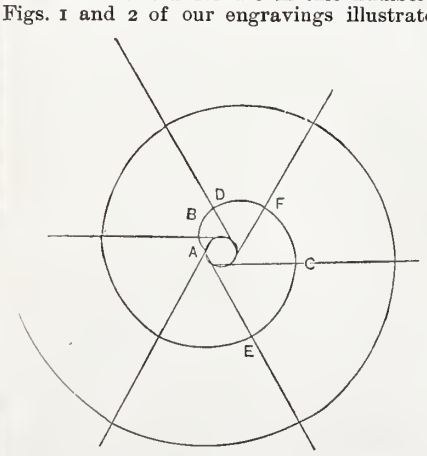
From A. A. F., *Byesville, Ohio.*—The art of saw filing is something which but comparatively few workmen who employ the hand-saw really understand. While a few are ready to admit that they cannot put a saw in first-class order, the great majority of mechanics claim that they cannot be told anything about filing a saw. A glance at their tools will show at once that they do not know the first principles of the art, or, knowing them, are too heedless to make proper application of them. As the saw is one of the first and most important tools the carpenter uses, it is of the greatest importance that it should be kept in the best of order. Having used that implement almost constantly for the last 25 years, I propose to give to the readers of *Carpentry and Building* some directions concerning the management of this tool which I have found to be useful. If any one employs a plan that is better I shall be glad to hear from him, for I am still a learner.

The first thing to take into consideration is the clamp for holding the saw while it is being filed. Clamps are very generally made of two flat pieces of board put together with a single screw, or else with a screw at each end. The top edges are beveled. This is considered a good saw clamp, but for my part I would as soon have a bunch of shingles set up on end, into which to place the saw for filing, as to use a clamp of this description. I am not an advocate of patent clamps nor of filing machines. Some of them may be good, but I never yet have used one that is better than that I shall now describe, and which is so simple in its parts that any carpenter can construct it in a half hour's time. Once made it will last for many years. Take two pieces of straight-grained wood, (soft wood preferable to hard) 3 to 3½ inches wide and a little longer than the longest saw that is to be filed. Every carpenter ought to know that if two such pieces are put together flat and kept so, the action of the atmosphere on the outside surfaces will cause them to work outward, so that when he presses them together the joint will be open at both ends. When a saw is filed between pieces warped in this manner it will rattle so that it may be heard a long distance. In order to avoid this difficulty, take an oval bit plane and hollow out the sides of the pieces which are to come together. I do not mean to gouge them out in ridges, but to make them concave, say at least 1-16th inch deep in the center and tapering to the edge, all in a workmanlike manner. Let the concavity run from end to end of each piece. Next bevel that which is to be the top edge to an angle of, say 45 degrees; a little more rather than less. It is also essential to have the pieces hollowing lengthwiso on the inside. They should be sufficiently hollowed, so that when they are laid together with the ends touching, they will be ¼ inch apart in the center on both edges. With all this done, the strips are not yet ready to fasten together. Quite an essential part is yet to be done, that is, to bevel off the outside lower edges from about the center to the lower edge, leaving the edge about ½ inch thick. Some of your readers may say they cannot see what there is so essential about this. I will explain. The vise should hold the clamps in the center, and not at the extreme top or bottom. If the outside is left flat and the vise is thrown out far at the foot, it will apply the greatest pressure at the top edge of the clamp or *vice versa*. By considering the section of the clamp constructed as I have described, it will be seen that it is possible to fasten them together with a wood screw at each end if desired. In my practice, however, I only use one, and that is at the point end of the saw. Since the clamp is bowing lengthwise, it will grasp the saw first at the extreme ends; then as it is tightened in the vise, which should hold it in the center, it will finally press upon the saw firmly from end to end. Further, it will hold it firmly both along the top and bottom edges; consequently, when the file comes to be used it will prove to be almost as solid as a block of metal. The construction of a clamp of this kind in an intelligent manner embraces about one quarter of the art of saw filing. I will defer the remainder until another time, as I believe editors are apt to frown at long communications.

Drawing Scrolls and Spirals.

From E. F. S., *South Boston, Mass.*—Will you not explain in *Carpentry and Building* the means of drawing scrolls and spirals? I am acquainted with one or two simple rules, as, for example, drawing the spiral from two points by means of the compasses, which answers very well in some cases, but this rule is altogether inadequate where the spaces between the lines are large. I would like to see the matter treated exhaustively, and also a good rule presented for drawing the scroll end to a modillion side.

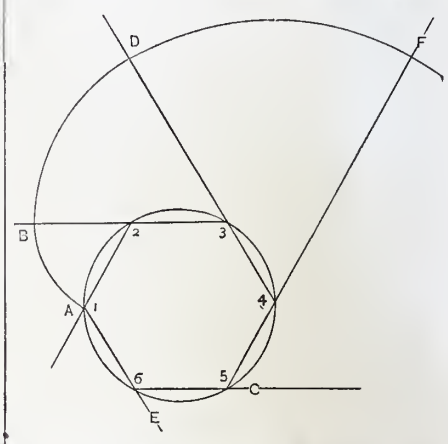
Answer.—We take pleasure in complying with our correspondent's request, although the reply demanded will occupy so much space as to make it necessary to carry over other valuable and interesting matter which had been intended for use in this number. Figs. 1 and 2 of our engravings illustrate



Scrolls and Spirals.—Fig. 1.—Drawing a Spiral from Centers with Compasses.

the method of drawing a spiral from center with the compasses. Draw a circle, called the eye of the spiral, or primary, and divide it into any number of equal parts, in this case, six. Fig. 2 shows an enlarged view of the primary. After the points in it have been established, the next step is to complete the polygon by drawing the lines 1 2, 2 3, 3 4, &c., producing them outside of the primary, as shown by A, B, D, F, C and E. From 2 as center, with 2 1 as radius, describe the arc A B. From 3 as center, and 3 B as radius, describe the arc B D; and with 4 as center, with radius 4 D, describe the arc D F. In this manner the spiral may be drawn any number of revolutions. Use 1, 2, 3, 4, 5 and 6 as centers, describing from each in turn an arc contained between two sides.

To draw a simple volute, let D A, in Fig. 3, be the width of a scroll or other member for which it is desired to draw a volute termination. Draw the line D 1, in length equal to three times D A, as shown by D A, A B and B 1. From the point 1 draw 1 2 at right angles to D 1, and in length equal to two-thirds the width of the scroll, or, what is the same, to two thirds the width of D A. From 2 draw the line 2 3 perpendicular to 1 2, and in length equal to three-quarters of A D. Draw the diagonal line 1 3. From 2 draw a line perpendicular to 1 3, as shown by 2 4, indefinitely. From 3 draw a line perpendicular to 2 3, producing it until it cuts the line 2 4 in the point 4. From 4 draw a line perpendicular to 3 4, producing it until it meets the line 1 3 in the point 5. In like manner draw 5 6 and 6 7. The points 1, 2, 3, 4, &c., thus obtained are the



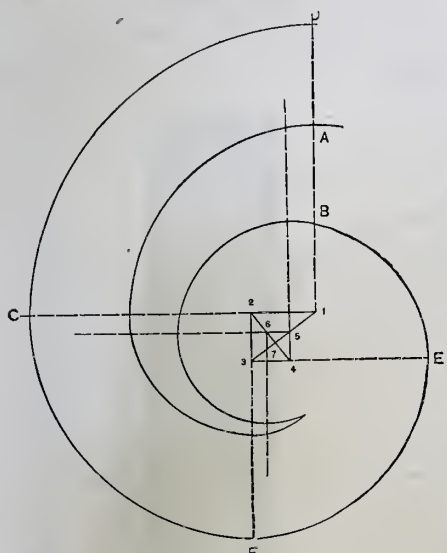
Scrolls and Spirals.—Fig. 2.—Enlarged View of the Central Part of Fig. 1.

centers by which the curve of the volute is struck. From 1 as center, and with 1 D as radius, describe the quarter circle D C. Then from 2 as center, and 2 C as radius, describe the quarter circle C F, and so continue until the figure is completed, as shown.

To draw a spiral by means of a spool and thread, set the spool, as shown by A D B in Fig. 4, and wind a thread around it. Make a loop, E, in the end of the thread, in which place a pencil, as shown. Hold the spool firmly and move the pencil around it, unwinding the thread. A curve will be described, as shown in the dotted lines of the engraving. It is evident that the proportions of the figure are determined by the size of the spool. Hence a larger or smaller spool is to be used, as circumstances require.

To draw a scroll to a specified width, as for a bracket or modillion, as in Fig. 5, let it be required to construct a scroll which shall touch the line D B at the top, E A at the bottom and A B at the side, the length of A B, which determines the length of the top and bottom line, being given. Bisect A B, obtaining the point C. Let the distance between the beginning and ending of the first revolution of the scroll, shown by *a e*, be established at pleasure. Having determined this distance, take one-eighth of it and set it off upward from C on the line A B, thus obtaining the point *b*. From *b* draw a horizontal line of any convenient length, as shown by *b h*. With the point of the compasses set at *b*, and with *b* A as radius, describe an arc cutting the line *b h* in the point 1. In like manner, from the same center, with radius *b* B, describe an arc cutting the line *b h* in the point 2. Upon 1 2 as a base erect a square, as shown by 1 2 3 4. Then from 1 as center, with 1 *a* as radius, describe an arc *a b*; and from 2 as center, with 2 *b* as radius, describe the arc *b c*. From 3 as center, with radius 3 *c*, describe the arc *c d*. From 4 as center, with radius 4 *d*, describe the arc *d e*. If the curve were continued from E, being struck from the same centers, it would run parallel to itself; but as one line of the scroll runs parallel to the outer line, its width may be set off at pleasure, as shown by *a a*¹, and the inner line may be drawn by the same centers as already used for the outer, and continued until it is inter-

sected by the outer curve. To find the centers from which to complete the outer curve, construct upon the line of the last radius above used (4 *e*) a smaller square within the larger one, as shown by 5 6 7 8. This is better illustrated by the larger diagram, Fig. 6, in which like figures represent the same points. Make the distance from 5 to 8 equal to one-half of the space from 4 to 1, and make 4 to 8 equal the distance of 5 to 1. Make 5 to 6 equal the distance from 8 to 5.



Scrolls and Spirals.—Fig. 3.—*Goldman's Rule for Drawing a Simple Volute.*

After obtaining the points 5, 6, 7, &c., in this manner, so many of them are to be used as are necessary to make the outer curve intersect the inner one, as shown at *g*. Thus 5 is used as a center for the arc *e f*, and 6 as a center for the arc *f g*. If the distance *a a*^{1} were taken less than here given, it is easy to see that more of the centers upon the small square would require to be used to arrive at the intersection.

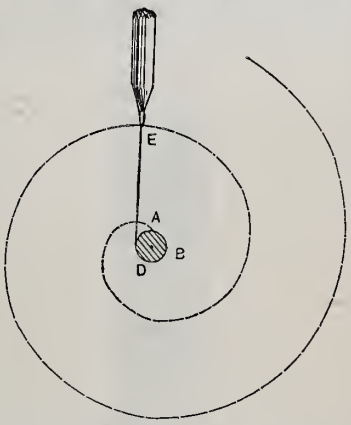
Backing Hip Rafters.

From D. E. D., *Jersey City, N. J.*—I want to say something about T. M.'s method of getting the backing of hip rafters, published in the February number. In the first place, he gives a plan of hip rafter and then goes on with the jack and common rafters, omitting entirely the backing of the hip rafter. I think his ideas should be cleared up a little before he undertakes to present a rule for publication in *Carpentry and Building*. I will undertake to describe a method for finding the bevels of hip rafters which I have tested and know to be correct. It can be found in Bell's "Art and Science of Carpentry Made Easy." It is as follows: To find the down and lower-end bevels of a hip rafter, take 17 inches on the blade of the square and the rise of the roof to the foot on the tongue. Make a knife scribe up the blade and down the tongue. The blade will be the lower end bevel and the tongue the down or upper end bevel. The reason for this operation is as follows: The relative position of a hip rafter to a common rafter is as 12 to 17—that is, if a common rafter, in running 12 inches, rises 6 inches, it will take 17 inches on the run of a hip rafter to rise 6 inches. The position is the same on any roof or any pitch. To find the side bevel, take the length of the hip rafter on the blade of the square and its run on the tongue, or proportional parts of each; then the blade will show the side bevel. To get the backing, take the length of the hip rafter on the blade of the square and the rise of the roof on the tongue. Draw a line down the tongue and set a bevel square to it, which will be the backing.

Further Information About Hip Rafters Required.

From WOOD CHOPPER, *Nashville, Tenn.*—I have been reading and studying the discussion that has been carried on in *Carpentry and Building* between our old friend who writes his opinions upon a shingle and G. H. H., A. M., A. S. L. and others upon framing and backing hip rafters. I think the whole subject has been made clear enough, so far as the backing of hips are concerned. I thought that I had the whole way of doing the thing in my head, and I still think I am competent on a common hip roof; but when it comes to setting hip timbers square with the world I find that I am in the dark. I need still further information. What I desire to learn may be stated as follows: Suppose that hip rafters or hip timbers, say 8 x 8 square; the sills, say 18 feet from out to out—the apex of the roof is 6 feet above the sills—the hip rafters are to stand square with the building, or, in other words, the diagonal line to stand perpendicular to the horizon. I desire to be informed how to get bevels for both top and bottom to cut by before backing, and also after backing, in a frame of this kind? I also wish to know how to get the length under both operations?

Note.—Although the points raised by this correspondent are thoroughly covered in the first volume of *Carpentry and Building*, in the series of articles entitled "Some Problems in Framing" and the correspondence which grew out of the same, there are probably some features which our readers may still feel disposed to discuss in this connection, and therefore we publish our correspondent's inquiries as above. In the letter from which the above is an extract, our correspondent says we need not refer him to anything that has been published in the first volume of the paper, because he is not in possession of it. We do not think this a sufficient reason, from the simple fact that $1.75 will put in his hand the papers for that year, handsomely bound. It would be impossible, in the conduct of this paper, to give the entire range of information required by carpenters and builders each year. In order to make the paper useful we must confine ourselves, as far as possible, to new topics, and therefore those of our readers

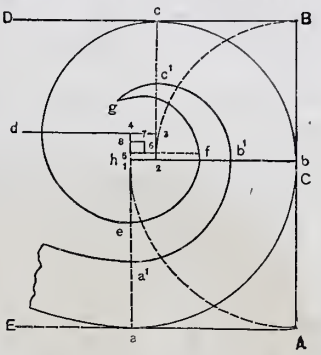


Scrolls and Spirals.—Fig. 4.—*Drawing a Spiral by means of a Spool and Thread.*

who desire to get the greatest benefit from this work will need the back volumes to refer to. Every number of *Carpentry and Building* is electrotyped, and accordingly back numbers can be supplied as may be required. We mention these facts not only for the benefit of the correspondent whose letter we give above, but for others who have written us in a similar way.

The Apprentice Question.

From C. W. R., *Geneva*, ——.—The apprentice question has been frequently hinted at in the correspondence department of the paper, but has never been thoroughly discussed. People seem to evade it, and I think for good reasons. An apprentice at this day and age is, as a rule, a terror to good work and something to be dreaded. There are very few foremen who care to add to their daily responsibilities and anxieties by the additional load of an unruly, conceited and stubborn youth. My experience in the matter is that boys must be taught at home the common principles of decency and proper respect for superiors to render them desirable candidates for apprenticeships. It is too much to ask master mechanics to disabuse their minds of fifteen years' growth of human noxious weeds while teaching them the principles of a trade. Prevention is far cheaper than cure, and whenever parents take sufficient interest in their children to properly educate them and thus lay foundation principles upon which to build, master mechanics will become interested in boys and there will be some hopes of their success. I am persuaded that there are few boys of from twelve to thirteen years of age who could not find ready employment if it were not for their miserable home training. Boys who are properly managed at home are always sought out and employed. Choice help is always at a



Scrolls and Spirals.—Fig. 5.—*To Draw a Scroll to a Specified Width, as for a Bracket or Modillion.*

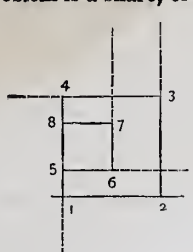
premium, while worthless help goes a begging. Especially is this the case with boys. I submit these opinions as my views upon the apprentice question, and trust their utterance will call forth letters from others.

The Carpet Problem.

From C. L. H., *Clarksburg, W. Va.*—In the February number of *Carpentry and Building* J. E. W. asks for a solution to the problem of cutting a strip of carpet to run diagonally across a room 12 x 24 feet, the carpet to be square at the ends, and each corner to touch the wall. In response thereto, I would first remark that the correspondent's problem cannot be solved according to the directions named. It will be impossible for the corners of the strip of carpet, when cut square at the ends, to touch the four walls of the room as he specifies, unless the room be square. If the room be made square the problem becomes comparatively easy of solution, and may be performed by the simple use of the carpenter's square.

From M. W. T., *Clarksburg, W. Va.*—In regard to the carpentry problem prepared by J. E. W., in the February number, I would say that a general formula for such questions, devised by Prof. E. B. Seitz, of the London Mathematical Society, can be found in the August number, 1880, of the *Mathematical Journal*, published by John S. Royer, of Ansonia, Ohio. I deem the question of little importance, as it involves solution of an equation by Homer's "Method of Approximation."

From C. A. M., *Cambridgeport, Mass.*—In response to J. E. W., I would say that his carpet problem is a snare, or else he has



Scrolls and Spirals.—Fig. 6.—*Enlarged Diagram of the Center of Fig.* 5.

overstepped himself by putting in too many restrictions; namely, having the carpet cut square and touching the room on the four sides, the room to be 12 x 24 feet. Such a thing is simply impossible. The carpet will touch only in two places—at opposite corners of the room.

From J. D. H., *Bel Green, Ala.*—My idea of the carpet problem is first to square the length and width of the room, and extract the square root of the sum of these amounts, which will give the diagonal length 26 feet 9 inches. Now, if the room was square—that is, if the width and length were the same, in laying a carpet 3 feet wide diagonally across, the corners would touch both sides and end wall, leaving a triangle whose altitude is equal to one-half the width of the carpet. But as the room is twice as long as it is wide, it follows that the altitude of this triangle is twice as great; namely, the full width of the carpet to be taken at each end, showing the actual length of the strip of carpet to be 20 feet 9 inches.

Joining Roofs of Different Pitches.

From W. A. E., *Coral, Mich.*—I will endeavor to answer the question of S. McE., of Stillman, Ill. Frame your rafters for each building so that when in position they will measure perpendicularly from the upper side of the rafter to the plate the same distance. Place the square against the side of the building, the tongue upward and the blade outward. Lower it or raise it until you get the desired width you wish for the cornice; then mark where the square intersects the rafter, and also where the heel of the square is upon the stud. Measure from this last mark to the upper side of the rafter. Then turn to the other building and measure down the same as you measured up upon the first, marking the point thus obtained. Place the heel of the square upon this mark with the blade downward, and where it intersects the rafter mark and cut off. In practice it is advisable to cut the rafters upon the wide building first. After both sides of the rafters are cut, place the planceer in position. With the straight-edge placed against the other rafters, mark where it intersects with the planceer, then mark in the angle three-eighths of an inch back. Take the square and draw a line from one mark to the other; then cut the miter plumb with the building. Place the planceer upon the other building in position and mark by miter of first, and cut it plumb with the building. The miters will not be square miters and the projections will not be quite the same, but will be near enough for all practical purposes.

Three Men Carrying a Log, &c.

From W. S., *Maxinkuckee, Ind.*—My rule for finding the proper position for placing a spike under a stick of timber is to divide the number of feet in the stick by the number of men carrying it. This will give the number of feet each man is to carry. Subtract the number of men that tail the stick from the number of men at the spike and multiply the number of feet one man is to carry by the number of men remaining. Then, as this must balance across the spike, divide by two, which will give the answer. For example, suppose three men are to carry a stick of timber 30 feet long with one man at the tail; $30 \div 3 = 10$ feet, which makes the load; $2 - 1 = 1 \times 10 = 10 \div 2 = 5$, the answer. Take another example: Five men carrying a stick of timber 30 feet long, with two men at the tail, $30 \div 5 = 6$, each man's load; $3 - 2 = 1$, the excess of men at spike over those at the tail; $6 \times 1 = 6 \div 2 = 3$, the answer. Take another example: Seven men carrying a stick of timber 28 feet long, with one man at tail; $28 \div 7 = 4$ feet, each man's load; six men at the spike, less one at the tail, makes an excess of five men at the spike; $5 \times 4 = 20$; $20 \div 2 = 10$, the answer.

Improvements in the Square.

From G. N. C., *Hancock, N. H.*—I have long thought that the carpenter's square might be made more convenient:

1. By marking one edge in hundredths of a foot, and another in twelfths of an inch, as many squares now made are marked. The other two edges should be marked as at present, by eighths and sixteenths.

2. On one side strike lines from the figure 12 on the tongue across the blade to the various points upon it, thereby representing the angles required in laying off various polygons, so that by laying the square on edge of the board, touching at points indicated, one could get the joint lines of the different angles required.

3. On one side of the blade have a quarter circle marked, so that one may readily read the degree, or by using a bevel in connection with it, may obtain a pitch of any degree required.

I offer these suggestions to set others thinking, and shall be pleased to have the craft give the matter general attention.

India Ink.

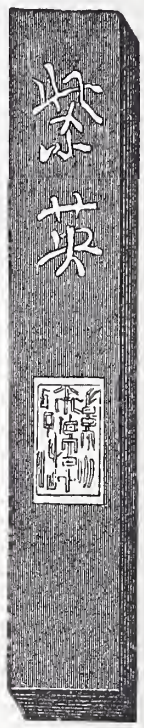
From K. M. O., *Van Wert, Ohio.*—Will you please give directions for the use of India ink. I also desire to learn something about the different qualities of ink and how to select a good article.

Answer.—India ink is sold in cakes and sticks of a variety of shapes, and at prices ranging from a few cents to several dollars per stick. The quality, in general terms, may be determined by the price, particularly when buying of a regular dealer who keeps all grades in stock. The test of price when buying outside of the regular trade, however, is not satisfactory. To a certain extent ink may be judged by the brands upon it, although in the case of the higher qualities the brands frequently change, so that this test may not be infallible. A common brand of ordinary quality (about 50 cents per stick at present prices) is shown by our engraving, Fig. 1, full size. In shape the stick is oval, and is known as the "Lion's Head." An article of good quality for general use, and which is also adapted to fine work, is shown full size in Fig. 2. This stick is nearly square in shape, and at present price is worth $2. There is a great deal more ink in this stick than in the one first described, while its quality renders its use so much more preferable to the other that it may safely be considered the cheaper of the two. These two brands have been selected for our illustrations because they are commonly known to the trade, and because they represent the two extremes between which the draftsman ordinarily chooses. There are other brands of about the same grade as each of these, and also those of intermediate and still better quality.

India Ink.—Fig. 1.—An Inferior Grade. Denoted by Shape of Stick, Brands, &c.

The quality of India ink is quite apparent the moment it is used. The best is entirely free from grit and sediment, is not musky, and has a soft feel when wetted and smoothed. The color of the lines may also be used as a test of quality. With a poor ink it is impossible to make a black line. It will be brown or irregular in color. With poor ink the line will also present an irregular edge, as though broken or ragged, while an ink of satisfactory quality will produce a clean line, whether drawn very fine or quite coarse.

In rubbing down ink ready for using, it should be made just so thick as to run freely from the pen. The degree can be determined at first by trial, but after a time it will be recognized by the appearance of the ink in the dish. The rubbing of a stick of ink in water tends to crack and break away the surface at the points. To prevent this, the stick may be shifted in the hand at intervals while being rubbed, thus rounding the surface. For the same reason, it is not advisable to bear very hard upon the stick while rubbing, as the mixture is otherwise more evenly made and the enamel of the pallet is less liable to be worn off. When drawings are being made which require the use of ink for some time, a considerable quantity of it should be rubbed down at once, as the water continually evaporates. By having quite a quantity prepared, it will remain longer in fit condition for use. As evaporation takes place the ink may be thinned from time to time, as required, by the addition of more water.



India Ink.—Fig. 2.—An Article of Good Quality for Ordinary Work.

Creosote in Stove Pipes.

From C. M. C., *Lansing, Mich.*—Will some one inform me how to prevent a furnace chimney from condensing and spoiling the plastering? The flue in this case is built straight and smooth, not plastered, but lined with brick on edge and joints struck. The flue is provided with an ash box. There is also a 2-inch hole in the chimney below where the pipe enters the flue designed to supply air, as the furnace when closed is air-tight.

From N. H. S., *Lock Haven, Pa.*—Will you please tell me what causes the tar-like substance to accumulate and run down in a stove pipe? I have had such a discharge from a pipe that is perfectly new when used with the first fire. What causes it, and what will prevent it?

Answer.—The substance is usually called creosote, and is formed by the destructive distillation of wood, soft coal and many other similar substances. It is found in stove pipes only when the pipe is so cool as to cause it to condense, for if it passes from the fire in the form of steam and smoke, and if the temperature of the pipe is reduced below 212 degrees, the water condenses on the sides of the pipe and dissolves the tar-like matter in it, the whole flowing down and forming the nasty liquid with which every one who uses long lengths of pipe or wood-burning stoves is familiar. To keep the pipe hot will be a preventive, as is also good ventilation. If, when the

draft is closed, we open a damper so as to let cold air into the pipe near the stove, we shall avoid any annoyance from this cause, because there will be a brisk circulation, which will carry off the vapors at once.

Electric Bells.

From B. A., *Winnepeg.*—Will you please give me some information, through correspondence department, about arrangement of electric bells? I have a large house to fit up with them and am at a loss to know how to commence. There are two floors, with ten bells on each floor. What I want to know is how to arrange the battery, the best battery to employ, and if wires are to be run in the usual way. Will ordinary copper wire answer, or must it be insulated? Any other information you may think necessary will be gratefully received.

Answer.—We think our friend has undertaken rather a difficult task, if he knows nothing about the arrangement of bells and batteries and intends to put up a system having some 20 bells in all. He will undoubtedly be obliged to use covered or insulated wire for the purpose; otherwise, if two wires should by any accident touch each other, bells might be set ringing and a great deal of trouble caused. How the bells are to be arranged depends very much in what order they are to be run, and what signals are intended to be sent and answered. In general, each bell must have a wire coming to it from the battery and another one going from the bell to the key by which it is to be operated, and from the key to the other pole of the battery. In this matter, however, he can probably obtain more practical information suited to his special case from the parties of whom he buys the bells, battery and material. If the use of the bells is not to be continuous, in all probability the most convenient and cheapest battery that he can buy will be some form of the Leclanché. In our own office three cells of this battery are employed for ringing three bells placed in various rooms. These batteries can be obtained in boxes, costing anywhere from $8 to $15, complete.

Flexible Molds for Plaster Casts.

From J. G. T., *New Glasgow.*—Please tell me what is the best composition for making flexible molds, in which to make plaster casts. The composition that I am using is flexible, but easily torn.

Answer.—We are afraid that all the compositions for which recipes are given will be found somewhat tender and easy to tear. The following is from a good authority: Put a sufficient quantity of clear gelatine in cold water and let it swell for 24 hours. Pour off the water and melt until it becomes like syrup. This is then poured upon the object and the mold made without any other mixture; when cool the mold is cut and taken off in the usual way. Another recipe directs the addition of tannic acid by weight equal to 1-50th part of the gelatine used. Still another recommends pouring over the mold, after it is finished, a 10 per cent. solution of bichromate of potash in water. That would be equal to about 48 grains to the fluid ounce. Other recipes call for the use of molasses. The very best quality of glue may be found better than the gelatine.

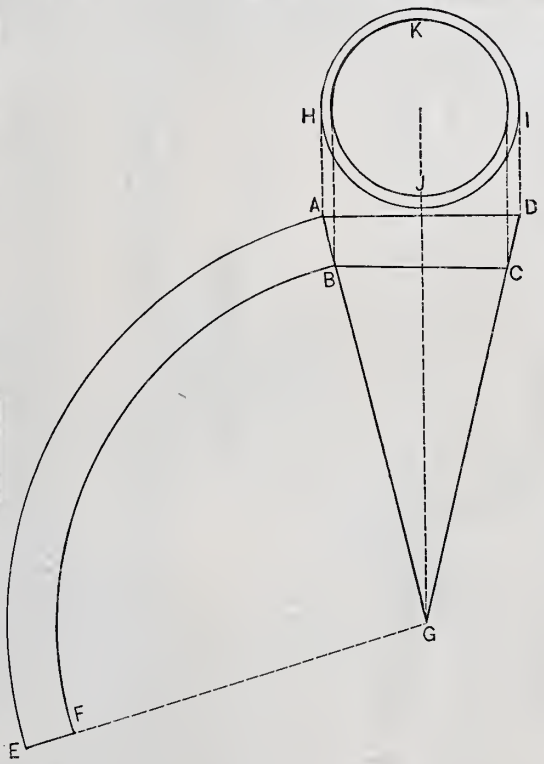
Steam Heating Apparatus.

From A. M. H., *Upper Sandusky, Ohio.*—Can you or some of the readers of your valuable paper inform me of some good steam-heating apparatus for the purpose of heating private residences?

Answer.—Clogston & Co., Boston; Walworth Mfg. Co., 69 Kilby street, Boston; the National Mfg. Co., 71 Beekman street, New York, and Gillis & Geogehan, 116 West street, New York, all make steam-heating apparatus and fit up private residences as well as public buildings. They do not, however, make an apparatus to be put in like a stove, although when any particular job is in hand they will furnish pipe, fittings, boilers and radiators for the local dealer to put up. Mr. Alexander Nimmo, 1204 Degraw street, Brooklyn, makes a small apparatus especially adapted for use in greenhouses, but it works equally well in dwellings. In most cases where the builder undertakes to put in steam-heating apparatus, he will find it advisable to get his radiators from some firm making a business of the manufacture, and, at the same time, if inexperienced, rely largely upon them for the design. It is especially advisable in all cases where there are any unusual difficulties to be met, to give the whole job to an experienced house, like one of those we have named. In steam heating, experience seems to be worth more than anything else in overcoming the difficulties which are found in almost every job. It is for this reason that old and long-established houses in the business seem to hold such a monopoly of the trade.

Covering Conical Pulleys.

From CARPENTER, *Lowell, Mass.*—In the May number of *Carpentry and Building* I noticed an article on pulleys which recommended covering them with leather. Now, that is easy enough on an ordinary pulley, but on a cone pulley is quite another thing.



Describing the Pattern for the Covering of a Conical Pulley.

I inclose diagram illustrating the method of obtaining the cover for a conical pulley. Let H I and J K represent the large and small ends of the pulley, and A B the width of the face of the pulley. A B C D represents a section through the face of the pulley. Prolong A B and C D until they meet in the point G. Then from G as center, with G B and G A as radii, describe the arcs A E and B F. With the dividers step off on A E the length of the circumference of the large end of the pulley, and from the last point draw the line E F, which is the line to cut the leather by. The piece E A B F will cover the face of the pulley.

De Graff's Method.

From F. S. W., *Cleveland, Ohio.*—A proper explanation of De Graff's method in the case of stair-railing, proposed by S. N. W., in a recent number of the paper, would cost him as much as the price of De Graff's book, which, I believe, is only $3. I find, however, that I shall have some rails to build this season wherein the conditions are the same as referred to. When I do them I will give you an account of the process.

Placing the Landing Riser.

From G. G. K., *Toronto, Ontario.*—In the May number of *Carpentry and Building* I notice an answer from F. S. W., Cleveland, Ohio, to the question of S. N. W., with regard to placing the landing riser on a straight flight of stairs. The answer proposed by F. S. W. is practically correct, but in order to make it more definite, I suggest placing the riser landing exactly half the width of square step from center or rail on cylinder. For example, suppose the cylinder to be 10 inches, and square step 10½ inches; the baluster to be 2 x 2 inches; then the center of rail would be 1 inch in from face to cylinder, and face of riser should be 5¼ inches from cylinder of rail.

REFERRED TO OUR READERS.

We had occasion, in a recent number of *Carpentry and Building*, to call our correspondents' attention to the large number of letters received at this office which were deficient in some essential particular in the address. It would seem that our former remarks have not worked a complete cure of this difficulty. We have before us as we write several letters inclosing remittances—some ordering subscriptions to *Carpentry and Building* and others ordering books—which lack, in some cases, the name of the party remitting; in others the town is lacking, the State being given, and in still others the State is omitted, the town alone being given. A correspondent from Watertown, N. Y., orders sundry copies of *Carpentry and Building*, but fails to sign his name. A correspondent from Youngstown incloses $2.25, and fails to tell in what State Youngstown is located, and so we might go on to enumerate. In the two instances above referred to, we shall be under obligations to our correspondents, if they have not already written complaining of non-reply to their letter, if they will write, giving us their complete addresses at once. Generally only a short delay is experienced in matters of this kind where money is inclosed, for, after a few days, a second letter comes, sometimes couched in anything but courteous terms, complaining of tardiness, if not charging something worse. We do not like to receive such letters, even though they give us the very information we require. We trust, therefore, that those who write to this office will bear in mind the necessity of giving their full addresses, thus saving us much annoyance and saving them delay in receipt of answers to their inquiries.

Hip and Jack Rafters for Octagon Roofs.

From F. C. S., *Rochester, N. Y.*—Referring to the discussion on hip-rafters, I would say that so far as my examination goes, I have not seen any rule for getting the proper cuts on hip and jack rafters in a roof in which the angles are not right angles, as, for instance, on hay windows. My impression is that the rules already given will not apply in such cases. I would be glad to have some of the experts take up this subject and present a simple diagram for my information with this particular end in view.

Note.—We had supposed that all the phases of the hip-rafter question had been discussed and the subject well covered, if not exhausted. Several correspondents have referred to the method of getting the bevels for hip rafters on octagon corners and the like, but no one has given a simple diagram showing the general rules applied in such cases. Accordingly we publish the above request from our correspondent, and shall be pleased to have it receive attention at the hands of our readers.

A Barn-board Opera House.

From D. C., ——Will some practical reader of the paper please inform me how he would go to work to construct an opera house 55 by 125 feet; 16 feet to the plate, entrance to be at one end, and a store

room, 20 by 25, to be fitted in each corner of the front about 10 feet to the ceiling; the house to have a gallery down each side and over the stores? I would like to build it with barn boards if I could. What kind of a roof is it best to put on? I would like to have some large doors in the side for convenient use in case of a panic.

Note.—We publish the above communication as a curiosity. The architectural features of an opera house constructed of barn boards, and with large doors for use in case of a panic, are quite interesting. There are only two sections of the country that occur to us at this moment where it would be possible to make use of such a building. One of these would be the oil regions of Pennsylvania, and the other the mining regions of the far West—for example, Deadwood and vicinity. If any of our subscribers in these two localities have had experience in buildings of this character which they think would be valuable to the above inquirer, we should be pleased to have them forward answers to his questions.

Time Required to Learn Carpentry.

From J. K., *Mexia, Tex.*—I am learning the carpenter's trade, and would like to hear something from the old workmen as to the time necessary for the apprentice to become master of his business. We have a carpenter in this town who can beat Andrew Doremus's four-year man all hollow. This man says he can learn any trade in six months. He has only been working at carpentering three years, and he is now the principal contractor of this place. This man has done some really first class work, and what I desire to know is this—whether or not his success is exceptional. Is six months a reasonable time in which to acquire a trade, and can men expect, in general, to conduct the contracting business successfully on only three years' experience? If some old masters of the trade will discuss this subject, they will greatly oblige not only your correspondent, but probably other readers of the paper.

What Becomes of the Inch in an Octagon Miter.

From W. W. C., *Chautauqua, N. Y.*—I desire to present for discussion a question that has long interested me, and one which I have heard asked very often. What becomes of the inch in cutting the octagon miter? As every carpenter is aware, 12 on the blade and 12 on the tongue of the square applied to a straight line, and the line scribed along the blade, makes an angle equal to the angle of an octagon. Now, if 12 and 12 form the angle, why will not 6 and 12 bisect it or cut the required miter, instead of 5 and 12? In other words, what becomes of the inch? I hope this question will draw out some theory.

The Supporting Resistance of Piles.

From E. B. B., *St. Paul, Minn.*—I desire to be informed by some reader of the paper concerning the following question: If a pine pile 10 inches in diameter, 30 feet long, sinks 3 inches under the last clip of a hammer weighing 2500 pounds, falling 20 feet, what weight will the pile sustain? If some practical engineer among the readers of *Carpentry and Building* will give me an answer to the above question, and a rule for solving similar problems, he will confer a favor.

Nicks in the Heels of Saws.

From W. W. C., *Chautauqua, N Y.*—I have heard a great many opinions expressed as to the meaning of the slight nicks to be found on the heel of a saw between the handle and first tooth. Sometimes there are none visible, and in no case is there more than three. Do they represent quality, defects, or are they simply makers' marks? If any of the readers of *Carpentry and Building* know about this, an answer through the paper will greatly oblige.

Stair Brackets.

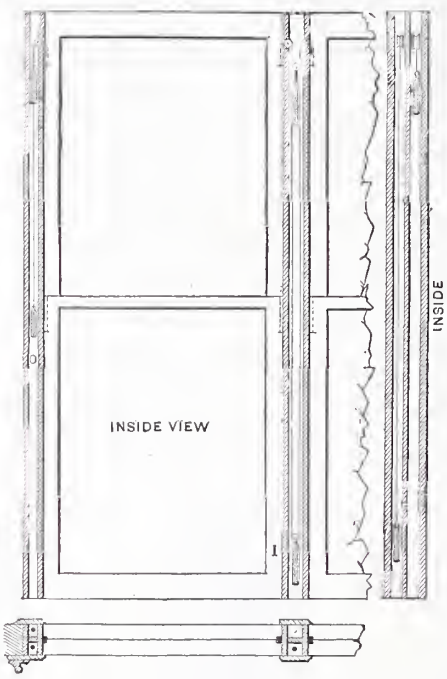
From J. C. A., *Midland City, Mich.*—I made a request, through the correspondence department of the paper, over a year since, for some designs for stair brackets and for molded strings. Having seen no response published in the paper, I now renew my request and trust some reader will oblige me.

Hand Power Circular Rip Saw.

From P. S., *Minier, Illinois.*—Will some one please give me a plan for constructing a hand-power circular rip saw? I desire something that may be set aside when not in use, as my shop room is small. I also desire to inquire concerning a good foot-power mortising machine. Will some reader who has had experience advise me?

Weights for Twin Windows.

From J. B. SHANNON & SONS, *Philadelphia, Pa.*—It is a well-known fact in hanging twin windows after the fashion indicated by the accompanying sketch, that the twin balance weight must be two-thirds the weight of both sashes. The outside weights are required to be one-half the weight of each sash. Now, we would like to see the reasons explained in *Carpentry and Building* why this arrangement is necessary? We have sold weights upon the above formula for many years, and have seen the question tested in such a manner that we know it to be correct. We also desire to ask if there is any reason why the weight I should be shown so much lower than the weight O? When both the upper sashes are thrown down to the sill, I rises to the light of O in the drawing. Our carpenter friends say that otherwise the two weights would come in contact. This evidently is incorrect, as they are separated by a parting strip. The drawing has been looked at, measured and pondered over many times. We trust the readers of *Carpentry and Building* will take interest enough in this question to discuss it in a way to show a reason for the facts.



Weights for Twin Windows.

Concrete Foundations.

From C. W. M., *Washington, D. C.*—Will some practical reader of the paper give me information with regard to concrete foundations? What are the proportions each of sand, cement and small stone? What thickness is necessary for the walls of a five-story building? I mean what thickness of concrete on which these walls are to rest? Is there any rule regulating the thickness of concrete for the walls to be built thereon?

Blind Dovetails.

From A., *Bridgeport, Conn.*—Will some practical reader of the paper explain what is called a "blind dovetail?"

Connecting Hand Rails with Newel Post.

From J. C. A., *Midland City, Mich.*—I desire to ask of the active builders among the readers, if it is customary to start the hand-rail from the newel post without an easing. I see that this plan is pursued in the first prize design for $3500 houses. This surely is a mistake or else beauty of design is of the past.

Dumb Waiters.

From C. R., *London, Ont.*—Will some reader of *Carpentry and Building* be kind enough to furnish a drawing of the construction of a dumb waiter, adapted for use between basement and first floor of a house, to be about 2 feet square?

Poultry House.

From F. P. G., *Columbus, Ohio.*—Will some reader of *Carpentry and Building* send a plan for what I would call a "fowl" house. I want something divided off in apartments in such a manner as to keep different breeds of chickens by themselves.

Stain for a Gun Stock.

From T. W., *Armenia, Wis.*—Will some practical reader please furnish a recipe for making a stain to stain a gun stock; also, a stain suitable for chairs and bedsteads? I desire something that has been put to a practical test by the reader contributing it.

Frame Church.

From W. M., *Boqia, Florida.*—I would like to see published in *Carpentry and Building* a cheap frame church, size about 30 x 50, accompanied by estimate of cost. I think plans of this character would be appreciated by many builders among its readers.

Slack in the Wire of Screens.

From W. A. C., *Scotia, N. Y.*—Can any reader of the paper tell me how to take up the slack in wire cloth used to cover window screens, door screens, &c.?

Octagon Barn.

From E. E., *Rontout, Ill.*—I shall be pleased to see in *Carpentry and Building* a plan for an octagon barn, from 20 feet to 65 feet on each side, also to see plans of framing the same.

Plan for Fruit House.

From W. F. P., *Berea, Ohio.*—Will some reader of *Carpentry and Building* furnish a good plan for a fruit house, for the purpose of storing fruit, &c., through the winter.

Window Sill Miters.

From J. C. A., *Midland City, Mich.*—I would like to ask some of the hopper-bevel men how they would get the miter and down cut for a window sill which pitches at an angle of say 40 degrees, the window being an octagon bay window.

Mitering Fascia Boards.

From A. J., *Berea, Ohio.*—Will some reader of the paper please inform me how to cut miter joints in fascia boards in cornice, in the angle where two buildings join together and on the corners of a hip roof? This information will greatly oblige.

Hoisting Apparatus.

From M. R. D., *Lincoln, Neb.*—Will some of the practical readers of *Carpentry and Building* furnish a sketch of a hoisting apparatus, such as would be suitable for use with horse or steam power?

Calcimine.

From C. M. C., *Lansing, Mich.*—I desire information with regard to preparing and applying calcimine. I want something that will not rub off, and that will stick to the wall under all reasonable circumstances.

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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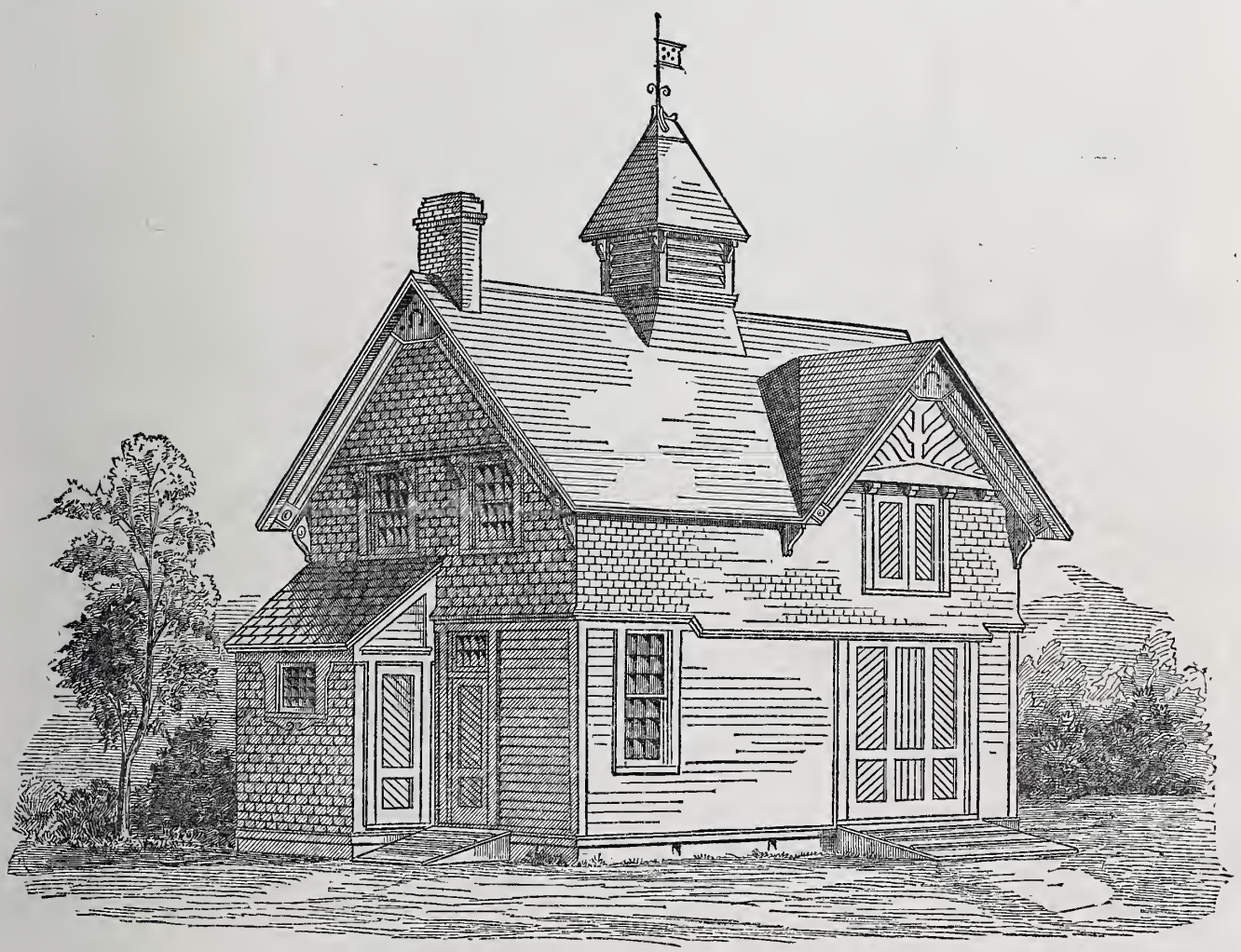
Design for Frame Stable.

Scarcely less attention is paid at the present time to the stable in which the family horses are kept than to the dwelling in which the family lives. Every residence of any pretensions whatever has its stable, and very generally the architectural effect of the latter is not less imposing than the former. In the country this is particularly the case. The stable is so located with respect to the house that it forms a fitting companion piece. The architectural styles of the buildings are made to harmonize, and in other respects the two structures are arranged to go together, thus presenting a complete picture from whatever side they may be viewed. The stable is, for the most part, finished and decorated so as to be in keeping with the house. In certain cases the stable is better finished than the residence. Some men, judging from this, may be considered to think more of their horses than of their families. On the other hand, there are exceptional cases in which the house is finished very elaborately, while the stable is a shabby affair. This would seem to indicate at once that the owner cared but little for horses. Aside from extreme cases like these, every one will admit that there should be a certain degree of correspondence between the stable and the house to which it belongs, and that in the selection of the design attention should be paid to considerations of this character.

The design which Mr. Morrison presents to our readers this month is one which is entirely appropriate for erection with the great majority of medium-priced houses of the kind very commonly built in the smaller cities, where space is not so expensive as to be prohibitory. It is also appropriate for erection in connection with moderate-priced country houses, such as are frequently built in the suburbs of our larger cities. As will be seen by the estimate, the design is not an extravagant one in cost, although the appearance of the building is very tasteful and its accommodations ample for ordinary requirements. We present an abstract of the architect's specification, from which may be learned what construction he would employ in the various parts.



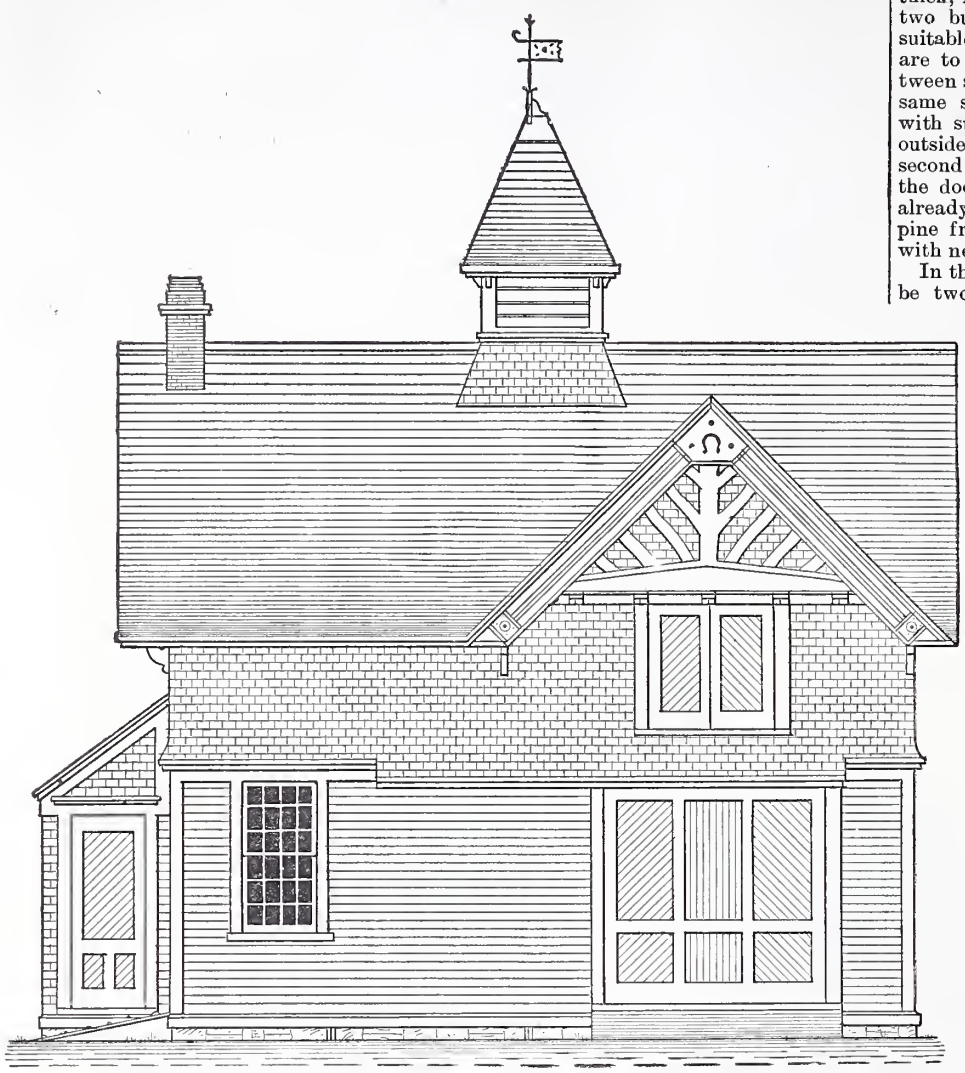
Design for Frame Stable.—Fig. 1.—Perspective View.—W. L. Morrison, Architect, Rochester, N. Y.

The foundation walls are to start 3 feet 6 inches below the grade and are to be laid upon suitable flat footing stones. The walls are to be 18 inches thick and built in the best manner. The pier in the center of the building is to be 20 inches square and started at the same level as the foundation walls. Vitrified clay tile of first quality is to be employed in the system of drains indicated upon the foundation plan, Fig. 6. The joints are to be made in hydraulic cement, carefully scraped smooth inside. If practicable, the stable drainage may be connected with the house drain by way of outlet. The greatest possible fall for these drains should be provided.

From the carpenter's specification we learn that the timber is to be sound hemlock, with exceptions as noted hereafter, free from shakes and as dry as the market affords. The sills are to be 6 x 8 inches; posts, 4 x 6 inches; studs, 2 x 4 inches; and plates, 4 x 4 inches, made of two thicknesses, 2 x 4 inches, spiked together. In framing, the studs are to be placed with 16 inches between centers. The sills, posts and joists are to be framed together, and the studs to be footed to the plates and sills. The floor joists are to be 2 x 10 inches, set with 16 inches between centers in second story and carriage room, and 12 inches between centers in stable. An 8 x 10-inch girder is to be provided under the partition in first floor. This girder is to be composed of four 2 x 10 inch joists firmly spiked together. A 4 x 4-inch plate is to be provided in the second floor over the partition studs. The joists in both floors are to be strongly bridged with 2 x 3-inch dry pine pieces, firmly nailed at each end; the bridging to be in rows, which are not to exceed 5 feet apart. The joists in the stable are to be furred up as may be necessary, in order to give a pitch of 3 inches in the length of the stalls.

All exterior surfaces will be covered on the studs with ⅞-inch pine or hemlock boards, planed and matched, and firmly nailed to each bearing. Clapboards are to be placed over this sheeting where shown in the elevations, and will be 5½ inches wide, of clear, dry pine, laid 4½ inches to the weather, and well nailed in true and even courses.

The stable part of the building is to be covered with heavy tarred felting, placed on the sheeting boards under the clapboards. The casings and corner boards will be 1⅛ inches thick, 4½ inches wide, properly finished and joined at the angles. The water-table will be 1⅜ inches thick, with beveled edge. The door sills in second story will be 2-inch white oak, and in first story 3-inch white oak. The rafters are to be 2 x 8, placed with 8 inches between centers, footed and headings to be planed smooth. A gutter made of 3-inch oak is indicated by O on plan Fig. 3, and, to incline toward the manure pit, is to be placed flush with the floor. There will be a flight of stairs from first to second floor, made in a neat and substantial manner and partly inclosed. The risers are to be ⅞-inch thick and the treads 1⅜ inches thick, to be finished with nosings and without coves. Inclosing of the stairs will be of ⅞-inch sound, dry, planed



Design for Frame Stable.—Fig. 2.—Front Elevation.—Scale, ⅛ Inch to the Foot.

to the plates and firmly spiked in place. Each second pair of rafters will have a 1⅛ x 4-inch collar, 12 feet long, firmly spiked in place. The valley rafters will be 4 x 10 inches. The roof will be covered on the rafters with 1-inch hemlock roof boards, laid 1 inch apart and firmly nailed to the bearings. Flashings of tin will be provided around ventilator and chimney in a first-class manner, and suitable gutters for the eaves. The roof and sides of buildings, as shown on elevation, will be shingled. First quality of sound, sawed pine shingles are to be employed, laid one-third to the weather and well nailed in place, with all courses true and even. The roof of the ventilator is to have the same finish. The frame for ventilator and stairway, also the trimmers and headers, will be of 6 x 10 stuff. Cornice brackets, ventilator finish, &c., will be shaped according to the details and as indicated upon the elevations. A weather-vane, of the design indicated by the detail, Fig. 12, is to be properly put in place upon the ventilator as shown.

For inside finish the carriage room is to be floored with 1⅛-inch planed and matched sound, dry, selected pine, the pieces not over 6 inches wide and all free from large, loose or unsound knots. The second floor is to be covered with the same quality dry pine ⅞-inch thick. The stable is to be floored with good quality 1¼-inch oak, free from unsound knots and other defects. All flooring is to be driven up to close joints, to be blind nailed to each bearing, and all joints and matched pine, put up vertically and firmly blind-nailed. The newel rail at bottom of stairs will be constructed as shown by detail, Fig. 7. A 3-inch newel will also be provided at upper landing, to be neatly designed and firmly placed in position.

The windows are to have 1⅜ inch clear dry pine molded sash fitted in 1⅛ inch clear dry pine frames, with suitable fastenings open and shut. The windows in the stalls, instead of this finish, will have two suitable butts and spring catches to each opening, and will be provided with suitable button fastenings to secure them in place when open. All glass will be single-thick Americau. The bill of glass will be as follows:

GROUND FLOOR.

4 windows,	24 lights,	8 x 12
4 "	16 "	5 x 7
1 "	16 "	7 x 7
1 "	8 "	8 x 12

SECOND FLOOR.

5 windows, 16 lights, 8 x 12

The glass to be well puttied and tacked in position, and the sash painted one coat before glazing.

The door to the carriage room will be 9 feet wide and 9 feet high, hung with best sheave on hanging track, and provided with suitable lock and knob. The frame will be 1⅜ inches thick, of dry pine rebated. The stiles and rails of this door will be 1⅛ inches, dry pine chamfered, strongly framed and backed with 1⅛ inches planed, matched and beaded narrow dry pine put on diagonally, as indicated in the engraving (Fig. 2).

Two outside doors, one 3 x 7 feet 6 inches to stable, and one 3 x 8 feet 6 inches to cow stall, are to be provided; the door to the stable to have transom and headlight. Both doors to be 1¾ inches thick, constructed in four panels, hung with three suitable butts in 1⅜ inches rebated dry-pine frames and trimmed with suitable locks and knob. The stable door is to be provided with heavy bolt additional. The doors to harness room and hostler's rooms are to be 1⅜ inches thick, four panels, not molded, hung with two butts, and provided with locks and suitable knobs. The frames for these doors are to be 1⅛ inches thick. The door between stable and carriage room to be of the same style, 1¾ inches thick, and to slide with suitable sheave and track. A pair of outside folding doors is to be provided in the second story, made in the same manner as the doors of the carriage room below, as already specified, to be hung in rebated dry pine frames 1⅜ inches thick, and provided with necessary butts and bolts.

In the construction of the stalls there will be two dry oak turned posts, extending from floor to ceiling at end of stall partition. These posts are to be 6 inches in diameter. The stall partitions will be 4 feet high, made of 2-inch planed and matched dry pine, placed vertically in rebated base, securely fastened to floor. Each face of the stall partitions is to be covered with 1-inch stuff of same quality planed and matched, and firmly blind nailed to each side. The stall partitions are to be capped with suitable molding of oak. Wire or cast-iron guards of proper design are to be securely fastened to the oak cap. These guards are to be 2 feet 6 inches high at stall posts, and about 4 feet high at the manger. The box stall indicated upon the plan, Fig. 3, will be provided with a gate and movable partition at end, made in the same general manner as specified for the stall partitions above. The gate of the box stall to have a ⅞-inch piece put on with screws to form a rebate. The gate is to be hung with two strong loose-jointed butts, and to have a spring catch. The stall partitions are to be secured in place in such a manner as to be movable, thus making it possible to use the space for three common stalls, or one box stall and one single stall, as circumstances may require. Mangers, as indicated, are to be made and erected in a neat and substantial manner of sound, dry oak, 1⅜ inches thick. The mangers are to be made in one length, and put in place before the stalls and partitions are set up. Feed boxes are to be partitioned off as required, oak plank being used for the purpose.

All the interior surface of the stable, except the under side of the rafter in the loft, is to be ceiled on the studs with ⅞-inch

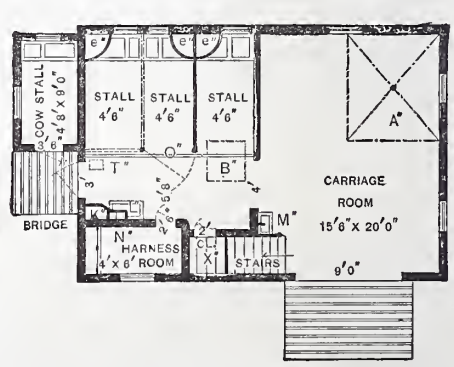
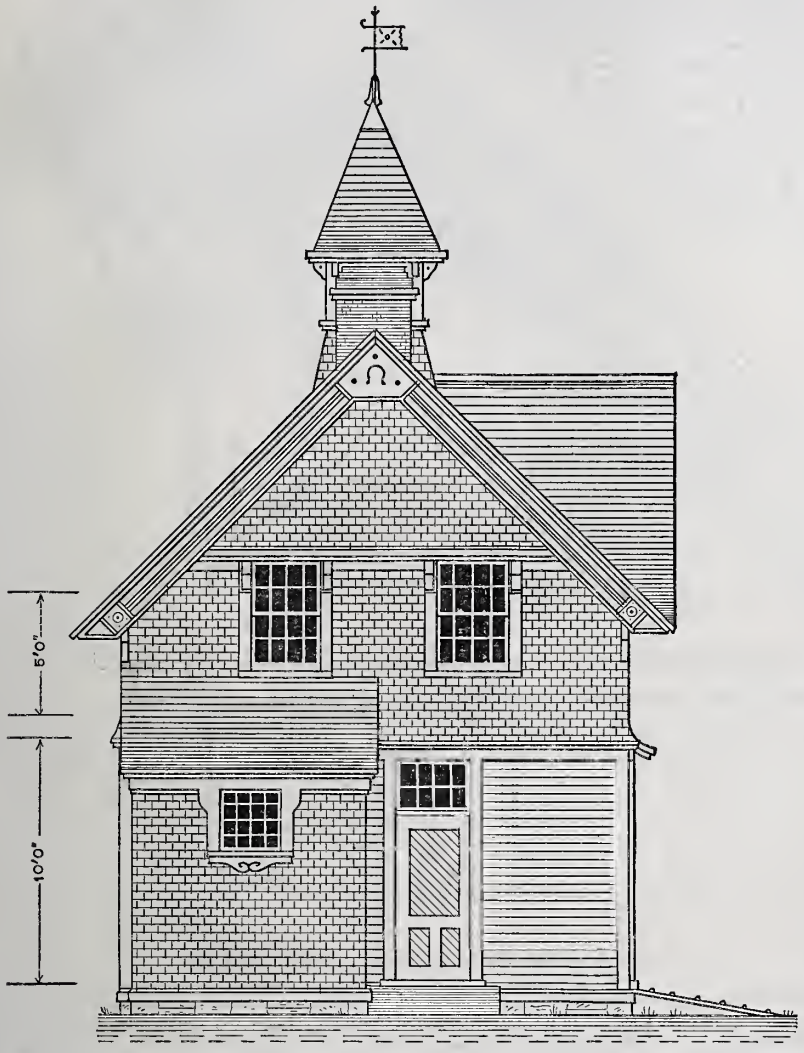


Fig. 3.—Ground Plan.—Scale, 1-16 Inch to the Foot

round matched and beaded dry pine, smoothly finished for painting or oiling. The angles are to be finished with beads. Doors in the first floor are to have casings 5 inches wide and ⅞-inch thick, with flat chamfered edges. Grain bins are to be provided in the second story, as shown by H and G in Fig. 5, made in a substantial manner of first

quality seasoned hemlock, planed, matched and properly put together. The bins are to be made in two parts, with the bottom inclined toward the spouts, and to be provided with batten lids, having wrought-iron hinges, staple and hasps. The bins are to be constructed with oak corner pieces, and are to be 4 feet high at back, with feed spouts 4 x 4 inches, inside measurement. The slides in the spouts are to be about 5 feet above the lower floor. A water-tight



Design for Frame Stable.—Fig. 4.—End Elevation.—Scale, ⅛ Inch to the Foot.

mixing-box is to be constructed at the bottom of spouts shown by K, Fig. 3, and is to be 14 inches deep. A sink, indicated by M, Fig. 3, is to be provided in the carriage room. An opening in floor, F in Fig. 5, next to the bins, properly fitted with trap door and spout, is to extend down to within 5 feet of lower floor for cut feed. The trap door to the same is to be provided with 2½-inch iron ring, staple and hinged. Three hay spouts, *e*, Figs. 3 and 5, extending from hay loft to supply mangers, also an opening from hay loft to cow stable about 16 x 16 inches in size, are to be provided. Under the stairs a small closet is to be fitted up with four lines of shelves about 8 inches wide; the closet to have a batten door, suitably provided with hinges and lock, and is designed to be used as a medicine closet. Suitable halter rings for stalls and at side of door are to be furnished.

The ventilating shaft is to extend from the opening in the stable ceiling to the under side of ventilator, and is to be strongly constructed of ⅞-inch dry pine. It is to be provided with a batten door 2 x 4 feet in size placed 16 inches from floor, thus adapting it to use as a straw shute. The door is to be provided with a bolt and properly hinged. The ventilating shaft is to have a matched ⅞ inch partition above the door, with ⅞-inch revolving clamp valve hung on pivots and arranged with cord for opening and shutting from stable. One end of the harness room is to be inclosed and provided with sliding doors, glazed in a suitable manner. Drawers are to be provided underneath, constructed of clear pine and furnished with screw knobs. Suitable harness hooks are strongly fastened in position in convenient places. A 2-inch rough pine-plank inclosure is to be placed around the manure pit, Fig. 6, to extend partly under the stable. The pit is to be covered with the bridge leading from outside door of stable; the bridge to be made movable. A suitable trap door in stable floor, as shown in plan, Fig. 3, by T, properly hinged and fitted with a 2-inch ring, is to be provided for the manure shute. The construction of the ventilator with louvre boards, also cornice brackets, bed moldings, &c., is indicated upon the accompanying details, Figs. 9 to 13. Con-

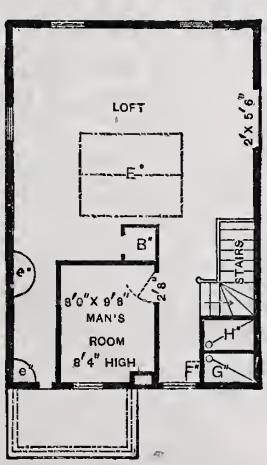


Fig. 5 —Loft Plan —Scale, 1-16 Inch to the Foot.

ductors of cross-tin 3 inches in diameter are to be placed in proper position, strongly fastened and connected with sewer. A chimney is to be started on two thicknesses of 2-inch plank on second floor, joists where indicated, Fig. 5, and is to be constructed of sound merchantable brick, topped out as indicated upon the elevation, Fig. 2, and smoothly plastered inside the full hight. It is to be provided with thimbles and tin covers at bottom and top in hostler's room. A suitable bridge is to be provided in front of carriage-room doors, constructed of 4 x 6-inch oak sleepers and 2-inch hemlock plank.

All exterior woodwork is to receive two coats of best linseed oil and lead paint, the body to be a medium brown, with trimmings two shades darker. The shingles and window are to receive a coat of Indian red. Chamfers and moldings are to be picked out with Indian red. All interior casings, ceilings, newel, rail and other parts usually painted on first floor, and woodwork of hostler's room in the second story, are to receive two coats oil and shellac applied in the best manner.

Where connection with water works can be had, the sink is to be supplied through 3-inch pipe, suitably fitted with brass cock finished to connect with hose. A 2-inch

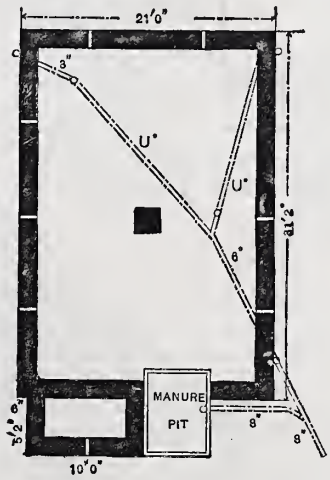


Fig. 6.—Foundation Plan.—Scale, 1-16 Inch to the Foot.

waste pipe is to connect with the waste of carriage wash. A waste connection is also to be made from the mixing box.

DETAILED ESTIMATE.

Excavation, stone wall, &c.	$140
Timbers and framing	130
Sheeting	58
Shingling	120
Gable finish, &c.	112
Vane, gutters, valleys, flashing, &c.	30
Flooring	65
Stairs	40
Door frames and trimmings	60
Stall partitions, mangers, &c.	65
Hay racks and wire guards	35
Ceiling	100
Windows and window frames	83
Grain bin, sink, mixing box, &c	31
Ventilator and shaft	47
Manure pit and bridges	19
Painting and oiling	96
Plumbing	30
Harness room, fittings, &c.	34
Contingencies	30
Total	$1,325

Carving from Models.

It must be observed that merely carving flowers and vegetation from models is not designing ornament, and that something more of thought, more of adaptation of the form to the circumstances and the material, must be displayed to justify the claim of the work to be called ornamental design. This is what we do find to perfection in Greek and in early gothic ornament; it is not the mere imitation of nature, but the application of natural form, retaining much of its original characteristics, to the production of ornament in a style suited to the peculiarities of the material in which it is executed, and the final form of which is the result of considerable thought, not of the mere cleverness of the hand and eye in realistic reproduction. But it is remarkable how few natural types seem to have been used in the production of ornament of this thoughtful class, and how little attempt there has been to evolve any new ones in the same class of

ornament. We have gone on reproducing the Corinthian capital over and over *ad infinitum*, without it having apparently even occurred to anyone that the same general form would be susceptible of varied treatment by using other leaves instead of the beautiful but well-worn acanthus, and that this variation might even be carried out in the same building with good effect, preserving the general aspect of the capitals alike, and varying the details. In the case of that beautiful production, the carved early English capital, again we have been content to go on copying and reproducing it (very seldom with anything like the success of the mediæval inventors), with no attempt to apply the same free, yet conventional, treatment, so admirably suited for execution in stone, to any other derivation from vegetable form. It may, we confess, be doubted whether the early English lobed foliage is adapted from any precise form in the vegetable world; whether it is not, in fact, evolved from a reminiscence of the volute of the classic capital, which took this lobed form in the Romanesque French capitals, while still retaining its original angle position as in the classic capital, but which the later carvers, in England more especially, adopted as the prevalent feature in the carving of a capital, introducing it with the same freedom and absence of order as if it had been a natural growth. The feature is so complete in itself, and so individual in character, that it seems difficult to touch it without spoiling it, and perhaps any effort to adapt the early English capital with another form of detail could hardly be successful. But other forms of gothic capital might be reproduced with foliage different from that which was used as their model by the mediæval carvers. And if the characteristic distinction of the classic and gothic types of capital be kept in mind, there is no reason why the same type of vegetation might not be equally suggestive for either type of capital (or of ornament generally), and be used with totally different expression in the classic or the gothic manner. The radical distinction, it must be remembered, between classic and gothic floral ornament is, that the former is geometrically and symmetrically arranged; the latter is free, and, for the most part, unsymmetrical, and imitates the irregular growth of nature, even when, as in the early English capital, it does not absolutely imitate nature in detail. This difference between symmetrical and unsymmetrical, in the relation between ornament and nature, is conveniently expressed in the terms "classic" and "gothic," the signification of which, in relation to such a point, every one readily understands; but, in reality, the distinction is a much more typical one, since the whole of ornament which is based on natural foliage may be divided into these two great classes; that which is irregular and more or less naturalistic, of which gothic work shows the best types, and that which, in adapting natural forms, compels them to assume an artificial and bi-lateral symmetry, and results in the type of ornament which we call classic, and of which Greek ornament furnishes the highest and most perfect examples.

Now, considering that we have always these two essentially different methods of treating a *motif* in ornament, and that behind these we have the almost infinite variety of nature to furnish us with types and suggestions, each of which may be treated not only in one or other of these two leading methods, but may be also susceptible of several sub-variations in character, arising out of the different natures and requirements of different materials, it seems strange that there has been so little effort, if not to evolve new forms of orna-

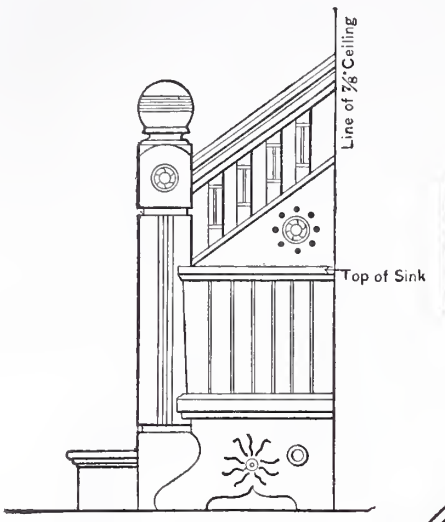


Fig. 7.—Newel Post and End of Sink.—Scale, ½ Inch to the Foot.

Design for Frame Stable.—Fig. 9.—Detail of Front Gable.—Scale, ½ Inch to the Foot.

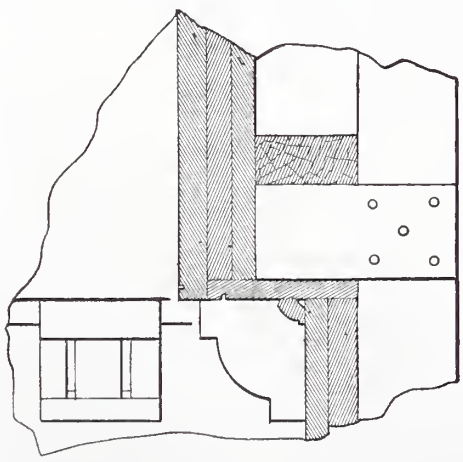


Fig. 8.—Detail of Finish Over Outside Doors in Loft.—Scale, 1½ Inches to the Foot.

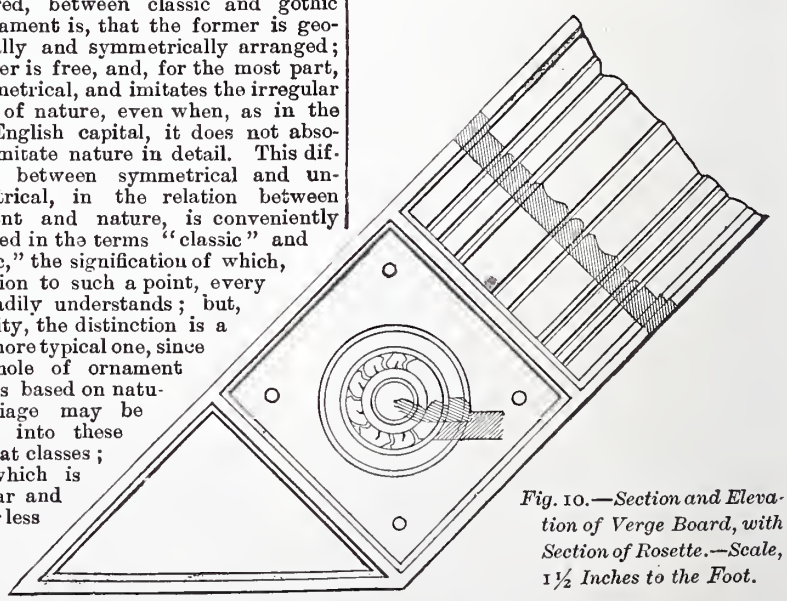


Fig. 10.—Section and Elevation of Verge Board, with Section of Rosette.—Scale, 1½ Inches to the Foot.

ment, at least to give new character and treatment to old forms by taking fresh suggestions from nature.

Curls in Wood and their Application as Veneers.

An English cabinet maker, in giving some practical directions about veneering, prefaces

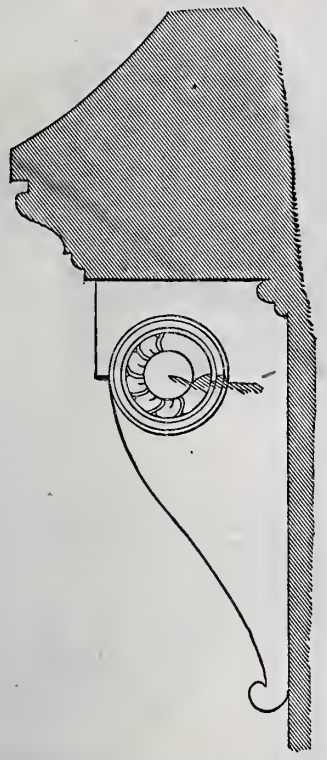
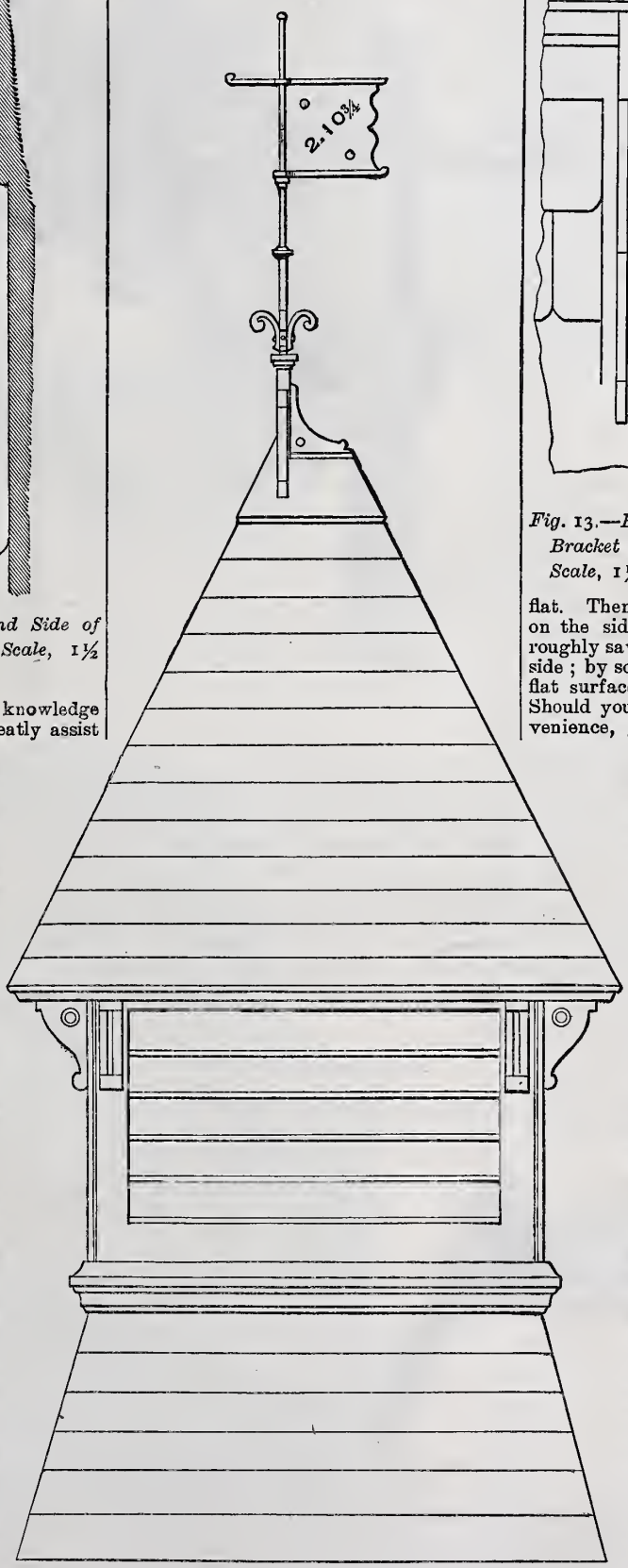


Fig. 11.—Profile of Molding and Side of Bracket on End Elevation.—Scale, 1½ Inches to the Foot.

his remarks by saying that as a knowledge of how curls are grown will greatly assist the workman in manipulating them, it is well for him to devote a little time to studying the natural forms in which they are usually found. In nearly all cases curls are to be met with in that part of the tree where the division of the arms or limbs commences its outward tendency from the trunk. The source of growth is at that point where the sap diverges from its first source into two or more distinct channels, which ultimately promotes and supplies the first limbs of the tree with their attendant off-shoots. Instances are numerous of a plurality of arms from the trunk of the tree; these are of a confused character, of root-like growth, and are not so extensively used. They are of less value than the double-arm curl, which is more single in growth, much richer in figure, and of greater value to the cabinet maker for enriching his work. We will now explain the best mode of cutting into veneers and planks what we will, for argument's sake, say is a good top of a double-limbed butt of suitable kind, using great care in converting it, and preserving its beauty and utility for the advantage of the cabinet-maker.

If the trunk is sawn through between the fork of the limbs, the feather of the curl will be much less than if the cut is made transversely or laterally. Instantly we see a large surface quite rich in quality, which must be of greater service for our purpose; therefore the latter is the best mode of converting. Now, seeing the different growth of curls, the grain at the broad end of the feather has quite an opposite grain to that of the narrow end. The broad end being one grain by natural growth, we must be careful in applying any materials capable of expansion and contraction. The narrow end of the feather is not so easily affected, and, being naturally interwoven, is more flexible, not so brittle, nor so easily acted upon by heat or cold. To give a direct idea of the growth of the broad end of the feather, lock your hands together, taking your right arm for the trunk, and with fingers and thumb of the same make an opening for the fingers of the left hand, and they will give you the manner of growth in the broad end of the curl. So transverse is the growth that you can whittle it with perfect ease in its solid form with your pocket knife.



Design for Frame Stable.—Fig. 12.—Detail of Vane and Ventilator.—Scale, ½ Inch to the Foot.

Having now some idea of how curls are grown, we will bring this to bear on the manner of how to manipulate them as veneers in cabinet-making. Suppose you have a bed panel to veneer, the length of which requires two veneers to make. Take these two veneers, and, having paired them and cut them to the sizes required, gently dry them between two boards until they are perfectly

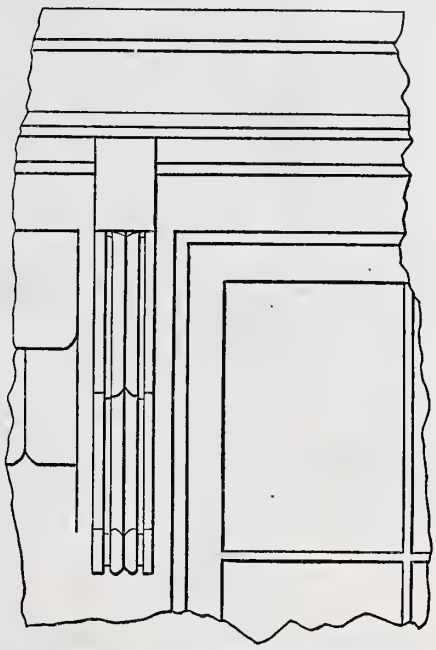


Fig. 13.—Elevation of Molding and Face of Bracket in Finish of End Elevation.—Scale, 1½ Inches to the Foot.

flat. Then proceed to carefully tooth them on the side to be glued, and if they are roughly sawn, tooth the ridges of the outside; by so doing you will get a thoroughly flat surface when judiciously cleaned off. Should you have a caul press at your convenience, gently rub some glue over that part of the broad end of the feather that contains most end grain, placing a piece of old copy book or other paper over the same; this will prevent it from adhering to anything by which the same is laid, and also aid in strengthening the end grain parts together. When thoroughly dry take and joint it to make your full length, and be careful when making the same that your joint is slightly hollow. Those end grain parts that you recently papered are sure to expand by the steam driven out with the glue by the heated appliances necessary to lay them.

We will now suppose the same class of panel to be laid by hand with the veneering hammer. Carefully dry and tooth your veneer as before mentioned, fix your panel firmly to the bench and proceed to lay one-half; glue well boiled, have thin and flowing clear and free from strings and unrendered bits; glue the feather on the side to be laid, place it on your panel, and, with a tack or two to keep it in position, glue all over the outside of the veneer. Now, with a cool head and a warm flat iron, not so hot as to scorch the glue, move your hot iron over the amount of surface you consider capable of laying in the one-half. On no account use water. Study to work from the center to either end of the piece you are laying. Having got all down you clean all glue off, putting the same in your pot for further use. Now, with a hot sponge rinsed out of water in glue kettle, thoroughly clean your tools for the next operation. After a few hours proceed

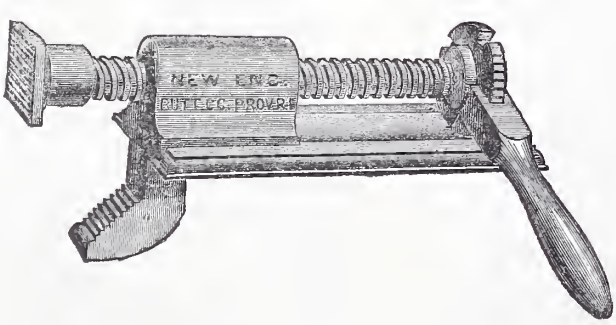
to make your joint with the other half, carefully observing your joint is slightly hollow, as heretofore; with panel firmly fixed to bench, glue and iron hot; proceed to lay from 6 to 8 inches near the joint, working your veneer hammer as much as possible across your veneer lineable with the joint. Having got your joint good, glue a piece of paper over the same to keep all air out, and proceed to lay the remainder, in no case using water until all is laid; scrape all glue off into glue pot, and with hot sponge clean tools as before. Should the end grain blister, don't let it worry or annoy you till all is laid; then with a fine needle point make two or three insertions for air to escape. Now with a small piece of hot wood, a bit of paper between and a little pressure, you will easily master the blistered part.

In preparing your groundwork for veneering, it is essential to slowly damp it a little on the underside to which you lay on; above all, have your glue hot and well boiled, and do not be over careful in using plenty, as you will use only so much as is required, carefully scraping all back into your glue pot. In making a star panel, or so many feathers graduating from a center, lay every other veneer, such as one, three, five and seven, in an eight-section panel. However, any practical workman will be able to make his own deductions, from the suggestions now made, for other forms of veneered panels that may be required.

NOVELTIES.

THE AMESBURY BAND SAW FILING MACHINE.

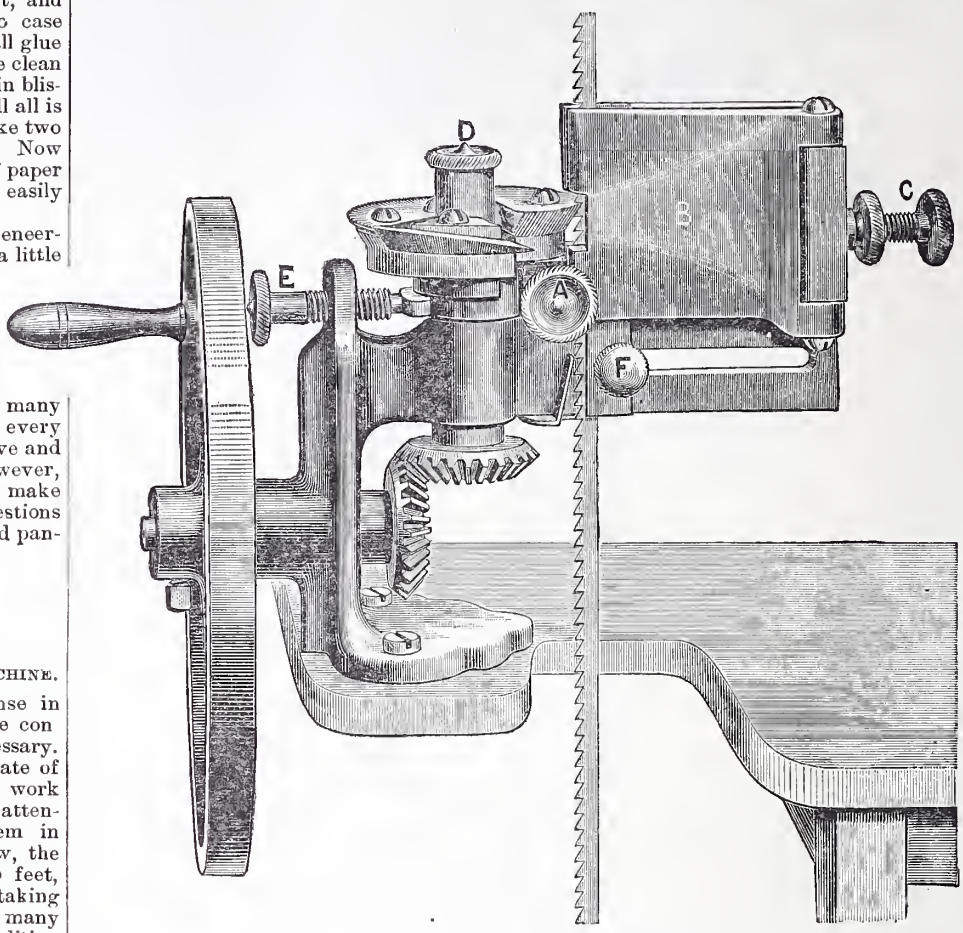
A very considerable item of expense in operating a band saw machine is the constant sharpening of the saws necessary. The saws being run at a very high rate of speed and doing a large amount of work in a given time, require constant attention in this direction to keep them in prime order. To sharpen a band saw, the length of which is from 12 to 20 feet, with an ordinary hand file is an undertaking of no small magnitude. Accordingly, many devices have been brought out for expediting this operation. The machine shown in Fig. 1 has recently been introduced by Messrs. G. W. Amesbury & Co., of Philadelphia, and has some peculiar features worthy of attention. The machine has an automatic feed, which is self adjustable for any grade of teeth, and is arranged to feed in succession only the tooth that is to be filed. The file head is composed of two sections, one stationary and the other movable in the direction of its axis. The stationary section carries the feeder and a very thin segmental file, which is intended to file only the face and throat of a tooth. The movable section carries a thick beveled file suitable for the different grades of teeth, and rotates on a higher plane and files the back of the tooth, which has previously been filed on its face by the thin file, and at the same time cleans off the burr on the point of the tooth. This file



Novelties.—Fig. 2.—Improved Bench Clamp.

is adjustable up or down, as may be required, by the thumb-screw D, thus adapting it to grade of teeth or to giving a desired pressure upon the back of same. The object of this construction is to divide the labor of the files and relieve the blade, and also lessen the strain occasioned by filing all parts of a tooth at one operation, and at the same time to get all the possible wear out of the files. The head carrying the files runs in an ob-

long bearing, which permits it to vibrate to and from the saw, to compensate for high teeth or any other irregularity. This head is provided with a pressure spring in the thimble E, which is adjustable. It is also provided with a spring and a head, which gives it an upward pressure against the face of the teeth. The saw is held in a clamping



Novelties.—Fig. 1.—Amesbury Band Saw Filing Machine.

jaw, with the back resting against the gauge F, which is readily adjusted to any width of saw by the screw C, and may be set at any angle. The clamping jaw is operated by a cam on the hub of the head, and opens and closes as the machine is feeding or filing. This jaw acts like a vise upon the saw when the files are in contact with the teeth, and immediately releases it when in contact with the feeder. The machine is adapted to band saws from 1-16th to 2 inches wide, and from the finest teeth made to three teeth to the inch.

IMPROVED BENCH CLAMP.

Fig. 2 represents a new clamp, which, it is believed, is a tool that will fill a long-felt want. A peculiarity of this device is that it is self-fastening without the use of bolts, screws or nails. It adapts itself to any thickness of bench top or other place where its use may be required. A simple mortise, with the front side of same beveled forward and downward, is all that is necessary to secure it wherever required. Mortises may be placed at suitable distances apart, thus adapting the tool to use in connection with work of whatever size may be required. One of the great advantages in the use of this device is the fact that it will protect the work, as well as the bench, from the destruction so often caused by the use of bench knives and nails. It is believed by the inventor that its use will result in a saving of from fifteen to thirty per cent. in time and labor, besides insuring a smooth bench top, to say nothing of preserving a smooth temper in the operator. The engraving shows the clamp very well in all its parts, but does not convey an adequate idea of the double-acting ratchet, by which the screw is operated. This ratchet is so constructed that a projecting member, fashioned within the slot of the handle, engages in the slots shown in the head of the screw, making it possible to turn the screw either way. By lifting the handle, or drawing it forward, it is released from the slot. The screw may then be turned by the hand in either direction, for which purpose the edge of the screw-head is milled. The tool is neat and compact and well made, being finished in black japan. The inventor is Mr. James Murphy, of Providenc, R. I. The New England Butt Company, of Providence, are manufacturing the article and supplying the trade.

NEW ORAL SPEAKING TUBE ANNUNCIATOR.

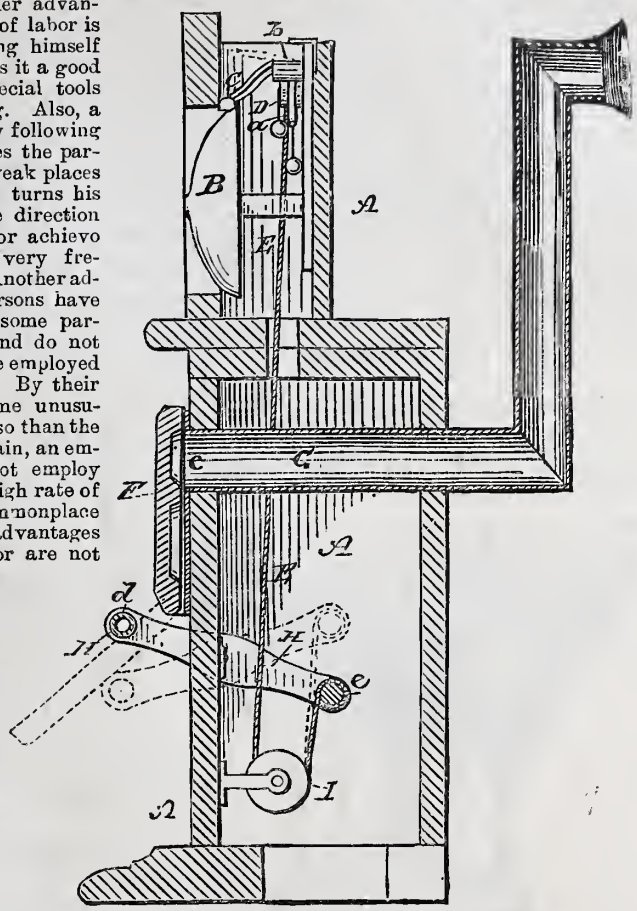
Mr. W. R. Ostrander, of 19 Ann street, this city, has invented and is now manufacturing an improved speaking-tube annunciator, of which Figs. 3 and 4 of the accompanying engravings give a fair idea. The special advantages claimed for this device over others are that it is self-acting and requires no attendance in regulating. There is nothing about it in the shape of springs requiring to be wound up, and no electric batteries to keep in order. It is also without delicate mechanism. The working of the apparatus may be clearly understood by inspection of Fig. 4. By blowing in the tube the drop F is forced from the vertical position which it usually occupies, and in falling strikes upon the rod H. This rod, as will be seen by examining the section, is one side of a nicely adjusted balance, which the weight of F is sufficient to overcome. Tipping the balance in this manner sounds the gong bell and attracts the attention of the attendant. By means of the portable mouth-piece shown in the foreground of Fig. 3, communication is established through the pipe from which the signal was given. By replacing the lid in a vertical position the apparatus is ready to receive another signal. The desirability of oral communication between the rooms of a hotel and the office, or between the various rooms in apartment houses and flats and the front hall or the janitor's quarters, is of considerable importance. It insures the

guest in the hotel the most prompt attention, and results in a saving of bell boys, as well as wear of carpets. There is nothing in the construction of this annunciator which would interfere with its being placed in buildings already occupied without special inconvenience to tenants. The cases of the annunciator are finished to correspond with the woodwork of the apartments in which they are situated.

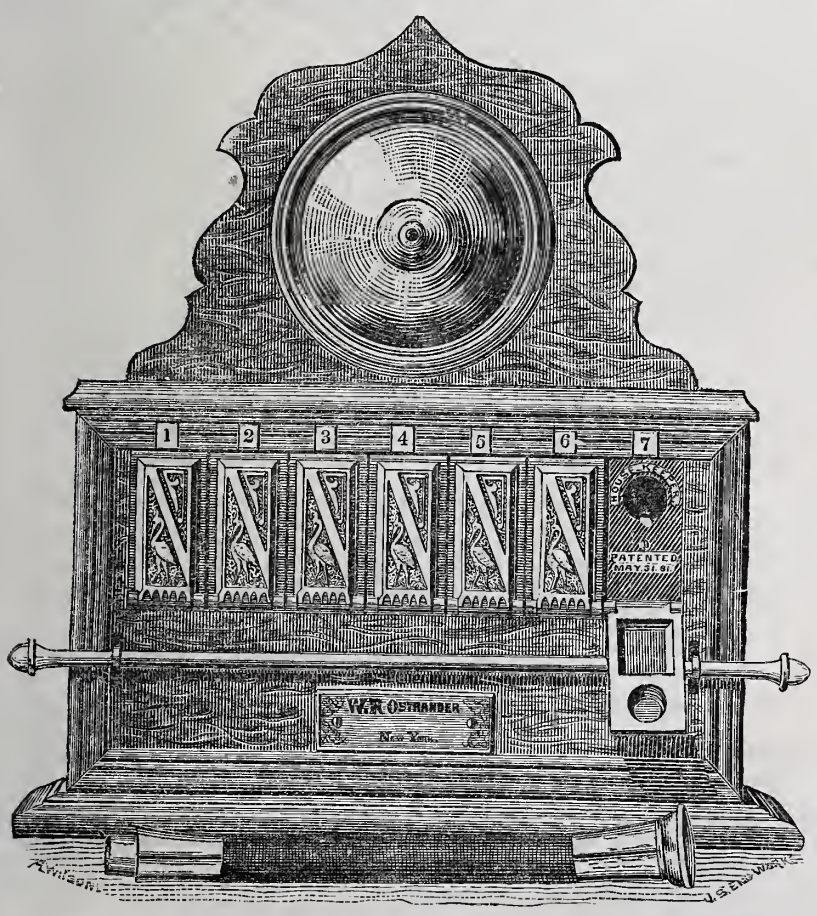
Division of Labor.

The advantages of division of labor are now so clearly recognized that but very little original can be said in their favor. The leading feature is, of course, economy in its broadest sense, including economy of time, of force and of material. At a very early age of the world's history division of labor would be instituted; thus the shepherd would tend the flocks, and the agriculturist would till the soil. In later times trade would be specialized, as the worker in metal and hewer in stone. In India this division of labor was carried (and still exists) so far as to become degraded into the system of caste, where one workman or race will not touch the work of another under the penalty of losing caste. But it is to the present century more particularly that we refer when speaking of the advantages of division of labor. A workman, by constantly making one article, becomes so expert and dexterous that he will oftentimes turn out double the work in a better manner than another who only occasionally does the same work. For example, the chainmakers, the makers of wrought-iron tubes, the nailmakers, bolt and nut makers, and riveters, may be mentioned, as well as the various bodies of men employed in the potteries and other districts. Time is thus economized by skill in manipulation, due to division of labor. Time is also economized by the time saved in changing from one occupation to another. Force is economized by the workman knowing exactly where to direct efforts to secure the best results. Economy is further secured by the dexterity acquired, fewer wasters being produced, each article being turned out of the required excellence.

The old English proverb expresses the popular opinion on this subject that "Jack of all trades is master of none;" or, a person who is able to do something of everything is not able to do any single thing in a proper manner. Another advantage due to the division of labor is that a workman confining himself to one class of work finds it a good investment to make special tools to simplify the making. Also, a person who is constantly following the same occupation sees the particular difficulties and weak places in a process, and hence turns his inventive powers in the direction that will give a remedy or achieve an improvement, and very frequently with success. Another advantage is that some persons have a particular talent for some particular class of work, and do not feel happy unless they are employed on that class of work. By their liking for it they become unusually expert, much more so than the ordinary workman. Again, an employer of labor need not employ highly skilled men at a high rate of wages to perform commonplace work. Of course, the advantages of the division of labor are not to be secured without some corresponding disadvantage. A lathe man may be expert at his lathe, and a planer at his planing machine, but they look at every piece of work with the eyes of a turner or planer. They care but little for the work as a whole; they lose interest in all except that which immediately concerns them. A tracer or copying draftsman soon loses interest in the higher branches of his calling if he is confined to tracing or copying without any change; and even a person constantly employed in arithmetical routine loses any liking for advanced mathematics, and becomes a mere mechanical calculator. Again, the mechanical engineer, engrossed by wheels, shafts and machinery, is but seldom more than an amateur among civil engineering works, as bridges, tunnels, &c., while a railway surveyor has but little interest in borough surveying. Division of labor is also found to be the rule among the professions of law and medicine. Thus we have specialist doctors and surgeons clever in some particular disease, in the treatment of which they have made themselves famous; while in the law some devote themselves solely to criminal cases, others to civil cases, others to conveyancing, others again to patent law, and so forth. As the division of labor is extended in the workshop, special machines are devised to do one class of work, and that only. The old-fashioned plan of making a machine act as a kind of universal tool is happily dying out. It always raises a smile to our lips when we hear an inventor vaunting the merits of his particular machine because it will do this, that, and some other particular thing, probably all these being done badly or not so well as if done in a machine devoted to one of the three objects. Human life is not long enough for a person to make himself master of all handicrafts, or acquire full knowledge on all subjects. Even our scientific physicists are obliged to devote themselves to one special subject, contenting themselves with a general knowledge of allied subjects.



Novelties.—Fig. 4.—Sectional View Through Receiver.



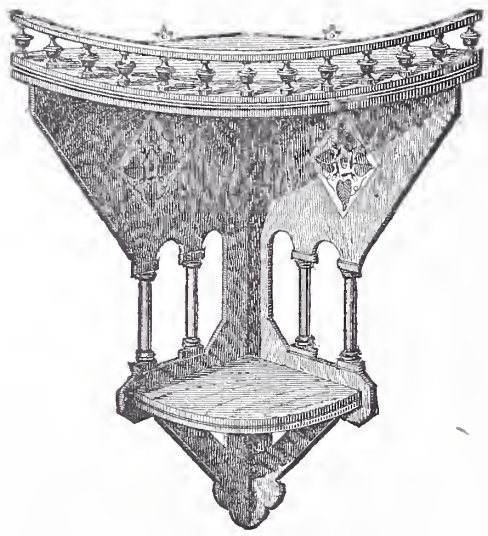
Novelties.—Fig. 3.—New Oral Speaking Tube Annunciator.—General View of the Receiver.

Building Activity in New York City.—Some curious and interesting facts are brought to light by the daily papers concerning the present extraordinary building activity in New York. The "boom," so-called, is almost entirely confined to New York city. A favored small part of Brooklyn feels it, but there is stagnation in New Jersey and other suburbs. The localities adjacent to the elevated roads, both up town and down town, are being built up much more rapidly than any other portion of the island. Down town the building enterprises are mostly office buildings, while up town they are residences, apartment houses, &c. The present building activity is somewhat a surprise, and is directly traceable to an extraordinary abundance of money in this market seeking better paying investments

than government bonds at 3½ per cent. The present building "boom" is undoubtedly a substantial one, without those speculative qualities or insecure bases which have characterized former seasons of building activity in this city. That it was unexpected is evidenced by the fact that architects and builders made calculations and provisions for a season of heavy work, and yet they far underestimated the great volume of work they have been called upon to do. As a consequence, builders have made contracts at prices too low to leave them much margin of profit, and many will lose money in consequence. Workmen have taken advantage of the great demand and have advanced wages. Unskilled labor has also advanced to comparatively high wages.

The Law of Curves.

"Curves," says an English author, "played a large part in ornament, and often they were drawn in an unscientific manner. A universal law was that all curves, whether springing from other curves or from straight



Corner Wall Bracket.—Fig. 1.—Perspective View.

lines, should be struck at a tangent to the lines from which they diverged; and when curves conformed to this rule the effect was agreeable and natural, and when it was departed from the effect was weak and crippled, because the lines would appear to cut through one another, whether continued to that point or not. Further, in two designs of leaves springing from common bases, that in which the stems ended parallel to each other would look better than that in which they approached one another, for in the latter the mental effect would be to continue the lines so as to intercept each other. The effect of these qualities of rhythm, repetition, geometrical symmetry, alternation, equal distribution of spaces and proper relation of curve to curve, made up what might be termed abstract ornament.

"Ornament should not attempt to directly imitate nature; but a large class of genuine ornament was based upon the adaptation of natural forms. There was a beautiful class of ornament not derived from these forms, and which might be distinguished as 'abstract' ornament. In the decorative work of all savage nations a great proportion of the ornament was produced by filling up the space treated with simple lines having little meaning or purpose in themselves. This abstract ornament might be traced in a higher form in Egyptian art, and reached its greatest development of perplexity and mystery in Saracenic art, in which a puzzling and complicated effect was produced by the shifting and rearrangement of a few lines. The familiar Greek key pattern was in like manner a collocation of squares, with one side cut away, interwoven with one another. One of the most intricate Saracenic patterns was a series of concentric hexagons, slightly tilted. Ornament could be produced not only by drawing on a surface, but by varying that surface so as to produce an alternation of light and shade. Ornament derived from nature, while it must not imitate, might have various degrees of approach to nature, governed in their nearness of likeness to a considerable extent by the nature of the material and medium worked in. Thus in crewel work, exact symmetry should be avoided, and the imitation of nature might be comparatively near, but ornament to be placed on a building should be architecturalized. A leading reason against the attempt to precisely copy nature was that in most media it could not be done successfully; the direct effort to reproduce a flower in carving only called attention to the absence of the delicacy, the finish, the fragility of the natural form. Again, such minutely copied work violated the necessity for fitness for its space and purpose. The principle governing growth in nature must be observed in ornament—*e. g.*, as in actual life, all curves must spring in the same direction, whether flowing from right or left of a central stem, and it was an obvious mistake to repeat the trailing festoons, so appropriate in Renaissance decoration for a wall surface, upon a ceiling. The grotesque did not suggest a misuse or degradation of the subject, and might be more boldly employed. The use of grotesque animals upon jugs or other domestic vessels is almost universal throughout the world. The imitation of artificial objects was invariably bad, because it brought back the mind to every-day matter, and it was generally a proof that it was introduced to save trouble and thought. Artificial objects were very frequently used in Roman and Renaissance work, and also in a great deal of the work by Grinling Gibbons, which was often very faulty in conception, although admirably executed."

Corner Wall Bracket.

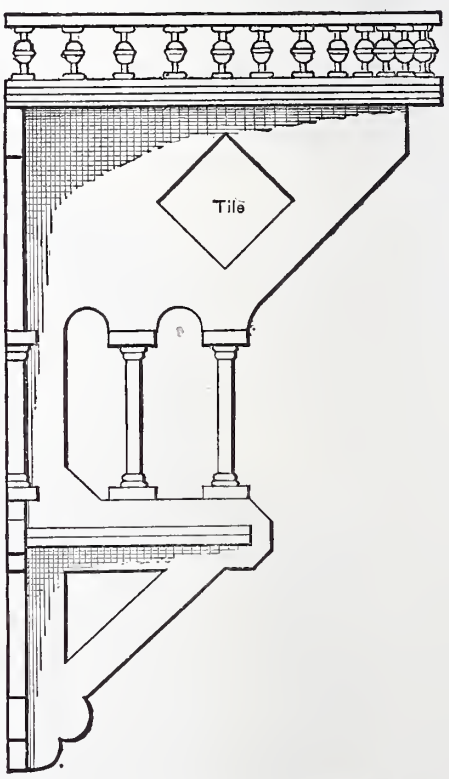
Continuing our series of designs of appropriate articles of ornamentation which the carpenter may make for his own use at odd times or for selling among his friends, we present this month a neat corner wall bracket in which tiles are introduced as an ornamental feature. As may be seen by the perspective view, Fig. 1, the two sides are cut from a board, being enriched by some small columns, a detail of which is shown in Fig. 5. A piece of tile of appropriate character and design is inserted in each half of the body, being placed diagonally instead of square. There is an opportunity of exercising taste and discrimination in the selection of tile for this purpose. Almost all of the art supply stores throughout the country, and in some cases the book and stationery stores, have odd pieces of tile for sale, or catalogues from which selection may be made for ordering. Two shelves for holding boquets, statuary, bric-a brac, small picture frames, or whatever one wishes to put upon them, are provided The upper shelf is inclosed by a neat balustrade, consisting of a plain rail at the top supported by simple spindles. A detail of this construction and the edge of the shelf is shown in Fig. 4. The spindles may be turned up in wood, something different from the body of the bracket and the rail being used for the purpose, or they may be made of metal, as fancy may dictate. A top view of the shelves is shown in Fig. 3.

NOTES AND COMMENTS.

THE PRICES which desirable property in New York City at present command are somewhat fabulous when considered in the abstract. Building sites upon Fifth avenue, from Twenty-third street upward, are selling at the highest prices ever known in its history. Desirable corners command especially high figures. Private dwellings, which exceed in size and cost any hitherto erected in the city (with one or two exceptions) are going up, and the upper part of the island, in the vicinity of Central Park, is being rapidly covered with expensive dwellings. Lots for building in the more desirable situations command prices which would have seemed enormous five years ago, and yet their purchasers, in many cases, are holding them for a further and speedy increase in value.

THE FIRE RECORD of New York for 1880 presents some interesting features. There were 1928 alarms, of which 145 were false alarms; 1665 fires were confined to the buildings in which they originated, and only 41 extended to other buildings; 1252 fires were extinguished by buckets of water and fire extinguishers; 22 were extinguished by chemical engines; 246 were extinguished by the stream from a single steam fire engine, and 263 by the streams of more than one engine. The total loss by fire for the year was $3,181,555. The total insurance upon the goods and buildings destroyed was $16,394,078. The average loss per fire was $1784. The four most costly fires resulted in losses of $108,750, $204,150, $517,342, and $750,108. The causes of the fires were very numerous; we can only refer to a few of them: 397 are attributed to carelessness, 117 to children, 7 to defective construction, 38 to defective flues, 103 to kerosene lamps, 116 to sparks from chimneys, 115 to window curtains, while 141 are declared to be not ascertained.

A NEW AND VALUABLE plastic material, adapted for ornamental and other purposes, has been recently introduced in Germany. The substance is one which may be pressed into shape and used for the production of bas-reliefs and other figures, and may be likewise worked by the hand into models. It can be readily manipulated. The only care necessary to be taken is to coat the hands thoroughly with linseed oil, and to keep the mass warm during the process. On becoming cooled and dried, which takes place in a few hours, the material is said to be as hard as stone. The composition is described as follows: Five parts of sifted whiting are

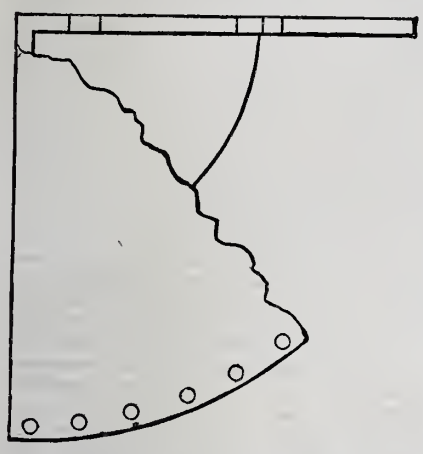


Corner Wall Bracket.—Fig. 2.—Elevation.—Scale, 3 Inches to the Foot.

mixed with a solution of one part of glue. When these two ingredients have been well worked into a paste, a proportionate amount of Venetian turpentine is added, which serves to prevent brittleness. A small amount of linseed oil is also put into the mixture to obviate its clinging to the hands. The mass may be colored in any way that may be desired, the proper tint being added in dry form, and worked into the mass by kneading.

W. MATTIEU WILLIAMS, in a paper communicated to the *Building and Engineering Times*, describes some experiments which he made some time since to test the durability of stone in an atmosphere more or less infected with sulphuric acid. Some pieces

of stone were immersed in moderately strong solutions of sulphuric and hydrochloric acids respectively, and were afterward carefully examined with reference to any action occurring. At the same time the crushing pressure of samples in their natural state was tested, and similar pieces, after being submitted to the acids, were likewise tested. In cases where there were no evidences of internal disintegration after several days immersion, it was inferred that the stone would stand the acid vapors of the Birmingham atmosphere. Subsequent practical tests proved these conclusions to be correct. Experiments of this kind indicated that the worst of material for exposure to acid

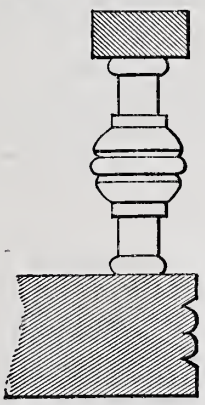


Corner Wall Bracket.—Fig. 3.—Plan Viewed from Above.—Scale, 3 Inches to the Foot.

atmosphere is sandstone, the particles of which are held together by limestone or are otherwise surrounded by, or intermingled with, limestone. On the other hand, the best ordinary material for resisting acid atmospheres is a pure sandstone quite free from lime. Compact limestone, such as good homogeneous marble, stands fairly well, although even it is slowly corroded. The corrosion, however, in this case is purely superficial and tolerably uniform. It is a very slow washing away of the surface without any disintegration, such as occurs where a small quantity of limestome acts as binding material to hold together a large quantity of silicious or sandy material, and where the agglomeration is porous and the stone so laid that a downward infiltration can take place. It must be remembered that although the acid originally exists as vapor in the air, it is taken up by the falling rain and the mischief is done to the stone by this acidified water. This, of course, is very weak acid indeed, that which was used for testing the stone being many thousand times stronger. On the other hand, the stones in being tested were exposed for only a few days.

The changes which occasionally take place in the course of trade, by which an existing source of supply is destroyed, or rather superseded by another, are sometimes quite remarkable. A struggle, which has at length been successful, is that of the American glass interest against competition from France. French plate glass in America has for years been regarded as a standard quality. The French glass factories ran full time, and sold all the glass they could at home, shipping the balance of their product to America, where it found ready and profitable sale. American manufacturers easily perceived that success could be made for American plate only by producing a superior quality of glass. Bending every effort to this end they accomplished it, and after years of loss made glass very superior to English and every way equal to French plate. The consequence of this has been that the French have given up the American market and have concentrated their efforts on the English market, to such good purpose that while twenty years ago there were six English plate-glass warehouses in the city of London, and quite a number of plate-glass factories in full operation throughout England, now there is but one English plate-glass warehouse in the whole city of London. All the English plate glass factories are either entirely stopped or are running on half or quarter time. During this period a number of French plate-glass warehouses have been established in London, and every French factory is running full time. French plate-glass has become so superior to the English that the latter has been almost entirely driven out of the London market, while the former has taken its place. The American factories, under every discouraging feature that could possibly be imagined, have, after years of financial loss and failures, arrived at the point where plate-glass is made which is generally recognized as equal to French and much superior to English. American glass, on account of this superiority, has almost entirely superseded English plate-glass in all the American markets.

The Labor Market.—Since the date at which our report of building operations and wages was compiled, which was published in our last number, there have been very few important changes to chronicle. The general tendency in wages, confining our remarks more particularly to the larger cities, has been upward. In many cases the rates paid are upon a private understanding between employees and employers, and are not generally known by outside parties. In New York city particularly is this the case. A careful examination of the daily papers shows less reference to the rates of wages being paid to mechanics here than in other cities. It seems to be agreed by both master builders and workmen that the subject of wages is not one for general discussion. Building activity in this city continues unabated, and desirable mechanics in all departments of the building trades have no difficulty in obtaining work at remunerative rates. The present prospect is that building will be actively continued until late in the fall, if not throughout the winter. Chicago and St. Louis, according to reports which have reached us, are paying higher wages than most of the Eastern cities. Bricklayers in Chicago are obtaining $3.50 per day and upward, while at St. Louis the wages will probably average $3.75. Carpenters in Chicago are quoted at from $3 to $3.25, and in St. Louis at about $3. House painters command from $2.50 to $2.75 in both cities. Taking Cincinnati as a central point, so far as the Western cities are concerned, we find rates somewhat below those we have just quoted, being for bricklayers $3.75, carpenters $2.25 and house painters $2.25. In the Eastern cities, excluding New York city, quotations are still lower. Boston and Philadelphia are paying about the same rates for bricklayers, wages being nominally $2.75. Baltimore, on the other hand, is quoted at



Corner Wall Bracket.—Fig. 4.—Detail of Upper Shelf and Balustrade, Full Size.

$3.25. Carpenters in Baltimore are obtaining $2.25, in Boston $2.50 and in Philadelphia $2.25. House painters in Baltimore are quoted at $2, in Boston $2.25 to $2.50 and Philadelphia at $2 to $2.25.

The builder of a church in a London suburb, recently, on returning thanks for the toast of his health, which had been proposed, remarked with much candor, "I fancy I am more fitted for the scaffold than for public speaking." A good many builders of churches and other buildings which prove to be fire-traps might say the same.

Builders' Sheet Metal Work.

BY A. O. KITTREDGE.

TREATMENT OF SURFACES IN ARCHITECTURAL FINISH.

It will not be without interest to the builder at this time to have his attention directed to some features of construction and ornamentation in architectural sheet metal work which affect not only the appearance, but the actual quality of the work he employs. A great objection to galvanized sheet iron work wherever found, whether in cornices, moldings, panels, belt courses or what not, is its hollow condition, and the tin-pan-like sound sent forth when it is struck. Another objection is that its plain surfaces are irregularly undulating, reflecting light in various directions, thereby indi-

Corner Wall Bracket.—Fig. 5.—Detail of Column in Side Pieces, Full Size.

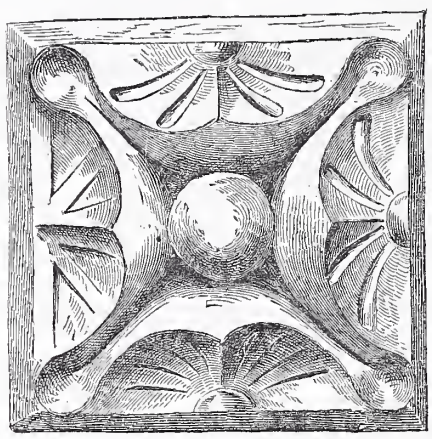
cating the character of the material beyond the power of paint to conceal it. No one who has ever critically examined a specimen of galvanized iron work can fail to have been struck with these peculiarities. Both of these difficulties can be overcome in a measure by breaking up the surfaces. This may be done by corrugations and by introducing angular bends at intervals when such treatment will harmonize with the general character of the design. Corrugations are quite common in sheet iron employed for the sides of buildings, roofs and the like, and this method of treating metal for the purpose has been in common use for many years. It is only of late, however, that the desirability of using corrugations in cornice work, as it is so generally called, has been appreciated. By corrugating the flat parts of panels, and flat surfaces generally, like friezes and planceers, much is done in the way of adding strength and stability to the work, besides removing some of the objections to which we have already alluded. Machines are now in use making corrugations in sheet metal of various sizes, ranging from the largest, which are about 5 inches between centers, to the smallest, in which the space between the centers does not exceed ¼ inch. Fine corrugations, by the very nature of the case, are the only ones which can be employed in connection with cornice work to advantage. What is known as crimped iron has been largely used in some of the more extensive factories, during the past few years, for plain surfaces. Crimped iron, in contradistinction to corrugated iron, means iron which has been run through ribbed rollers, in a way to free its surface from buckles and kinks, without, however, taking up any of its length. In other words, crimp-

ing stretches the sheet in a way to make it lie perfectly flat, and besides imparts to it a roughened surface, which destroys the distressing reflection of light peculiar to ordinary flat sheet metal work. It is greatly to the builder's interest to secure galvanized iron work constructed with the plain surfaces made either of crimped iron or finely corrugated iron, on account of the qualities above referred to. Fine corrugations, in many places, may be used and should be preferred to the crimping just described, because they add materially to the appearance of the work as well as to its streugth. A crimped surface appears perfectly flat when viewed from a short distance. Crimped iron may be bent to any angle across the lines imparted by the rollers, which adapts it to use for all such surfaces as planceers, friezes and panels, in which joints are made by flanges.

Another very common objection to galvanized iron work, and one in which there is much force, is the flimsy construction employed in its manufacture. Sometimes this is owing to carelessness upon the part of the mechanics engaged, but more frequently it is owing to the character of the design employed. It seems a fair proposition that a material so unique in its qualities as galvanized iron should have features of design peculiar to itself. When we build in wood, we do not use the same forms of parts and details of construction that we use when we build in stone. When we build in brick we employ an architecture adapted to that material, instead of taking forms belonging to stone or wood. By parity of reasoning, when we build a cornice in galvanized iron, we should not be held to the forms peculiar to wood, nor to those in which stone would be worked. Some of the greatest difficulties with which sheet metal work has had to contend in the past have had their origin in the designs used. Sheet metal has been so easily worked that it has been fashioned in the imitation of forms belonging to other materials, rather than in the forms to which it, by nature, is best adapted. There is no harm in employing forms belonging to wood and stone, so long as they are suitable for execution in sheet metal, but to build a cornice in sheet iron to the same pattern as one built in wood, in most cases is an absurdity —yes, worse than an absurdity. It costs more money than would be necessary if appropriate forms were selected, and it is not nearly so strong or durable.

One of the great sources of reproach to galvanized iron work has been the willingness on the part of the manufacturers to produce any design, to employ any construction that is suggested to them, instead of standing upon the merits of their material and holding themselves strictly to those designs which are best adapted to the material they employ. When a carpenter builds a cornice bracket of wood in order to get a certain effect upon the face, he sometimes employs several thicknesses of plank, placing them alternately in and out; or, rather, he cuts them to two patterns, one being regularly less than the other, thereby causing ridges and depressions in the face when the pieces are matched at the back. This construction is good in wood because it is appropriate to the material, but when it comes to building a bracket out of galvanized iron to the exact form and design above described, a great mistake is made. This material produces a shell and not a solid. Accordingly, each corner or angle of the projecting and receding ridges along the face consists simply of a soldered joint, something which is quite treacherous in galvanized iron and not to be depended upon. Besides this fault of construction, unless the very best of workmanship is employed, the bracket will often fail of being straight in its parts.

Still other instances might be named in which galvanized iron is used disadvantageously, but enough has been said to direct the builder's attention to points which are not generally considered. Many a builder has been greatly disgusted with the galvanized iron work supplied for his buildings. Some builders have condemned the use of the material outright. Had they examined closely into the cause of their dissatisfaction they would have found that much of the blame rested with the designs employed. If, instead of making the surface of a sheet metal bracket in the form of alternate depressions and projections, a plain flat face is used upon which metal ornaments in the form of leaves and rosettes are planted, all but two seams along the corners are avoided. A much stronger piece of work is produced, labor is saved, and a design is exhibited which is adapted to the material employed. By the facilities of manufacture now possessed by most of the larger cornice establishments throughout the country, pressed leaf work and rosette work is produced so cheaply as to make it quite desirable to use ornaments of this kind, in place of the soldered work above named. It is to the advantage of the cornice maker, if he be intelligent in his own interest, to use stamped work of this kind, rather than to build imitations of wooden brackets. I call the attention of builders to these facts, because from ignorance, or from other reasons, it sometimes happens that the cornice maker does



Lessons in Carving.—Fig. 13.—*A Rosette in Clay, the Four Quarters showing Different Degrees of Finish.*

not construct his work in the best manner. Careful attention to these points in selecting the design for a cornice, pediment, window cap, or for any other part of a building will result in better work and lower prices, at the same time avoiding the annoyance of broken seams and generally dilapidated appearance of cornice work as commonly made and shipped. Application of the principles of construction and of treatment of surfaces to which I have called attention, may be summed up in a very few words: Avoid plain surfaces, unless they can be broken up by crimping or corrugating. Avoid, as far as possible, all soldered joints in bracket work and the like. Obtain the necessary ornamentation and relief by means of stamped ornaments resembling carvings. By this means the best work will be produced—work which is likely to give much bteter satisfaction than that which is generally current.

Lessons in Carving.—IV.

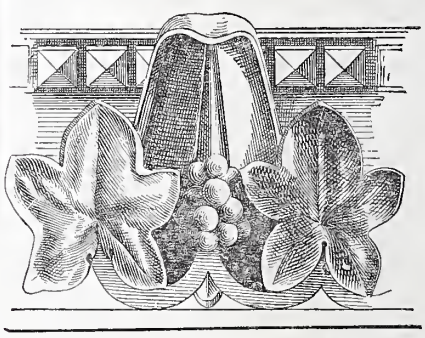
BY W. E. PARTRIDGE.

TREATMENT OF SURFACES.

The readers for whom these lessons are being especially prepared are of the class who, by association and long experience, understand the use of woodworking tools. It is more profitable, therefore, to continue our consideration of forms in clay than to attempt directions for cutting in wood—a part of the subject with which many of our readers are undoubtedly quite familiar already. The disposition of surfaces, the means of expression, the manner of attaining certain desired effects, and especially the broad subject of light and shade, early demand the learner's attention. A familiarity with these matters is more easily obtained by experiments in clay than in any other way. Accordingly, the student is recommended to pursue his investigations in this direction until considerable skill in manipulation is obtained. From that point forward his progress in cutting wood in ornamental forms and in shapes to express ideas, will be easy and rapid.

Almost every branch of art has an extensive literature, covering not only the theoretical, but the practical side of the subject. The teachers and masters have left us abundant instructions to guide us in composing in light and shade, for the disposing of figures in pictures, for the arrangement of masses and the theory of color. In a word, for all that is necessary in making a picture or producing a decorative design, we have an abundance of rules and directions. Indeed, the student's difficulty is one of selection and of digestion. He usually finds more material than he can master. When, however, he turns from his brushes, and, taking up the clay and modeling tools attempts to work in relief, he seeks in vain for a master. Little or nothing has been given to the world on the principles involved in decorations in the solid, or in industrial modeling, as it may perhaps more correctly be called. For this reason it is difficult to write intelligent instructions, for the teacher to a great extent finds himself upon an unknown sea, with only his own experience as a guide. Principles have not been established, and there is little to aid one in deducing them from the works accessible. Until copies of great decorative works in relief are available it will be diffieult perhaps to show, as has so often been done in painting, how success may be obtained by following recognized examples.

When sitting down with the pattern of a rosette or a panel before one, the question is naturally asked: "What are the principles by which we should be guided in giving these forms relief?" The student often asks: "How shall I proceed in order to obtain an effective disposition of light and shade on a surface?" To a certain extent he must answer himself. When one is working in clay, the very material seems frequently to suggest what is to be done. The student is, therefore, not altogether without a teacher, and, as it is easy to correct mistakes, it is a safe rule in modeling to follow any suggestion in regard to the disposition of surface or form and see whether it be correct or otherwise. In a design we first have our arrangement of lines to make. This is obtained by following some of the general principles that would guide the designer in ornamenting a flat surface. One who has studied decorations in the works of Colling or Dresser will find that they give abundant assistance, but when we ask how



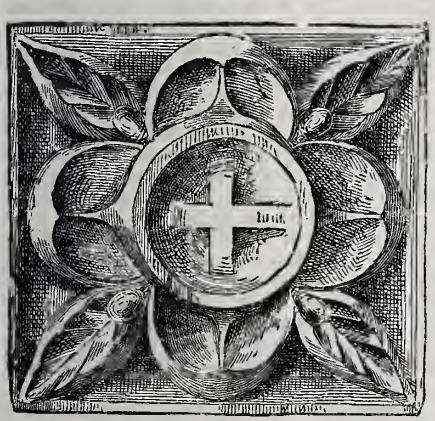
Lessons in Carving.—Fig. 14.—*Section of the Enrichment of a Carved Molding.*

shall the relief be distributed, the case becomes different and the student is left without guidance.

The first subjects likely to be attempted by the beginner are probably such designs as will be appropriate for rosettes or panels. In carving such work or in modeling it, it is well to observe that the design ought not to project above the rails or framework in in which it is held, nor above the moldings which surround it. If this is applicable to a rosette as to a panel, the reason for the rule is found in the fact that projecting work is continually liable to do injury and to receive it also. Very high relief is offensive, as it makes the ornament appear more like a separate work than a decoration. Some of the best work that we have ever seen in this country, although on a large scale, has only 1-inch or 1½ inch projection from

the background, and yet the panels are 4 or 5 feet long, and perhaps 2 feet in hight.

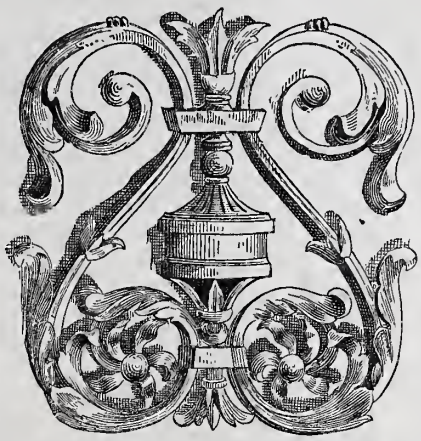
In a disposition of the lights and shadows, considered by themselves, we find in modeling that the same rules may be observed that guide us in designing in black and white upon a flat surface. The means for obtaining lights and shades of graduation are altogether different. For example, in Fig. 13 we roll up a ball of clay in the hand and place it in the center of the rosette, and we obtain a small and very high light, which will be graduated into a shade upon one side, while upon the other side will be a strong, dark shadow, and if there is a background on the side away from the light, there will be a shadow darker upon that surface than upon the ball itself. In this particular case, however, there is no flat background, and consequently no opportunity for a shadow to be thrown. The exact position of the light point will, of course, be determined by the direction in which the light falls. If the light comes from directly overhead, the shadow will probably be very strong and the effect very bold. A great portion of our ornamental work is modeled under a light which falls thus upon it, or at at angle of perhaps 40 or 45 degrees. This is admirable for the artist, but the work suffers, because the most of wood carving—and, in fact, most of the ornamental work in relief—is seen by side lights. Consequently, if we make our first design to be seen from a light coming from above, it suffers when seen in a side light. If the student will model a rosette like that shown in Fig. 13 or Fig. 15, doing it with a light falling in one direction only upon his work, and without turning it around, he can easily get a very pleasing effect. If he now turns the work through 45 degrees or 90 degrees, a very decided



Lessons in Carving.—Fig. 15.—A Rosette in Clay.

change in it will be seen, and if he turns it still further he may be surprised to find that its character is altogether different from that which he supposed it had. One thing will certainly be evident—that many errors had been made which were entirely invisible with the light falling as at first. Since most work is to be seen with side lights, common sense dictates that the model should be made with the light falling as nearly as possible like that in which the finished work is to be seen. The light which is found in ordinary rooms is more diffused and does not usually permit of the same striking effects to be obtained by the over head light, but the general appearance of the work modeled with a diffuse light from the side will be greater than that done in the usual way.

In the distribution of light and shade we must study the effects which the forms of surfaces have upon the reflected light, and by properly handling the forms we may obtain lights or shadows in such forms, and of any intensity that we may wish to give our work effectiveness. For designs which are to be seen at great distances, as in the cornices of buildings, it often happens that the only thing to which the artist's attention is directed in the modeling is this formation of surface as it modifies the light. When, however, the object is to be seen within a few feet of the eye, something further becomes necessary. We may introduce absolute beauty of form in addition to the beauty confined by light and shade, and what we may be permitted to term "flat outline." A mass of light can be produced by the use of a flat surface turned toward the side from which the light comes. To graduate such a mass, a portion of the surface may be curved away from the light, which will introduce a shadow or a partial one, according to the inclination. A similar graduation may be obtained by turning a surface sharply up to catch the light, and then allowing it to sink away rapidly till it reaches a considerable depth, so as to be out



Lessons in Carving.—Fig. 16.—A Scroll Ornament, Sometimes Used in the Decoration of Panels.

of reach of the light. In Figs. 13, 14 and 15, deep shadows are obtained by carrying the work down to great depths, so that in any ordinary light they will appear almost black. Shadows of projecting parts may sometimes be used for the same purpose. In the leaf on the right hand of Fig. 14 we have an illustration of how twisted or winding surfaces give modulated lights and shadows. Where fine lines of light are wanted, they are obtained by means of sharp raised edges. Lines of black, as in Fig. 13, can be obtained by sunken lines, the depth of color or shade being in proportion to the depth of the cut. In Fig. 14, which was sketched from a model made by a beginner, two leaves are shown, illustrating different kinds of work. The one on the left-hand side is like that employed in stonework, and in that material is very easy to produce. Such convex surfaces, however, are difficult in wood, and the leaf on the right shows more nearly the form which would be used by wood carvers.

The tongue which rises up between these leaves is almost flat and rises sharply at the edges. A section of it would be almost like a sled runner, the curve only commencing within a very short distance of the edge. The bunch of grapes gives a roughness, and breaks up the light and shade very effectively. The original design was intended to form part of a bold decorated molding, and this pattern is repeated continuously. The edges of the leaf in the original are left wide, and in the spaces between the leaves several lines are cut to increase the shadows. This is shown as solid black in the cut. For architectural work and that which is seen at a distance, the edges of the leaves are often worked up an eighth or a quarter of an inch wide. This is very effective, as it outlines the forms perfectly and prevents them from having an appearance like sheet metal. In small carvings to be seen near the eye this treatment is not necessary, and the leaf will be finished more like that on the right-hand side, the line of light which the edge catches being ample for the purpose of outlining.

Fig. 15 is a rosette which is very difficult for the beginner to model in clay, yet in wood carving it would be comparatively easy, since the lines can all be drawn and the work cut almost as well without a model as with one. This is one of the few designs which appear almost as well when reversed as when positive. That is to say, if instead of a cup in the center we had made a ball with a cross cut into it, the design would have had nearly the same appearance as at present. Each of the cup-shaped leaves at the sides rolls upward, so as to give a mass of graduated light on either side the central depression. At the same time the lines forming the edges of these leaves are very graceful when properly modeled in the solid, and are good illustrations of the fact that we can often see beauty in relief which does not appear when the same subject is drawn in plan or elevation, or when seen from any point of view with one eye. This is particularly true of all lines which have widely different curvatures when seen in profile and in front view. Such lines give a wonderful grace and beauty to relief work. Of course, when represented upon paper only one set of their curvatures can possibly be represented, and much of their beauty must of necessity be lost.

Our illustrations are all drawn from the work of a beginner, and are useful in illustrating the different steps which were taken and the measure of progress which may be expected. Fig. 16 is a style of work once very fashionable, but now chiefly useful for showing how surfaces may be bent, in order to carry out a scheme of light and shade, and of outlines at the same time. If the plain bands at the top and bottom, by which the scrolls are joined or held together, be set at different angles, the amount of light which they will catch will be greatly varied and their effects emphasized or diminished. The main stems and branches forming the scrolls are raised nearly their own width from the background, and while nominally octagonal, the lower sides are considerably higher or wider than the others, and stand at an angle with the background, so that upon examination it would seem as though the stem had been pushed over sideways after being put in position. This increases the shadow upon the one side and angments the amount of light reflected by the other. The same is true of the stem, shown in Fig. 17, where the relief is greatly exaggerated, and the pieces connecting them with the body of the work are vertical on one side and greatly cut away upon the other.

It will be profitable for every one who wishes to learn enough of the art to make it useful as an aid in wood carving, to attempt to copy these designs on a large scale. Fig. 13 should be made about 10 inches square,

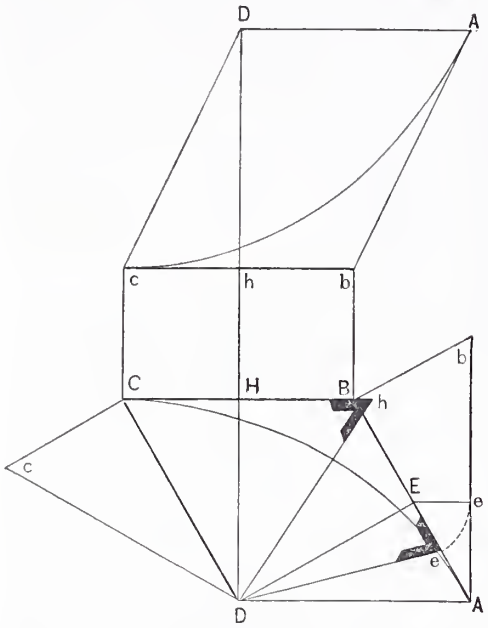
Lessons in Carving.—Fig. 17.—Stem and Flowers Modeled upon a Concave or Convex Surface.

and the ball in the center given a projection of about 1 inch. For speed of working it is a great advantage to have the work so large that the finger will answer for tools. Fig. 15 should also be made about 10 inches square. If convenient, this may be cut in wood without attempting to make a clay model. Fig. 14 should be about 20 inches wide. It will be a very grand lesson if this design can be completed without the use of a tool. One-half of it may be made as a model for wood, and the other, as shown, for stone. It will be found that it is much easier in clay to get the stone effect than that which imitates wood. In this, as in most of the early work, the beginner is constantly tempted to seek after too much relief. He wants to get boldness and vigor by leav-

ing his work standing up away from the background. It will be well, therefore, if the highest portion of this work he limited to 2 inches. While not very pleasing on paper, it becomes effective in the clay.

In Fig. 15, as in Fig. 13, it is well to try the effect of finishing the different sides differently. Thus in Fig. 13, three different methods of decorating the leaves are shown. In one the ground is sunk, leaving flat, raised ribs; in another, deep lines give the effect; while the other two are ornamented with lines made by a broad, round, pointed tool.

Fig. 16 was modeled, like all the others, by a beginner from a very small sketch, and in copying it the student will have one very good lesson in the preservation of his outlines, while he is attending to relief also. This design should be modeled on a large board and should not be less than 30 inches from top to bottom. The highest relief need not be more than 2 inches. In doing it work rapidly, and do not attempt to finish any portion the first day. In fact, the clay should be kept so soft that finishing is impossible. Get it right as near as possible, and then at the next sitting begin the finishing. The focus of each of the stems, when they are single, may be made slightly concave with advantage, instead of perfectly flat. Fig. 17 is made upon a round and concave, or convex, hed of clay. The relief need not be great. For a model for this design the student may take a flower and buds of the buttercup, laurel, or, better yet, the common potato. The leaves may be taken from the willow, while the stems should he from the apple. These are all good to study if one aims at the character and does not attempt to make a "dead copy." The raised stem through the middle of the leaf is difficult at first. Model the leaf without it; then down the center place a three-cornered roll of clay, and cut and trim till it is reduced to the right size. After modeling a leaf once in this way the difficulty will disappear, and other similar leaves can be made at once without any sticking on of the middle. Flower buds are especially valuable objects for copying. The bud, however, should he very small, and the copy a foot long and done entirely with the fingers. This will prevent an imitation of details and at the same time force a bold and striking resemblance, a character greatly to he desired, since it is the foundation of all good work.



Wreath-pieces with Raked and Level Tangents over Ground Plans that are less than Quarter Circles.—Fig. 1.—Obtaining the Elevated Center Line.

We offer this paragraph as evidence that color hlindness is universal. While to every one who reads it it will appear hlack, it is actually read.

Decoration of a Room.

One of the art journals, in discussing this subject, says: Crude white is in favor with housewives for ceilings—"it looks so clean." That is just its fault. It looks so clean, even when it is not, that it makes all else look dirty, even though it may be clean. To paint the flat ceiling of a moderate-sized room by hand is simply a waste of labor. It is only at great personal inconvenience that one can look long at it, while, as a matter of fact, no one cares to do so. You see it occasionally by accident and for a moment, and that this casual glimpse should not be a shock to the eye, it is as well to tint it in accordance with the room, or even cover it with a simple, diapered paper, which will to some extent withdraw the attention from the cracks that frequently disfigure the ceilings of modern houses. What hand-painting we can afford may best he reserved for the panels of the doors, window shutters and the like, where it can he seen, these doors and the other woodwork being painted in two or three shades of color, flat or varnished, according as we prefer softness of tone or durahility of surface. Perhaps it will be best in this instance that the woodwork should fall in with the tone of the dado, but this is not a point on which any rule can be laid down. The decoration of the panels should be in keeping with the wall-paper patterns. It may he much more pronounced than they, but still it must not assert itself. One great point of consideration in the decoration of a room is the relation of the various patterns one to another. It may often he well to sacrifice an otherwise admirable design simply because you can find nothing else to go with it. A single pattern, once chosen, will often control the whole scheme of decoration.

A Building Venture in Philadelphia.—A number of wealthy merchants have purchased a tract of 585 building lots lying east of Broad street and north of Germantown avenue, upon which are to be constructed a collection of dwellings which will give that growing neighborhood the appearance of a London suburh. A row of 24 houses has already been constructed on this tract. These dwellings are counterparts of those gahled residences, huried in rose-scented gardens, which environ the great English metropolis, and, to a limited degree, highten the beauties of Boston's suburbs. The street is 90 feet wide, and is lined with trees. Each house is provided with a garden front and rear, over which looks a porch. From the porch the visitor reaches a vestibule, which is lighted with a little square, colored, glass-leaded window at the side, and which leads into the hall, which has the proportions of a room, and separates the parlor from the dining-room. This arrangement permits the whole lower floor, excluding the kitchen, to he thrown open to the air. From the hall the main staircase leads to the upper floors, which are apportioned into sleeping apartments, hath and sitting rooms, &c. The walls from kitchen to garret are covered with rich patterns of wall papers.

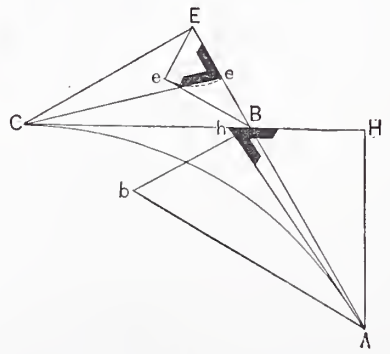


Fig. 2.—A Shorter Method of Reaching the Same Result as shown in Fig. 1.

Practical Stair Building.—XII.

WREATH-PIECES WITH RAKED AND LEVEL TANGENTS OVER GROUND PLANS OF LESS THAN A QUARTER CIRCLE.

Referring to the classification of wreath-pieces, which appeared in the article in the April number, it will be seen that the next class of problems requiring attention embraces those in which the ground plan is less than a quarter circle, as there shown in Fig. 9, and in which the wreath-pieces have raked and level tangents The problems thus presented are necessarily very similar to those we last described. The principles upon which the several operations are performed are identical in all the cases, and in describing them in detail we necessarily come very near printing mere repetitions. It is, however, essential that these problems be described, in order to present a complete treatise, and therefore we shall give attention to them in the order in which they occur, even though there he less variety in our articles upon this plan than would be the case if they were differently arranged.

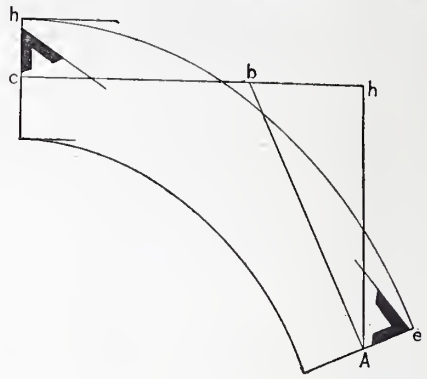


Fig. 3.—Method of Drawing the Face Pattern.

In Fig. 1 of the accompanying illustrations, let A C be a ground line of less than a quarter circle; A B and B C represent its tangents. Let it be required to draw an elevated center line over A C, having its tangent over A B on a rake, and its tangent over B C on a level. Draw A D parallel with B C, and C D parallel with A B. Draw the triangles A B *b* and D C *c* to represent the inclination of the raking tangents over A B. Draw the rectangle B C *c b* of the same hight as B *b*. Draw the line D H perpendicular to C B. Produce C B so as to make H *h* equal to B *b*. Draw *h* D. Produce D H through *h*, making *h* D equal to *h* D. Draw D *c*. Complete the parallelogram *c b* A D. Draw the curved line A C, as shown in the figure; then A C is the elevated center line required.

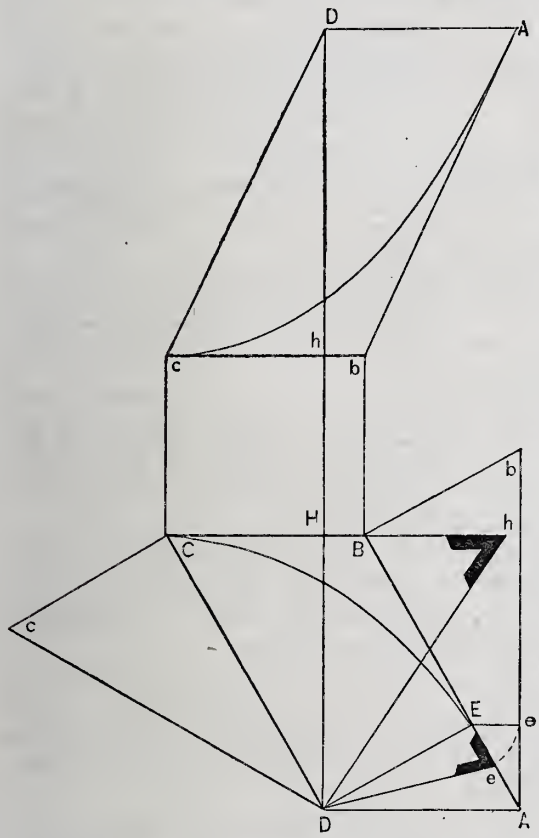
These several operations may be proven and their correctness graphically illustrated hy drawing the figure on a piece of cardboard and scoring the heavy lines A B, B C, D C and *c b*, and then folding it, placing the parts as they would come in actual work.

To draw the face pattern of a wreath-piece to correspond with the elevated center line A *c*, proceed as shown in Fig. 3. Draw *c b* equal to C B. Produce *c b*, making *b h* equal to C H. At right angles with *c h* draw *h* A equal to *h* D. Connect A *b*; then A *b* and *b c* are the elevated tangent lines, having their proper angle at *b*. At A and *c* make the pattern ahout one-quarter wider than the rail, and then bending a thin strip of wood by which to mark, draw the inside and outside curved lines of the pattern. These curved lines, it will be noticed, begin parallel with the tangents.

In Fig. 1 the angle *h* is the hevel for the joint at *c*. To find the bevel for the joint at A, draw D E at right angles with A B. Draw E *c* at right angles with A *b*. From E as a center, draw the arc *e e*. Draw *e* D; then the angle at *e* is the bevel required for the joint at A. By cutting these beveled triangles from separate pieces of cardboard, they may he placed in their positions in the folded figure, so as to show the solid angles which they represent, and of which the tangents A *b* and *b c* are the vertices.

Fig. 2 is the shorter method of performing the same operation that is illustrated in Fig. 1. Referring to Fig. 2, suppose that we

have the center line A C, with its tangents A B and B C, and that it is required to draw the face pattern of the wreath-piece with the raking tangent over A B and a level tangent over B C. Draw the triangle A *b* B, showing the pitch of the raking tangent A *b*. Produce C B to H, and draw A H at right angles with C H. Take H *h*, equal to B *b*, and draw *h* A. Produce A B to E and draw C E at right angles with A E. Draw B *e* parallel with A *b*, and from E draw E *e* perpendicular to B *e*. From E as a center draw the arc *e e*, then draw *e* C. For the face pattern in connection with Fig. 2, draw *c h* equal to *c* H. At right angles to *e h* draw *h* A equal to *h* A. Take *c h*, equal to C B, and draw *b* A. The lines A *b* and *b c* are the elevated tangents sought, having their proper angle at *b*. At A *b* draw the butt joints at right angles with the tangents, and, as described in connection with Fig. 3, make the pattern about one quarter wider than the rail. Begin at each end parallel with the tangents, and draw the inside and outside



Wreath-pieces with Raked and Level Tangents Over Ground Plans of Less Than a Quarter Ellipse.—Fig. 4.—Drawing the Elevated Center Line.

curved lines of the pattern as already described. The angle at *e* is the bevel for the joint at A.

The next class of problems, according to the divisions of the subject referred to at the commencement of this article, comprises those having

WREATH-PIECES WITH RAKED AND LEVEL TANGENTS OVER GROUND PLANS OF LESS THAN A QUARTER ELLIPSE.

The methods of working problems of this class are identical with those already described, and are fully shown in Figs. 4, 5 and 6 of the illustrations. Corresponding letters refer to corresponding parts, making it unnecessary for us to weary the reader with details.

Marking Tools.—Coat the tools with a thin layer of wax, by first warming the steel and rubbing on the wax warm until it flows, and letting it cool. When hard, mark your name through the wax with a graver, and apply aqua fortis (nitric acid); after a few moments wash off the acid thoroughly with water, warm the metal enough to melt the wax, and wipe it off with a soft rag. The letters will be found etched into the steel.

Stench About Kitchen Sinks.

An exchange says: Complaints in this connection are almost universal, particularly in cheap tenements and moderate-priced residence buildings, in the erection of which economy of cost has been the chief and controlling consideration; and the presumption is well sustained that tens of thousands of wives and servants are made sick by the unwholesome gases inhaled from sinks and their connections. The causes producing this result are twofold: First, a large number of mechanics have but an imperfect knowledge of "how to make and fit up a sink," so as to render it secure against bad odors, and much of the difficulty complained of exists in this fact. The matter of gaining and nailing a sink together, and securing a bottom thereto, appears so simple a matter that any man who can use tools at all imagines that he is fully competent; and so he may be, so far as using up the quantity of material necessary for the purpose is concerned. But when the essential niceties of the sink complete are required of him, he is as ignorant as the wild ass's colt—unable to comprehend more than the mere matter of manual labor necessary to "fix" the sink. And sinks fitted up under the direction of architects who say all they know about them when they specify that this essential adjunct to kitchen conveniences is to be "framed and fixed," are no better than those "fixed" by the commonest scrub of a carpenter. Secondly, the plumber comes in for a share of the responsibility; for, however nicely the woodwork may be fitted, if the plumbing-work is defective evil effects follow. Too great care cannot be exercised by all parties, and comparatively sweet and wholesome sinks can only be obtained by careful and perfect work by both carpenter and plumber. Every joint in the sink, caps, wainscoting and drain-board should be made with the greatest care possible, leaving nowhere a single crevice or hole for the reception of vegetable or greasy substances. For wherever leaks exist, or places in which de caying matter can possibly find lodgment, impurity and infection must follow. But some men are so ignorant of the natural laws of things in general that they consider a joint or fitting all right so long as it is not sufficiently large to admit a green pea or a considerable sized potato peeling, overlooking the fact that injurious and decomposing matter exists in fluid as well as in solid forms. We urge mechanics, carpenters and plumbers to think this matter over carefully, and while they would scorn the act of taking human life intentionally, to be careful that they do not cause the death of many females by their improper workmanship in connection with sink work allotted to them. Remember that human life may be as effectually, if not so speedily, destroyed by the agency of poisonous gases, as by the knife, pistol or a deadly drug.

NEW PUBLICATIONS.

HAND BOOK OF USEFUL TABLES. For the Lumberman, Farmer and Mechanic. 176 pages, 4½ by 5 inches. Price, 25 cents.

The compilers of this work have given a large collection of very convenient and useful tables, amounting to about 30 in all. The leading tables are interest, wages per week and per month, board measure, scantling measure, plank measure, contents of square and of round timber, and of round timber squared, and a table giving the cost of wood and another of timber. Each table is made of sufficient size to cover all cases likely to be met in practice. In the latter part of the book there are several tables giving the capacity of boxes, &c., in bushels and gallons, and the weight of a gallon of various liquids. In using these, the reader should bear in mind the fact that the figures are given for New York State and Canada, being stated in "Imperial" measure. The United States standard is the old Winchester bushel and gallon, which is considerably smaller than the Imperial. The Winchester gallon (231 cubic inches) is 20 per cent., in round numbers, smaller than the Imperial

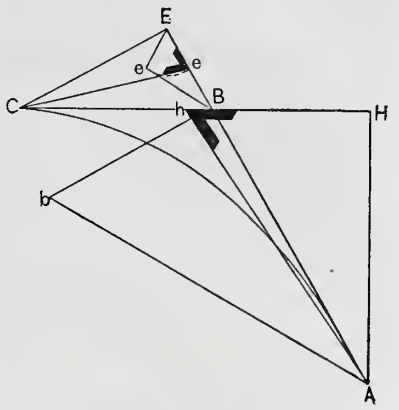


Fig. 5.—Another Method of Accomplishing the Same Result as shown in Fig. 4.

gallon (277.1 cubic inches). Bearing this in mind, the work will be found very useful. We understand that the tables have been most carefully corrected.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. Part X. William T. Comstock, publisher. Price, $1 per part.

The tenth and closing part of this valuable publication was issued about the time our last number went to press. In character and variety of contents it is quite as interesting as any which have preceded it. The first plate contains a perspective view and floor plans of a brick and frame cottage by Mesers. Gould & Angell, architects, of Providence, a firm with whom our readers are somewhat acquainted. Following are the elevations, exterior and interior details, finished with unusual care and accuracy. The elevations and plans of a dwelling in the Elizabethan style occupy the fourth plate. Two plates of elevations and sections of counter and screen, suitable for use in a banking or insurance office, are prominent features. A plate of designs of ventilating registers, by J. P. Putnam, of Boston,

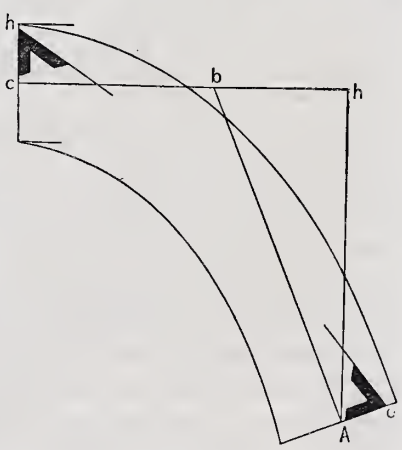


Fig. 6.—Drawing the Face Pattern.

and another of chimney tops, complete the number. The entire work is now furnished, handsomely bound, to those who desire it in one volume, and it makes one of the most attractive volumes that has recently been issued upon architectural topics. A title page, preface and table of contents are furnished with the tenth part, thus completing the work in good shape for those who have placed their numbers in portfolio covers.

Ink for Writing on Glass—May be made by mixing barium sulphate, three parts; ammonium fluoride, one part; and sulphuric acid q. s. to decompose the ammonium fluoride and make the mixture of a

semi-fluid consistence. It should be prepared in a leaden dish, and kept in a gutta-percha or leaden bottle.

STRAY CHIPS.

HARD WEAR—tight boots.

THE SONG of the bricklayer—"Still there's mortar follow."

A NEW COURT-HOUSE is contemplated at Tucson, Arizona.

A COURT-HOUSE costing $100,000 is in progress at Elyria, Ohio.

A COURT HOUSE costing $70,000 is being built at Shelbyville, Ill.

THREE HUNDRED HOUSES are said to be in progress at Brockton, Mass.

AT SOCORRO, New Mexico, a smelting and stamp mill, costing $75,000, is in progress.

A PLANING MILL costing $8000 is being built at Whitehall, N. Y. Louis L. Casse is the builder.

B. F. PRICE, of Alexandria, Va., is building a residence for Mr. Herbert Bayant, costing $6500.

A $4000 SCHOOL-HOUSE is being built at Fisherville, Pa., by Messrs. Sheetz & Killinger, of that place.

A SCHOOL-HOUSE costing $8000 is being built at Alamosa, Cal. L. Cutshaw, of Denver, is the architect.

A HOTEL costing $16,000, to designs prepared by George C. Chittenden, is contemplated at Fairfield, Ill.

AN OPERA HOUSE costing $20,000 is being built at Rockford, Ill. David Keyt, of Rockford, is the contractor.

SALT LAKE CITY is said to be doing more building the present year than at any other time since its existence.

E. M. BUTZ, architect, of Allegheny City, is engaged upon the new State Prison now being erected in that city.

ROBERT MILLER is building a business house and a church at Jonesboro, Tenn., at an aggregate cost of $9000.

THE DELAWARE, Lackawanna and Western Railroad Company are erecting buildings at Birmingham to cost $150,000.

FRANCIS TINKER, of Pittsburgh, had under contract in June last no less than 10 dwelling houses; also, a flouring mill.

TWO BUILDINGS are in progress at the Normal School at Hampton, Va., each three stories in hight, costing $25,000.

THE MEMORIAL HALL now being built at the Soldiers' Home, Hampton, Va., is 70 x 100 feet in size, and will cost $25,000.

IT IS ESTIMATED that 400 houses and buildings of various kinds will be erected during the present season at Johnstown, Penn.

AN ORPHANS' HOME is in contemplation at New Albany, Ind. William Banes, of that city, has been selected as the architect.

THREE OIL MILLS are in progress at Memphis, Tenn., which, together with the machinery, will cost from $50,000 to $75 000.

MESSRS. SIMS & FIELDS, of Attica Ind., are engaged in building a residence for J R. Latta, of that place, costing about $10,000.

AN ARMORY and town hall is being built by a local military company, at Nanticoke, Pa. S. S. Greisboch is the architect and builder.

AT TRENTON, TENN., a county jail costing $14,000 is in progress. Pauley, Brother & Co., of St. Louis, Mo., are the builders.

A PUBLIC SCHOOL building costing $26,000, to designs prepared by Daily & Anglo, of Allegheny City, is in progress at Wilkensburg, Pa.

A CHURCH BUILDING costing $10,000 is being built by the Sisters of Mercy at New Bedford, Pa. No regular architect has been employed.

E. E. MYERS, architect, of Detroit, is at present engaged upon six court-houses, besides the new capitols at Austin, Texas, and Omaha, Neb.

PETER KALBFLEISCH is building a hotel, 50 x 80 feet, iron front, costing $6000, at Millstadt, Ill. Charles Sieber is the architect and builder.

A SCHOOL HOUSE costing $10,000, and a hotel costing $7000, are in progress at New Castle, Pa. Barrett & Jameson and John Preston are the builders.

J. D. WILSON, builder, of Valparaiso, Ind., is engaged upon a hotel and church in that place. The estimated cost of the two improvements is $13,000.

A STORE BUILDING costing $3000 is being built at Byron, Ill., for Messrs. Campbell & Nott. J. S Kosier, of that place, is the architect and builder.

THE MICHIGAN CHEMICAL WORKS are putting up four large buildings at Elk Rapids. Mich., at a cost of $40,000. F. W. Lombard, of that city, is the builder.

THE VERMONT MARBLE CO., of Rutland, Vt., are supplying the interior marble work, columns, pilasters, &c., of the new State House at Indianapolis, Ind.

AT THE National Home for Disabled Volunteer Soldiers, at Dayton, Ohio, the barracks buildings, three stories high, 35 x 140 feet, cost $10,000 each.

FRANKLIN, PA., is putting up a town hall 56 x 65 feet in size, three stories high, at a cost of $10,000. D. K. Dean, of Erie, Pa., is the architect.

SMITH & HOWE, architects, of New York, have, among other work, a church at Tower City, D T., a dwelling at Middletown, N. Y., and a dwelling at St. Johns, Fla.

DWELLINGS COSTING in the aggregate $100,000, are said to be in progress at Maysville, Ky. S. M. Williams, J. R. Sousley and Chase & Slitz are the builders.

A COURT HOUSE costing $35,000 is being built at Kent, Ohio. Samuel W. Lane, of Cleveland, is the architect, and Capt. Carpenter, of Meadville, Pa., the contractor.

BUILDING MATERIALS, exclusive of brick and stone, were consumed in Cincinnati, in the year 1880, to the extent of $2,161,500. This gave employment to 1100 mechanics.

MESSRS. PETERS & BURNS, architects, of Dayton, Ohio, have furnished the plans for a $15,000 residence for Samuel Buttler, of Wapakoneta. C. Huebner is the builder.

H. ALDRICKS, JR., of Harrisburg, Pa., is the architect of the $75,000 miners' hospital now being built at Ashland, Pa. W. F. Patterson, of Philadelphia, is the builder.

THE NEW YORK Condensed Milk Company is building a factory 80 x 350 feet in size, at Shawangunk, N. Y. W. T Dutcher is the builder. Estimated cost is $100,000.

A CLUB HOUSE and hotel is being built by the Cambria Iron Company at Johnstown, Pa. Messrs. Hoover, Hughes & Co. are the contractors. The estimated cost is $30,000.

A $25,000 OPERA HOUSE, 91 x 110 feet, is being built by the Cheyenne Opera Company, at Cheyenne, Wyoming. Messrs. Cooper & Todd, of that place, are the architects.

B. V. ENOS & SON, architects, of Indianapolis, have prepared the plans for a $6000 school-house to be erected at Waynestown, Ind. R. T. Hays, of that place, is the builder.

A. KÖHLER, architect, of Cleveland, Ohio, has prepared a plan for a $10,000 opera house and business block, to be erected at Minerva in that State. J. Myers, of that place, is the builder.

A PRESBYTERIAN CHURCH costing $15,000, to designs prepared by P. Hale, of Burlington, Iowa, is being built at Monmouth, Ill. O. J King, of Corning, Iowa, is the contractor.

AMONG THE FINE residences built at Long Branch, N. J., this season may be mentioned that of Commodore Garrison, 70 x 100 feet in size, three stories high and costing $50,000.

JAMES BOYD, architect, of Johnstown, Pa., has prepared the plans for a $14,000 school-house, to be built at that place. Also, for a number of private residences and business blocks.

THE PRODUCTION of plate glass in the United States for the census year ending May 31, 1881, was over 2,000,000 square feet. The product for the current year will probably exceed these figures.

A MUSIC HALL to replace the opera house destroyed by fire several years since is being erected at Rutland, Vt. Gen. E. H. Ripley is the owner, and J. J. R. Randall the architect and superintendent.

A FLOURING MILL, 60 x 150 feet in area, and an elevator 40 x 110 feet, are being built at Madison, Ind., under the superintendence of W. R. Pattie. J. Webster, of Detroit, Mich., is the architect in charge.

ROBERT MCKANE, of Allegheny City, is the contractor for a five-story business house now being erected for B. F. Jones in Pittsburgh, costing about $40,000. Messrs. Steelburg & Straub are the architects.

C. C. MILLER, architect, of Chicago, has prepared the plans for two churches, one to be erected at St. Joseph and the other at Benton Harbor, Ill. Messrs. Richards & Robinson are the contractors for the latter.

MESSRS. DRUM & STEIN, architects, of Pittsburgh, are engaged upon the Mercer County Home building; also, upon the Home for the Poor for Westmoreland County, Pa.—both large and commodious buildings.

A DWELLING in the old English style, costing $100,000, is being built at Haverhill, Mass., for Mr. Thomas Sanders. R. W. Emerson, Jr., of Boston, is the architect. The work is being done by the day and not by contract.

MESSRS. J B. INGHAM & SON are building a residence for Col. James Andrews, of Allegheny City, in the modern Gothic style, to cost $50,000. The same firm have the contract for the addition to the Pittsburgh Exposition Building.

MEMPHIS, TENN., has experienced a visitation of the building boom. A large number of new residences are in progress, and five large business houses near the square have been contracted. Still other improvements are contemplated.

JOHN WANNAMAKER, of mercantile fame, of Philadelphia, is building a private residence at Jenkenton, at an estimated cost of $75,000. Messrs. Stent & Sargent, of New York City, are the architects. A. A. Catanoch, of Philadelphia, is the builder.

A FIRE PROOF OFFICE BUILDING, with a frontage of 64 feet on Chestnut street and 74 feet on Fourth street, six stories, basement and sub-cellar, costing $120,000, is in progress in Philadelphia. Addison Hutton is the architect, and Messrs. Stacy Reeves & Son are the builders.

THE LARGEST CONTRACT ever awarded at Manchester, N. H., was recently given out by the Amoskeag Manufacturing Company, being for seven tenement blocks of brick, the whole amounting to $150,000. John A. Fox, of Boston, is the architect, and Messrs. Head & Dawst the builders.

THE ESTIMATED EXPENDITURE in new buildings and improvements in Richmond, Ind., from Jan. 1 to June 1, was upward of $200,000. No very large enterprises have been undertaken, this amount being made up of a great number of small improvements, principally brick and frame dwellings.

A NEW OBSERVATORY has been recently commenced at West Point, the cost of which will be about $32,000, not including the dome. A large addition to the cadet barracks is also under way, and the new hospital, a large stone building which was commenced in 1878, is being finished the present season.

At Concord, Mass., J. O. Haskell has designed and is now building a block of stores for Messrs. Devens, Hunt & Hatch, costing about $10,000. J. H. Chapman, architect, has prepared a set of plans for a dwelling-house for himself, the cost of which is to be about $7000. W. O. Benjamin, builder, has the work in charge.

The new custom house, St. Louis, progresses slowly. The walls, built of granite from Maine, are up, and the ironwork of the roof and dome has been apparently ready for the slaters for nearly two months. It is hoped that the building may be roofed before cold weather sets in. Mr. Alexander Cameron is the superintendent.

The largest cotton shed in the world is in contemplation at Memphis, Tenn. It is intended to cover 35 acres of ground and to be capable of storing 200,000 bales of cotton. It is to be provided with two of the largest compressors made, and will have a capacity sufficient for handling the entire shipment of cotton that passes through Memphis.

The new Union Methodist Church building, at the corner of Lucas and Garrison avenues, St. Louis, progresses slowly, but will probably be finished early in the fall. The stone walls are up and the roof is ready for slating. It is a "basement" church, having the Sunday-school rooms on the level of the street and the audience room above. Cost, about $65,000.

A correspondent says a number of contracts would have been given out in Pittsburgh during the last few months had it not been for the unsettled condition of the labor market. He says that if the difficulties are not adjusted there is a prospect of a dull winter. On the other hand, if a mutually satisfactory understanding is arrived at, there will probably be plenty of work for all.

Brick, stone and iron have never before been used in such a variety of combinations as at present in New York city. Questions of taste aside, these materials were never used more worthily. The façades which meet the eye of the observer who wanders through the busy thoroughfares of the metropolis cannot all be commended for design and treatment, but in these great buildings the material is being honestly handled, at least.

The number of plans submitted to the Bureau of Building in New York city, from the 1st of January to the 1st of June, was nearly 600. Some of these plans cover an entire block of buildings. The actual number of new buildings commenced in the same period was 1150. Their cost was estimated at $18,500,000. Beside this there were hundreds of buildings undergoing alteration, mainly having additional stories put upon them.

A new swimming school, styled the "Natatorium," is being erected at the northeast corner of Chestnut and Nineteenth streets, St. Louis. The building will be about 65 feet front by 120 feet deep and two stories in hight at the two ends, which are devoted to suitable offices and rooms. Between them is an ample tank for bathing and swimming, bordered by dressing-rooms and lighted through the roof. In light and ventilation and in its central location, the "Natatorium" will be superior to the old swimming school on Catalpa street.

The Crystal City Plate Glass Company, of Missouri, have been awarded the contract for the glass for the new State House at Des Moines, Iowa. The building will require 17,000 square feet of polished plate glass, and the contract was competed for by a number of houses, including English, French and Belgian factories, all of whom submitted specimens of their production. The award is considered a signal triumph for American glass. The same company furnished the glass for the Metropolitan Museum of Fine Arts, this city, and for the State House at Albany.

A new exposition building, now being erected at Milwaukee, Wis., has a frontage on Fifth street of 400 feet, and on State street of 293 feet. The hight of the main building is 89 feet, and of the dome 138 feet. The hight of landing above dome is 145 feet, and to top of cupola roof 202 feet. The area of the ground floor is 87,000 square feet. In style the building may be described as Queen Anne, combining the picturesque qualities of the Gothic with the practical features of the classic. The estimated cost is $125,000, and the time of completion September 1.

One of the daily papers says that the business blocks now being erected in the lower part of this city, which are notable for their hight, each new building towering above those that have preceded it, are going higher for every new rail that is laid toward the city of Mexico and the Pacific Coast; higher for every ranche in the vast domains of Texas and higher for every new mine opened in New Mexico, Arizona and Nevada, because every great enterprise of the continent requires at least a counting house in New York, and it must be close to Wall street.

Mansfield, Ohio, the county seat of Richland County, has buildings in progress at present amounting to over $350,000. This, for a place of a little less than 10,000 inhabitants, speaks well for its enterprise and business prosperity. Among the notable buildings may be mentioned a dwelling for O. H. Booth, costing $15,000; mill buildings for Gilbert, Waugh & Co., costing $35,000; business block for Blecker Bros., costing $15,000; county jail, costing $42,000; linseed oil mill, costing $30,000; Richland County Children's Home, costing $30,000, and a grain elevator costing $12,000.

Seventy-five thousand dollars is being expended this year for soldiers' and officers' quarters at Fort Lewis, Col. The buildings are generally of wood, one and two stories high. Our correspondent says: "Colorado is invariably a good State for mechanics of all classes. They are in demand for mining operations, and wages are always good. Mills for the reduction of ores are going up continually throughout the State. Millwrights' wages are from $5 to $7 per day. On the removal of the Indians and the settlement of existing troubles new opportunities will open for mechanics in this section."

The Western National Bank of Baltimore, Md., is erecting a new banking house on the site formerly occupied by the bank adjoining the Eutaw House, in that city. The building is 50 feet front, with a depth of 85 feet, and will be 50 feet high. The material of the front will be pressed brick, trimmed with Cheat River stone. The main business room will be 63 x 44 feet. In the rear of this will be the vault and separate rooms for president, cashier and directors. The floor and roof will be of iron. William Ortwine is the builder. Chas. L. Carson is the architect. It is expected to have the banking house under roof by December 1.

Any one but a New Yorker must be greatly astonished and not a little shocked at the havoc that is going on among good houses in some parts of the business wards. Buildings that are as strong, sightly, large and as well arranged as any of their neighbors were 20 years ago, are being torn down for the simple reason that there is a demand for two or three times as much floor space on the same ground, and the rents that may be obtained justify the destruction of the old buildings and the erection of new ones half a hundred feet higher. When the first of these large buildings—the Bennett Building, on the site of the old *Herald* office, being one of the number—were erected, the croakers prophesied that they never would pay for themselves; that people would not occupy offices so far from the ground; that elevators were not safe, and all that sort of thing; but men have gone on building just as if a croaker never had been born, and many of them have tenants for all their space before the foundations are fairly above ground. New York's growth should no longer be computed by the number of houses; the aggregate yearly increase of floor space can alone tell the story correctly.

CORRESPONDENCE.

We desire to remind our readers that we are depending upon them for our supply of "Stray Chips." We are in receipt of a large number of letters commending this new feature, from which we infer that it has met the approval of many of our subscribers. If the department is to be maintained our readers generally must send their contributions to it. We do not want second-hand news, and therefore we appeal directly to those who are moving in the enterprises we desire to chronicle. In order to give the greatest interest to these items, we desire the full names of interested parties wherever practicable. Let us know who is the owner, architect and builder of all the important buildings in your vicinity. Mail reports about the 10th of each month, so they shall reach us on or before the 15th. In giving attention to news items we do not wish our correspondents to lose their interest in the discussion of practical problems. Our regular correspondence department, which has been so valuable to all in the past, will be maintained, and we hope with even more satisfactory results than ever before. The most profitable work that *Carpentry and Building* has done so far has been that in which we have had direct assistance from interested readers. This is the reason we always appeal to our subscribers for substantial encouragement and help whenever we have anything of unusual importance in hand.

The practical questions presented by the correspondent who writes over the name "Wawayanda," in the letter which appears in this number, afford an unusually fine opportunity for discussion of the ways and means of arranging some of the most important conveniences in dwelling houses already built. There are thousands of people situated similarly to our correspondent. They live in ill-arranged and inconvenient houses, not from lack of means to make them better, but from lack of knowledge how to set about it. They go without the conveniences of furnaces or hot water for heating, and without bath rooms, not account of the expense of providing these useful adjuncts, but because their houses are not furnished with them, and they do not realize that changes can be made. Our correspondent addresses his inquiries to *Carpentry and Building* and *The Metal Worker* jointly. He proposes questions, part of which can be answered by the trades reached by one paper and part by the other, but all of them admit of the best answer by a friendly consultation between the two classes. The work should be executed under the superintendence of an intelligent carpenter. Hence, in proposing to give our readers the benefit of such answers as may be addressed to *The Metal Worker* as well as those that come to us direct, we shall serve their best interests. Our correspondent is in earnest. He proposes to make the improvements suggested this fall, and will mature his plans in the light of advice thus obtained. Further, he proposes in the end to describe just how he performs the work, and to tell what results are obtained. These considerations should warrant our readers in giving his questions careful thought and the best possible answers. The opportunity for interchange of opinion here afforded is unusual, and properly improved can be made one of the most valuable discussions our columns have ever presented.

Weights for Twin Windows.

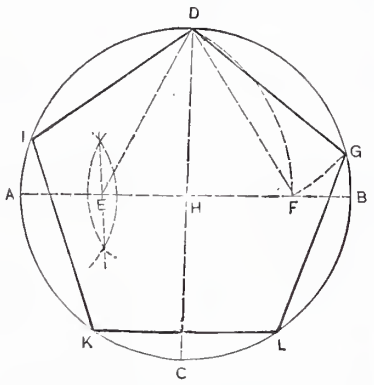
From The P. T. P. Belt Co., *New York City.*—We notice in the July issue a communication from Messrs. J. B. Shannon & Sons, Philadelphia, relative to the weights for sash weight for twin windows. We have made some careful experiments, and find that the outside weight should be one-half the weight of the sash, and the middle weight equal to the weight of one of the sashes. We find that it is impossible to make a perfect balance in any other way. We fail to understand why they say "it is a well-known fact that the middle weight should be two thirds the weight of the two sashes." We can only account for their experience on the ground that the heavier

weight is used to overhalance the sash, because it is easier to pull a sash down than to push it up.

Construction of Polygons.

From P. J. A. B., *Westerly, R. I.*—I desire to inquire concerning rules for describing five, seven and nine-sided polygons within a circle. Probably a discussion on the subject of the construction of polygons, hy the various means which may he employed for the purpose, will be of interest to the readers of the paper.

Answer.—Accepting our correspondent's suggestion, we will devote some space at the present time not only to an answer of the question which he proposes, hut also to a hrief consideration of other matters of a like character which may come up incidentally in an examination of the subject. Fig. 1 of the engravings shows a method for constructing a pentagon or a polygon of five sides within a given circle, hy means of a pair of compasses and a straight-edge. Draw any two diameters at right angles to each other, as A B and D C. Bisect a radius A H, as shown at E. With E D as radius strike the arc D F, and with the chord D F as radius strike the arc F G, cutting the circumference of the given circle at the point G. Draw D G, which will be equal to one side of the required figure. Then with the dividers set to the space D G, step off in the circumference of the circle the remaining sides as shown by the points I, K and L. Connect these points as shown hy D I, I K, K L and L G, thus completing the figure.



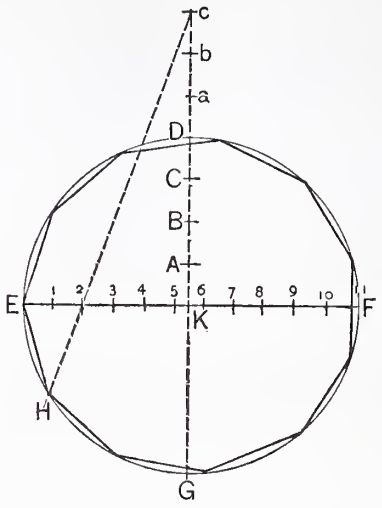
Construction of Polygons.—Fig. 1.—*Drawing a Regular Pentagon within a Given Circle.*

Rules similar in character to these have been devised for constructing all regular polygons within given circles, and are undoubtedly very desirable for use where a certain shape is constantly recurring. They are, however, somewhat difficult to remember where they are only required for occasional use. Accordingly, a rule which is universal in its application will be of interest in this connection.

Fig. 2 presents an example of a general rule which may he applied to the construction of all regular polygons. Stated in general terms the rule is as follows: Through the given circle draw any diameter. At right angles to this diameter draw a radius. Divide that radius into four equal parts, and prolong it outside of the circle to a distance equal to three of those parts. Divide the diameter of the circle into the same number of equal parts as the polygon is to have sides; then from the end of the radius prolonged draw a line through the second division of the diameter cutting the circumference. Connect this point in the circumference and the nearest end of the diameter. The line thus drawn will be one side of the required figure. Set the dividers to this space and step off on the circumference of the circle the remaining number of sides and draw connecting lines.

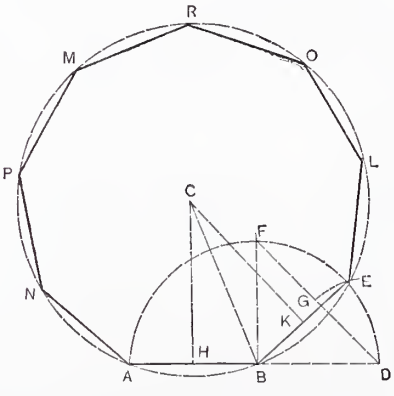
Fig. 2 shows an eleven-sided polygon constructed by this rule. Through the given circle E D F G, a diameter, E F, is drawn, which is divided into 11 equal parts, as shown by the small figures. At right angles to the diameter a radius, D K, is drawn, which is divided into four equal parts. This radius is prolonged outside of the circle to the extent of three of those parts, as shown by *a b c*, thus ohtaining the point *c*. From *c*, through the second division in the diameter, the line *c* H is drawn, cutting the circumference in the point H; then the line H E, which may be now drawn, will be one side of the required figure. The dividers are set to the distance H E, and the circumference is stepped off as shown, thus ohtaining the points hy which the remaining sides may be drawn.

Besides the construction of polygons



Construction of Polygons.—Fig. 2.—*A Regular Figure of Eleven Sides, Drawn within a Given Circle by the General Rule Applicable in all Cases.*

within circles, it is frequently required in practical work to draw a figure of a given number of sides, each of which is to he equal to a specified length. Problems of this kind are termed constructing polygons upon given sides, and an illustration of a special rule for performing this operation in the case of a nonagon, or nine-sided figure, is shown in Fig. 3. A B is the given side upon which it is required to draw a regular nonagon. Produce A B indefinitely in the direction of D. From B as center, with B A as radius, strike the semicircle A F D. At B erect a perpendicular to A B, cutting the semicircle in the point F. Draw the arc F D, which bisect, obtaining the point G. From D as center, with D G as radius, cut the semicircle in the point E. Draw E B, which will he the second side of the required figure. From the middle points of the two sides now established, as iudicated by H and K, erect perpendiculars, producing

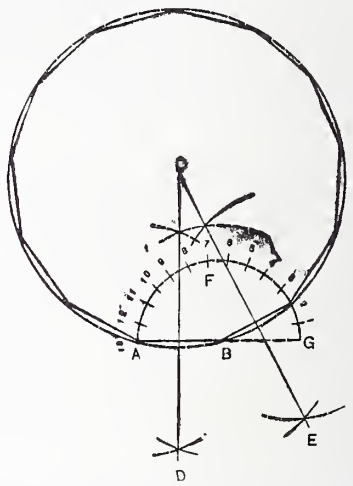


Construction of Polygons.—Fig. 3.—*A Regular Nonagon Drawn Upon a Given Side, A B.*

them until they intersect at the point C; then C is the center of the circle which will circumscribe the required nonagon. From C draw a line to B, as shown by C B, which will be the radius of the required circle. From C as center, with C B as radius, strike the circle B O P A. Set the dividers to the space A B, and step off the circle as shown, thus obtaining the points by which to draw the other sides.

In instances of this kind, as well as those already cited, a rule of general application is of greater utility than one which is restricted to special cases. Such a rule for the construction of polygons upon given sides is shown in Fig. 4, and is there applied to a figure of 13 sides. The rule, in general terms, may be described as follows: With a radius equal to the given side describe a semicircle, the circumference of which divide into as many eqnal parts as the figure is to have sides. From the center by which the semicircle was struck draw a line to the second division in the circumference. This line will be one side required and one-half the diameter of the semicircle will he another, and the two will be in proper relationship to each other. Therefore, hy bisecting these two sides and erecting perpendiculars to points thus obtained, producing them until they intersect, the center of the circle will he ohtained which will circumscribe the polygon. Having described this circle, the remaining sides may he estahlished hy stepping off this circumference with the length of the given side. We think our readers will understand this explanation of the rule without describing in detail the construction of the polygon shown in Fig. 4.

Besides the compasses and straight-edge for the construction of polygons, other means may he employed, some of which it may be well for us to illustrate in this connection.



Construction of Polygons.—Fig. 4.—*A Regular Polygon of Thirteen Sides, the Length of a side (A B) being Given, Drawn by the General Rule Applicable in all Cases.*

Figs. 5 and 6 show the use of the T-square and set-square, or triangle, in the construction of a hexagon, and illustrates the use of these tools in drawing polygons generally. In Fig. 5 let O be the center of a given circle within which a hexagon is to he drawn. Place the side E F of a 30-degree set-square against the edge of the T-square, as shown. Move the set-square along until the side E O meets the center O of the circle. Mark the points A and B. Reverse the set-square and mark the points C and D. With the side F G of the set-square against the T-square, move it along until the side E F meets O, and mark the points I and H. Then the points A H D B I and C thus established in the circumference of the circle represent the angles of the proposed hexagon. From this stage the figure may be readily completed by drawing the sides to these points hy the use of the straight-edge. Greater accuracy, however, may he attained hy the further use of the set-square, as shown in Fig. 6. With the side E F against the T-square, as indicated in the engraving, draw the line H D, and, by moving the T-square upward, draw the side C I. Reverse the T-square so that the point G is to the left of the point E, and draw the side A H, and hy shifting the T-square, draw the side I B. With the side E F of set-square agaiust the T-square, move it up until the side G E coincides with the points B and D, and draw the side B D. In like manner draw A C, thus completing the figure. By inspection of Fig. 6 it will he seen that hy establishing some point in the circumference of the circle, as H, and working from it as a hase with the set-square as last described, the hexagon may be produced without the preliminary work shown in Fig. 5. Our object in showing the two methods

together has been to illustrate the construction of polygons. All the regular polygons may be drawn in the general manner here indicated.

Fig. 7 shows a method of constructing an octagon by means of the T-square and set-square, the length of the side being given. C B is the given side. Place one of the short sides of a 45 degree set-square against the T-square, as shown in the engraving. Move the set-square along until its long side coincides with the point C. Draw the line C B and make it in length equal to C D. With the T-square draw the line A B, also in length equal to C D. Reverse the set-square and bring the edge against the point A, and draw A H in length equal to C D. Still keeping a short side of the set-square against the T-square, slide it along until the other short side meets the point H, and draw H G, making it in length equal to C D. Then using the long side of the set-square, draw G F of corresponding length. By means of the T-square draw F E, and by reversing the set-square draw E D, both in length equal to the original side C D, joining it in the point D, thus completing the required figure.

Fig. 8 illustrates the use of the protractor in the construction of polygons, and is applied to drawing a square within a given circle. Through the center O draw a diameter, C D, as shown. Place the protractor so that its center point shall coincide with O, and turn it until the point marking 45 degrees falls upon the line C D. Mark points in the circumference of the circle corresponding to c°, 90° and 180° of the protractor, as shown by F G and E respectively. From G, through the center O, draw G H, cutting the circumference of the circle in the point H; then E G F and H are the angles of the required figure, which may be completed by drawing the sides as indicated. The reasons for these steps are quite evident. Since the circle is composed of 360 degrees, one side of the inscribed square must represent one-quarter part of 360, or 90 degrees. The half of 90 degrees is 45 degrees; hence, in setting the protractor, we placed the point representing 45 degrees opposite the point in which we desire the center of one of the sides to fall, or, in other words, upon the line C D. Then having marked the points 90 degrees, removed from each other as shown by F G and E, the fourth point was obtained by the diagonal line D H as described. Instead of this latter operation, we might have located the point H by moving the protractor around, and by means of it measured a space of 90 degrees from either F or E.

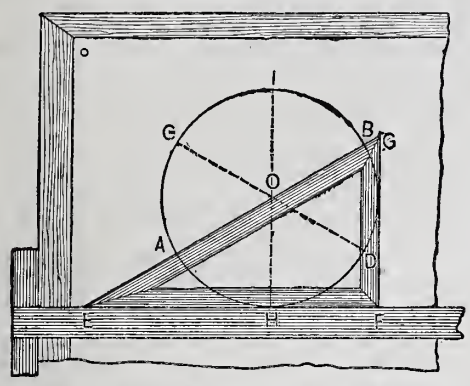


Fig. 5.—Establishing the Angles of the Figure.

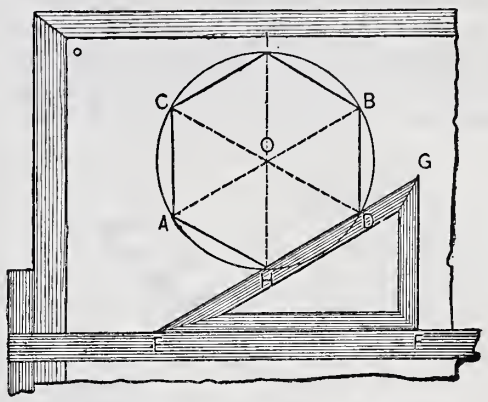
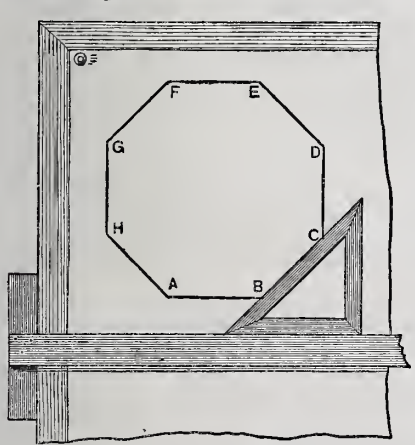


Fig. 6.—Drawing the Sides of the Polygon.

Construction of Polygons.—Drawing a Hexagon within a Given Circle by Means of the T-Square and a Triangle.



Construction of Polygons.—Fig. 7.—Drawing an Octagon with Sides of a Stipulated Length, by Means of the T-Square and a Triangle.

Advantage of Business Knowledge.

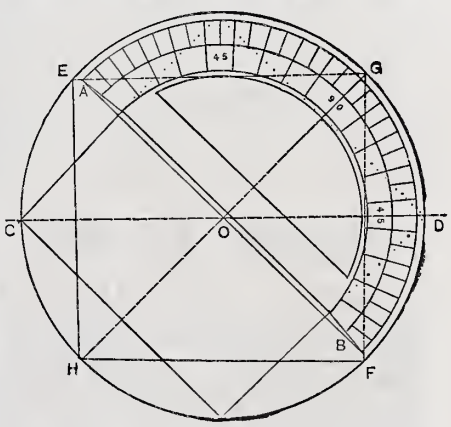
From F. T., *Pittsburgh, Pa.*—Had there been such a publication as *Carpentry and Building*, quality and price both considered, when I was learning my trade, I should undoubtedly have been better prepared for the work I am now doing than at present. There was an article in a recent number, entitled "The Advantage of Business Knowledge to the Builder." I have suffered from the lack of business knowledge throughout my career as a builder. I do not mean that I have not had enough work to do, for the contrary is the case; nor that I fail to obtain the right goods at the right prices in my home market. But I have felt the lack whenever it has been necessary for me to write to another city for what I could not obtain at home. Sometimes I am inclined to think the fault is all my own, for, undoubtedly, I have not in all cases put my best foot forward. I have never had a card nor letter-head printed. I have never made use of printed bill-heads, nor have I ever advertised my business or had a sign painted.

Note.—Our correspondent's letter might form the text for a lengthy sermon on the advantages of conforming to business customs, and of making use of the usual means for conducting and managing a business enterprise. The fact that he has never employed printed stationery shows that he has neglected a small thing which is sometimes of great importance. That he has never put out a sign, either upon his shop or in the form of an advertisement in his local paper, indicates that he has kept himself in the dark rather than in the light, where all who needed his services might see him and know where to find him. Men are frequently judged by little things. The appearance of the sign upon the shop, or of the stationery upon which a letter or proposition is written, often establishes the opinion in which a man is held. Accordingly, all other things being equal, the man who gives attention to little points of this kind is likely to possess an important advantage over his competitors who care nothing for them. The same also may be said with reference to the style and composition of the letters which are written, and the shape in which bills and invoices are made out. Builders cannot afford to do less than put their best foot forward in all such matters. Careful use of what is already learned, and close observation of business customs and methods as opportunities present themselves, will in the end put the builder in a position where he will be free from the disadvantages named by our correspondent above.

Glue for Paper.

From J. G., *Geneva, N. Y.*—Will you please inform me how to make a paste or glue to stick paper on wooden rollers—something that will not color the paper and will stand the changes of the atmosphere without allowing the paper to get loose.

Answer.—Our correspondent has not given us an easy question by any means, yet we think that he may accomplish what he wishes by a little care—using only ordinary means. We would suggest the following: Use rye-flour paste, carefully made and free from lumps. When the paper has been dampened long enough to have swelled as much as it will, it is applied to the roller and carried round and lapped. If a joint is objectionable, the edges must be carefully thinned or chamfered with a sharp knife. A first-class paper like a "Whatman drawing paper" or a tough bond paper, when applied in this way, will shrink so much in drying that atmospheric changes will have comparatively little effect upon them. There are kinds of paper used by water-color painters which, if allowed to expand as much as they will by soaking, would probably dry so much in shrinking as to tear open. Artists gauge the amount of water they allow a paper to absorb by turning up a corner of the sheet and noting whether it



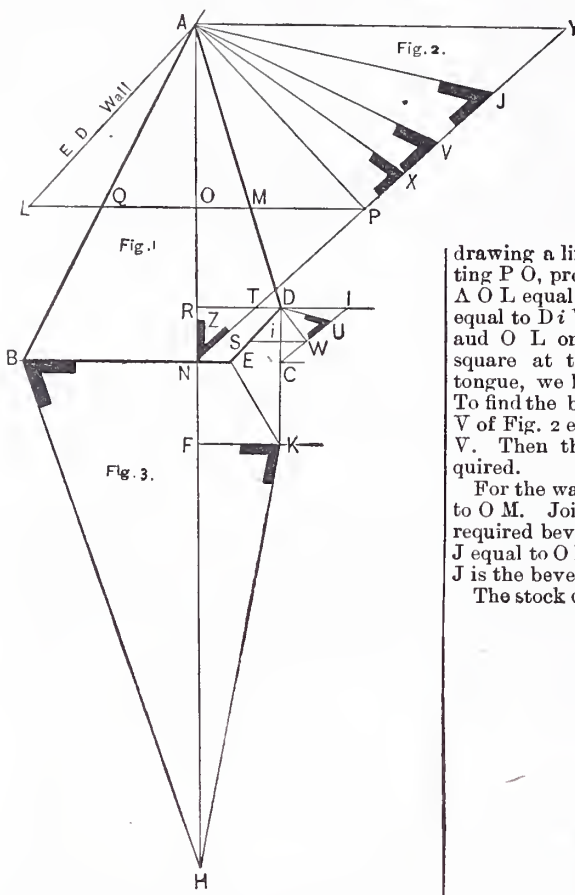
Construction of Polygons.—Fig. 8.—Drawing a Square within a Given Circle by Means of the Protractor.

drops back in place or goes back with a spring. When it ceases to spring it has taken up water enough.

We think that our friend may be able, with these suggestions, to fasten the paper securely to the rollers without having re course to any special preparation. White glue, made very thin, so that it does not "set" too quickly, will hold paper firmly without discoloring it. White shellac can also be used for the purpose of a varnish and cement. The paper, however, must be well sized before the shellac is applied.

Problem in Angles and Bevels.

From E. W. C., *Randolph, Mass.*—I have carefully examined the "Problem of Angles and Bevels" published in *Carpentry and Building* for February of the current volume, and I fail to to see any point



Problem in Angles and Bevels.—Sketch Accompanying Letter from E. W. C.

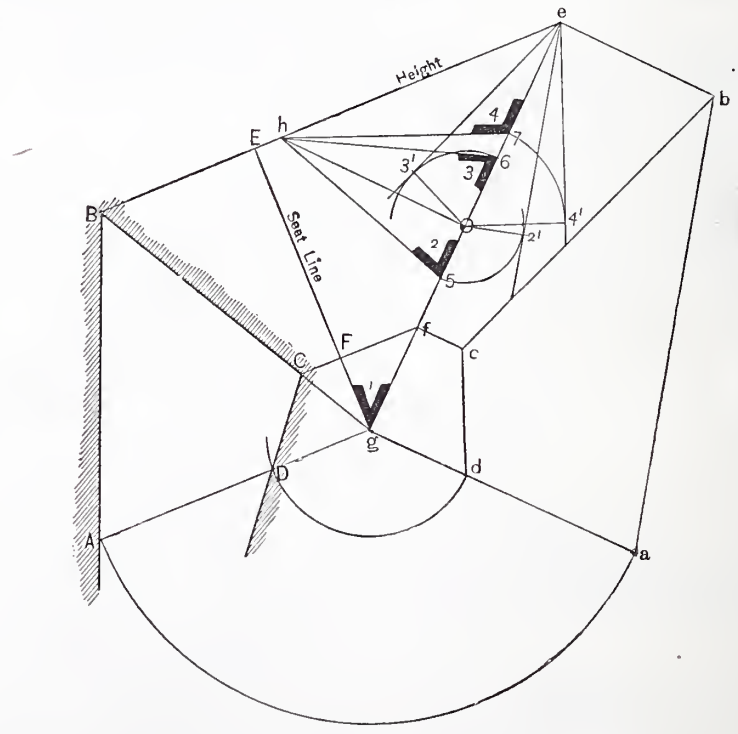
for criticism in it. So far as I have tested it it is correct. My idea is, however, that it can be simplified, and I, therefore, inclose diagram herewith showing another method of solution. Lay out the ground plan as shown by A B E D. At right angles to B E from the point A draw A H, cutting B E in the point N. Square with A N, make A Y equal to A B. Join Y N. By this operation we have Y N the width of the board. Take Y N on the blade of the square and B N on the tongue. Holding the tongue at B and the blade toward E, mark on the tongue, which gives the face line J of the wall on the board A B. I would suggest that placing the square on the opposite side of the diagram, or setting a bevel to the same, will obviate the danger of a misunderstanding. Extend A N. Make N H of Fig. 3 equal to Y N, already described. Join B H. By this means a like result is accomplished. Next for the wall A D. Draw D R parallel to E B, cutting Y N in the point T. Make N F of Fig. 3 equal to N T. Draw a line to the right parallel with R D, and from the point D draw a line parallel to R H, cutting the line F K in the point K. To find the angle with the square, take T Y of Fig. 2 on the blade and D R on the tongue. Hold the tongue at K and the blade toward F and the heel toward H, Fig. 3. Mark on the tongue. Join K H; then the angle at K is the face line on the board for the wall D A. By joining K E we have the face line on the board for wall D E. To obtain E K with the square, take N T on the blade and the distance, C E, on the tongue. Place the tongue at E, with the blade toward C and heel toward K F, which will give the same result. Then B E K H will be the surface of the board for the three angles of the three walls and the base B E.

To find the bevels on the edge of the board for obtuse and acute angles, begin by drawing a line square with N Y, Fig. 2, toward A, cutting N Y in the point P. From P draw a line square with A N indefinitely in the direction of L, cutting the wall A B in the point Q, also the wall A D in the point M. For the wall A B, take A P on the blade and O Q on the tongue. Mark on the tongue. On the square edge at the base, for the wall A D, take A P on the blade and O M on the tongue. Mark on the tongue. At H, Fig. 3, hold the two points parallel with B E on the edge, which will give the bevel for the wall A D. For the wall D E it will be seen that the angle C D I is the same angle as N R T. By squaring C I to D we have D W parallel with A P. At W draw W S square with C D, cutting the wall line D E in the point S. Join S D; then the angle at S is the required bevel. Again, by drawing a line at A parallel with D E, cutting P O, produced at the point L, we have A O L equal to the angle D S *i*, and A O P equal to D *i* W. By taking A P on the blade and O L on the tongue, and holding the square at the base B E, marking on the tongue, we have the bevel for the wall E D. To find the bevel for the wall A B, make P V of Fig. 2 equal to O Q of Fig. 1. Join A V. Then the angle at V is the bevel required.

For the wall A D, make P X of Fig. 2 equal to O M. Join A X; then the angle X is the required bevel. For the wall D E make P J equal to O L. Join A J; then the angle at J is the bevel sought.

The stock of the bevel is to be parallel with the base B E, because the bevel for the base B E is set at the angle made by N Y A at N, and the stock of the bevel should be parallel with N Y, Fig. 3. The bottom board should be beveled the last thing.

From X X X —Let A B C D in the accompanying sketch be the ground plan of walls, inside line, to which a board is to be fitted on an inclination of 45 degrees at the side A B, and to fit the floor on the line A D. The construction will be as follows: At right angles to the line A D produced, draw the seat line *g* E. At right angles to this seat line from the angle B draw the hight E *e*, equal to the side A B. Since the required board is to have a pitch of 45 degrees on the side A B, join *e g*, which will be the required pitch. From the angle C, at right angles to the seat line, draw C *f*, cutting the pitch line *e g* in the point *f*. At right angles to the pitch line, draw the lines *g d*, *f c* and *b e*, equal respectively to *g* D, F C and E B. Produce *g d* in the direction of *a*, making *d a* equal to D A. Join *a b c d*, which will be the form of the required board. To get the bevels proceed as follows: At any point in the pitch line *g e*, as *o*, draw *o h* at right angles to *g e*, cutting the hight line in *h*. From *e* draw *e* 2¹, *e* 3¹ and *e* 4¹ indefinitely, and parallel to the sides of the board *b a*, *b c* and *c d* respectively. From the point *o* in the pitch line *g e*, draw *o* 2¹, *o* 3¹ and *o* 4¹, at right angles respectively to *e* 2¹, *e* 3¹ and *e* 4¹. Make *o* 5, *o* 6 and *o* 7 equal respectively to *o* 2¹, *o* 3¹ and *o* 4¹. Join 5 *h*, 6 *h* and 7 *h*; then the bevels 2, 3 and 4 respectively will apply to the sides *b a*, *b c* *c d*. The bevel for the side *b a* is shown at 1, being the intersection of the pitch line with the seat line. In conclusion, I would remark that it does not matter how many sides there may be to the walls, the manner of cutting the bevels is the same and can best be understood by making a solid to fit the ground plan, and then cutting it off on the pitch the board is required to have.



Problem in Angles and Bevels.—Sketch from XXX.

The Art of Saw Filing.—II.

From A. A. F., *Byesville, Ohio.*—Having made a saw clamp that will hold the saw firmly, all as described in my last letter, the next step is to place the saw in it, so that the teeth will project above the edge from ⅜ to ½ inch. Place the clamp in the vise so that the vise holds it in about the center of its length, taking care that the blade hangs about plumb. Tighten the screw just sufficiently to hold the clamp firmly. Do not draw it to the full power that a man can exert, for a bench screw that requires this is not fit to put a saw in under any circumstances. In this position the saw is ready to be sighted, in order to see what is necessary to be done. Without doubt, the operator will discover that it needs jointing. This operation requires care and judgment. By examiniug new saws, it will be discovered that they are made slightly full, or crowning through the center. If the saw to be filed is not in this condition, it should be made so at once. It should not be allowed to become the least hollowing, and, as the most wear is along the center, the ends should be jointed down as fast as the

center wears away. The mechanic should also look to see that the teeth on both sides are kept of an even length. This can only be done by frequent jointing. For example, suppose a saw is in good shape and the teeth all even, and by accident it is run upon a nail that touches the points of the teeth 2 or 3 inches on one side only. To file these teeth up to points again and not file the others, will leave them shorter than the remainder; therefore they will not do their proper share of the work, and the longer ones on the opposite side cutting to a greater depth, will have the tendency to cause the saw to take a crooked course. The only way to get the saw in perfect order again is to joint the teeth until all will line with the short ones, and then file all of them to points again. Very few workmen give sufficient attention to this all-important point of jointing, and, as a result, their saw teeth are very irregular. The last tooth at the head will sometimes be found ¼ to ⅛ inch longer than any others; then for a short space, in some cases, the teeth are even; then one side is shorter than the other; then a hump; then a hollow; then a short tooth on one side again; then another hump and hollow, and so on, finally terminating with a large spike tooth at the point, that will occasionally plow into the bottom of the kerf and stop the saw whenever it is drawn back sufficiently to cause it to enter the cut. How many readers of the paper, after seeing this, will go right out to their tool chests and examine their saws and say that I am not correct? This last tooth just described is, in my opinion, the direct cause of more saws being kinked than all other causes put together. To remedy this difficulty, first point off the tooth until it is as short as the rest. Next, after filing, round off the point so that it cannot catch into the bottom of the cut. By jointing the teeth from the point back—say, 2 or 3 inches—in a way to form something like a sled runner, it will be found much easier to make the first straight, for example, in cutting a hole through a floor and other work of that class, or for cutting off furring against a wall, than if the saw is finished in the usual manner. My advice to all is to joint their saws well. Joint them little at a time and often. Use a flat or mill file. Hold it as nearly square with the blade as possible, and run from heel to point. This, with a proper saw clamp, comprises one-half the art of saw filing.

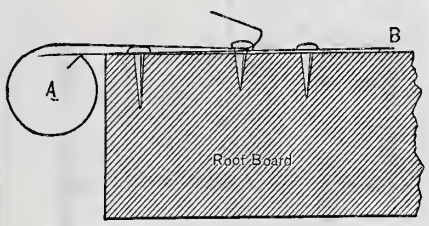
Relative Advantages of Country Towns and Large Cities for Learning a Trade.

From M. H. M., *Haverhill, Mass.*—I desire to ask a few questions through your columns. I am trying to learn the carpentry trade. I have worked at it a year and a half, and now the man by whom I have been employed has gone out of business. I desire advice as to where I had better go to finish my trade. I have been thinking about going to Boston. If some of your readers in that vicinity will inform me as to my prospects in that direction they will greatly oblige.

Answer.—It is very difficult for the Editor, or, indeed, any one else, to give a correspondent advice in a matter of this kind. Although there are occasional spurts in building matters in various localities, taking them through the course of several years, operations average about the same in any given section of the country. Therefore, we feel inclined to advise young mechanics to stay where they are, rather than to go into the large cities for the supposed advantages there to be enjoyed. For ourselves, we feel certain that the disadvantages attending a young man going into a large city to learn a trade more than balance the superior opportunities which he there enjoys. We are disposed to solicit opinions concerning this point from our readers in the cities, in the manner requested in the letter above published. Besides the extra expense of living, the temptations to spend money, and all the other disadvantages of a city life, there is to be considered the fact that work is crowded, men are made mere machines, and, accordingly, there is less opportunity to really learn how to do things than in the smaller places where work is conducted in a different manner. From facts to which our attention has been called, we are disposed to think that those contractors who succeed best in the cities are the ones who have learned their trade and gained much of their experience outside before entering the whirl and excitement of the metropolis. Points of this kind are of great interest to many of our readers, and we trust that correspondents will feel free to discuss them.

Finishing the Edges of Roofs.

From G. S. R., *Lakeville, Conn.*—I have a plan for the finish of the edges of tin roofs which is entirely different from anything I have seen described. I inclose you a sketch which illustrates the plan we have adopted during the past few years, and we employ it on both large and small roofs. It has so far given entire satisfaction wherever applied, and it makes a much neater finish than the old style of nailing below an uneven edge. In the sketch, A represents the edging. It is formed of a strip cut 3 inches wide and of any convenient length. It is run through an ordinary gutter beader for the outside finish, and through the roofing folder to form the lock shown at the right. It may be used either by cleating or nailing to the roof. The former I think is to be preferred. It certainly makes the better job. In case the roof is exposed to heavy winds, we are in the habit of nailing strips of tin or sheet iron on edge of roof, allowing them to project over the edge of sheeting boards, as shown by the strip marked B in the sketch. This adds strength to the finish, and makes



Finishing the Edges of Roofs.

it impossible for the wind to tear the roof loose. As shown in the sketch, the edging is ready for being locked to the sheets of tin which form the roofing. In applying the edging, it is to be lapped joint by joint the same as an ordinary gutter.

Taking Up the Slack in Wire Cloth.

From B. B., *Mexico, Mo.*—W. A. C. can spring his window or door-screen frame in a little at the middle with a clamp. After this is done tack on the wire as smoothly as possible. Take off the clamp, and, if the frame has been sprung just enough, the slack will all be taken up. If the frame has been sprung too much, the wire cloth may tear loose. A little practice is sufficient to enable any one to perform this operation in a satisfactory manner.

From G. D. B., *Pittsford, Vt.*—In reply to W. A. C., of Scotia, N. Y., I would say first nail on one side of the wire cloth; then take a common wooden hand screw and slip it on the frame, with one jaw on either side; put a block on one side between the wire and jaw and screw them tight; then drive a wedge between the screen frame and the screw in the hand screw; begin at one side and move the hand screw along as the cloth is nailed. I think your correspondent will find this a satisfactory remedy for the difficulty of which he complains.

Black Walnut Stain.

From M. H. C., *Macon, Ga.*—I will give your correspondent E. A. W., who inquires in the May number for a recipe for black-walnut stain, a formula which may of use to him. It is simply burnt umber mixed with thin glue. The good qualities of this composition are its cheapness. The sizing serves as a wood filling, and therefore it takes less varnish to finish the wood. This stain is durable; it dries in a short time and may be rubbed down with sandpaper in a few minutes after it is put on. It is nearer the color of walnut than anything I have ever used.

Relative Wages of Carpenters and other Mechanics.

From W. B. S., *Flemington, N. J.*—I notice in the February number of *Carpentry and Building* that E. G. A., of Ossian, Iowa, says that it is not clear to him that carpenters are expected to understand and superintend the details of all the different departments of work on a building and yet receive less wages than other mechanics. This thing has been a puzzle to me, and I have had some practical experience in that line. Some years since I was building a brick dwelling in which pressed brick were employed for the front. The owner had a pressed-brick layer from Philadelphia, to whom he paid $5, while I only received $3 per day. I was expected to know the details of the work and to superintend the same. Your correspondent says there may be too many of us. I think there are too many of certain kinds of us. There are too many of what I call wood butchers—men who can use only a saw and a hatchet and yet who call themselves carpenters. Last summer a builder proposing to engage my services asked me what wages I expected. When I told him the amount, he said he could get hands for 50 cents less. I replied that I supposed he could, but asked him the question what kind of mechanics they were. I think a mechanic who understands his business is worth more per day than one who does not. Wages, however, do not seem to be regulated by competency. Under such circumstances there is no inducement for a carpenter to become proficient in his business. He will not be likely to try, unless he is very ambitious and does it for self gratification. I wish some remedy might be devised for this unsatisfactory condition of affairs. I wish something might be suggested which would protect good mechanics and discriminate against men who are not competent in the work they attempt.

From E. M. B., *Coudersport, Pa.*—I desire to ask why it is that carpenters get less wages than plasterers, bricklayers and painters. Surely the carpenter is required to possess as much brains as any of those just named, and he has to invest quite a little capital in tools, which the others have not. In this place journeymen carpenters are receiving $2; bricklayers and plasterers, $2.50 to $3, and painters, $3 per day. These are the facts and figures. What is the remedy?

REFERRED TO OUR READERS.

Using India Ink and Water Colors.

From C. E. W., *Lancaster, Pa.*—Will some experienced draftsman among the readers of *Carpentry and Building* inform me of the best method of preparing India ink for architectural drawings? I also desire to learn something about the use of water colors in tinting plans and elevations. I desire information about the quality and kind of colors. Is there any means of preventing ink lines from moistening and blurring where the water colors touch them?

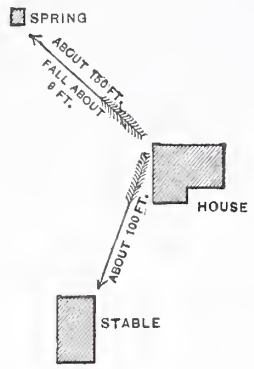
Note.—We shall be pleased to have our practical readers answer these questions for our correspondent in the way he has asked them. We would say in this connection that our little pamphlet entitled "Facts about Books for Draftsmen and Artists," contains the description of several low-priced books which treat upon the subject our correspondent is investigating. We shall be pleased to send it to any of our readers interested in the same direction who will forward a request.

Hole for a Cross Belt.

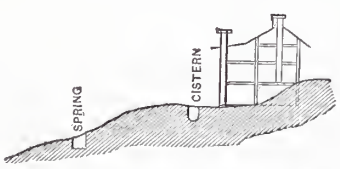
From A., *Bridgeport, Conn.*—Will some reader of *Carpentry and Building* furnish me the best method for laying out a hole for cross belt through floor; also, for a quarter turn belt? I also desire to know the best method for figuring the speed of pulleys.

Improving an Old House.

From WAWAYANDA, *New York.*—I have been a constant reader of *Carpentry and Building* from the start, and have also taken *The Metal Worker* for a number of years. I have noticed with great interest and satisfaction how practical problems are discussed by experienced men in the correspondence department of both papers. I am in need of advice upon some points concerning which a largo number of readers of both publications must be well posted. I venture, therefore, to address myself to the two journals jointly. I am about making some improvements in a country house already built, and inclose plans of the several floors, also a profile of the side hill on which it stands, and a plot showing the relative location of house and barn, and a spring which is the present source of water supply. By the profile section, Fig. 2, it will be seen that the cellar part of the basement is only partly below the surface. The front chimney (single flue), shown in plans, Figs. 4 and 5, does not extend below the principal floor. The back chimney consists of a single flue, 4 x 8, and while manifestly inadequate for several fires, persists in smoking when but one is in operation, particularly when the wind is in certain quarters. The front wall of the cellar, also the wall across the end of hall in basement, is damp, sometimes quite wet, from the earth outside. The floor of the cellar is at present native clay. The ground about the house slopes, as shown in the profile (Fig. 2), and also in the opposite direction—that is (referring to the plot Fig. 1), the surface to the right of the spring and above the house is higher than that part shown below the house. The highest point is to the right and a little beyond the spring, and is about 20 feet above the level of the basement floor, the slope being regular from that point toward and beyond the house. I desire to introduce an adequate system of heating, either by furnace, hot water, or otherwise. I also want to arrange a water supply, hot and cold, with bath-room, water-closet and necessary drainage. Would also like to have water in the stable, and the opportunity for a lawn sprinkler. I desire to heat the two principal chambers, shown in plan, Fig. 5, and all the rooms on main floor. I assume that a new chimney will have to be built to replace the one that smokes as above described. The suggestion has been made that a grate of some of the improved kinds might, at the same time, be placed in the sitting-room, be provided with an ash shute and be made to warm the chamber above it. I suppose the heating apparatus, furnace or boiler, will have to be located in the cellar as marked on plan. This is no special disadvantage, for I contemplate an addition at the rear, indicated by dotted lines, under which another cellar can be provided. I do not like the idea of a water tank on the house if it can be avoided; besides, I do not know where to put it. The bath-room and water-closet may be located in the basement (present cellar), if no better place can be suggested. With this much of an explanation I will proceed to present the questions I am now considering.



Improving an Old House.—Fig. 1.—*Location of House with Reference to Spring and Barn.*



Improving an Old House.—Fig. 2.—*Situation of House on Side Hill, showing Portion of Spring and Cistern.*

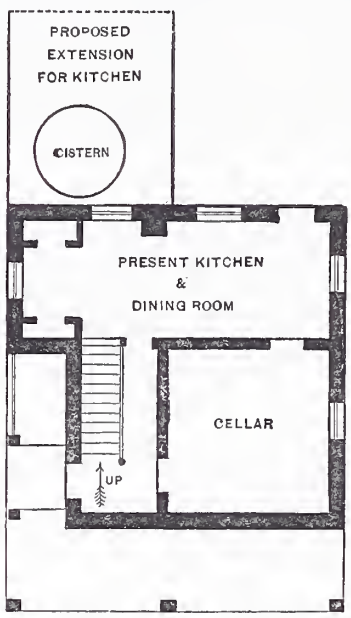
1. What is the best plan of heating the house as above specified? If a furnace is recommended, what size is best? Should it be brick set or portable? If hot water is recommended, what apparatus is necessary?

2. Can the front chimney, now supported on the first floor, be extended downward to ground line, without tearing down and rebuilding? If so, how shall I proceed?

3. What kind of a chimney should I build in the place of the one which is now so unsatisfactory, in order to accommodate a stove in the dining-room, a range in the proposed new kitchen, a grate in the sitting-room, arranged to heat the chamber over it, and an ash shute? What kind of a grate should I get?

4. What can be done to overcome the dampness in the front wall of basement?

5. If a furnace is located in the present cellar, what kind of a floor is best for that



Improving an Old House.—Fig. 3.—*Plan of Basement.—Approximate Scale,* 1-16 *Inch to the Foot.*

apartment? If cement or concrete is recommended, I desire directions for making and applying.

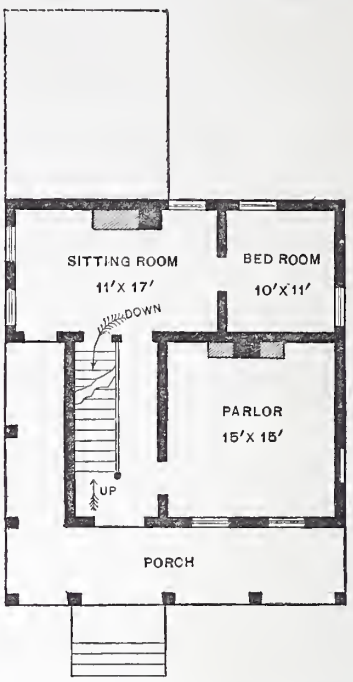
6. What kind of a water supply can be arranged upon the premises described? Where should tank be located? How large should it be? What is best in the way of power for pumping? What pump is most desirable for the purpose?

7. I desire suggestions as to location and arrangement of bath-room; also concerning fixtures. I prefer to have it in the house as at present built to putting it in the proposed addition.

8. What is the best system of drainage for this house? How should the drains run? How should they terminate? How should they be ventilated?

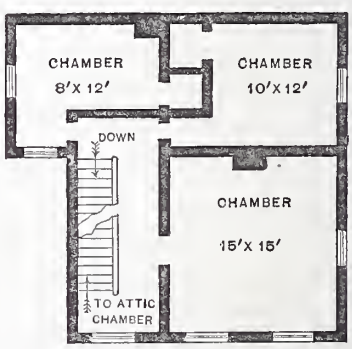
I think I have presented enough questions to show that I am open to suggestions generally. I cannot say that expense is no object, for the reverse is the case. I do not wish to expend any more money upon the property than is absolutely necessary in providing the conveniences and comforts named. I desire to complete the work this fall. I shall mature my plans in the light of advice and suggestions called out by this letter, and if it is likely to be of interest to the readers of the two papers to which this is addressed, I will agree in the end to present an account of the plan adopted and the way the work is done. In reading I have often noticed that persons ask for advice and obtain the benefit of a great many suggestions from correspondents, but it seldom occurs that those making the suggestions ever know whether or not their advice is followed, or, if followed, what results are obtained. Hence my proposition to present an account of the way the work is done.

Note.— Our correspondent's proposition to tell how the work is finally done will undoubtedly give additional interest to his



Improving an Old House.—Fig. 4.—*Plan of Principal Floor.—Approximate Scale,* 1-16 *Inch to the Foot.*

questions. As the problems presented cover several different departments of trade, as mechanics generally work, we have classified his queries and numbered them so that each reader may take up any question he chooses. We do not suppose that our correspondents generally will attempt to answer upon all the points advanced, although comprehensive responses would be very acceptable. Let each one address himself to that part upon which he is best informed. Very few of the problems referred to our readers are presented with such circumstantial detail as in the present case, and therefore the opportunity for practical discussion of interesting problems is an unusual one. We hope to have numerous responses.



Improving an Old House.—Fig. 5.—*Plan of Second Story.—Approximate Scale,* 1-16 *Inch to the Foot.*

Finishing a Bay Window.

From W. F. P., *Berea, Ohio.*—Will some reader of the paper give me a neat plan of finish in the internal angle of a square bay window. I mean the corner of the bay and the side of the room.

Miter Box.

From J. H., *Worcester, Mass.*—I desire to inqure of readers of the paper what kind of a miter box is the best for general use by a carpenter?

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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Ornamental Table.

Our first-page illustration this month represents a piece of furniture which, like other odd articles published from time to time in the past, is adapted to construction by carpenters and amateurs. The perspective view, Fig. 1, shows the table in all its parts so clearly that very little description is necessary. The frame upon which the top rests is a triangle in shape. A full section through the parts composing it is shown by Fig. 4, while the plan is presented in Fig. 5. The top is intended to be about 1⅛ inches in thickness, with the edge finished as shown in Fig. 6. A detail of the legs and also of the lower rail is shown in Fig. 2. A section through the rail is presented in Fig. 7, and a plan of the same in Fig. 3. There is nothing especially new about this design, but it is one which is easily made by any mechanic accustomed to the use of tools and who has had even slight experience in wood working. This style of table has been facetiously dubbed the "King Billee," the original of the design being traceable, so it is said, back to the time of William the Conqueror. Tradition has it that in one of the campaigns of that famous soldier, and upon a certain occasion, he made use of a table, the general features of which were the same as are here shown. The design will look well in either ebony, mahogany, walnut or oak. In whatever material it is executed, much of its beauty and quality will depend upon the manner in which it is finished. Carpenters in general, and amateur cabinet makers in particular, are often careless in matters of this kind, and hence their work, however carefully made, sometimes fails of due appreciation. Those who set out to build the article here shown, will find it profitable to read what we have published in back numbers upon wood finishing.

Ornamental Table.—Fig. 1.—Perspective View.

Fire-Proof Materials.

Fires of enormous extent are, it is almost needless to remark, constantly occurring, the loss of life and property being frequently immense and irrecoverable. As population and trade increase, the size and number of buildings increase; hence we have now, more than ever, larger dwellings, larger workshops and larger public buildings, wherein the strength, durability and resisting power of materials are tested to their utmost. One of our English exchanges says:

It may be fairly represented as a very general notion that what is incombustible is fire-proof. Certainly it was the notion of the framers of the Metropolitan Building Act when they insisted on such things as stone heads to iron doors, and it is the opinion of the public in general. It needs hardly to be mentioned how unfounded is this idea; but people would appear to still believe that if the fronts of their shops are of iron, if their doors are formed of iron bearers on iron pillars, and their stairs of stone, their premises and themselves are perfectly safe from fire. To prove how erroneous and dangerous this notion is, a few examples may be selected, showing how fire treats these supposed fire-proof things.

Commencing with stone in its ordinary and perhaps most dangerous use—that of stairs—we find that stone, marble and granite are utterly untrustworthy in case of fire, unless used of a thickness quite unusual in modern works. York stone, which has been subject to a fiery red heat, has its color changed to a deep red tint and loses its strength. Granite under similar circumstances is found to have started into fragments. Slabs of marble and stone are often warped and curled by heat in a most curious way, like wood.

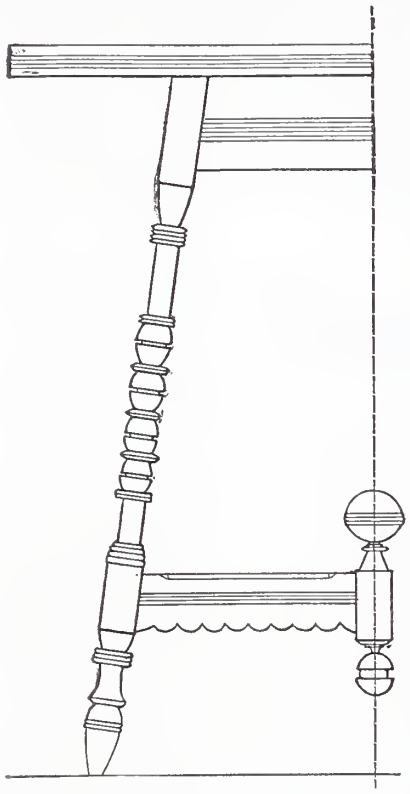
The next substance for notice is the very valuable one—brick. There is scarcely a case on record in which good bricks have been destroyed by fire. That bricks resist fire better than anything else was strikingly exemplified at the great fire at Chicago, when granite buildings were destroyed, while those of brick remained comparatively intact. Cases have occurred in which the surface has been exfoliated to the depth of an inch or so, and where a long-continued heat of great intensity has vitrified it, but never more. This is, in fact, just what we might expect from the process of manufacture.

Passing to the use of metals, it may be briefly noted that the softer ones, such as lead and zinc, are of course fit only for covering. But it must be remembered that zinc melts at the comparatively low heat of 700 degrees, and then burns fiercely. Lead melts at a somewhat lower temperature of 594 degrees.

Iron is a great aid now in construction, and its almost universal use suggests the need of more careful research with respect to it. The first and most obvious defect in iron as a building material is its rapidly deteriorating strength when heated, and though the fact is well known, it is curious that opinions should vary very much indeed as to the measure of deterioration. All agree that at and above red heat (which is common enough in fires) the diminution in strength is great. Wrought iron is very sensibly weakened and cast iron rendered brittle at a comparatively low heat. It is very common to find iron ties and other similar work bent merely by their own weight in small buildings and other places where the heat has clearly not been very great. Wrought-iron girders fail in a similar manner, for there are cases where they have been bent, twisted and broken in the most violent way when subjected to only a moderate heat, although cast-iron columns on which they have rested have only been slightly bent; such columns were, however, much stronger than is usually found. In large fires iron and brass are often actually melted. It is quite certain that at high temperatures, such as are to be found in a large fire, iron rapidly loses strength, and thus a floor or beam which would ordinarily bear the weight upon it quite safely will almost instantly break down at a high temperature. Iron offers such admirable aid as columns and girders, when used as metal should be, that its really treacherous character is much to be regretted. It should, however, always be borne in mind, and the metal should never be used without precautions. It is possible that means may be found of removing the defects which at present militate so seriously against its use.

Wood, contrary to the common opinion, is not a radically unreliable material. Timber posts and girders have been exposed to a heat sufficient to melt brass, and have remained comparatively undamaged, being burnt only some little and scorched deeply in, still retaining their strength. This is only, however, when the supply of air is limited, causing the formation of a coating of charcoal around the center of the beam or post, which acts as a protection to the unburnt portion. Capt. Shaw records some interesting and valuable experiments on the behavior of wood when subjected to fire, which show that with care it is a much better material than would at first be supposed.

Concrete is much used for fire-proof floors and many other purposes, and is likely to be



Ornamental Table.—Fig. 2.—Half Elevation. —Scale, 1½ Inches to the Foot.

employed still more ere long. Still, it must be used with some reservation. Evidently flint work is unsafe, as the flint is injured so much by fire that walls made of them are shattered to pieces by it. So are the ordinary gravel pebbles. But concrete may be made of broken bricks as the old Romans made it. As a rule concrete ranks high as a fire-proof material, but there have been cases of some suspicion as to the perfect protection to be derived from its use.

The last substance which need be mentioned is ordinary plaster, a most valuable auxiliary, as may be expected from its well-known non-conducting properties. Of all building materials, a combination of lime, sand and plaster has least conducting power.

STRAY CHIPS.

Lafayette, Ind., is building a court-house to cost $200,000.

D. Finn, of Merrill, Wis., has the contract for an $8000 court-house to be built at Jenny.

A town school-house, to cost $7500, is being built by A. Fales, at South Framingham, Mass.

At Hillsburo, Ohio, an addition to the County Infirmary is being erected, at a cost of $10,000.

A national bank building, to cost $30,000, is to be built at Turner's Falls, Mass., the present season.

A Methodist church, costing $5000, and a Catholic church, costing $8000, are in progress at Scotsdale, Pa.

A dwelling, to cost $6000, is being built at Orville, Ohio, for O. K. Griffith; James Piper is the contractor.

At Kokomo, a jail costing $28,000, and two residences costing $4000 and $7000 respectively, are in progress.

The number of new houses built in London, England, during 1879 was 21,589, and 401 new streets were opened.

L. A. Jennings, of New Castle, Ind., is putting up a business block 36x132 feet, four stories high, costing $14,000.

Hull, Mass., is putting up a hotel, 40 x 250 feet, to cost $50,000. Messrs. McKenzie & Campbell are the builders.

A new freight depot, 400 feet long and 75 feet wide, is to be built at Richmond, Ind., by the Pan Handle Railroad Co.

Emery Sailing, of Weston, Oregon, is building a residence to cost $7000. John H. Irons is the architect and builder.

Messrs. Darling & Lovell, of Burrillville, Rhode Island, are building a residence for Mr. D. C. Remington, to cost $8000.

Messrs. Myers & Kammerer, of Newark, Ohio, are engaged upon a two-story dwelling for Levi Baker of that place.

Andrew Peebles is the architect for the business block now being erected on Liberty street, Pittsburgh, for Mrs. T. L. Coffey.

At Waupaca, Wis., a court-house to cost $15,000 is proposed. Neither architect nor builder had been selected at last advices.

Heywood Bros. & Co., New York city, are erecting two factories for the manufacture of rattan furniture at Gardner, Mass.

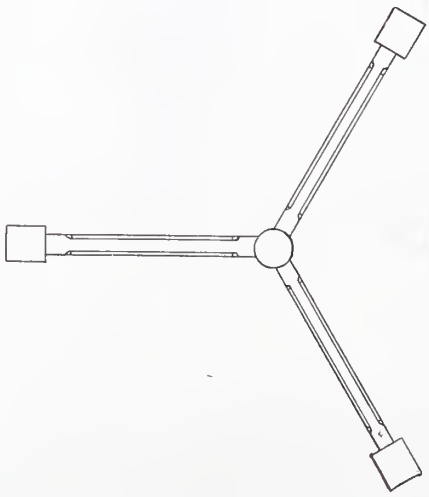
An Insane Asylum is in progress at Burlington, Pa. Estimated cost, $50,000. A. F. Frink is architect and superintendent.

A block of stores three stories high, costing $10,000, to designs prepared by E. H. Thomas, are being erected at Woodstock, Vt.

At Central Falls, Rhode Island, a large store building is being put up by Mr. J. G. Fales. Marchant & Southwick are the contractors.

Two business blocks, to cost $25,000, are being built at Lancaster, Ohio; J. B. Overman is the architect, and Overman & Bros. the contractors.

A hotel of 188 rooms is being built by the Nantasket Railroad Co. at Randolph, Mass. The builders are McKenzie & Campbell, of Boston, Mass.



Ornamental Table.—Fig. 3.—Plan of Lower Rail.—Scale, 1½ Inches to the Foot.

At Mahoningtown, Pa., an $8000 hotel is in progress. J. J. Garley, of New Castle, is the architect, and John Preston, of the same place, is the builder.

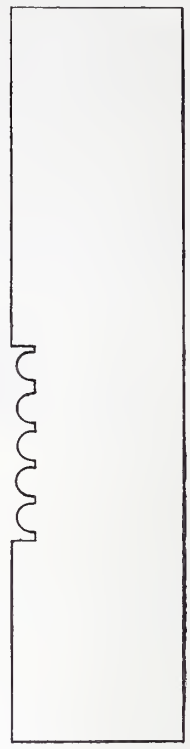
E. A. Curtis, architect, of Fredonia, New York, has prepared the plans for a business block at Titusville, Penn., and an opera house at Olean, New York.

Mr. William M. Butterfield, architect, Manchester, N. H., has prepared the plans for two town halls, one to be erected at Farmington and the other at Wilton.

Buildings for the State institution for deaf and dumb, costing $75,000, were finished last season at Delwan, Wis. Builders are busy this season on smaller improvements.

William R. Walker, architect, of Providence, has prepared the plans for a residence for Mr. William E. Tinkham, estimated to cost $6000, to be built at Burrellville, Rhode Island.

Clark's Cove Guano Co., of New Bedford, Mass., are building a new factory and wharf at South Dartmouth, to cost $60,000. Samuel M. Davis, of South Dartmouth, is the builder.



Ornamental Table.—Fig. 4.—Full Size Section through Pieces composing Frame.

Chippewa Falls, Wis., is putting up a public school building, to replace one destroyed by fire about a year since, at a cost of $10,500. Edbrook & Burnham, of Chicago, are the architects.

H. C. Finch, architect, of Trenton, N. J, has prepared the plans for a $12,000 store and office building, to be erected at Flemington, N. J. William B. Swallow, of that place, is the builder.

An armory is being talked of at St. Louis, size about 150 x 300. A company has been incorporated, and efforts are being made to raise the money. It is expected to cost $60,000 to $70,000.

A hat factory, 50x200 feet, four stories high, costing $12,000, is being erected at Three Rivers, Mass. Messrs. Gage & Reynolds are the owners, and John Orcutt, of Monson, Mass., is the builder.

At Champaign City, Ill., two store buildings, estimated to cost $12,000, are in progress. Messrs. G. C. Willis and William Price are the owners. Seely Brown, of Champaign, is the architect and builder.

Edwy E. Benedict, of Winsted, Conn., has prepared plans for a four-story brick block to cost $10,000, to be erected by Messrs. Woodford & Camp, of that place. Operations have not yet been commenced.

The Eagle Mfg. Co. is putting up a building 60 x 210 feet, to cost $25,000, at South Shaftsbury, Vt. It will be used as a woodworking establishment. S. D. Montgomery, of that place, is the architect and builder.

Messrs. Smyth & Carpenter are putting up a block 94 x 100, four stories high, for stores and tenements, at Manchester, N. H. Several other large blocks are contemplated, plans being prepared by Mr. William M. Butterfield.

A machine shop is being built by the American Tool Co., of Boston, at Hyde Park. Messrs. Tileston & Hollingsworth are build-

ing a paper mill in the same place. Henry Perkin and George Pease, of Hyde Park, are the builders.

S. A. CALDWELL, editor of the *Advocate*, Newark, Ohio, is building a brick residence, the estimated cost of which is about $7000. George Knapher has the work in charge, which is being done by the day, and not by contract.

A NOVEL CONSTRUCTION, in the shape of a paper dome thirty feet in diameter and weighing about two tons, is being made for the new observatory at West Point. It will only weigh one-tenth as much as a copper dome of equal size.

A $20,000 RESIDENCE for Mr. J. Kirkner is now being built at Plainfield, N. J. Oscar Teale, of New York, is the architect, and J. Manning, of Plainfield, the builder. A number of other residences are also in progress at Plainfield.

AN IMMENSE DERRICK is in use upon the new City Hall in Albany. The mast is 70 feet high and the boom is 75 feet in length. By its use stone weighing less than 10 tons can be lifted from the street and swung to any corner of the building.

AT MACON, GA., $25,000, the gift of a wealthy New York gentleman, is being expended in repairing, refitting and modernizing the Wesleyan Female College. A store building costing $30,000, and a number of residences are also in progress.

A COTTON MILL, 74 x 250 feet, four stories and basement, is being built at Centreville, Rhode Island. Messrs. Stone and Carpenter,

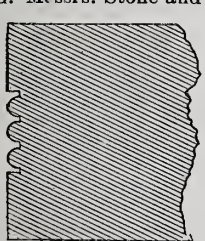


Fig. 6.—Full Size Section through Edge of Table.

of Providence, are the architects, and Louis Walker, of River Point, Rhode Island, the contractor for the masonry.

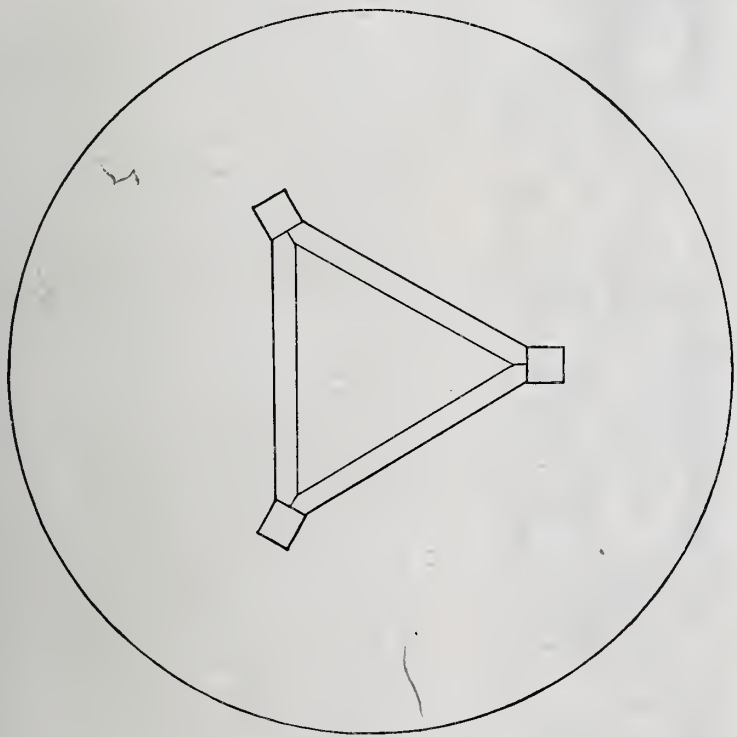
THE PLATE GLASS WORKS now in existence in the United States are six in number, and are located at the following places: Berkshire County, Mass.; New Albany, Ind.; Jeffersonville, Ind.; Louisville, Ky.; Crystal City, Mo., and Pittsburgh, Pa.

AT EAST LIVERPOOL, OHIO, an opera house and business block costing $40,000 is now in progress. James A. Miller, of Westchester, Ohio, has prepared the plans for a brick residence for Mrs. L. Howard, of that place; estimated cost, upward of $4000.

A NEW CHURCH now building in St. Louis is for the English Lutheran congregation, worshiping till recently on Elliott avenue, Rev. M. Rhodes, pastor. The walls are of stone and the roof of slate. The building is about half done; cost, about $55,000.

THE PLANS FILED with the New York Bureau of Buildings for the construction of houses during the second quarter of the year involve an outlay of $17,500,000. Among the new structures contemplated are eight places of amusement, at a cost of $415,000.

THE RECENT CONVENTION of Carpenters and Joiners at Chicago was attended by 55 union delegates. R. W. Comfort, of Chicago, was elected president, and John Ritter, of New York, vice-president. A uniform organization of carpenters throughout Europe and America was considered.



Ornamental Table.—Fig. 5.—Plan of Top and Frame.—Scale, 1½ Inches to the Foot.

A SLEEPER is one who sleeps; a sleeper is also a car where a sleeper can sleep; and a sleeper is, too, a thing over which runs the sleeper in which the sleeper sleeps, so that the sleeper in the sleeper sleeps, while the sleeper runs over sleepers, as well as sometimes leaps off the track.

THERE IS NOW in course of construction, at Lima, Ohio, a mammoth building which is to accommodate the Allen County Bank, an opera house, and a large number of stores, offices, etc. The work is being done by B. C. Faurot, president of the bank. The architect is Oscar Cobb, of Chicago.

A NUMBER OF BUSINESS blocks and some fine residences are in progress at Knoxville, Tenn. A dormitory for Knoxville College, costing $12,000, and an addition to the Deaf and Dumb Asylum, are among the improvements being made this season. A car factory, estimated to cost $75,000, is also in progress.

A NEW THEATRE is being built in St. Louis, at the corner of Sixth and Elm streets, to be called the People's Theatre. It will take the place of the old Theatre Comique, burned last winter, but will be devoted to a more select class of performances. The architect is Mr. McElfatrick, of St. Louis and Louisville.

M. Q. WILSON, architect, of Louisville, Ky., is now erecting a new school building, three stories high, in the Tenth Ward, of that city. The estimated cost $10,000. He is also remodeling a school-house in the Fifth Ward, the improvements to cost nearly $7000. Both buildings are expected to be finished in time for the fall term.

A NEW GREENHOUSE, to replace the one burned down last winter, is being built for Jay Gould, at Irvington, New York. It will be 380 feet long, 40 feet wide, with wings at either end 60 feet long. The cost will be $75,000. Messrs. Pugin & Walter, of New York, are the architects. Lord & Burnham, of Irvington, are the builders.

A SCHOOL TEACHER asked a new boy: "If a carpenter wants to cover a roof 15 feet wide by 30 broad with shingles 5 feet broad by 12 long, how many shingles will he need?" The boy took up his hat and started for the door. "Where are you going?" asked the teacher. "To find a carpenter. He ought to know that better than any of we fellows."

MR. WILLIS G. HALE is the architect for the new building being erected on Chestnut street, adjoining the new Post Office, Philadelphia, for the *Record*. This building will be of granite, six stories in hight, surmounted by a tower. The front will be highly ornamented, and, taken in all its parts, it will be one of the most complete newspaper buildings in that city.

WM. M. BUTTERFIELD, architect, of Manchester, N. H., has prepared plans for a new church building to be erected by the St. Paul's Methodist Episcopal congregation. The style of architecture is modern gothic, and the estimated cost is about $18,000. The building will be of brick, with granite trimmings. The contracts had not been awarded at the time of our information.

THE TYPICAL New York dwelling house is simply a brick box open at the ends. Fully half its interior is never visited by the rays of the sun. In the brightest day a sickly half-light pervades its best rooms. On hot summer nights its inmates stifle in a stagnant atmosphere, except only when the breeze is in the right quarter to blow through the house from front to back or back to front.

THE BUILDING TRADE in this city is not a little unsettled by the demands of the laborers. Good bricklayers get $4 a day, and in some few instances have demanded and got $4.50. Architects say that this is frightening capitaliststs who think of building. They compare the prices of bricks and other material with those which obtained a year ago, and conclude it will not pay to build at such figures.

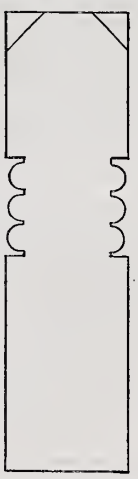


Fig. 7.—Full Size Section through Lower Rail.

THE NEW POST OFFICE and custom house, now in course of erection in St. Louis, is so located with reference to the tunnel running underneath the city, by which trains from the various roads are brought together in one central union depot, that the mail bags will be transferred to and from the cars direct at the office, without the slow transportation of mail wagons customary in most of the cities.

THE SOLDIER'S MEMORIAL BUILDING in Boston is to cost some $60,000 when com-

pleted. Local architects only have been invited to engage in the competition. The building is to be occupy a site in the center of the city. It will contain artillery accommodations, a memorial hall for war relics, &c., a G. A. R. hall, a large drill room, &c. The result of the competition is soon to be decided.

MOST OF THE BRICK used in New York city and vicinity are manufactured in yards along the Hudson River, located at various points between Albany and this city. Transportation is for the most part by barges and sailing vessels. One of the manufacturers at Glasco has recently had made an immense barge, which is calculated to carry 200,000 brick at a load. This craft will be able to carry a good-sized building each trip.

WM. H. VANDERBILT, it is said, while abroad recently, engaged about thirty of the best wood carvers to be found in France and other parts of the Continent, to elaborate the woodwork in his new house. At the present time, the United States is spending more money than any other nation on wood decoration in household interiors. At the rate we are now proceeding, in twenty years we shall have the most artistic household interiors in the world.

JAMES H. WINDRIM, of Philadelphia, the architect who wrought such a wonderful change in the fronts of the Girard Estate buildings on Chestnut street, transforming those thoroughly Philadelphia-appearing edifices into things of beauty, has in charge the Lafayette Hotel improvements. What was once the La Pierre House is being remodeled and will henceforth form a part of the Lafayette Hotel. The total cost of improvements will not fall short of $150,000.

A LARGE AMOUNT of public work is in progress at Lansing, Mich., among which may be mentioned a library, a museum in connection with the Agricultural College, and a chapel for the Reform School. The entire outlay is estimated at $40,000. Messrs. C. H. Marsh & Co , of Detroit, and Watkins & Arnold, of Lansing, are the architects. Messrs. Fuller & Wheeler are the builders of the library and museum building; F. Hillard, of the chapel. Their addresses are Lansing, Mich.

E. D. GREGORY, architect, of Elmira, N. Y., has in charge at Corning, N. Y., a store and office building for F. N. Drake, costing $8000; a carriage house and stable for J. A. Drake, costing $6000; a dwelling house for George Hitchcock, costing $5000; a foundry building for Preston & Hermance, costing $10,000, and other buildings of less importance. He also has in charge at Canton, a store and office building for George Bullock, costing $7000; three cottages at Middletown, N. Y., and a depot and opera house at Mansfield.

ABOUT A YEAR AGO, the extensive Stove Works of the Excelsior Manufacturing Co., St. Louis, were nearly destroyed by fire, which caught from burning warehouses adjoining. The Company proceeded to rebuild at once, and had just resumed the full occupancy of their new works, a few weeks since, when the whole of them were again destroyed by a fire which broke out in one of the shops immediately after work had closed for the day. Preparations have been made for rebuilding. Meanwhile, temporary quarters have been secured for the company's business.

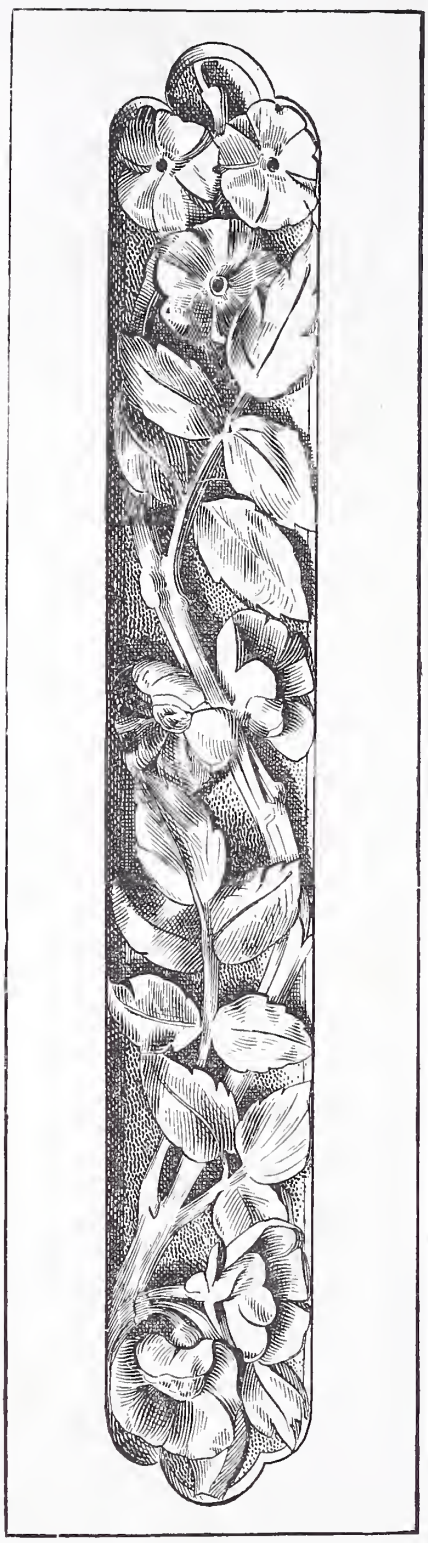
THE PLANS have been approved by the Brooklyn Commissioner of Buildings for a new theatre, which is to be built on Elm Place, between Fulton and Livingston streets, on the site of the Rev. Dr. Wild's Congregational church. The theatre building, which will be of brick, with a brown-stone front, will have a frontage on Elm Place of 78 feet, a depth of 140 feet and a hight of 72 feet. The stage will be 70 feet in width and 36 in depth, and the crown of the proscenium arch will be 40 feet above the stage. There will be two galleries, and the interior of the structure will be tastefully decorated, well ventilated and heated. The seating capacity of the Grand Opera House—for that is to be the name of the new playhouse—will be about 3000, and its cost is estimated at $75.000.

Lessons in Carving.—V.

BY W. E. PARTRIDGE.

EXAMPLES OF WORK.

The student in wood carving who has followed our articles, has doubtless felt the need of some examples of work suitable for his purpose other than those we have given. In



Lessons in Carving.—Fig. 18.—A Narrow Panel Cut in Pine.

this article we present engravings of some wood carvings made by very skillful men, especially to illustrate leading features of simply carved work. Fig. 18 represents a panel 2 inches wide by 14 inches long. It is carved in pine, and the greatest depth of the background is scarcely ⅜ inch at the deepest point. None of the work reaches the surface. These figures show that it is unnecessary, in order to obtain strong contrast, to seek for very high relief. The method of handling the surfaces, of bringing projecting parts against deep hollows and of placing one part over another, is sufficient to give all the contrasts which are shown in the engravings, without the necessity of cutting the wood away to great depths, this shallow work being even more striking in the wood than is shown in the cut. The stems in all this work were first cut rectangular in section and then finished with a gouge having a very small sweep; this, while leaving the corners sharp, so as to catch the light and make strong shadows, admirably imitates the general effect of the bark. This example, drawn on a considerably larger scale, would form an admirable lesson in modeling, giving, as it does, a very pretty theme for a panel, and at the same time allowing the student an ample field for displaying his knowledge or his skill of hand. It is, of course, impossible, in an engraving printed in an ordinary press, to give an idea of the beautiful effects obtained by the cutting tool in the soft wood, and that, too, in the simplest manner and with little labor. Fig. 19 is a small oak panel, in which the greatest depth is ¼ inch. The panel is the same width as that first mentioned, but not quite so long. The reader will notice that the lower half of the design is unfinished, showing the work as it was blocked out. The upper half is complete. The two little flowers at the bottom are scarcely more than buttons, yet they are in the condition of half-finished work and show how results are to be obtained. All the stems in the lower portion are rectangular, and the forms of the leaves are given and their outlines corrected, but there is no attempt made at the veining. The stems of the upper portion are finished by cutting a chamfer along their edges, and in the chamfer making a score, so that the finished work, when closely examined, appears as though a V-shaped tool had been run along so as to cut out the corner. In finishing the leaves, one-half is made higher than the other at the center line, so that, according as the light falls, we have the effect of a raised or sunken rib. The smaller ribs are formed by sharp V shaped cuts and by raising the surface on one side above that of the other. The workman was evidently a master, for he has made his tool mark useful in indicating curves on the surfaces. The light veins upon the leaves and many other skillful matters of this sort must be seen rather than described, but the carver will find out many of them for himself after a little use of his tools. One thing must be borne in mind—that on work of this description sandpaper must not be used. Many men are so accustomed to see dead, smooth surfaces on carved furniture and other work of the kind, that they have an instinctive tendency toward smoothing up everything to which they can apply a piece of sandpaper. This destroys the character of the work, and makes it appear as though it were made of putty. In the best work the tool marks show, and show to some purpose.

The original rosette from which Fig. 20 was taken is 5¼ inches square, and the projection of the center above the background on which the smaller rosettes are carved is only ⅜ inch. In looking at it, it is difficult to believe that so good an effect has been obtained with so small a projection. The leaves radiating from the center rise; then, with long sweep, slope outward, and, finally, rise again just inside of the circle. This design, while very easy to make in wood, would be unnecessarily difficult in clay, and we should not advise any one to attempt to model it. It can be laid out with the compasses and lead pencil upon the surface of the wood and work commenced at once.

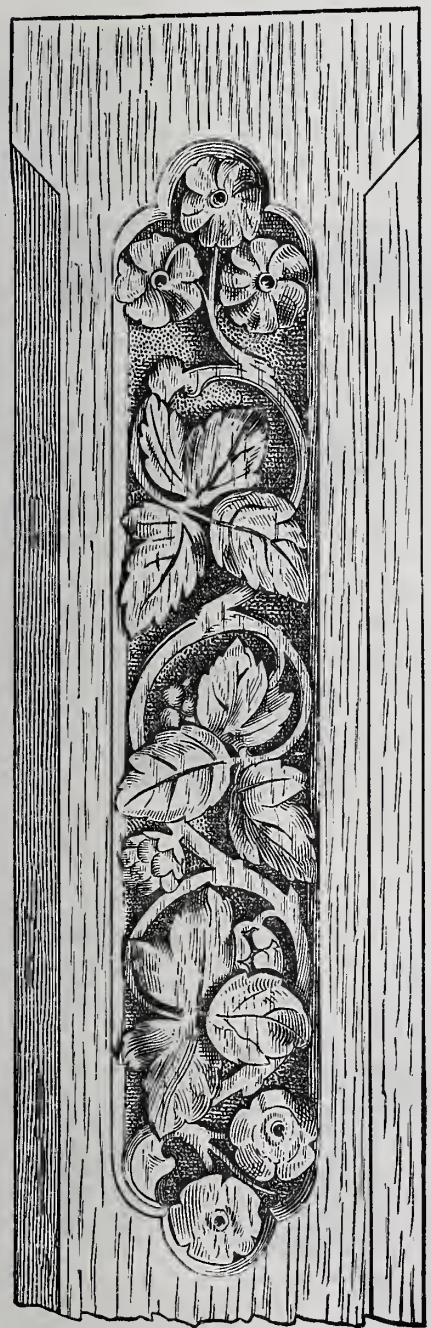
One of the great beauties of this ornament is its suggestiveness; it is hardly possible to look at it without seeing in the mind each of the leaves filled with a variety of complicated work, as illustrated in Fig. 21. If the student wishes some practice in wood carving he cannot do better, after having had the practice which we have indicated in our previous articles, than to take a block of pine, and, drawing any one of these designs upon it, attempt to carve it. In doing this let the design be first outlined with a narrow chisel, sharpened like a knife blade from both sides. When the outline has been incised to perhaps the depth of ⅛ inch, cutting

away may be begun. The other steps need not be described, as to any one accustomed to the use of tools this would be superfluous, and our remarks have been directed to those who are already familiar with the handling of wood and the use of tools.

A Modern Apartment House.

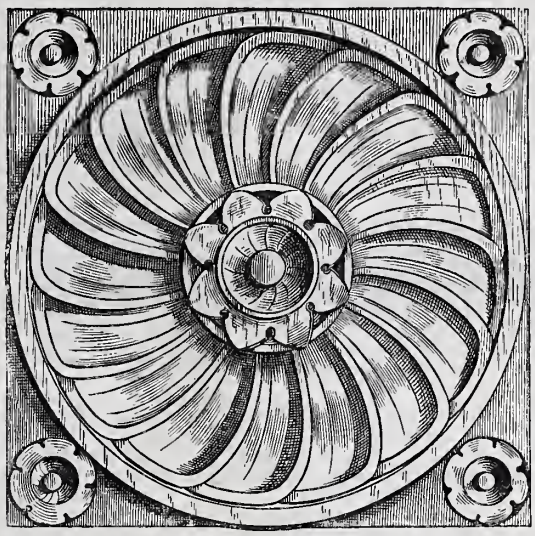
Co-operative effort in the way of apartment houses has been attracting considerable attention in New York of late. The following account of one of the more prominent enterprises of this kind will be read with interest:

The "Berkshire," as this new co-operative apartment house will be called, is being erected on the northwest corner of Madison avenue and Fifty-second street, and will be one of the noteworthy ornaments of the upper part of the city. It is being constructed under the personal supervision of Mr. Carl Pfeiffer, the architect, and will cost $200,000, making the value of the property,



Lessons in Carving.—Fig. 19.—Small Panel in Oak.—Lower Half in an Unfinished State.

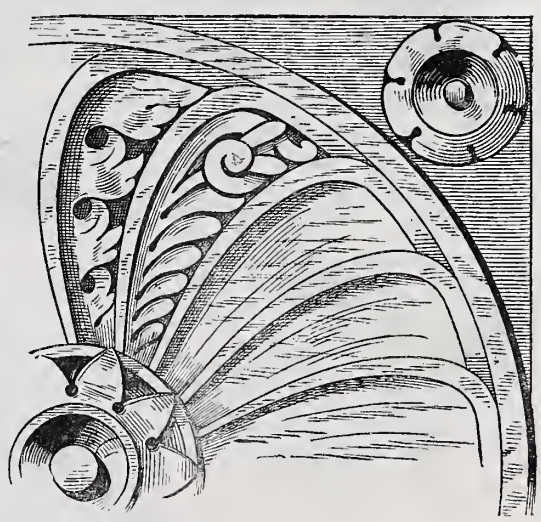
including the land, $350,000. The "Berkshire Apartment Association," a company incorporated under the laws of the State, is the owner. There are eight shareholders in the association. Alexander Guild is the president, Fletcher Harper, of the Harper Brothers, publishers, treasurer, and F. H. Hamlin, Deputy Commissioner of Public Works, secretary. The other stockholders are Mrs. Fletcher Harper, A. C. Taylor, of the publishing house of Ives, Blakeman & Taylor, F. V. Hamlin, Bessie C. Pfeiffer and Edward M. Shepard, of the firm of Stickney & Shepard. It is expected that each of these shareholders will occupy one of the apartments in the Berkshire when the building is completed, and this apartment will be his property permanently. The other apartments are to be rented out, and the stockholders will have a joint interest in the profits arising from this source, which will be realized in the form of regular dividends at stated intervals. It is confidently believed that these dividends will pay a good interest on the money invested in the stock, while the holders of shares will have an elegant residence rent free.



Lessons in Carving.—Fig. 20.—A Rosette or an Ornament for a Small Panel.

The Berkshire will have a frontage of 76 feet on Madison avenue, and a depth of 91 feet on Fifty-second street. It will be nine stories high, with a basement and sub-cellar. The first story will be built of granite, and the upper stories of Croton pressed brick, with stone, terra cotta, and molded brick ornamentations. The hight of the building from the sidewalk to the roof will be 122 feet, and the roof, which is to be flat, will be laid in tile work, so as to form a promenade on summer evenings. From the top of the house fine views can be obtained of Long Island, Long Island Sound, and the Palisades of the Hudson. To add to the attractiveness of this lofty promenade, hanging gardens of flowers in ornamented boxes will adorn the edges of the roof. The main entrance for the occupants of apartments will be on Madison avenue, and is of a very elaborate design. A separate entrance for servants and tradespeople will be constructed in the court-yard at the rear of the building. Inside the Berkshire will be cut up into 17 apartments, two on each of the first seven floors, and three on the eighth floor. Each one of these apartments will consist of a library, a dining-room, a parlor, a kitchen, a bath-room, a laundry, a servants' room, abundance of closet room, and four bedrooms. The partitions are to be so arranged that they can be moved, so as to meet the views of the occupants in regard to the size of any of these rooms, and each apartment is to have a second servants' room and a trunk room on the ninth floor, which is to be used as an attic for the convenience of tenants. On this floor, also, there is to be a steam drying-room. The kitchens of the apartments on the eighth floor will be in the attic. The rooms will all be finished in hard wood, and each apartment is liberally supplied with bay windows and balconies of iron and stone, which will serve to ornament the exterior of the building, as well as for the convenience of the occupants. The upper sashes of the windows are to be of stained glass, and the lower of the finest French plate glass. The floors of the hallways and the landings of the stairs will be laid in tiles, and wherever the interior of the building can be tastefully ornamented it will be. A wide staircase is to lead from the main entrance to the different apartments on the upper floors. The supports of this will be of iron ornamented; the steps will be of white marble and the railing of colored marble. A separate staircase for the servants and tradesmen will lead from the entrance on the court-yard. There will be two elevators—one for the occupants of the apartments and the other for the servants, and the former will run to the roof of the house to accommodate gentlemen and ladies who wish to utilize the roof as a promenade. It is expected to light the building by gas, but the fixtures will be so constructed that, as soon as any electric light company locates a main near enough to be available, electricity can be substituted for the gas. Every convenience known to modern improvement will be introduced into the house, which is intended to rival the Paris *palais* in elegance and comfort.

A portion of the basement of the Berkshire will be set apart for the use of the janitor, and the two apartments on the first floor will have their kitchen and laundry here. The remainder of the basement is to be rented out for offices to physicians. The cellar is to be used for the engine and boiler rooms and for the storage of coal. Here will be located an apparatus for cremating the refuse of the kitchen. No slop-barrels are to disfigure the sidewalk in front of the Berkshire. The refuse will all be dried by steam and then burned. The house is to be heated throughout by steam. For ventilation the same system will be used that has proved so successful in Dr. Hall's church and the Roosevelt Hospital, both of which buildings were designed by Mr. Pfeiffer. It consists simply of a large fan in the basement, which forces the air over steam coils. The Berkshire will be made as thoroughly fire-proof as possible, and two iron staircases will run from the roof to the court-yard in the rear, connecting with each floor, for use in case of fire. Building experiments of this kind are of great interest to all who are obliged to live in this city.



Lessons in Carving.—Fig. 21.—Part of Rosette Shown in the Preceding Figure, Enlarged.—Two Modifications of the Design are Shown.

Cast Iron Pipe.

Cast-iron pipe is at the present day so extensively used about buildings, that it may be regarded as a staple building material rather than a specialty, which it was considered only a few years since. One of the principal uses to which it is applied is for soil and waste pipes in connection with plumbing fixtures. Previous to the War of the Rebellion, or up to within 20 years, lead pipe was almost exclusively used. Since that date, however, cast-iron pipe has almost entirely superseded it for the purpose. It frequently devolves upon the carpenter or building superintendent to order piping for certain places, to calculate the runs which are to be made, or, in planning a building, to say just what can be done with the piping in order to accomplish required results. A brief talk, therefore, about cast-iron pipe and the fittings which are made for use with it, cannot fail to to be of interest and profit to our readers. We propose to present the matter in such a manner as will make any one intelligent in buying material of this class or in providing for its use, and at another time we may follow with directions for making joints in pipe. Plumbing work at the present day, considering the fixtures which are to be bought in the market for almost every possible position and purpose, is a comparatively simple trade. Certain skill, it is true, is required in some parts of the work, but there is nothing about it which the builder cannot readily comprehend and which it is not to his interest to thoroughly understand. In directing attention, therefore, to matters of this kind, we shall presume that our readers are interested in knowing about them in a practical way.

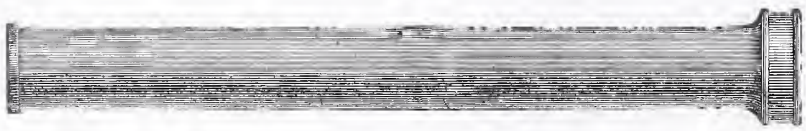


Fig. 1.—An Ordinary Length of Cast Iron Pipe.—One End is Provided with a Hub and the other End with a Fillet for Centering in Making a Joint.

Fig. 2.—A Reducer.

Fig. 3.—An Increaser.

Devices for Joining Lengths of Pipe of Different Diameters.

Ordinary lengths of cast-iron pipe, as made and sold in the trade, have the general appearance indicated in Fig. 1 of the accompanying illustrations. One end, that to the right, is provided with a hub, and the opposite end with a fillet. The use of this hub and fillet is very evident when the process of making a joint is examined, and need not be referred to in detail at this time. In matching pipes the fillet end is slipped into the hub. The course of the water passing through the pipe is from the hub end toward the fillet end. In putting up vertical lengths of pipe the filiet end is placed downward. Sometimes in making runs of pipe of specified distances it is necessary to use short lengths, in which case, unless special pieces are provided, there is a waste to the extent of the parts cut off. For this purpose pipes with a hub at each end are made as shown in Fig. 5. The fillet is of less importance in making the joint than the hub, and may be dispensed with if care is taken in the operation. Therefore, such a length of pipe as shown in Fig. 5 is more serviceable for use in cutting than that shown in Fig. 1. In order to utilize the short lengths which are produced by cutting pipe, either when lengths like Fig. 1 or Fig. 5 are used, what are called double hubs are sometimes provided. One of these is shown in Fig. 9.

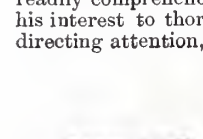


Fig. 4.—A Long Quarter Bend.

In the almost infinite number of positions in which cast-iron pipe is required to be placed, use is found for a great many shapes and fittings which at first sight would not seem to be needed. Two of these are shown in Figs. 2 and 3. The first is what is called a reducer, and is, in effect, a double hub, only that the two lengths of pipe joined by it are of different diameters. Fig. 3 is what is called an increaser, and serves the same purpose as the fitting just described, save that instead of having two hubs it has a hub and a fillet.

Fig. 4 represents what is called a long quarter bend. This is a piece of pipe which is somewhat less in length than an ordinary straight piece, one end of which is provided with a quarter bend and is useful in turning the course of a pipe from a vertical to a horizontal direction, or at right angles to itself. Fig. 6 shows a length of pipe made with a T-branch. Its use is somewhat special in character, being most serviceable where a number of water-closets are placed quite close together. Pipe of this kind is made of various diameters and with different sized Ts, thus permitting the use of various sized pipes for the branch wastes which empty into them. For example,

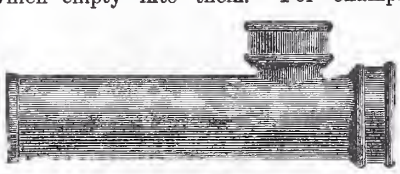


Fig. 6.—A Long T-Branch.

6-inch pipe is provided with branches either 6, 5, 4, 3 or 2 inches in diameter. Fig. 4 shows what is known in the trade as a cross head branch, and the general remarks made concerning previous figures apply to it also. By means of this fitting, various sizes of branch pipe can be joined to any size main pipe, as circumstances require.

Other styles of branches are made, two of which are shown in Figs. 13 and 14. The first of these is what is called a Y-branch. A modification of this article is known as a half Y branch, the difference being only in the angle at which the branch joins the main pipe. Fig. 14 shows what is called a double Y-branch. A similar article is made, differing only in the angle of the branches, which is known as a double half Y-branch. Fig. 15 represents what is known as a sixth bend. It is provided at one end with a hub and at the other end with a fillet, the same as straight lengths of pipe. A quarter bend of this same kind is also made. Fig. 16 shows a quarter bend, which is provided with a hub at both ends, suitable for use between pipes deficient in hubs. The various bends are also provided with branches, as shown in Figs. 17 and 18. The first of these is a quarter bend having an outlet at the heel. The second represents the same fitting, save that the outlet is on the side. These outlets are made of various diameters for the same size of pipe, thus accommodating branch wastes of different diameters.

Fig. 5.—A Length of Cast Iron Pipe Provided with a Hub at each End, Convenient for Use where Lengths are to be Cut.

Fig. 8.—A Pipe Plug.

Fig. 9.—A Double Hub.

One of the most useful fittings under many different circumstances is what is called an offset, an illustration of which is shown in Fig. 19. Its use, as indicated by its name, is to set the pipe off from the course in which it is running. Such a change in the course of a pipe may be made necessary by various causes. In carrying a course of pipe vertically in a building, sometimes there is a change in the thickness of the wall, as, for example, between the foundation and the superstructure. In order to have the pipe follow directly against the wall an offset is necessary. Offsets are also provided with outlets, thus admitting the joining of branches to them, as shown in Fig. 20.

After cast-iron pipe is in position, as, for example, in remodeling old buildings or in making new connections, it is sometimes necessary to provide for a connection between old and new pipes. The fittings provided for this purpose are shown in Figs. 21, 22 and 23. The first of these represents what is called a half Y-saddle hub. A hole is first cut into the old pipe, after which this is bolted against the pipe, the joint being made perfectly tight by red lead, &c. Different angles of this fitting are provided, and the collar or flange is made to fit different sizes of pipe. Fig. 22 represents a saddle hub for use when a connection is wanted at right angles to the main pipe. Different diameters are furnished, and the collar is also made to fit various sizes of pipe. Fig. 23 represents a pipe band, which answers the same general purpose, any more than that, instead of being bolted directly to the pipe, it is fastened around the pipe by means of the two parts of which it is composed. Different sizes of outlets are made for each

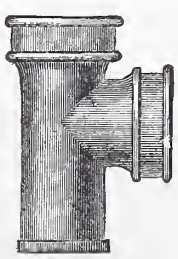


Fig. 7.—A Common T-Branch.

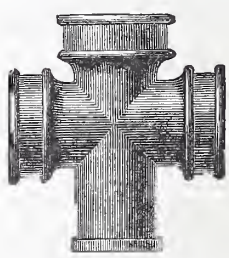


Fig. 10.—A Crosshead Branch.

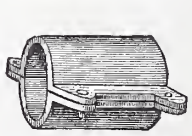


Fig. 11.—Plain Pipe Bend.

Fig. 12.—Sleeve.

Fittings for Repairing Cracked Pipe.

size of pipe to which this fitting may be applied. A pipe band of a similar character, but used only for repairing old pipe which has become cracked, or for some similar purpose, is shown in Fig. 11. Fig. 12 represents a sleeve which is sometimes slipped over a length of pipe for the same purpose.

What is known as a return bend is shown in Fig. 24. One of the principal uses made of this fitting is for topping out pipe that extends above the roof of a building for ventilating purposes. It is also serviceable in other connections, and its two ends being provided with a bub and a fillet respectively, joints can be made with it as required.

Fig. 13.—A Y-Branch.

Fig. 8 shows what is called a pipe plug, the use of which is to stop up the end of a pipe when, for any reason, that is required.

This somewhat extended list of fittings for cast iron pipe does not exhaust the assortment kept in stock by manufacturers. Among the articles which we have not shown may be mentioned traps, of which there are a number of kinds, and special fittings for use in connection with hot-water heating systems. We have, however, presented enough to make our readers reasonably intelligent in planning work in which cast-iron pipe is to be employed. We will close by calling attention briefly to the grades of

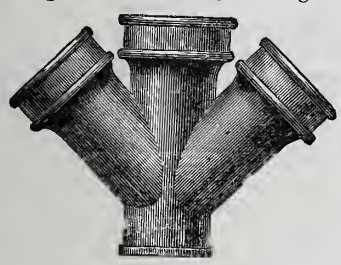


Fig. 14.—A Double Y-Branch.

cast-iron pipe. The average weight of extra-heavy pipe, which is generally recommended for use by architects and engineers of experience, is as follows:

Diameter. Inches.	Weight per running foot. Pounds.
2	5½
3	9½
4	13
5	17
6	20
7	27
8	33½
10	45
12	54

Lighter pipe is to be found in the market, and may be considered of two general classes; one is the ordinary pipe used in

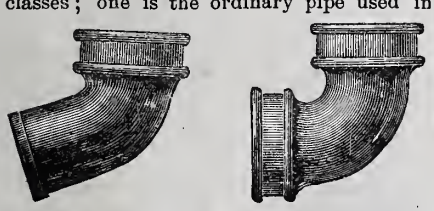


Fig. 15.—A Sixth Bend. Fig. 16.—A Quarter Bend.

Examples of Fittings for Making Bends.

cheap plumbing work, and the other is light pipe, used in special places. There is considerable choice in the selection of pipe with reference to the way in which it is made. Pipe produced from carefully prepared patterns of the weight for which the patterns were originally designed, is much better for use than that made light by shaving the core from which a heavier pipe would be cast. Pipe, to be of the very best quality, should be thoroughly sound, uniform in casting and in thickness, of smooth finish and of a quality to be readily cut without fracture.

Hydraulic Jacks.—A successful operation has lately been effected by means of hydraulic jacks. The foundations of the lower pillars of the basement of a 60,000-spindle mill at Bolton, England, were lately discovered to have subsided and the pillar bottoms to have seriously shifted, so much

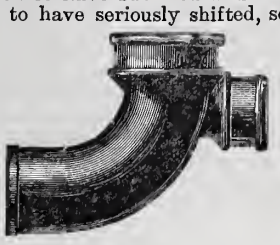


Fig. 17.—Quarter Bend with Outlet at the Heel.

so that the whole of the five floors were ascertained to have settled down to a depth in all of at least 5 inches, owing partly, it is believed, to the presence of a previously unsuspected coal seam. It was found that it would be necessary to raise six of the pillars, and to bottom and concrete the seam of coal, the operation being rendered the more difficult as the weight to be lifted could not be arrived at accurately, the floors of the mill being constructed of wrought iron and concrete, and having arched downward

Fig. 18.—Quarter Bend with Outlet at the Side.

in subsiding. It was, however, estimated that the resistance could not be less than 100 tons upon each pillar. Six 50-ton hydraulic jacks were applied, two to each pillar, and three pillars were lifted at the same time. The work had to be carried on slowly, to guard against cracking the floors when raised. The jacks held the enormous weight for about a week in each case, while the foundations were excavated and the concrete put in. The job was successfully carried on, the jacks sustaining the loads

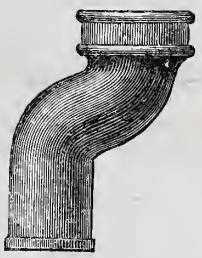


Fig. 19.—An Offset.

without giving way in any degree. Recently, also, a large chimney-stack at one of the South Staffordshire iron works having got dangerously out of perpendicular, it was successfully restored, having been sustained by the jacks while the foundations were excavated.

Driving Nails by Machinery.—Nails are now driven by machinery in most box factories where sufficient system and repeti-

Fig. 20.—An Offset with an Inlet at the Side.

tion exist to make it profitable, one machine doing the work of 10 or 15 men. The general idea of these machines is as follows: The nails are fed by hand into bell-shaped holes in a revolving disk. These holes are arranged in radial lines, each line with as many holes as there are nails wanted along the side of a box. This disk revolves and delivers the nails into bent tubes, each nail to a separate tube, which then delivers it to a pair of nippers arranged in a row with others. Upon receiving their nails, the nippers advance simultaneously, so as to bring each its nail under a kind of stationary hammer, the point of the nail protruding below the embrace of the nippers. At this point in the operation the box, upon a sliding platform, rises until the points of the nails penetrate it to a certain extent, when the nippers relax their hold and recede, the box still rising to receive the entire penetration of the released nails, the stationary hammer acting upon the heads of them meantime. This nails one edge of the box; but all the

Fig. 21.—A Y-Saddle Hub.

Fig. 22.—A T-Saddle Hub.

Fittings for Connecting Branches with Pipes Already in Position.

edges having the same arrangement of nails are finished by a repetition of the above movements. Then, to do the ends, the boxes are transferred to other machines, or the same one can be readjusted when a sufficient number of boxes have been passed. These machines work with rapidity and precision, not one nail in many thousands failing to enter properly.

How to Render Wood Fire-proof.—P. Folbarry, of New York, has devised a method of making wood incombustible without, in

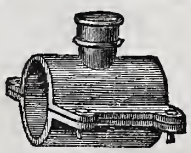


Fig. 23.—A Pipe Band with an Inlet for Making Connection with Branch Wastes.

any way, altering its outward appearance. Wood prepared in accordance with his process may possibly be charred just at the surface, but the heat to which it is exposed, though ever so intense, can never penetrate right into the wood, and touch its fibers. Timber petrified in this way is particularly suitable to staircases that are to resist a conflagration. The composition devised by the inventor is as follows: 55 pounds of sulphate of zinc, 22 pounds of potash, 44 pounds of alum, 22 pounds of sesquioxide of manganese, 22 pounds of sulphuric acid at 60°, and 45 pounds of water. The whole

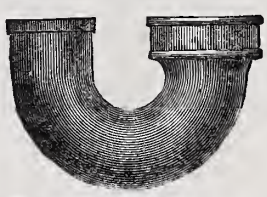


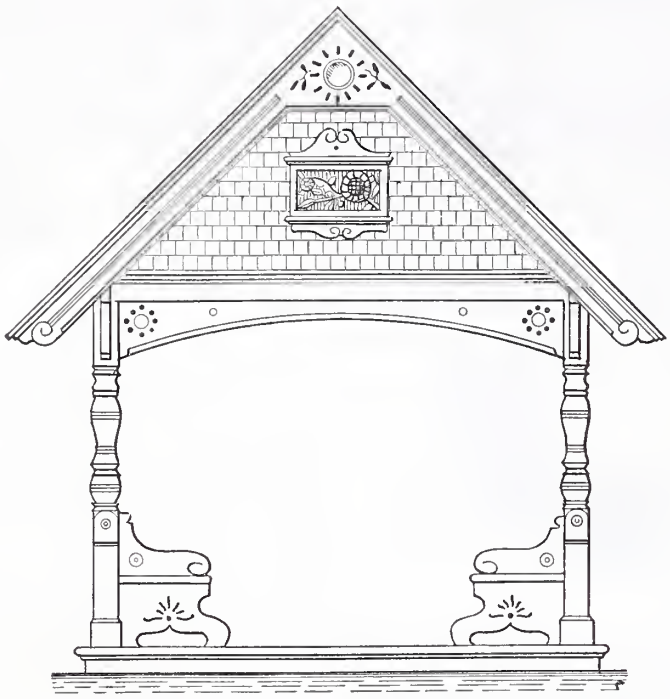
Fig. 24.—A Return Bend.

of the solid substances are put in an iron vessel, containing the water at a temperature of 113° F. When all this solid matter is dissolved, the sulphuric acid is poured in slowly until the whole is saturated with it. The solution is now ready, and in order to prepare timber with it the pieces must be put on an iron grate in a suitable recipient, in accordance with the size of the pieces and the object for which they are intended, care being taken to leave half an inch between any two pieces. The composition is pumped into the recipient, and after the whole of the spaces have been filled up it is left there in a boiling state for three hours. The wood is then taken out and placed on a grate-like wooden stand in the open air, to make it dry and firm. When thus prepared the impregnated wood may be

used for shipbuilding and building in general, for railway carriages, scaffoldings, posts, wooden pavements and generally for all purposes, while it is desirable that the material should be able to resist fire.

Design for a Summer House.

Mr. W. L. Morrison, in sending us the design for the frame stable published in the last number of *Carpentry and Building*, accompanied it by a design for a summer house and also a design for a well house. The three structures correspond somewhat in architectural style. We now present our



Design for Summer House.—Fig. 1.—Front Elevation.—Scale, ¼ Inch to the Foot.

readers with the elevation, plans and details of the summer house, and at some future time will publish the well house. The specification accompanying this design provides that the sills shall be 6 x 6 inches and the joists 2 x 6 inches, all framed and bridged. The floor is to be of 1⅜-inch clear, dry, planed and matched pine not over 3 inches wide, and put together with white lead and securely nailed to each bearing. The rafters are to be 2 x 8 inches, chamfered on the under side, and will be covered with ⅞-inch matched and beaded clear, dry pine, the beading to show from the under side. This ceiling to be covered with 1-inch pine or hemlock roofing boards firmly nailed. The roof and gables are to be laid with ⅜-inch pine shingles, with corners clipped as shown in Fig. 5, placed 5 inches to the weather and well nailed. The gables are to be backed with 2 x 4-inch studs, set edgeways, which will be covered on the inside with matched and beaded stuff, the same as ceiling. On the outside they will be covered with ⅞-inch matched boards, against which the shingles are to be nailed. The posts are to be as shown in the detail, Figs. 3 and 5. The molded parts are to be turned, the base and top being square. The balusters will be beaded as shown in the drawing. The rail seats and brackets to the same will be constructed as shown in the details, and all smoothly finished for painting. All the exposed surfaces of woodwork are to be painted with two coats of best linseed oil and lead paint, the color to be a medium brown, with trimmings two shades darker. The shingles are to be painted Indian red. The ceiling is to be painted a light blue. The chamfers on rafters, carvings, rosettes, &c., to be picked out with Indian red. The estimate on this design is as follows:

Platform, gable finish, &c.	$35 00
Posts, rafters, &c	58.00
Shingling	20.00
Seats	30.00
Carved panel	7.00
Total	$140.00

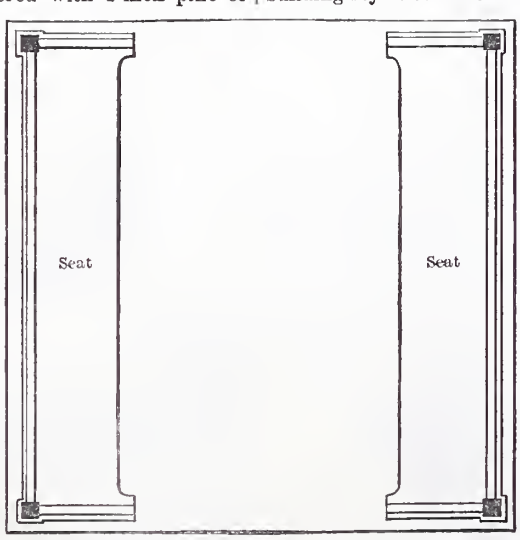


Fig. 2.—Plan.— Scale, ¼ Inch to the Foot.

NOTES AND COMMENTS.

The Oriental Craze.—The craze in building styles to which the daily papers frequently refer is not the only one which has taken hold of the people. There is the decorative mania, which, at the present time, is so widespread that it is necessary to particularize some one phase of it if we are to confine our remarks to a limited space. Perhaps what is called the Oriental craze is as marked a feature of the present manifestations as any. To be fashionable at the present time people must have Oriental goods, Oriental bric-a-brac, and Oriental this, that and the other. Hence it is that Oriental goods are purchased, whether they are pretty or not. This behest of fashion—for we cannot regard it as anything else than a fashion or a fancy—has produced an anomalous state of affairs. Our stores are filled with the rugs of Turkey made in Paris. In decorating our houses the hues of Egypt may be obtained at the nearest paintshop. American artists trace Japanese forms upon our ceilings. The Chinese jars that stand in our halls are but clever imitations of scarce originals. Old China plates shipped from London are slapped like a school boy's spit ball upon our walls. Modern made antique brass candlesticks are found upon our sconces. If this mania continues, before it has run its course we shall doubtless have restored the wooden plow of Palestine. We shall see the idle and snobbish youths of our cities forsaking their coaches and fours-in-hand and fooling away their time with Babylonian chariots. The goat-skin bottle will displace the ice pitcher, and the drinking vessel of gourd drive the crystal goblet and tumbler from the table.

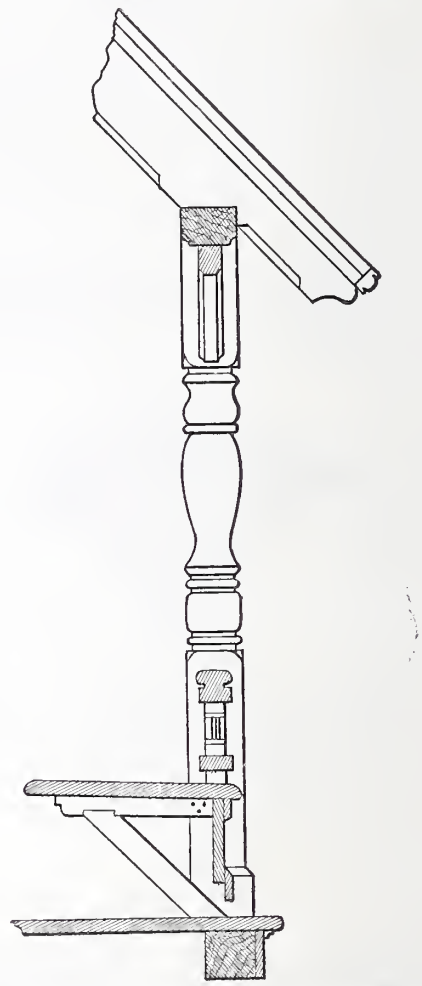
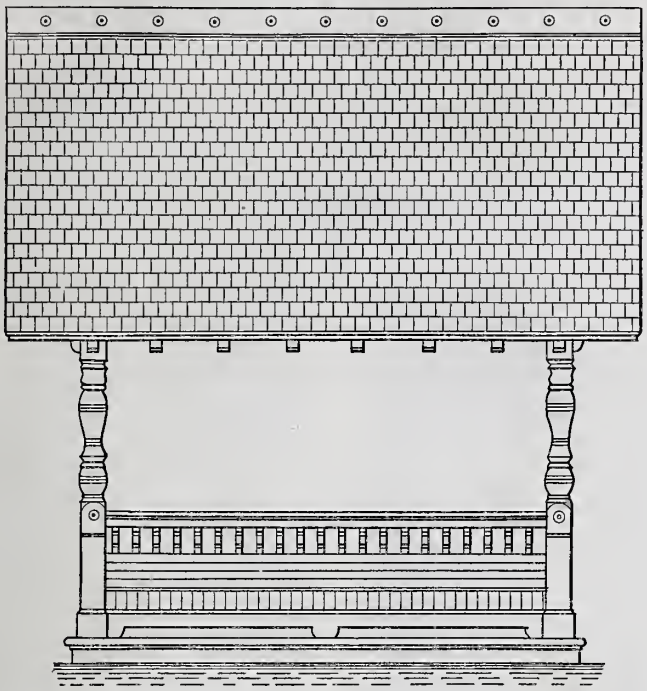


Fig. 3.—Cross Section Through Seat, &c.— Scale, ½ Inch to the Foot.

Architectural and decorative possibilities of terra cotta as a building material, have been finely illustrated in two prominent structures now nearing completion in Philadelphia. We refer to the new offices of the Insurance Company of North America, situated on Walnut street below Third, and the passenger station of the Pennsylvania railroad at Merrick and Filbert streets. Brick has long been recognized as one of the best fire-reisting building materials, but its use in ornamental structures has been much restricted by the idea that a brick can be nothing more than a plain, oblong block of burned clay of a bright red color. This notion, however, has been going out of vogue for some years past, and that it can hold good no longer is evidenced by the buildings alluded to. The insurance building has a large gable fronting the street, which is composed entirely of brick molded into ornamental shapes, and carrying out a most elaborate foliated design in low relief and in

large free curved lines. In the center is the date, 1881, in figures some three feet high, all molded so as to combine and intertwine with the other ornamentation. The front of the depot building is also a fine specimen of this kind of work. Large



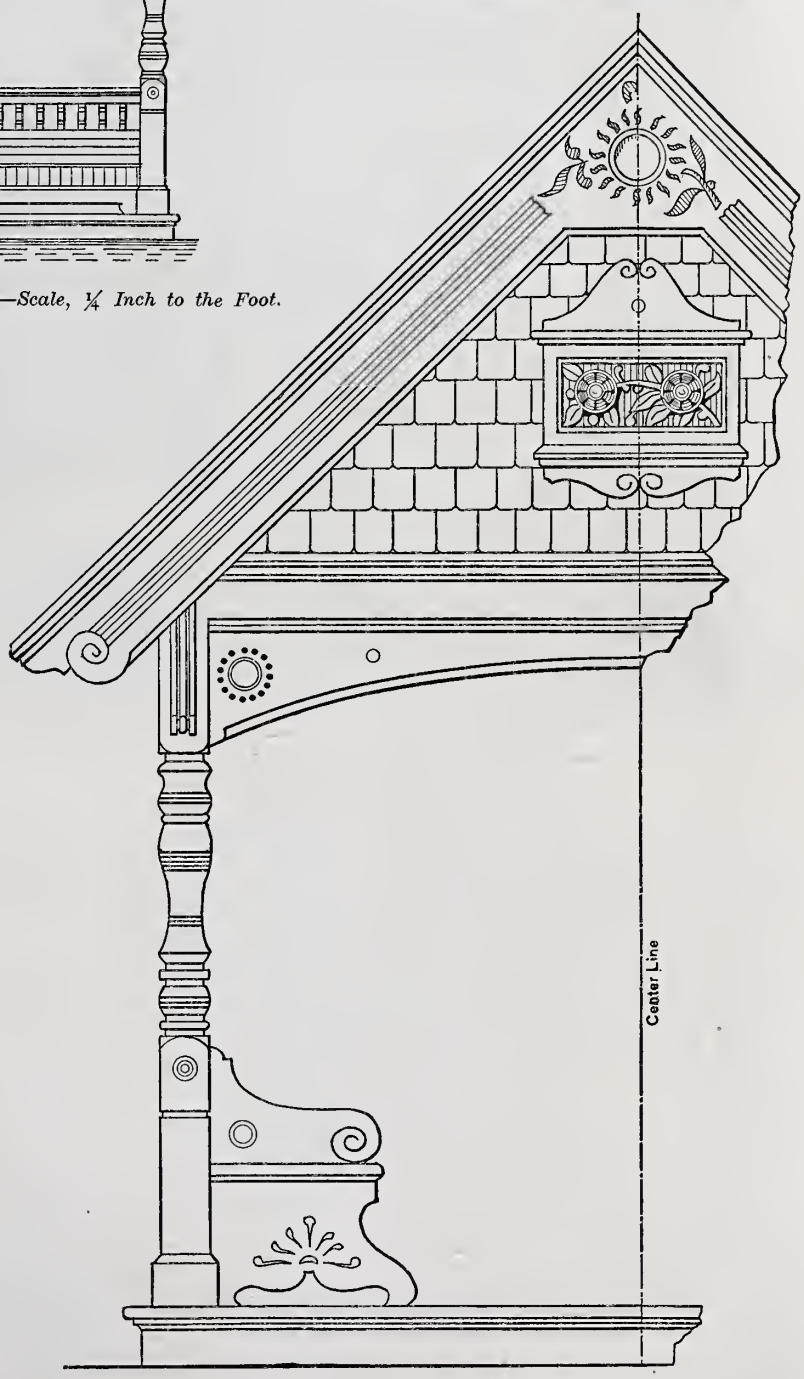
Design for Summer House.—Fig. 4.—Side Elevation —Scale, ¼ Inch to the Foot.

Gothic windows set far back in the massive walls, and are surrounded by ornamental columns and hoods. Broad bands of ornamentation in low relief, showing leaves, flowers and grotesque animal forms, and bay windows surrounded by heavy railings are other prominent features of the brickwork. Within the building another application of ornamental brickwork is presented by the use of enameled pressed brick of various colors for the walls, instead of plaster or fresco.

MANY OF THE first-class houses of the day, as well as some of our more striking store fronts, are built in what is called Queen Anne style of architecture. While this may do for a name, it is evident that they did not build in Queen Anne's day as we are building now. In those days they did not have iron window frames nor wrought iron rolled girders, nor many other prominent features of modern buildings. It would seem that no name can be applied to the prevailing architecture of the present day that would properly characterize it. In some respects it might be called the common sense style. Although our architecture at the present time seems to be passing through a transitional period, there is no doubt that a century hence the styles of architecture of the present time will be as distinct and marked as those of past periods.

A METHOD of rendering an ordinary frame house dry, warm and cool is thus described by a daily paper: These conditions are obtained by the introduction of a mortar or concrete wall between the upright timbers or "studding" of the ordinary balloon frame. The wall is very cheaply made, the mortar being simply filled in between boards loosely nailed on, and as soon as the first or lower filling has set, the boards are taken off and nailed on higher up, and the space again filled. In this way, the filling process and removal of the boards being repeated as often as necessary, the wall may be carried up as high as desired, whether to the roof, or only to the top of the first story, but the full hight of the studding is best. The plaster may be put directly upon the interior surface of this wall, which, of course, will be of the same thickness as the width of the studding timbers, usually 4 inches, and will be flush with them on both sides. But to prevent the dampness which a solid wall without an interior air space would be sure to produce, strips of lath must be nailed up and down on the studding on the outside of the house, and the siding nailed to and through these strips. There will now remain, when the siding is put on, a space of about a third of an inch between the siding and the wall. This is not sufficient for a harbor for rats or mice, while it is quite enough to insure the retention of its warmth by the wall during a winter night, at least in a sufficient degree to prevent frost. On the other hand, the heated condition of the outer surface of the siding in summer will not be readily transmitted through the non-conducting material of the wall, which will, therefore, maintain nearly the same temperature day and night at all seasons of the year.

AN ERROR occasionally committed by designers in the use of iron for building purposes, is thus described by Mr. E. T. Bellhouse in a paper on "The Proper Use of Iron for Building Purposes:" I have seen a rigid cast-iron beam in one piece resting at each end upon the main walls of the building, supported in the center by a column. If there should be any settlement or sinking in the foundation walls, or if one of them and the pillar-stone should remain firm, the beam would have its back broken over the column. If, on the other hand, the pillar foundation gave way and the walls remained firm, the superincumbent weight would in all probability be too much for the beam to bear. In such a case there should have been two castings, with such a joint over the column as to admit of a slight deviation from a horizontal line, if any such should occur. In using wrought-iron beams, as in the case of timber, the elasticity of the material will admit of considerabla deflection without any danger, so that no special provision needs to be made for the contingency. I may add that I have seen, in a very large structure, cast iron employed in tension and wrought iron in compression. This, too, was in accordance with an architect's specification.



Design for Summer House.—Fig. 5.—Half Elevation of End.—Scale, ½ Inch to the Foot.

In the way of building materials, one of the latest novelties is the importation of Bay of Fundy freestone. Large and expensive structures are now being built of this material, the principal characteristics of which are strength, durability and uniformity of color. Moreover, it costs much less to cut than other freestones, and is admirably adapted to elaborate architecture and fine lines. Its strength is 9250 pounds to the inch, and atmospheric influences do not affect it. The colors of the different qualities are dark and light brown, blue, olive, brick red and salmon. Large cargoes are arriving every week.

The conventional and traditional style of architecture which gave to Philadelphia the monotony of white steps and green shutters, is fast being superseded by a more

Ancient Door Furniture.—Fig. 1.—One of a Pair of Cupboard Doors of Carved Oak, Fitted with Plate, Lock and Hinges.

modern and costly one. The people are said to like it, and the novelty is so great that architects' offices are overrun with orders for the most elaborate, and at the same time most substantial, sort of edifices.

The electric light is at present employed to a large extent in the principal streets of this city, and it is reasonable to expect that in time its use in this way will become general. There it is in its proper sphere. For illuminations and for the enhancement of certain stage effects, it is also very acceptable. But almost any other application of it is as yet entirely out of place. Numerous stores, hotels and coucert halls have adopted it, and the consequence is that people obliged to work for hours continuously by this light, such as salesmen and clerks, are having their eyesight gradually destroyed thereby. To most of the guests in hotels this glaring light is intensely disagreeable, and those concert halls where it is used are not so popular as they would otherwise be. To endure such a light as this within a very limited circle for a length of time is a very hard strain upon that sensitive organ, the eye. In the street the intense glare is distributed throughout a very large space, and the effect thus becomes moderated. In all large cities there are enough things to fret the nervous system without this additional annoyance being introduced. When the latest invention shall have tempered the blinding fury of the electric light, then it may be used in small spaces to advantage. At present it should be confined to the illumination of very large spaces, so that its beams may be absorbed to some extent by the surrounding darkness.

Now that the building business is so brisk in this country, we are quite apt to forget the dull times through which we recently passed, and to overlook the fact that other parts of the world may be far less favored than our own country. In contrast with the cheerful reports with which our daily papers teem at present, we present the following from a recent number of one of the building journals published in London: "Builders and contractors have to exercise all their skill to keep things going, stock from depreciation and plant from being ruined by want of use. Wages are high, jobs are scarce, and dozens now run after a contract which, not long since, would hardly attract anyone to tender. Therefore, contracts are taken at almost certain loss, because, even in that event, the loss is less than it would be from mere idleness."

Wooden Cities.—The recent accident at a seaside resort is worthy of attention. One of the hastily constructed summer hotels suddenly took fire, and in the middle of the night the guests found themselves out in the open air, houseless, homeless and in many instances destitute of clothing, except bathing suits and night garments. The fire was sudden and decisive. There is scarcely a summer when we do not read of fires at the seaside watering places. So unsafe and dangerous are these summer hotels that the insurance companies will only guarantee them against fire upon the payment of a large premium. There is a theory that the only mode of life at the seashore is in large, flimsily constructed wooden buildings, built simply for space and air. Besides this, the cupidity of investors and tavern keepers finds expression in a desire to make the utmost out of the few weeks that are given for summer recreation. The history of a citizen's stay at the seaside or watering place is generally a history of extortion and discomfort. There is no reason why we should not have seaside resorts where we could have all the comforts of a residence in town and which might be inhabited all the year round. If our large wooden hotels which stretch along the New Jersey and Long Island coasts could be pulled down and hotels of brick and stone and iron built in their place, with accommodations for winter, it would be an improvement in every way, not alone to those who visit the hotels, but to the owners of the property. There is no month in the year, with the exception, perhaps, of the stormy weeks in midwiuter, when life at the seashore could not be made pleasant. Our friends who own seaside hotels will be wise if they follow the example of the French and English, and instead of making calculations for a six weeks' season in midsummer, with the guests huddled in inflammable houses, build hotels which will be comfortable to the guests and a source of profit to the owners all the year round.

Conference Between Employers and Employees.—A good example of the wisdom of employers and employees taking counsel together when vexed questions divide them, is to be found in the convention of glass manufacturers and glass blowers which was held in Pittsburgh recently. After sessions extending over several days, all questions in dispute were amicably settled and a scale of wages was agreed upon. A sliding scale of compensation based on last year's wages, but complicated by other considerations, was adopted, and the net result of the council was a satisfactory adjustment of all possible differences. Employers and employed presented facts and views bearing upon their different sides of the matter under debate, and so the real truth was finally reached by all parties. This is much better than having a strike, closing the works and alienating those who perform the labor from those who pay for it.

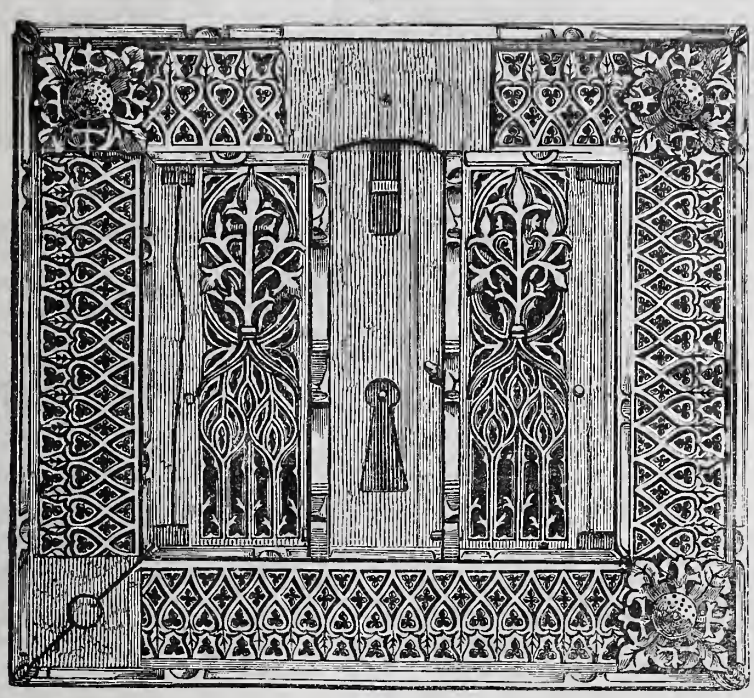
All the readers of this paper who have worked to the specifications of New York architects, are doubtless familiar with the term Haverstraw bricks or Haverstraw Bay bricks. The region thus located is on the west bank of the Hudson River, or more definitely, of that portion of it known as Newburgh Bay or Haverstraw Bay. The shore is thickly lined with brick yards for miles. It is claimed by the brick makers of this region that they possess a superior clay, and therefore make a better grade of brick thau their competitors higher up the river. They demand more for their product than is obtained for what is termed "Up River Brick." But this distinction is now becoming very indefinite and is not always maintained by builders. More care is used in the selection of material, as well as in temper and burning, up the river than formerly, and some makers of that locality claim to make as good building brick as are made anywhere.

The New Orleans *Democrat* says: A tendency has been shown lately to paint our houses of a brown, dark yellow, or some similar somber color. Formerly nine wooden houses out of ten in New Orleans were white. Houses of this hue always look cool, fresh and pleasant, but, on the other hand, easily become muddy and dirty, and certainly glare disagreeably in our morning and evening summer sun. There have been an unusual number of houses renovated and repainted this year, and most of them come out with one of those uncertain colors that will stand a great deal of dust and smoke without showing it.

The burning of the opera house at Nice has been the cause of the thorough inspection of the theatres in Vienna and of admirable precautions against fire in them. Among other regulations, it is provided that all the stair balusters must have secure supports in the adjacent walls; that the doors must be sheeted with iron plate and the corridors and halls be supplied with lighted oil lamps, in addition to the usual gas lights. The gas pipes that supply the stage and the auditorium are to be separate, and, during every performance, persons trained in the use of fire extinguishing apparatus must be stationed in the galleries, corridors and behind the stage.

All the bronze work for William H. Vanderbilt's new house in New York is being made in Philadelphia, one firm having the

contract and letting out the work to different manufacturers. This only embraces the stationary ornaments and fixtures of the building, and does not include the artistic bronzes that will be introduced for adornment after the house is finished. An establishment on Race street has completed some elaborate and beautifully finished bronze lamps, and also some balcony railings, part cast and part rolled, so as to resemble different metals. At present the railings are gold



Ancient Door Furniture.—Fig. 2.—An Outside Plate Lock, Locking Certain Portions of the Casing.

color, but they will oxidize a deep rich tint by exposure. There is a central rosette, with a wreath of smaller rosettes surrounding it, and winding through the design thus formed is a delicate scroll tracery, with brilliantly burnished balls intersected at the points where the rosettes and tracery meet. This gives an arrangement and contrast and relief of lines that is unique and striking, while yet graceful and in good taste. The work is all of the most expensive character.

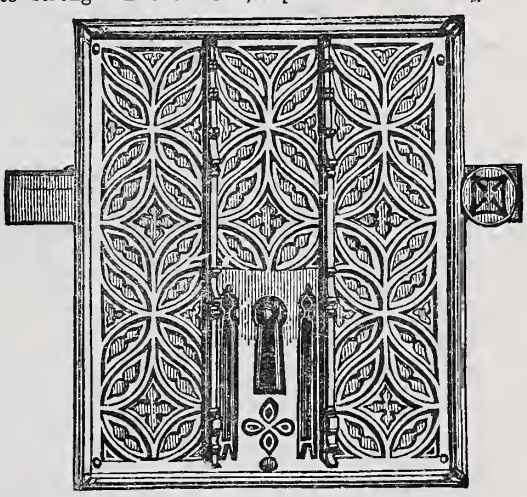
Ancient Door Furniture.

We illustrate a number of interesting specimens of old ironwork, taken from doors of the sixteenth and early seventeenth centuries. In Fig. 1 is shown one of a pair of cupboard doors of carved oak, probably Flemish in workmanship. Each door has a sunk panel with a semicircular head and small spandrils of foliage; within the panel is a circular border inclosing the monograms, *ihs* and *ma*; above the circle is a crown formed of three *fleurs de lis*, with Gothic tracery. The outside plate lock has a horizontal bolt, which works outside the front plate through two loops formed by the buttress staples which fasten the lock to the door. The hinges are garnet, of elegant and slender design; in the center of each is a rose-like figure, and the ends are worked with Gothic forms.

An outside plate lock is also shown in Fig. 2. In the center are three compartments, the middle one being for the keyhole; those on the sides are covered with Flamboyant tracery, having crocketed canopies above; the cover plate to the keyhole, of which only the rivets remain, probably matched these. A border of rich tracery surrounds the whole. The heads of the four corner rivets, which hold the perforated plates to the back, are eight-leaved flowers, in two thicknesses.

A third lock of the outside plate type is shown in Fig. 3. This was formed with a bolt which works within the front plate, and, when pushed into the staple, catches over a notch in the inside of the lock, and is held in its place by a spring, the key being required to lower the notch in order to open the lock. The front of the lock is designed in three upright panels of Flamboyant tracery, the keyhole being in the center, with two small buttresses between; a plain rim surrounds the whole as a border. The tracery of the front is made up in pierced plates of two thicknesses, so as to give the effect of relief.

It is worthy of note that, in the example shown in Fig. 1, most unusual care has been taken to have the keyhole so arranged that the key drops into its place almost in an automatic manner. If the key strikes the escutcheon in any portion of the principal part and is then carried downward, it will slide into the keyhole without any guidance from the hand. We call attention to this, because it was one of the characteristic features of all the older locks which have come to our attention. Occasionally the keyhole is placed at the bottom of a large depression. It is never in this old work put at the top of a boss, as is very common at the present day. In Fig. 1 the metal work is made most effectually to strengthen the wood,



Ancient Door Furniture.—Fig. 3.—Another Form of Outside Plate Lock.

while the carvings are used in a subordinate position. Of the three examples this one strikes us as being the finer, though by no means as elaborate as the other two, which seem more like carved work than wrought iron. It has been a question in the minds of some who have examined old work of this character, whether portions were not actually made of a malleable cast iron which, after being cast approximately to the shape, was drawn under the hammer. Certainly, some of the more wonderful specimens of complicated work would lead one to suppose that this was the case.

Amateur Inventors.

It is not only in literature and the arts that, metaphorically speaking, "many a flower is born to blush unseen, to waste its sweetness on the desert air." The workshop and the laboratory have each a claim to be inserted in the long list that records the failure of many an able individual, many a second George Stephenson or Humphrey Davy, with whom, from lack of assistance or perseverance, has perished the secret or idea of some invention or discovery, the utility of which the world has never had an opportunity of testing. It is a lamentable fact this, and is rendered more so when one investigates the conditions under which such failures have occurred. The contemplation of misfortune is, at all times, an unpleasant occupation for the mind; but when ill luck or failure, either bodily or mentally, are coupled with untiring industry and enduring patience, our commiseration may take another shape—admiration. The knowledge that one has worked for years at some theory, idea, or invention, and has, perhaps, toiled alone and unassisted at some machine or process, affects the mind to admiration rather than to pity. It would form a marvelously interesting volume were it possible to collect and gather together the multitude of notions or discoveries which have perished and gone to obscurity with their owners. There is many a youth at the bench, who, through absence of others' aid, or through want of energy, has been prevented from developing into a great man, of practical use to the world. Skeptics may sneer, but such is the truth.

There are many, and there have been many for ages past, whose talents and abilities fate has suffered to be hidden. It must not be supposed, of course, that such a melancholy state of affairs has been brought on by the amateurs themselves. A great deal lies at others' doors. A harsh word or a mocking voice has often turned the aspirant away with a bitter feeling in his heart and a vow on his lips to give up henceforth and forever all attempts at originality or self-instruction. Another instance: An amateur may have discovered or invented something, and brought it to a stage when only a little practical knowledge or pecuniary help is required to complete and perfect it. Fortune, however, turns away from this deserving one. The support which is necessary to add the finishing touches to his work is wanting, and so his work is lost. Many who have raised themselves to an honorable position in a profession are apt to look down upon others striving to do the same with feelings of superciliousness and even enmity. They have regard for the labor and trouble they experienced or underwent in obtaining their position, and are therefore not disposed to assist others on the way to dethrone them. Such feelings are natural in every section. Yet one may lend a helping hand here or there to solve some difficulty or clear away some perplexity without injury to his own interest to any great degree. "Many a mickle makes a muckle." Many a kind word or generous action, be it ever so small and insignificant, has cheered the drooping spirits and lightened the heavy heart of the young

inventor, and laid the foundation for renewed strength in the race to success.

Most foremen are ready to impart their knowledge or experience, provided the object of their instructions is a worthy one, but still there are some who are chary of giving away their brains, and the work, perhaps, of a lifetime. Many a mechanic, who has taught himself by hard work and persevering industry, has regard to the fact that others should do the same, and that dearly-bought knowledge, or deeply-sought information is not to be disposed of to the first comer who may seek to learn in an hour facts which have been gleaned in a lifetime of labor and steadfast application. "Let every one work for himself," is his maxim, "and then there will be no occasion for courting the opinion or the advice of others." Such a statement is all very well as a theory, but in practice it will not generally hold good, except in a few exceptional cases, for there are some who, although possesed of natural ability, are yet so situated as to be unable to properly apply it; and there are others who have worked or studied under advantageous conditions, while their unfortunate companions have toiled by the sweat of their brow and the exertions of their own hands.

Turning from these results, which proceed from the aid or influence of others we find that more than one failure may be justly thrown on the shoulders of the amateurs themselves. A lack of patience and perseverance is an obstacle to successful progress, and those who show the "white feather" at the first rebuff or harsh words are never likely to succeed. The danger and difficulties which the amateur inventor must force himself to meet are placed purposely to block the way, or, as Shakespeare puts it, "to plague the inventor." We have no idea here, however, of preaching a moral sermon on the benefits of application and close attention to any subject under consideration, for these virtues are too well known to need comment in these pages. No one will venture to deny that, in order to make a thing succeed, and to achieve prosperity as a reward for labor and diligence, one must work with persistent industry—one must "stick to his work" in every sense of that expression, and not be stayed by the first obstacle that may chance to crop up, or the first difficulty that may bar the road to success. These and all obstacles must be triumphed over. It cannot be done at once—perhaps in a month, perhaps a year. Still the amateur should not desist from endeavoring to clear the way to perfection, even if the difficulties and dangers may appear so numerous at first sight as to make the task appear impossible. Several remarkable personages have said that the word "impossible" had been omitted from their vocabularies, and this same thought should also be present in the mind of the young inventor; and when his spirits are damped by the multitude of impediments which crowd around him, and the brightness of the future is obscured by the dark shades of perplexity and doubt, let him not yield himself to despair, but, with the words "what's impossible cannot be, and never comes to pass," in his mind, set firmly to work. Success will, some time or other, sooner or later, crown his efforts, and terminate the hours of toil and trouble with the knowledge that perseverance and industry have truly gained the day, and are honestly entitled to the full measure of the reward.

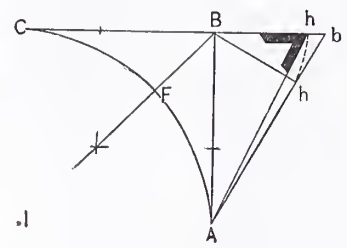
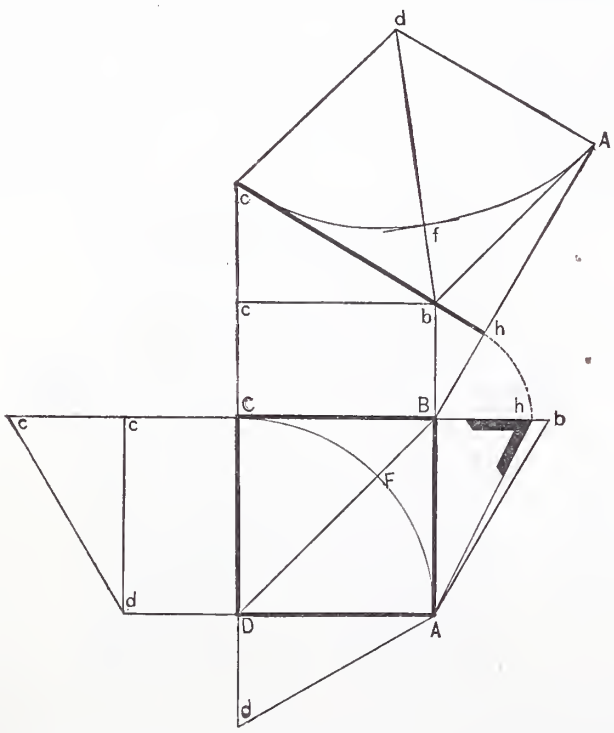


Fig. 2.—A Shorter Method of Accomplishing the Same Results.

Another shortcoming, from which few amateurs are wholly free, is the want of application. There is a certain difficulty in fixing one's attention on one object and one subject alone. The amateur flies from one subject to another, regardless of everything, or, too often, anything; skips playfully from mechanics to geology, or from astronomy to botany, taking in a word here and there indiscriminately, as may chance to catch the eye or the attention. His mind is occupied one moment by the alluring attractivess of some interesting experiment—the next he is mentally constructing a balloon, or an air-pump, or a boot-cleaning machine. The great kingdom of amateurism is not, however, entirely composed of these superficial ones, whose knowledge is but momentary, and whose brains are of use only for the time being. There are many hard-working students who set themselves to accomplish one thing at a time, and to overcome its difficulties first, ere they attempt to plunge into the mazes of another



Wreath-pieces which have a Continuous Rake over Quarter Circle Plans.—Fig. 1.—General Method of Obtaining Tangent Lines, &c.

These should be the successful ones, and are so invariably. It is not the individual who seizes the first brush at hand and daubs his canvas with the most convenient colors who finds his name enrolled among those whose works adorn the walls of Burlington House; neither will the young mechanic or student who knows "a little of everything," ever hope to attain the position of a Watt, a Nasmyth, a Thompson, or a Brunel. We do not maintain that a cosmopolitan acquaintance with facts and things is not a useful acquisition; but we think experience shows far better than words, that a close application to one subject is more certain to produce good results than a cursory and fleeting glance at a hundred diversified and totally different ones is likely to do.

Practical Stair Building.—XIII.

WREATH-PIECES WHICH HAVE A CONTINUOUS RAKE OVER QUARTER-CIRCLE GROUND PLANS.

In the preceding papers we have illustrated the principles employed in the solution of those problems connected with wreath-pieces which arise where the rail passes from a rake to a level, or, in other words, where the wreath-piece has raked and level tangents, the plan being either a quarter circle or quarter ellipse, or more than a quarter circle or more than a quarter ellipse, or less than a quarter circle or less than a quarter ellipse. The six cases here presented

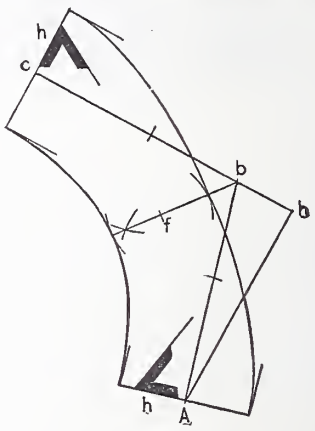


Fig. 3.—Laying Out the Pattern.

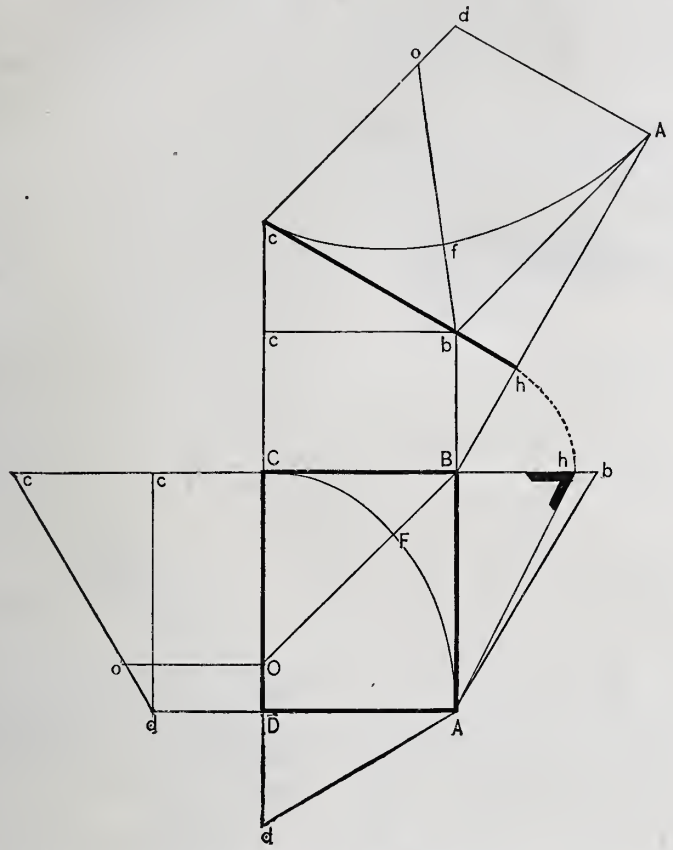
embrace all the positions in which a wreath-piece of the kind named can occur. The next step in regular course is to consider wreath-pieces which have a continuous rake, or, in other words, which have the two tangents of equal length. Wreaths of this kind may occur in each of the several positions, with respect to ground plan, above enumerated, and which we have explained in connection with the first class.

Referring to the accompanying engravings, let A C in Fig. 1 be the ground line of a quarter circle with its tangents A B and B C. Let it be required to produce an elevated center line having its tangents over A B and B C, both on the same rake. The first step is to complete the square A D C B. Draw the triangles A *d* D and A *b* B, showing the proper rake of the tangents. Draw the rectangles C *c b* B and D *d c* C equal in hight to the altitude of the triangles. Draw the triangles *d c c* and *c c b*, showing the rake of the tangents. Produce the rake line *c b* to *h*, and from B draw the line B *h* A at right angles with *c h*. With B as center describe the arc *h h*. Connect *h* A. On the line B *h* A take the distance *h* A equal to *h* A of the triangle. Connect A *b*. Complete the parallelogram A *d c b*. Draw the lines D B and *d b*. On the line *d b* make the distance *b f* equal to B F. Through *f* draw a short line at right angles to *d b*; then through *f* draw the short curved line A *c*, which will be the elevated center line required.

A *b* and *b c* are the elevated tangents. The angle at *h* is a representation of the solid angle at the elevated tangent *b c*. To prove the figure, draw upon a piece of cardboard as explained in previous papers, and

fold upon the heavy lines A B, B C, A D, D C and *h c*. If, in folding up the figure, the triangle B *b* A is left out and is afterward folded up against the end A *h*, it will he seen that the bevel angle at *h* represents the solid angle formed at the elevated tangent *b c*.

To draw the face pattern for a wreath-piece corresponding with this elevated center line proceed as indicated in Fig. 3. Draw the line *c b b* H equal to *c b b* H, Fig. 1. At right angles with *c h* draw *h* A equal to *h* A of the first figure. Connect A *b*. Bisect the angle *c b* A by the line *b f*. Take the distance *b f* equal to B F of Fig. 1, and from *f* as center, with a radius a little greater than half the width of the rail, draw two short arcs, measuring the width of the pattern at that point. At A and *c* make the pattern about one-quarter wider than the rail, and with the short parallel lines shown in the engraving to serve as guides at the end, draw the inside and outside lines of the pattern, touching the short arcs above mentioned. The angle at *h* is the bevel for both ends of the wreath-piece.



Wreath-pieces which have a Continuous Rake over Plans which are Quarter Ellipses.—Fig. 4.—General Method of Obtaining Tangent Lines, &c.

Fig. 2 is an abbreviated method for accomplishing the same results as shown in Fig. 1. Let A C be a ground center line

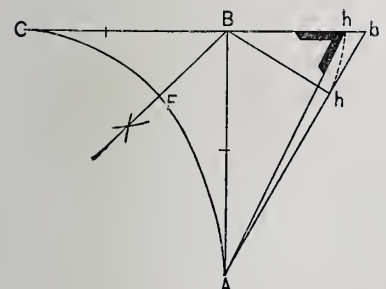


Fig. 5.—Abbreviated Method of Accomplishing the Same Results.

over which it is required to form a wreath-piece having its tangents over A B and B C on the same rake. Draw the triangle A *b* B, showing the rake of the tangent over A B. Draw B *h* perpendicular to A *b*. From B as center, draw the arc *h h*. Connect *h* A. Bisect the angle C B A hy the line B F. The use of this diagram, referring now to the pattern of the wreath-piece, is as follows: In Fig. 3 draw the line *c b h*, making *c h* equal to A *b*, and *b h* equal to *b h* on the line *b* A of Fig. 2. At right angles with *c h*, draw *h* A equal to *h* A. Draw *b* A. Bisect the angle at *b* by the line *b f*. Make *b f* equal to B F of Fig. 2, and then, from *f* as center, draw two short arcs, thus measuring the width of the pattern at that point, which, as hefore remarked, should he a little wider than the rail. At A and *c* make the pattern about one-quarter wider than the rail, and then, from points thus obtained, by means of the short lines at the end of the pattern, draw the inside and outside curves as shown in the engraving.

WREATH-PIECES WHICH HAVE A CONTINUOUS RAKE OVER GROUND PLANS WHICH ARE QUARTER ELLIPSES.

The method of proceeding in the case outlined by this title is so nearly identical with that just described in detail that it is not necessary to occupy space with a demonstration. The reader will have no difficulty in understanding Figs. 4, 5 and 6 of the accompanying illustrations hy reference to what has preceded. We may remark in passing, however, that the lines B F, in the figures referred to, bisect the angles C B A. The lines *b f* bisect the angles *c b* A. In Fig. 4, the line O o is used to transfer the point o to the elevation.

Ebonizing.—The following recipe for ebonizing is highly recommended hy some of the English mechanics who have put it to a practical test. To imitate black ebony, first wet the work over with a solution of log-wood and copperas, hoiled together and laid on hot. For this purpose 2 ounces of log-wood chips, with 1½ ounces of copperas, to a quart of water, are required. When the work has become dry, wet the surface again with a mixture of vinegar and steel filings. This mixture may be made by dissolving 2 ounces of steel filings in ½ pint of vinegar. When the work has become dry again, sandpaper down until quite smooth. Then oil and fill in with powdered drop-black mixed in the filler. Afterward proceed to body-up, using a little drop-black in the polish. Work to be ebonized should have a good level hody of polish. Should the work become rough or uneven, a little powdered pumice-stone, tied up in a bit of cloth, may be used, touching the work lightly. After bodying-up, allow it to sink for 12 hours, after which hody-up again with white polish.

Why Stone Walls are Damp.—The walls of a stone house, and sometimes of a hrick house, are covered with dampness. This is due to the very same cause by which dew is deposited on grasses, or moisture on the side of a glass or pitcher that is filled with ice water and is brought into a warm room. The walls become cold, and as stone is a non-conductor of heat, they remain cold for a long time. When the weather changes suddenly from cold to warm, the air becomes filled with moisture, for the warmer the air is the more moisture it will ahsorh. When this warm air strikes the cold wall, the moisture is deposited on it from the air, which is suddenly cooled by contact with them, and as the warm air is continually coming in contact with the walls, the dampness accumulates until it appears like a dew upon them and pours down in streams at times. It is easily prevented. No plaster should he put directly upon brick or stone, but furring strips should be nailed to the wall and the laths he put on these. Cellars are frequently made very damp in the same way by too much ventilation in warm weather.

Architecture of Seaside Cottages.—No one, in designing a seaside cottage in these days, would think of adopting the old "four square" arrangement of rooms that was thought to be the perfection of house-huilding by our grandfathers. Nothing that is not odd or quaint, or at least irregular, is now tolerated, and he who hrings together the most conceits, the greatest number of angles, overhanging stories, pretty oriels, bays and picturesque dormers, commands the most respect. To be out of the fashion of the day is to be out of the world, in architecture as in other things, and to build a cottage in the classic style when everybody

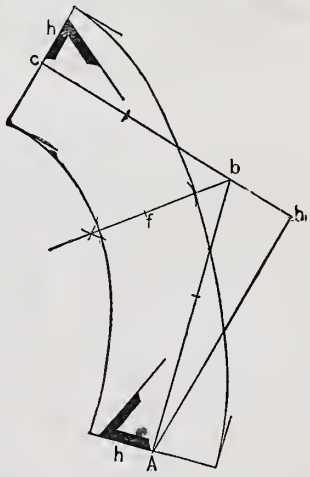


Fig. 6.—Laying Out the Pattern.

is yielding to the Queen Anne craze is a step that but few persons are willing to take. In the cottage architecture to he seen at Newport and other well-known resorts, there is the greatest freedom, for it embraces almost every variety—the Italian villa, the chateau, French pavilion, gothic, free classic, chalet, mansard, Jacobean and colonial are all to be seen, more or less fully carried out, with many other styles, or rather want of style, that defy classification. But, withal, there is a great deal that is picturesque, and a quiet, low-toned development, hightened hy judicious and tasteful colors, works a change that from year to year is becoming more and more decided.

The new house, bought hy General Grant a short time since, is located in East Sixty-sixth street, this city, and is one of a lot of seven houses huilt by Cornelius W. Luyster, ahout a year ago. It has a frontage of 34 feet, heing larger than any of the others. It is finished in hard woods. The mantels are quite expensive in character, and the mirrors are very large and costly. The basement is laid in marble tiling.

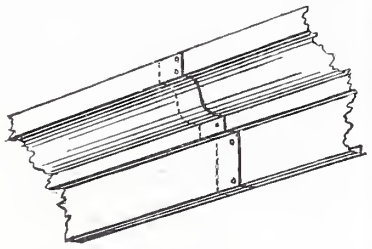
Builders' Sheet Metal Work.

BY A. O. KITTREDGE.

JOINTS IN CORNICE WORK.

At first thought it may appear that the builder has very little concern in the matter of joints in sheet metal work. Such things belong entirely to the cornice maker, and the builder ought not to be bothered with them. This is all true in theory, but unfortunately the metal worker in many cases is either ignorant or careless, and hence, unless the builder looks to it carefully, he may get work which is very inferior, for no other reason than that the joints are not made in the best manner. Such considerations justify the builder in learning what are and what are not good joints in cornice work. His ability to specify just what he wants when buying work, and to judge of what he is getting when work is being put upon a building in his charge, will often procure better services from metal workers than he could obtain if circumstances were different.

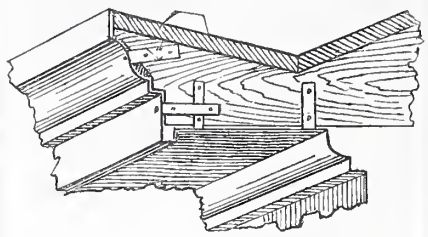
One of the most common joints in cornice work is that between two lengths of straight molding. The parts are lapped from an inch to 2 inches, as indicated in Fig. 1 of the engravings, and are then soldered. Sometimes the soldering is done in a thorough manner, but frequently it is only partially done. Tinners employ two terms with reference to soldered joints of this kind. Where very light soldering is done the joint is said to be tacked; where it is heavily soldered the joint is said to be soaked. Solder, at best, upon galvanized ironwork is treacherous. Very little strength can be obtained from soldered joints, however made. Tacking, in many cases, is almost as serviceable as soaking the joints. The only reliable way of finishing a joint of this kind is by means of rivets. If rivets are to be employed, then soaking is hardly necessary. Tacking, simply to get the parts straight and to hold them in position while the rivets are inserted, is all that is necessary. No joints of this kind, in cornice work, should be made without rivets, and builders, by insisting upon riveted joints, will save themselves the annoyance of broken seams and loosely hanging parts, often seen in cornice work a short time after the completion of a building.



Joints in Cornice Work.—Fig. 1.—A Lap Joint Between Simple Moldings.

A feature of construction intimately associated with joints, although it would scarcely be proper to classify it under that head, is the manner of attaching the moldings to the lookouts or supports which sustain the cornice. The usual plan for doing this part of the work is to nail through the face of the moldings into the lookouts. Sometimes the same nail is made to serve the purpose of rivets in fastening the lengths of molding together, as well as attaching them to the lookouts. While this construction may be made to answer, and has undoubtedly served quite satisfactorily in many cases, it is not the best way. It is better to have recourse to rivets, and to fasten the moldings in place as indicated in Fig. 2. This illustration shows how short straps of galvanized iron may be riveted at proper places to the faces of the moldings, and then, being drawn tight, so as to press the molding firmly against their supports, fastened by nailing into the sides of the lookouts. This plan, while attended with some additional labor, and doubtless some bother to the metal worker, produces better work than the usual method employed, to which allusion has already been made. The fact of the strain being against nails driven into the side of the lookouts, instead of having a tendency to pull them from the end of the lookouts, adds greatly to the strength and stability of the work.

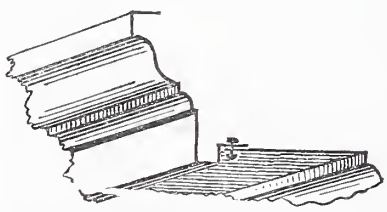
Besides the joints to be made between lengths of moldings, there are joints between the various sections composing the cornice which also require attention. There is both a right and a wrong way of constructing work in particulars of this kind. One of the most important joints of this character is that between the crown molding and the planceer. Any builder who has had experience in cornice work will agree to the proposition that, if the crown molding of a cornice is put up straight in all particulars, the appearance of the cornice will be satisfactory to the casual observer, even though



Joints in Cornice Work.—Fig. 2.—Joint Between Crown Molding and Planceer, and Manner of Attaching to the Lookouts.

other parts are not as accurate in their position as they might be; hence it is very desirable in sheet-metal work to have some opportunity for adjustment in the crown molding, which is usually put in place the last of all. Another feature about a crown molding to which attention may be called in this connection, is that of the drip at the bottom, by which the water running over from the gutter shall be thrown clear from the lower parts of the cornice. The adjustability just referred to and the drip last mentioned may be both accomplisbed in the joint which is made between this member and the planceer. One of the most common methods of making the joint is clearly shown in Fig. 2. In forming the planceer an edge is bent downward. The crown molding is carried around so as to form a drip, its terminating member being bent upward. In putting the crown molding in place the drip member is hooked against the planceer, as shown in Fig. 2. It will readily be seen that there is the opportunity of adjustment here so necessary in straightening the upper member of the cornice.

In fire-proof construction, by which, in contradistinction to ordinary work, is meant



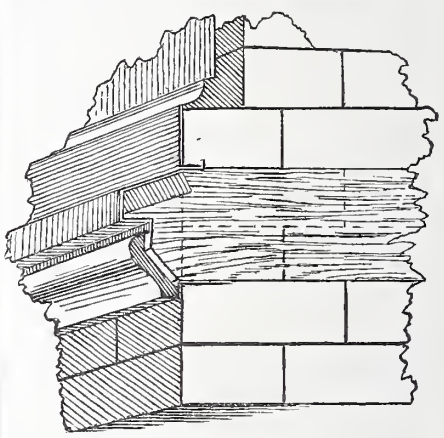
Joints in Cornice Work.—Fig. 3.—Method of Making a Riveted Joint Between Crown Molding and Planceer.

that in which no woodwork is used, the same results are accomplished in a little different manner. An additional flange is added to the crown molding, and the planceer is slipped below it and against the drip member, the two being united by rivets, as shown in Fig. 3. I shall have more to say about this, however, in another paper, wherein iron lookouts will be specially considered.

Other longitudinal joints to be made in cornice work occur between the foot molding and the frieze or panel course, between the panel course and the bed molding or modillion course, according to the construction employed and the design used. All of these are somewhat similar in character and need not be illustrated in detail. Referring to Fig. 4, the joint between the foot molding and the frieze above it is presented as an illustration of the manner of making all the joints of this general character. The foot molding is carried back within the wall from 1 to 2 inches, according to circumstances, and a small edge, say ⅜ or ½-inch in width, is turned upward. The bottom of the frieze is bent inward, the flange being sufficiently wide to extend back against the narrow edge of the foot molding just mentioned. This narrow edge serves as a gauge in setting the work. After the parts are in place, the two flanges laying together are united by riveting, and the little edge turned up is bent over, forming a water-tight joint. This description refers to the best construction. There are modifications of it which are less desirable for use, but which many mechanics are in the habit of employing.

Referring to the matter of a gauge in the joint for the purpose of setting a cornice readily and of making it straight, a feature of this kind may be readily incorporated in the flange of the foot molding which runs into the wall at the bottom. By bending what may be called a drip member, as shown in the lower part of Fig. 4, a ready means of setting the foot molding is obtained. Joints of the kind just described, and also the gauge in connection with the foot molding, are in very general use with some of the best cornice makers in the country; accordingly, what I am presenting in this connection is not new nor are the ideas untried.

Before closing this part of the subject, brief reference to the method of putting up a cornice is appropriate. I would always advise building a cornice in as the walls proceed, as opposed to the idea of fastening it from the outside after the walls are finished. It will be noticed that all the joints here described are of a character requiring to be



Joints in Cornice Work.—Fig. 4.—Construction of Foot Molding.

made from within, rather than from without. The foot molding should be set first. When it is in position the frieze course should be put in place and joined to it, after which the brickwork may be carried up to the level required for setting the next member. So proceed until the lookouts for sustaining the overhanging part of the cornice are reached; then the planceer may be attached in the general way indicated in Fig. 2, after which the crown molding is hooked on and secured.

A Large Pavement Stone.—What is claimed to be the largest pavement stone every quarried in the United States has recently been brought to this city, and is to be laid in front of the main entrance of William H. Vanderbilt's new house in Fifth avenue, between Fifty-first and Fifty-second streets. The block is 25 feet 2 inches long, 15 feet wide and 8 inches thick. Its weight is something over 44,000 pounds. The block could have been made 35 feet in length, but the great weight would have made its transportation very risky. As it was, a great deal of difficulty was met in bringing it to this city. It was first rolled down a hill a distance of half a mile to the river bank, and then placed edgewise in a canal boat especially arranged to receive it. The canal boat brought it to this city. The stone was taken out by a floating derrick and placed upon two trucks built for the occasion, and capable of carrying 35 or 40 tons. Six teams of horses hauled it to its present resting place.

A man is a perfect brick when he shows himself all the better for being hard pressed.

CORRESPONDENCE.

We acknowledge many favors from our correspondents during the month just passed, in the way of items for our department of "Stray Chips." The summer is now past and fall is at hand. There are, accordingly, less projected buildings throughout the country than there were a few months ago. A great deal of work remains to be finished, however, and in many instances there will be a close race between the builders and old father Time, in the endeavor to get buildings inclosed before had weather commences. Mechanics are still quite busy in most sections of the country, but the time is at hand when it will be possible for builders to take retrospective views of their season's business. Whenever this period of comparative leisure is reached, we hope they will not forget items for *Carpentry and Building*. We particularly desire to make our "Stray Chips" very complete in our issues of October and November. If, say, 500 readers, in 500 different towns, will each take the small trouble of writing us about the more notable buildings upon which he has been engaged during the season, or about those of which he has some knowledge, even if not of his own work, we shall have abundant material for our purpose. Accordingly, we request the favor. We mean you, reader, for one. Will you not write us at once?

"Wawayanda's" letter of questions published in our last issue has called out a number of replies, but not as many as we yet hope to receive. We find it impossible to present any of the answers received to our readers in this issue, partly because our columns are otherwise crowded, but more particularly because we have not had sufficient time to get the necessary engravings prepared. Meanwhile our correspondent has had the benefit of the suggestions so far received in advance of their publication. We hope still others among our readers will answer to the points raised.

Figuring Speed of Pulleys, &c.

From C., *Lowell, Mass.*—Please say to A., of Bridgeport, Conn., that the best method with which I am familiar for figuring speed, where three terms are given to find the fourth, is proportion. For example, a shaft is running 100 revolutions per minute on which is a pulley 12 inches in diameter. A machine on the floor is required to run 50 revolutions per minute. What is the diameter of the pulley necessary to employ on the machine—$50 : 100 :: 12 : x$? Multiplying the means together—$100 \times 12 = 1200$, which, divided by 50, gives 24 as the answer—or, in other words, the diameter of the pulley on the machine must be 24 inches. Speed, under all circumstances, may be figured by this rule. Of course, if the conditions are different, the rule must be varied to meet them. It must be reversed if the conditions are reversed from the example presented.

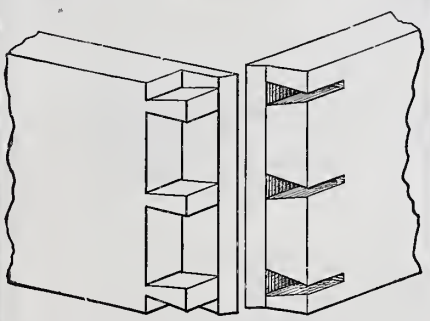
Contents of a Tapering Log.

From C. J., *Brooklyn, N. Y.*—E. L. M., of Cooksport, is right in his answer to the problem of finding the contents of a tapering log. The size at the large end is 12 by 12, and at the small end, 6 by 6; the length is 30 feet. The method of performing the operation is as follows: The area of the large end, 12 by 12, is 144; the area of the small end, 6 by 6, is 36. These products, added together, give 180 as the total sum. One-half of this is 90, which may be considered as representing the end of a log 9 by 10 inches and 30 feet long. This is equal to nine boards 10 inches wide and 30 feet long. A board of these dimensions will represent 25 feet, board measure. Nine of them would represent 9 by 25, equal to 225 feet, the contents of the log.

From J. D. H., *Bel Green, Ala.*—By a recent number of the paper I find that my rule for calculating the contents of a tapering timber has been rejected. This at first surprised me very much. However, after a closer examination of the problem I have decided that it is proper to "shell down the corn." Notwithstanding this, the rule I presented is the one generally employed in this vicinity. On asking a lumberman today how he calculated the contents of a tapering log, he answered by giving the rule which I forwarded. I am under the impression that E. L. M., of Cooksport, Pa., has presented the only correct solution. He gives what is known as Caldwell's, which is indorsed by men of high repute and learning. Caldwell says to find the contents of a tapering board, add the two ends together, and by one-half the sum multiply the length. If the dimensions are in inches, divide the product by 144. If the dimensions are in feet, divide by 12. If the material be scantling, add together the areas of the two ends and multiply the length by one-half of this sum. If the dimensions are in inches, divide the product by 144; if in feet, divide by 12

Blind Dovetail.

From E. H. C. *East Rochester, N. H.*—In the July number a correspondent requests some one to explain what is called a blind dovetail. I will attempt to comply with

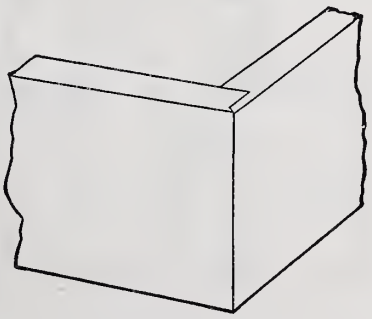


Blind Dovetails.—Fig. 1.—Manner of Preparing the Pieces.

his request by inclosing a sketch of what I understand to be meant by the term. Fig. 1 of my drawings shows the joint complete and Fig. 2 its construction. The pieces must be cut to the exterior dimensions of the work and then rebated out square at each end. After the pins and dovetails have been formed, square rebates are to be cut into the miter joint, a rebated plane being used for the purpose. When properly finished, neither the pins nor the mode of their concealment can be seen and the work has the appearance of a plain miter joint.

From J. C. H., Johnstown, Pa., we have an explanation of a blind dovetail, accompanied by sketches which are in substance the same as the above.

From H. E. D., *Pullman, Ill.*—In answer to the question about blind dovetails, which appeared in a recent number of the paper, I would state that what I call a blind dovetail



Blind Dovetails.—Fig. 2.—Appearance of the Corner after Finishing.

is one made about two-thirds of the thickness of the board, the remaining one-third being cut so as to form a miter.

Horse Shoe Saw Sets.

From R. S. H., *Harlan, Kan.*—Will you please inform me where I can buy one of the old-fashioned horse-shoe saw sets?

Answer.—Upon receipt of this inquiry we submitted the question to a number of hardware dealers in this city, all of whom report that the article in question is entirely out of the market. Accordingly we are unable to afford our correspondent the desired information. If any of our readers can answer the question more satisfactorily, we shall be pleased to hear from them.

The Cabinet Design in the May Number.

From H. & H., *Albany, N. Y.*—We have made up the cabinet which formed the first-page illustration in the May number, and it is pronounced "just splendid" by all who have seen it.

Calculating the Length of Rafters.

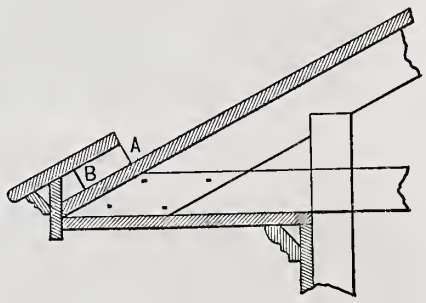
From D. M. W., *Caledonia Station, Mich.*—I desire to call the attention of the readers of *Carpentry and Building* to the following rule for ascertaining the length of rafters in roofs of one-third pitch where there is no purlin: Multiply the width of the building by 6, and point off one figure to the right for inches; *e. g.*, suppose the width to be 18 feet—18 x 6 equals 108, or, by the rule, 10 feet 8 inches is the length of the rafter required. This rule will work on any width of building.

Nicks in the Heels of Saws.

From RICHARDSON'S SAW WORKS, *Newark, N. J.*—Answering the inquiry of a correspondent in a recent number of *Carpentry and Building*, we would say that the nicks to be found on the heel of a saw are the filers' marks for designating the kind of saw.

Construction of Cornice Gutter.

From W. E. B., *Ames, Iowa.*—I have a way of putting a gutter upon a hip roof building which I think is the best of the kind that I have ever seen. The inclosed sketch



Construction of Cornice Gutter Recommended By W. E. B.

will, I think, fully explain the same to your readers. A represents the highest point in the gutter and B the lowest.

Hip Rafter for a Curved Roof.

Referring to our comments (page 92 of the volume for last year) upon a plan submitted by T. A. B., of Philadelphia, for obtaining the shape of a hip rafter for a curved mansard roof, two correspondents, viz., J. E. L., of Lowell, Mass., and L. W. T., of Upper Alton, Ill., have written, taking exceptions to what was there stated. Our words were as follows: "T. A. B. uses the line in the plan representing the side of the rafter as a base line, from which to measure in obtaining points through which to draw curve of hip rafter. This is manifestly incorrect," &c. Both of the correspondents in question have assumed that what we meant in the above was that there is a difference in the results obtained between measuring from the seat of the hip or the vertical line at its back, in laying out the curve of the hip rafter. The diagram submitted by T. A. B., and which, on account of our comments, has proven an innocent stumbling block to these two correspondents, was very different in its arrangement from what they have supposed it to be, and our remarks, as applied to it, were strictly correct, although we now see that a misunderstanding was possible when considering them away from the sketch upon

which they were based. We allude to this matter at the present time in order to correct misapprehensions which may exist in the minds of others of our readers who have given attention to the same problem.

A $650 Cottage.

From C. O. B., *Little Rock, Ark.*—I shall be pleased to see in *Carpentry and Building* plans and specifications of a house for a poor man, the cost, say, not to exceed $650 It should consist of four or five rooms and a hall.

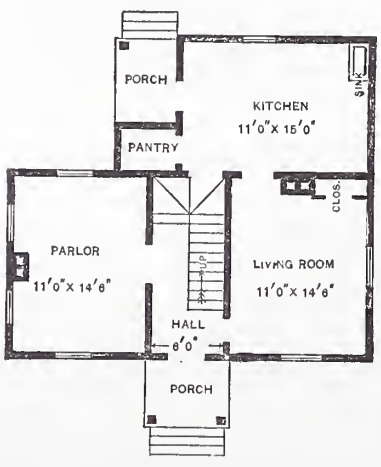
Note.—We referred the above letter to Messrs. Smith & Howe, architects, No. 7 Warren street, this city, for such reply as in their judgment seemed appropriate. We now take pleasure in presenting this correspondent, and others of our readers who are interested in similar buildings, with a set of plans and elevations of a very neat five-room cottage, which, as it appears from figures named below, can be built for the sum stipulated by our correspondent. The following communication from the architects is descriptive of the building :

A $650 Cottage.—Fig. 1.—Front Elevation.—Scale, ⅛ Inch to the Foot.

NEW YORK, Aug. 12, 1881.

To the Editor of Carpentry and Building :

The accompanying design, which attempts to be a practical answer to the problem presented by your correspondent C. O. B., of Little Rock, Ark., embodies several features to which we would call attention briefly. The central hall in the lower story affords convenient communication with each of the three rooms upon that floor, thus rendering it unnecessary to pass through one room to get into another. The stairs leading from this hall to the second story are also convenient for use either from the living room or from the kitchen. The cellar stairs are placed under the chamber stairs, and are so located as to be very accessible from the kitchen. The pantry, which is cut off from the rear stoop, opens into the kitchen near to the cellar door, a feature which, we believe, is generally considered desirable by housekeepers. The living room is provided with a large closet occupying the space between the chimney and the corner of the room, while each of the chambers are provided with two closets. The hights of the stories may be estimated by the elevations, but to build the house in the cheapest manner the lower story should not exceed 9 feet. The cellar is placed under the living room only, the other parts of the house being supported upon piers which are filled in between with lattice-work. An idea of the specification we would furnish with full working drawings for such a house may be gained from the following items : Posts, 4 x 6 inches, 14 feet high; studs, 2 x 4 inches, 16 inches between centers; floor beams, 2 x 10 inches, 20 inches between centers; rafters, 2 x 6 inches, 2 feet between centers; sills, 4 x 6 inches; plate, 4 x 4 inches. The frame to be covered with felt before the siding is put on. Felt should be laid over the floor beams before the flooring is put down. We would recommend novelty pattern siding and spruce flooring where the same is cheaper than other suitable material. Sash to be 1¼ inches thick and hung with weights. The inside doors to be 1¼ inches thick, and the front door 1½ inches thick. The plastering should consist of one coat of brown mortar and hard finish. The inside trimmings to be 4½ inches wide, with 2-inch back moldings. It is to be remarked, with reference to this specification, that we have aimed to obtain the cheapest in all respects consistant with the necessary strength and durability required in such a building. Constructed as here indicated, in the vicinity of New York, such a building can be erected within the limit named by your correspondent.



A $650 Cottage.—Fig. 2.—Ground Plan.—Scale, 1-16 Inch to the Foot.

Referring to an article entitled "Homes for Employees," which appeared in *Carpentry and Building* some months since, we desire to say, in this connection, that managers of corporations and building associations seldom understand how much of real comfort and convenience can be obtained in cheap houses. There is nothing in the design submitted herewith that approaches the elegant, and yet within the limitations of cost it is convenient and comfortable, and, we venture to say, better adapted to the needs of mechanics and people of small means generally, than the ordinary kind of houses built for the price named.

Yours, truly, SMITH & HOWE.

In addition to the estimate made by Messrs. Smith & Howe, the plans here presented were submitted for figures to prominent practical builders in some of the smaller towns located within 100 miles of New York, in order that we might obtain the lowest figures at which such houses could be erected at the present time. From a number of these estimates, it is evident that the limitation of our correspondent has not been exceeded in the design submitted by the architects. Built in a cheap yet substantial manner, this house may be regarded as worth $650, and in some sections of the country it can be built for less, while in a very few of them will the cost exceed that sum.

Discount.

From W. A. H., *Jenkentown, Pa.*—I do not understand the subject of discount as employed in price lists. To make myself understood, I will refer to an item in the price current published in the June number of *Carpentry and Building.* Glass, for example, is quoted at certain prices per box, subject to a discount of 70 per cent. for single and 70 and 10 per cent. for double. By this is it meant that for each dollar's worth of glass by the price list, purchasers can get it on paying only 30 cents? Will you please explain this matter to me in an early number of the paper?

Answer.—Our correspondent, we believe, has the right idea, but for fear we misunderstand his statement, we will attempt to answer his question somewhat in detail. Referring to the price list in question, single thickness American glass of a certain size is priced at $13 per box. At 70 per cent. discount, the price would be $13, less 70 per cent. of $13—or, as our correspondent has it, 30 per cent. of $13—being $3.90, net, per box. In the case of two discounts being quoted, they are to be calculated separately. For example, referring to the double thickness American glass of the same price list, a certain size is quoted at $21 per box. The discount in this case is 70 and 10 per cent. First subtract 70 per cent. from the $21, which would leave $6.30, and from this sum take the second discount (10 per cent.), leaving $5.67, the net price per box. The same calculation can be performed a little differently. At 70 per cent. discount, each dollar of the price list represents 30 cents, net; therefore, multiply the price per box by 30 per cent., instead of subtracting 70 per cent. of the amount, as in the first instance; then, instead of subtracting 10 per cent., multiply this sum by 90 per cent., which will result, as before, in $5.67. Some statements of discount to the uninitiated appear quite perplexing. For example, a certain article in the hardware trade some years ago was sold at 50, 40 and 10 per cent. and 5 per cent. off for cash. Since the aggregate of the percentages here named exceeds 100, the first impression upon the mind is one of bewilderment. It appears that the goods are given away and a premium paid for taking them. However, by making the calculation it will be seen that something still remains for the seller. Supposing a bill in question to amount to $100, gross, discounting 50 per cent. leaves $50; discounting this sum, in turn, by 40 per cent., leaves $30; subtracting from this 10 per cent., leaves $27; and then, in turn, taking off the final percentage (5) for cash, it leaves, as the net amount of the bill, $25.65. From these last examples the rule is derived that, in the case of repeated discounts, each one is to be calculated separately, and in no case are the several percentages to be added together and considered as one. Another point to which we may call attention in this connection is that, in the case of several discounts, it makes no difference in what

order they are calculated. Referring now to the box of glass which was discounted at 70 and 10 per cent., if, instead of taking off the 70 per cent. first, we had taken off the 10 per cent. and then deducted the 70 per cent., the result would still be the same. In like manner, in the case of four discounts above cited, if, instead of subtracting the discounts in the order named, we reverse the order or transpose them, the same result will be obtained. For example, supposing the bill, as in the former case, to be $100, subtracting 5 per cent. leaves $95; from this subtract 40 per cent., and the amount becomes $57; deducting from this 50 per cent., we have $28.50; and finally, taking off the 10 per cent. gives us $25.65, the same result as obtained in the first instance. The term "gross" is applied to the amount of the bill as made out from the price list. The term "net" is applied to the amount of the bill after the discount has been subtracted.

A $650 Cottage.—Fig. 3.—Side Elevation —Scale, ⅛ Inch to the Foot.

Taking up the Slack in Wire Cloth.

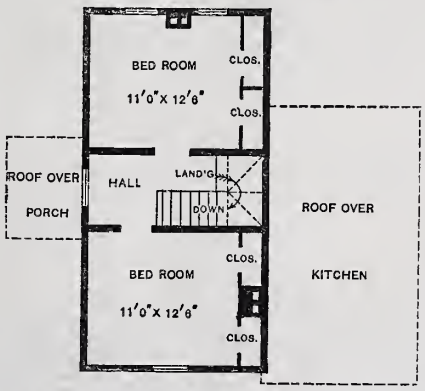
From R. N. P., *La Crosse, Wis.*—If W. A. C. will camber the stiles and rails of his wire screens half an inch in the length of an ordinary window, and put the frames together with the hollow edges in clamping them until straight, and nail on the wire while the frames are clamped, he will not experience the necessity of taking up any slack in the wire cloth. I made some screens for my own house some 12 years since, and they are good to this day. No slack has ever manifested itself. I do not expect to live long enough to see them attain that condition.

Finishing Cherry.—Hard Oil Finish.

From R. P., *Chicago, Ill.*—I have seen the article on finishing woodwork in your July number, but I do not agree with you that the hard oil finish of Messrs. Berry Brothers will resist water. I have used it, and find it will spot with either hot or cold water. I would like to know what would be the best and most durable way to finish the inside of a house in cherry wood, and, if necessary, to fill the same. If you should suggest a varnish, please let me know what varnish would be best, and the process of applying each coat until finished.

Answer.—Messrs. Berry Brothers do not say that hard oil finish is water-proof, nor do they recommend it for work to be used where water will be constantly falling upon it. Using it ourselves on pieces of wood, the finish of our kitchen sink, and upon a paper box which we used as a water cup, in all of which positions it was constantly exposed to water, and finding no signs of spotting, we came to the conclusion that in general it was pretty nearly a water-proof varnish. We wish to ask a question in regard to the hard oil finish used by our friend. Was it put on just as it came from the can, or did he "thin" it with turpentine? There is no end to the deviltries of varnishes of all kinds when one begins to tamper with them. Hard oil finish should be used without mixing. Turpentine will certainly injure, if not spoil it.

In regard to the finish of the cherry wood we can offer a few suggestions. The first thing that is to be done is to fill the wood in the manner we have described. If a regular varnish is to be applied, we do not dare to recommend our correspondent to undertake its application himself. The results will be anything but satisfactory, since it is necessary, in order to do varnishing well, to have a long apprenticeship at it.



A $650 Cottage.—Fig. 4.—Second Floor Plan.—Scale, 1-16 Inch to the Foot.

Wax finish, though needing frequent renewal, is easily put on and will give fair satisfaction. So far as our knowledge goes, we should prefer the hard oil finish to anything that has been suggested.

Home-Made Elevators and Hoists.

From H. E. D., *Pullman, Ill.*—I noticed in a recent number of *Carpentry and Building* that a correspondent inquires for hoisting apparatus. I think it will be greatly to his interest to read the advertisements of elevators, &c., which appear regularly in that paper. It seems to me hardly necessary to describe a home-made construction for his purpose, it being so easy to obtain something ready made. It seems more desirable that space in the paper should be filled with other material.

The Art of Saw Filing.—III.

From A. A. F., *Byesville, Ohio.*—Having properly placed the saw in the clamps and jointed it, as described in my last letter, all is now ready for filing. I always begin at the point end of the saw. A great secret of success is to have the teeth all of an even length and size when done. Suppose the saw was in very bad shape before jointing, some of the teeth would have been reduced by that operation nearly one-half their length, while others very near them will have been barely touched by the jointer. Every tooth will show a glazed or bright glossy spot on the top or point. This spot must be distinctly seen and closely watched as the filing progresses, for as soon as it is lost sight of the filing becomes guesswork and altogether an uncertainty. The light often reaches the saw from such a direction that the eye has to be placed over and at one end of the saw, in order to see the bright points spoken of. Suppose the first dozen teeth are equal in size on both sides. Begin by holding the file at an angle of about 45 degrees with the side of the saw. Drop the handle to an angle of about 20 or 30 degrees below the level. Hold the file firmly, but not in a cramped manner. File between every other pair of teeth, letting the file cut about equally the back of the one and the front of the other, until about one-third of the glazed point upon the teeth disappears. When this is accomplished with one pair, move to the next, and so on. When a tooth is encountered that shows a larger glazed point than the one next opposite, let the file do all or nearly all of its cutting against it. It makes no difference which side of the file the tooth may be, but do not try to file any tooth up to a finished point the first time across it. After going over the saw in this manner, turn it and clamp it, end for end, in the vise; begin again at the point and go over the second side in like manner, but do not yet try to finish any teeth. Reverse the saw again, and again go over the first side. This time, the row of teeth that is set from the operator are the ones to be particularly watched. File them until the bright point disappears, but not a single stroke more. Bear the file slightly toward the one tooth that is being particularly watched, so as to do most of the cutting upon it. After going over the saw in this manner for three or four times, again turn it in the vise and go over the second side in the same manner. Watch closely for the glazed points. Some teeth will want just a little brushing from the file, some may not want touching at all, while others will probably require several strokes to bring them to a sharp point. None of them should be filed in the least after the glazed spot has disappeared. This is the operator's only guide in keeping the teeth of an even length. When a saw is in very bad shape I have often jointed it right over again, after filing as above described, and then repeated the operation. It is difficult to get the teeth all of an equal length and size at one filing, particularly if they are quite uneven. After taking the saw from the clamp it is well to lay it flat on the bench and run an oil stone over each side, to take off the feather edge from the teeth. I never use a file for this purpose, for I think it is liable to cut off too much.

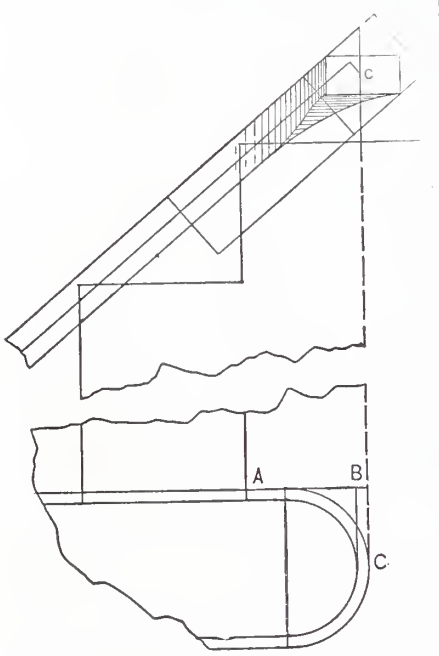
The cause of saw teeth becoming shorter on one side than on the other, is that they are filed up to a point the first time going over them; then, when the saw is turned, the file is allowed to bear on both its sides. The result is, it cuts off the front side of the tooth that was brought up to a point from the back and thereby makes it too short. If this tooth had not been brought up to a point the first time, it would not be injured in going over it in this manner.

In conclusion, I will say that to keep a saw in the best order, it must be filed little and often. Always keep the saw keen

and sharp. A little brushing up once a day that will not take over five minutes, is much better than filing it once in three days or once a week, consuming half an hour at the operation. A saw should cut, not tear its way through the wood.

Placing the Landing Riser.

From F. S. W., *Cleveland, Ohio.*—In the May number I gave some advice as to placing the landing riser in a straight flight of stairs having a cylinder at the top. One of your correspondents thinks I did not explain the method sufficiently. Perhaps I did not for all classes of readers, although I thought it would answer the purpose of the correspondent who proposed the question. My words were as follows: "The riser should be placed so as to correspond with the usual method of getting out the rail piece which is above." With this I send you a sketch showing the usual method of getting out the rail piece. It will be noticed that the subject is treated from a mechanical standpoint, rather than from an artistic one. The plan shows the inside line of the cylinder, the center line of the rail passing round it

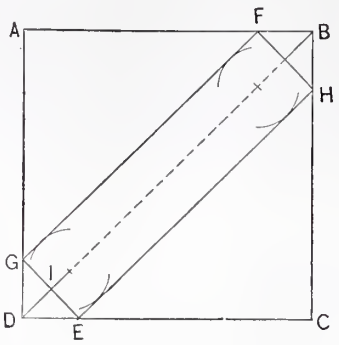


Placing the Landing Riser.—Accompanying the letter from F. S. W.

and the position of a couple of risers. With plans of this kind the easement is made in the twist piece which passes over the first half of the cylinder; in other words, from A. to C. Some straight wood, of course, is added at the bottom for convenience of holding the crook in the vise. The elevation shows how a rail is taken out of the solid block. It is cut square through the plank from a pattern, by the method shown in the May number of *Carpentry and Building.* It will be seen that the rake and level tangents do not meet each other in the block if the rail is cut out this way, the bottom end of the crook being taken from the top of the plank, while the top end is taken from the center of the plank. This is a modification of the standard method, which, besides being more convenient for use, also gives easier curve to the rail. In laying out work of this kind the elevation is made first, the center line of the rail being drawn through the short baluster. The hight of the rail at C is made half a riser higher than the short baluster, thus providing for long balusters on the landing. The location of risers in the plan is taken from the elevation, making the distance A B the same, no matter what sized cylinder is employed.

The Carpet Problem.

From T. W., *Pulaski, Tenn.*—I do not think I should have attempted the solution of J. E. W.'s carpet problem, which was proposed in the February number, if it had not been that I had seen it stated in the *Scientific American* supplement of Nov. 17, 1877, that in the construction of the Howe truss bridge, the hight and width of a panel being known, no method had yet been found for calculating the dimensions of the angle block. The article stated that several engineers at that time were trying to discover a solution to the problem. A. C.



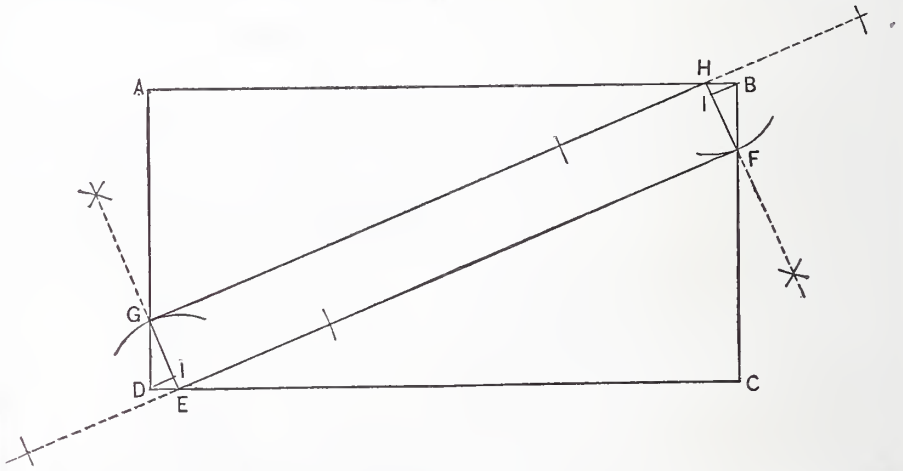
The Carpet Problem.—Fig. 1.—T. W.'s Solution Applied to a Square.

Haverstick, of Mount Pleasant, Penn., presented an algebraic solution of the problem, but another correspondent, A. F. Alexander, of Lexington, Mo., in a subsequent number, proved that Mr. Haverstick was wrong. Inasmuch as I do not understand algebra I could not determine which of them was right or wrong. The carpet problem reminded me of the problem above mentioned, and accordingly I hunted up the papers containing it, hoping to obtain some information from them. I was, however, disappointed in the main, the only advantage gained being slight assistance from the diagrams. The resemblance between the two problems is this—that if the length of carpet is found, the angle block is also found. The solution I propose is as follows:

Consider A B C D of Fig. 1 to be a square room or panel, and that a brace or carpet is placed diagonally across it and cut off square at the ends, as shown. The length in this case is easily calculated. It will be equal to the length D B less two times D I, or, otherwise expressed, it will be equal to the $\sqrt{G A^2 + A F^2}$. To find the length of G A or A F, we see by inspection that D I G or D I E is a right-angled triangle with two sides known, from which it is required to find the other side. By the conditions of the problem, G I and I E are equal to 1 foot 6 inches, being one-half the width of the carpet. D I G is a right-angled triangle and the sides being equal, we have D G equal to the $\sqrt{D I^2 + I G^2}$. Now D A—D G = G A or A F. D E or D G I find by calculation to be 2 feet 1 7 16ths inches, and is a constant number for all square figures providing the carpet or brace is 3 feet wide. Where other widths are used the constant may be ascertained in the same way. Having proceeded thus far, the remaining steps are easy. The dimensions of the room given are 12 x 24 feet; in other words, it is twice as long as it is wide. We have, therefore, to take one-half the distance D G, Fig. 1, and make D E and H B, Fig. 2, equal to it. From the points E and H, with radius equal to the width of the brace or carpet—that is, 3 feet—strike the arcs shown at G and F. Draw lines through G H and E F as shown, which will indicate the edges of the carpet in position. Next construct perpendiculars from E to G and from H to F, which will complete the length and position of the carpet. To find the length G H by calculation, proceed as follows: Consider G D E as a right-angled triangle with G E and D E given. Now D E, as above stated, is equal to one-half of D G. Fig. 1, and is expressed decimally 1.0605. G E is equal to 3 feet. D G then is equal to the $\sqrt{G E^2 - D E^2}$, or 2.8062. Now, D C—D E=E C, and D A—D G = G A or C F. E F is equal to the $\sqrt{E C^2 + C F^2}$, which is equal to 24 feet 8½ inches, the length of the carpet or brace. By similar calculations I found the length of D I and B I to be 1 foot 11 13-16ths inches each, so it will be seen that by finding the length of the carpet I have also found the dimensions of the angle block. This rule will work equally well for any width of carpet or any size of room, provided the room is of the same proportions as here stated. If the room were three times as long as it is wide, then one-third of G B, Fig. 1, would be used instead of one-half, the carpet in both cases being the same width.

From F. M. S., *Hickory, Miss.*—My solution to the carpet problem proposed by J. E. W. is as follows: $24^2 + (6^2 - 3^2) = 603$ log. 2.780317. Divide by index of log. equal 1.390158. The number answering to this log. is 24.556058, which is the length of the strip of carpet 3 feet wide, square at the ends, laid diagonally across a room 24 by 12 feet size, the four corners touching the walls.

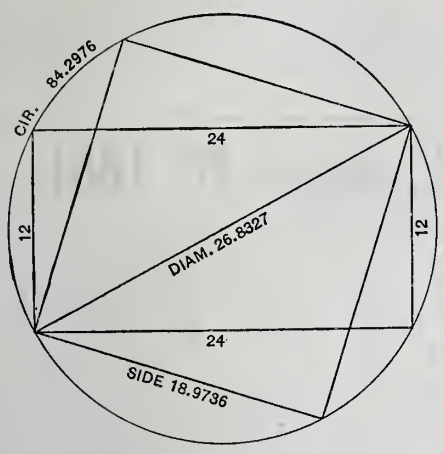
To illustrate principles and mechanical application, suppose from a tree whose circumference is 84.2976 inches (Fig. 3) it is required to obtain the largest square beam that can be taken cut. Divide the circumference by 3.1416, which gives 26.8327, the diameter, which is also the hypothenuse of a right-angled triangle, the sides of which are the sides of the beam; hence the square root of one-half of the square of the hypothenuse equals 18.9736, the sides of the beam. If, on the other hand, it was required to take from the log the widest beam that could be cut, which should be 12 inches in thickness, the diameter would still be the hypothenuse and the arms of the corresponding right-angle triangle the sides of the beam. Hence the square root of the hypothenuse squared, minus the square root of 12, equal 24. The sides of the beam, as indicated in the last calculations, are shown in Fig. 3 of the accompanying sketches. To carry the principles another step (Fig. 4), let it be required to cut the largest square-cornered piece that can be got out of this beam (24 x 12) 3 inches thick; then the hypothenuse already used is the diameter of a tree from which the piece last described can be cut. To get this diameter, we say $12^2 + 3^2 = 153$, the square root of which is 12.3693, which equals the radius



The Carpet Problem.—Fig. 2.—T. W.'s Solution Applied to the Dimensions Given in the Original Proposition.

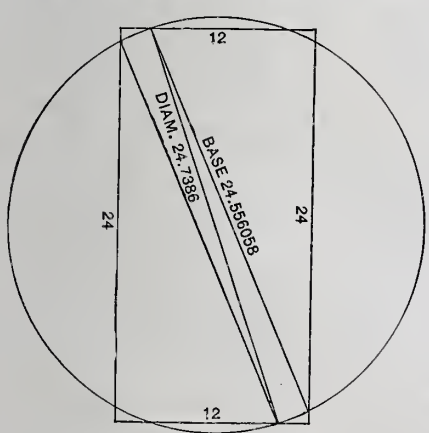
of the circle, or 24.7386 equals the diameter. This, then, is also the hypothenuse of a right-angled triangle, the arms of which are the sides of the required piece. Hence the square root of this hypothenuse squared minus 3^2 equals 24.556058, is the length of the required piece, all as shown in the lines of Fig. 2 of the inclosed sketches.

From S. O. E., *Evergreen, La.*—I notice that some of the correspondents are of the opinion that the carpet problem proposed by J. E. W., in the February number, cannot be solved at all—that it is a snare, &c. I



The Carpet Problem.—Fig. 3.—Principles upon which F. M. S.'s Solution is Based.

do not agree with them, and should be pleased to help your correspondent out of his difficulty if I can. I am not able to present a strictly arithmetical solution, nor can I place the carpet parallel with the diagonal of the room and have all the corners touch, but I lay it off as shown in the inclosed sketch, Fig. 5, being careful to make the hypothenuse of the small triangle at the end of the carpet just 3 feet; then measuring the base and perpendicular, I find them respectively, base or short side, 1 foot 1′ 5.4528″; perpendicular or long side, 2 feet 9′ 4.6944″. The base or short side of large triangle at side of carpet, 9 feet 2′ 7.3056″; perpendicular or long side, 22 feet 10′ 6.5472″. From this I



The Carpet Problem.—Fig. 4.—F. M. S.'s Solution.

find that the hypothenuse of the large triangle, or the length of the carpet, is 24 feet 7′ 11.8608″.

From J. E. W., *Royalton, Wis.*—I think if C. L. H. and C. A. M. will look over my carpet problem they will find that they are mistaken, and that the carpet may be cut square at the ends and still touch the walls of the room at each corner. They evidently tried to place the carpet parallel with the diagonal of the room. This problem was given to me for solution and an arithmetical method was requested. Inasmuch as I was not able to answer the demand myself and could not find any one who did understand the question, I concluded to refer it to the readers of *Carpentry and Building*. The solution presented by J. D. H., of Bel Green, Ala., does not quite fill the bill, and I think that if he will look over his reply again he will himself see that he is wide of the mark.

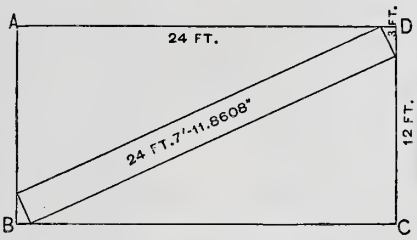
REFERRED TO OUR READERS.

Where is the Fallacy?

From A. L. S., *West Unity, Ohio.*—Will some reader of the paper explain the fallacy of the following proposition? If a board, 11 x 13 inches, as shown by Fig. 1 in the inclosed sketches, be cut diagonally and the two pieces slipped so as to occupy the position shown in Fig. 2, an increase in superficial area seems to be obtained. Eleven times 13 equal 143 inches. The parts, when placed as shown in Fig. 2, measure 12 x 12 inches, equal 144, with two half square inches projecting at opposite corners, making the apparent area 145 square inches. Of course, this is impossible. Will some reader please help me out of the woods, showing where the fallacy lies?

Moving Buildings.

From H. W. M., *Newton, N. J.*—I have a one-story brick building, the extreme dimensions of which are 25 by 35 feet, which occupies space that is wanted for another purpose. The question arises: Can it be moved a distance of some 250 feet? The building is approximately in the shape of a cross. The walls are 8 inches in thickness and are 15 feet high from the foundations to the roof. The roof is a low mansard, with rafters curved at the base, and is covered with slate. The deck portion is hipped and is covered with tin. Dormer windows are cut through the mansard part. If such a



The Carpet Problem.—Fig. 5.—Sketch Accompanying S. O. E.'s Letter.

building can be moved at less cost than taking it down and rebuilding, I shall be pleased to have directions how to proceed.

From N. A. F., *Winchester, Ohio.*—I notice in a number of the paper issued several months since that a correspondent asks for information about moving buildings. It seems to me that suggestions from practical men on moving all kinds of wooden buildings, also of raising heavy buildings, trestling, trusses, roofs, &c., would be of great interest to a large class of readers; therefore I take the liberty of again calling attention to the subject.

From E. R., *Shawangunk, N. Y.*—Will some reader of *Carpentry and Building* please present a method for moving a frame building without taking it apart?

Piazza Balustrade.

From W. A. J., *Canyon City, Oregon.*—I shall be pleased to see published in *Carpentry and Building* some designs for a piazza fence or balustrade. Will not some of the readers of the paper give me the benefit of their patterns?

Extension Ladder.

From G. R. S., *Oswego, N. Y.*—I want a good extension ladder 32 feet long. I think that many others of your readers would be pleased to see a drawing in *Carpentry and Building* illustrating the plan of constructing such an article. Will not some practical reader contribute the same?

Grounds for Skeleton Box Window Frames.

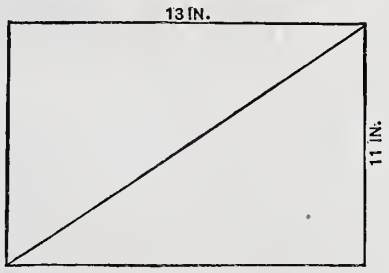
From M. S., *Nebraska, Ind.*—I desire to learn the method of putting in the grounds for fastening skeleton-box window frames to brick walls. If some practical reader of the paper will show this up by sketches, he will confer a great favor. Please include a diagram showing horizontal section through windows with frame in position.

A Question in Construction.

From N. A. B., *New York.*—I have a roof, the adjoining sides of which are one-half and one-third pitch respectively. The cornice is required to be of one projection on all sides, and the planceer to run parallel or nearly so to the top of the roof, and end of rafter to be cut square. Will some practical reader of the paper show me how this may be accomplished?

Novelty Siding.

From W. C. D., *Ashland, Oregon.*—Will some subscriber to the paper send for publication a sketch of what is called the "Novelty" pattern siding. I have seen it mentioned in specifications quite frequently, and I am at a loss to understand what it means.



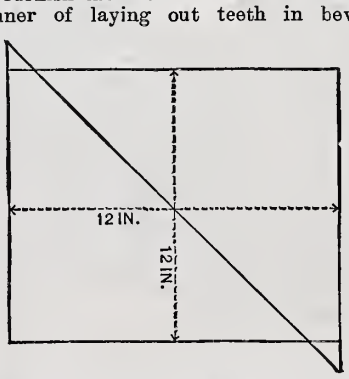
Where is the Fallacy?—Fig. 1.—A Board 11 by 13 Cut Diagonally.

Grocery Refrigerator.

From H. & H., *Albany, N. Y.*—Will some practical reader of the paper furnish a design for a good family or grocery refrigerator and ice box—an article which is frequently required at the hands of carpenters? Plans for the construction of it, therefore, will be of general service to your readers.

Teeth for Beveled Wheels.

From J. E. W., *Royalton, Wis.*—Will some of the readers of *Carpentry and Building* furnish me with information about the manner of laying out teeth in beveled



Where is the Fallacy?—Fig. 2.—The Parts Slipped so as to Form a Square with two Projecting Corners.

wheels and pinions? I also desire directions for lining shafting quickly and in the best manner.

Odd Size Scantling.

From W. W., *Windsor, Mo.*—I desire to inquire why correspondents writing to the paper concerning timber describe it in odd sizes, for example, 3 x 5, 5 x 8, &c.? Now, I have seen saw mills, but I never knew of odd-sized stuff being used in building.

Bending Moldings by Kerfing.

From J. H. H., *Mount Clair, W. Va.*—Will some experienced reader please furnish a method for making saw cuts in a straight piece of molding, so that they will close tight when the molding is bent and put upon the outside casing of a segmental head window or door frame?

Remedying Noisy Windows.

From J. R. C., *Oil City, Pa.*—In my house the dumb waiter is very noisy. My windows at times either stick or are loose and shaky in windy weather. Is there not some invention covering metallic slides with self-regulating adjustment which would remedy the trouble in both cases? If I were not too busy, it seems to me I could work out something of the kind. Can any reader of the paper point out the means?

Laying Out Inside Blinds.

From M. M., *Philadelphia, Pa.*—Will some one please be kind enough to show, in *Carpentry and Building*, a method of laying out inside blinds to fold into boxes; also the best method of forming the boxes?

Fernery.

From E. D. S., *Springfield, Vt.*—Will some reader of *Carpentry and Building* furnish for publication a drawing of the construction of a fernery?

A Problem in Practical Geometry.

From S. P. J., *Toledo, Ohio.*—Given the length of an arc of a circle, and the inclosed angle formed by two radii, what is the rule by which to find the length of chord and the versed sine?

Plan of Staircase.

From S. W. M., *Bethlehem, Pa.*—Will some practical correspondent of *Carpentry and Building* furnish me a plan of a well-hole square staircase? I start with my stairs on the first floor and have 16 steps. Then I have a platform from which I have 21 steps, which brings me to the second floor. The same thing is repeated in the next story. If some of the readers of the paper will give me an idea of the construction of such a stair they will confer a great favor.

Ebonizing on Black Walnut.

From W. I. N., *Burlington, Iowa.*—Will some of the cabinet makers or cabinet finishers among the read rs of the paper furnish for publication the best method for ebonizing on black walnut or soft wood in a quick and effective manner? I desire something for use on walnut, white wood, poplar and pine. I have tried two or three methods, but none of them proved satisfactory.

Prices of Building Materials in New York, August 20, 1881.

Blinds.—OUTSIDE.

Per lineal, up to 2.10 wide	$	@	0.24
Per lineal, up to 3.1 wide		@	0.26
Per lineal, up to 3.4 wide		@	0.28
Per lineal, paint'd and trim'd	0.45	@	0.55
INSIDE.			
Per lineal, 4 folds, Pine		@	.53
Per lineal, 4 folds, ash or chestnut		@	.78
Per lin'l, 4 folds, cherry or butternut		@	.96
Per lineal, 4 folds, bl'k wal't.		@	1.06

Bricks—(Afloat.)

Pale	₱ M. $4.00	@	4 25
Jersey	" 7.00	@	7 50
Long Island	"	@	
Up-River	" 7.50	@	8 00
Havers'aw Bay, 2ds	" 8.00	@	8.25
Havers'aw Bay, 1sts	" 8.50	@	
Croton—Brown	" 11 00	@	
Croton—Dark	" 13 00	@	
Croton—Red	" 13.00	@	
Philadelphia Fronts	"	@	23 50
Trenton	"	@	28 50
Baltimore	"	@	38.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2.00 for Crotons and $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh	$35 00	@	
Scotch	30.00	@	
English	30.00	@	32.00
Silica (English)	35 00	@	
Silica (Welsh)	50.00	@	
Stourbridge	50.00	@	
American, No. 1		@	40.00
" 2		@	30.00

Afloat, 500 ₱ M less

Cement.—(Cargo rate.)

Rosendale, ₱ bbl	$1.25	@	
Portland Saylor's American, ₱ bbl	2.25	@	
Portland (imported) ₱ bbl	2.60	@	2 65
Roman	2.75	@	3.00
Keene's coarse	6.00	@	
Keene's fine		@	10 50

Add 25 cts. to above rates for yard prices.

Doors.

RAISED PANELS, TWO SIDES.

2.0 x 6.0	1¼ in.	$0.90
2.6 x 6.6	1¼ in.	1.20
2.6 x 6.8	1¼ in.	1.25
2.8 x 6.8	1¼ in.	1.30
2.10 x 6.10	1¼ in.	1.40
3.0 x 7.0	1¼ in	1.62

MOULDED.

Size.	1¼ in.	1⅜ in.	1¾ in
2.0 x 6.0	$1.48		
2.6 x 6.6	1 77	2.25	
2.6 x 6.8	1 80	2.28	
2.6 x 6.10	1 83	2.33	
2.6 x 7.0	1 97	2.36	
2.8 x 6 8	1 88	2.39	3.33
2.8 x 7.0	2.04	2 46	3.47
2.10 x 6.10	1.98	2.54	3.56
3.0 x 7.0	2.21	2.69	3.80
2.6 x 7.6	2.15	2.63	
2.8 x 7.6	2.25	2.7-	3.85
2.10 x 7 6	2.36	2.87	4.05
3.0 x 7.6		3 00	4.22
2.6 x 8.0	2.25	2.75	
2.8 x 8.0		2.88	
2.10 x 8.0		3.02	4 47
3 0 x 8.0		3.15	4.70

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Bends & Elbows, Each.	Branches—Sing.	Branches—D'bl. & V.	Traps, Each.
2 in.	$ .13	$ .40	$ .48	$ ...	$1.00
3 "	.16	.50	.61	...	1.25
4 "	.20	.65	.75	1.30	1.75
5 "	.25	.85	.90	1.55	2.50
6 "	.30	1.15	1.05	1.80	3.50
7 "	.35	1.50	1.20	2.05	5.00
8 "	.45	2.00	1.45	2.45	6.00
9 "	.55	2.50	1.70	2.85	7.00
10 "	.70	3.00	2.00	3.30	8.00
12 "	.80	3.75	2.52	4.24	10.00
15 "	1.25	5.00	House Branches pr. lin. ft.		Sewer Branches pr. lin. ft.,
"	1.60	7.50	15x6	$1.75	15 in. $2.25
			18x6	2.50	18 " 3.00

Longer than 1 ft., charged as pipe.

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$8.25	$7 50	$7.00	$6.50
11x14—15x24	9.25	8.50	8.00	7.25
16x24—20x28	10.75	9.75	8.75	7.75
15x34—24x30	12.25	10.75	9 00	8.50
26x28—24x36	13.00	11.50	9.75	9.00
26x36—26x44	14.50	13.25	10.75	9.50
26x46—30x50	15.00	14.00	11.25	6.50
30x52—30x54	16.00	14.50	12.00	...
30x56—34x56	17.25	15.50	13.50	....
34x58—34x60	18.25	17.25	15.00	....
36x60—40x60	20.75	18.75	17.25	....

DOUBLE.

6x 8—10x15	$12.75	$11.75	$10.75	$10.00
11x14—15x24	14.50	13.25	12.50	11.25
16x24—20x28	17.25	15.75	14.00	....
15x34—24x30	19.75	17.25	14.50	....
26x28—24x36	21.00	18.50	15.75	...
26x36—26x44	23.25	21.25	17.25	...
26x46—30x50	24.00	22.50	18.00	...
30x52—30x54	25.75	23.25	19.25	...
30x56—34x56	27.75	25.00	21.75	...
34x58—34x60	29.25	27.75	24.00	....
36x60—40x60	33.25	30.00	27.75	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent., will be charged for all glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: Single, 70 %; Double, 70 %.

French

WINDOW, PICTURE AND CAR GLASS.

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x13	$6.50	$5.75	$5.50	$5 25
11x14—16x24	7.25	6.75	6.25	6 00
18x22—20x30	9.25	8 50	7.75	7.25
15x36—24x30	10.25	9.25	8.25	....
26x28—24x36	11.00	10 00	9.00	....
26x36—26x44	11.75	10.75	9.50	....
26x46—30x50	13.25	12.50	10.50	...
30x52—30x54	14 00	13.00	11.25	....
30x56—34x56	15.00	13 75	12 50	....
34x58—34x60	15.50	15 00	13 25	..
36x60—40x60	17 50	16.00	15.00	..

DOUBLE.

6x 8—10x15	$8.25	$7.75	$7.50	$7.00
11x14—16x24	10 00	9.25	8.75	8.25
18x22—20x30	12.75	11 75	10 75	....
15x36—24x30	14.25	13.00	11.25	....
26x28—24x36	15 25	13.75	12.50	....
26x36—26x44	16 25	14 75	13 00	....
26x46—30x50	17.50	16.75	14.25	....
30x52—30x54	18.50	17.25	14.75	....
30x56—34x56	19.50	18.25	16.25	....
34x58—34x60	20.50	19.50	18.00	....
36x60—40x60	23 00	21.00	20.00	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: 50, 10 & 5 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS

Per square foot, net cash.

⅛ Fluted plate,	case	10c;	cut to size	16c.
3-16 Fluted plate	"	13c.	" "	18c.
¼ Fluted plate	"	16c.	" "	20c.
¼ Rough plate	"	16c.	" "	20c.
⅜ Rough plate	"	21c.	" "	27c.
½ Rough plate	"	28c.	" "	33c.
¾ Rough plate	"	45c.	" "	55c.
1 Rough plate	"	55c.	" "	65c.

Hair.

Cattle	₱ bushel, $11.00	@	
Goat	" 14.00	@	

Lath.

Cargo rate	₱ M $1.85	@	

Lime.

Glen's Falls, or Keenan's common, cargo rate ₱ bbl		@	.90
Glen's Falls, or Keenan's finishing			
Jointa	1.10	@	
Rockland, common	1.00	@	
Rockland, finishiug	1.15	@	

Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Prices firm, with upward tendency.

Pine, very choice and ex. dry, ₱ M. ft. thick	$70.00	@	$75.00
Pine, clear	60.00	@	65.00
Pine, selects	50.00	@	55.00
Pine, pickings	40.00	@	45.50
Pine, selected, box	22.00	@	25.00
Pine, common box	18 00	@	22.00
Pine, common box, ⅝	16.00	@	17.50
Pine 1¼x10, 13 ft., matched, each	.42	@	.45
Pine, 1¼x10, 13 ft., culls	...	@	.30
Pine, 1x10, 12 ft., good matched, each	.30	@	.32
Pine, 1x10, 13 ft., common matched, each	.25	@	.28
Pine, 1x4½, clear, match'd, each	.24	@	.26
Pine, 1x4½, merchantable, matched, each	...	@	.18
Pine, 1¼x4½, cl'r, match'd, each	.35	@	.38
Pine, 1¼x4½, merchantable, matched, each	.30	@	.32
Spruce, 1x9, 13 ft., rough	.20	@	.21
Spruce, 1x9, 13 ft. matched, each	.23	@	.25
Spruce, 1¼x9, 13 ft., rough	.23	@	.25
Spruce, 1¼x9, 13 ft., matched, each	.28	@	.30
Spruce, 2x9, 13 ft., rough	.37	@	.39
Spruce, 2x9, 13 ft., match'd, each	.43	@	.46
Spruce, 2x4, 13 ft	.15	@	.16
Spruce timber, flat, ₱ M ft	20.00	@	.....
Spruce timber, square, ₱ M ft	.....	@	22.50
Hemlock, 1x10, 13 ft., each	.16	@	.18
Hemlock, 2½x4, 13 ft., each	.16	@	.17
Hemlock, 3x4, 13 ft., each	.19	@	.20
Hemlock, 4x6, 13 ft., each	.40	@	.44
Ash, good, ₱ M ft	45.00	@	55.00
Oak	45.00	@	55.00
Oak, quartered	70.00	@	90.00
Maple, common	25.00	@	35.00
Maple, good to 2 in	40.00	@	45.00
Maple good thick	45.00	@	55.00
Maple white	55.00	@	65.00
Chestnut	45 00	@	60.00
Bl'k walnut, good to choice	95 00	@	110.00
Black Walnut 2d	65.00	@	75.00
Black walnut, ⅝	85.00	@	95.00
Black walnut, selected and seasoned	120.00	@	140.00
Bl'k walnut counters, ₱ ft	.15	@	.25
Cherry, wide, ₱ M ft	95.00	@	105 00
Cherry, ordinary	75.00	@	85.00
Whitewood, or Poplar ⅝ in.	30.00	@	35.00
Whitewood, or Poplar ⅝ panels	35.00	@	45.00
Whitewood, or Poplar 1 to 1¼ inch	40.00	@	50.00
Whitewood or Poplar, 2 in. and upward	45.00	@	50.00
Shingles, extra sawed pine, 18 in.	5.00	@	6.00
Shingles, clear sawed pine, 18 in., 2 md	4.00	@	5.00
Shingles, cypress, 7x24	14.00	@	18.00
Shingles, cypress, 6x20	12.00	@	14.00
Shingles, Cedar, 6x24, No. 1	—	@	22.00
Shingles, Cedar, 6x24, A's	—	@	16.00
Shingles, Cedar, 6x20, No. 1	—	@	12.50
Shingles, Cedar, 6x20, A's	—	@	10.00
Shingles, Cedar Eastern	—	@	3.50
Shingles, Hemlock	—	@	3.75
Shingles, Pine	4.00	@	5.00
Shingles, Spruce	—	@	3.50
Shingles, Redwood (California), ordinary, per bunch	—	@	.85
Shingles Redwood (California) 6x16 cut	—	@	1.85
Yellow pine dressed flooring, wide, ₱ M ft	35.00	@	37.00
Narrow ditto	35.00	@	40.00
Yellow pine timber	30 00	@	45.00
Locust posts, 8 ft., ₱ in	.18	@	.20
Locust posts, 10 ft	.24	@	.25
Locust posts, 12 ft	.25	@	.30
Chestnut posts, ₱ ft	.03	@	.3½
Mahogany, ¼ in. ₱ ft	.05	@	.07
Mahogany, ⅜ in. ₱ ft	.08	@	.10
Mahogany, ½ in. ₱ ft	.10	@	.12
Mahogany, ⅝ in. ₱ ft	.12	@	.14
Mahogany, ¾ in. ₱ ft	.14	@	.16
Mahogany 1 in. ₱ ft	.16	@	20
Rosewood, ⅛ in. ₱ ft	.11	@	.15
Rosewood, ¼ in. ₱ ft	.16	@	.20
Rosewood, ⅜ in. ₱ ft	.24	@	.28
Rosewood, ⅝ in. ₱ ft	.40	@	.45
Rosewood, 1 in. ₱ ft	.60	@	.75
Satin wood, ⅛ in. ₱ ft	.25	@	.35
Satin wood, 1 in. ₱ ft	.35	@	.50
White holley ¼-inch	.10	@	.12
White holley ⅝-inch	.15	@	.18
Cedar (Cubau and Mexican) ₱ ft	.10	@	.14
Cedar (Florida) Less than 1 inch	.10	@	.24
1 inch and over	.25	@	.30
Redwood (California) 1 to 2 in., dry, per M		@	60.00
3 in. and over, per M		@	60.00

Moldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof building, ₱ lb.	16c	@	17c
Rosin Sized Sheating, ₱ lb.	4c	@	5c
Dry Sheating ₱ lb	3c	@	3½c
Tarred Felt. ₱ lb	....	@	3c

Plaster.

Calcined City	Mill rate. $1 25	@	....

Sash.—15 to 25 % dis.

GLAZED.

Dimensions of windows.	12 Lights. 1¼pl.	1¼c.	1½c.	8 L's. 1½c.	4 Lights. 1¼c.	1½c.
2.1x3.6	$0.90	0.96	....	....	...	....
2.4x3.10	.98	1.05	....	....	1.15	....
2.7x4.6	1.18	1.25	....	....	1.45	1.54
2.7x4.10	1.32	1.38	....	....	1.52	1.62
2.7x5.2	....	1.47	....	....	1.77	1.87
2.7x5.6	....	....	....	1.86	1.93	2.04
2.7x5.10	....	....	....	1.64	2.02	2.14
2.10x4.6	1.32	1.41	1.50	....	....	....
2.10x5.2	1.49	1.58	1.71	1.90	1.95	2.08
2.10x5.6	1.59	1.68	1.84	2.03	2.05	2.21
2.10x5.10	1.86	1.96	2.12	2.14	....	2.38

c. means counted checked—plowed and bored for weights.

Hot bed sash, glazed	$2.35		

HEAD LIGHT.

Two or three Lights, Glazed.

Size.	1¼	1⅜	Size.	1¼	1⅜
2.6x1.0	40	45	2.10x1.0	45	55
2.6x1.6	50	55	2.10x1.6	60	65
2.8x1.0	45	50	3.0x1.0	50	60
2.8x1.6	55	60	3.0x1.6	67	75

Slate.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're.	$5.50	@	$6.00
Green slate	5.50	@	6.00
Red slate		@	10.00
Black slate, Pennsylvania	4.00	@	4.50
Tiles, 1¼ in. rubbed, ₱ sq. ft.		@	.30
₱ snp. ft.			
Steps and platforms, 1¼ in. thick; Risers, 1 inch thick			.60c
" " 2 "			.75c
Red tile and borders			.60c
Coping, 1½ "			.40c
" 2 "			.45c
Lineal ft.			
Window sills, 4x7			.70c
" 3x7			.60c
Window caps, 4x10, plain			1 00
" 4x8, "			.80c
" 3x10, "			.70c
" 3x8, "			.65c

Stair Material.

BALUSTERS.

Black Walnut.	1½ in.	1¾ in.	2 in.	2½ in
Fancy Turned	8c	10c	11c	17½c
Neck Turned	10c	11c	13½c	21c
Fluted or Octagon	15c	16c	18c	26c

OCTAGON PANELED NEWELS.

Paneis Veneered with French Walnut.

8-inch Newels, with Cap				$8 30
9 "	"	"		9 20
10 "	"	"		9.75

SOLID NEWELS, WITH CAPS.

Black Walnut.	5 in.	6 in.	7 in.	8 in.
Fancy Turned	$1.75	$2 30	$3.15	$4.30
Octagon	2.25	2.75	3.62	4 75

STAIR RAIL.

Worked out and finished ready to put up. Easements and cylinders counted double. Price per foot Newels and Balusters not inciuded.

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded	43c	48½c	55c	60c
Toad Back	52c	57½c	63c	72c

STAIR RAIL, UNFINISHED.

Price per foot.

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded	12½c	15c	17½c	20c
Toad Back	14c	16c	18½c	21c

Stone.

Cargo rates, delivered at New York.

Amherst Blue	$1.00		
Amherst freestone, in rough, ₱ C ft	1.00		
Bay of Fundy, Wood Point, brown	0.80	@	1.00
Bay of Fundy, Mary's Point, brown	$0.80	@	1.00
Bay of Fundy, Mary's Pt., olive	0.80	@	1.00
Berlin Blue		@	1.00
Berlin freestone, in rough		@	1.00
Berea freestone, in rough	0.85	@	.90
Brown stone, Portland, Ct	1.25	@	1.50
Brown stone, Belleville, N. J.	1.00	@	1.50
Corsenili (Scotch) Red Sandstone		@	1.00
Granite rough	.50	@	1.00
Dorchester, N. B., stone, rough, ₱ foot.		@	1.00

BLUE STONE

Rubbed hearth, 10 ft. or under	25c		
Rubbed hearth, 20 ft. or under	35c		
Rubbed hearth, 30 ft. or under	45c		
Rubbed hearth, 40 ft. or under	50c		
Rubbed sills	30c		
Sawed & Planed	40c		
Sills and lintels		@	18c
Sills and lintels, fine quarry cut sills		@	35c
Coping, 11 to 18 in. wide	20c	@	24c
Coping, 20 to 28 in. wide	38c	@	6 c
Coping, 30 to 36 in. wide	65c	@	80c
Steps, 8 in		@	60c
Steps, 7 in		@	55c
Steps, 6 in		@	35c
Steps, door, per in. wide		@	3c
Platforms, promiscuous, 4 in		@	32c
Wyoming Valley, promiscuous, per cubic ft	1 30	@	1.35

Vault Lights.—Nominal.

Platform, sq ft	$3.50		
Step and risers, sq. ft	3.50		
Floor light, sq. ft	2.50		
Roof light, sq. ft	2.50		
Platform, 2d quality, sq. ft	2.60		

COVERS.

Diameter.	Round.	Hexagon.
14 inch	$3.00	$0.00
16 "	3.75	4.00
18 "	5.50	6.00
20 "	8.00	8.50
24 "	14.00	15.00
26 "	16.00	17.00
30 "	23.50	25.00
36 "	31.00	33.00

CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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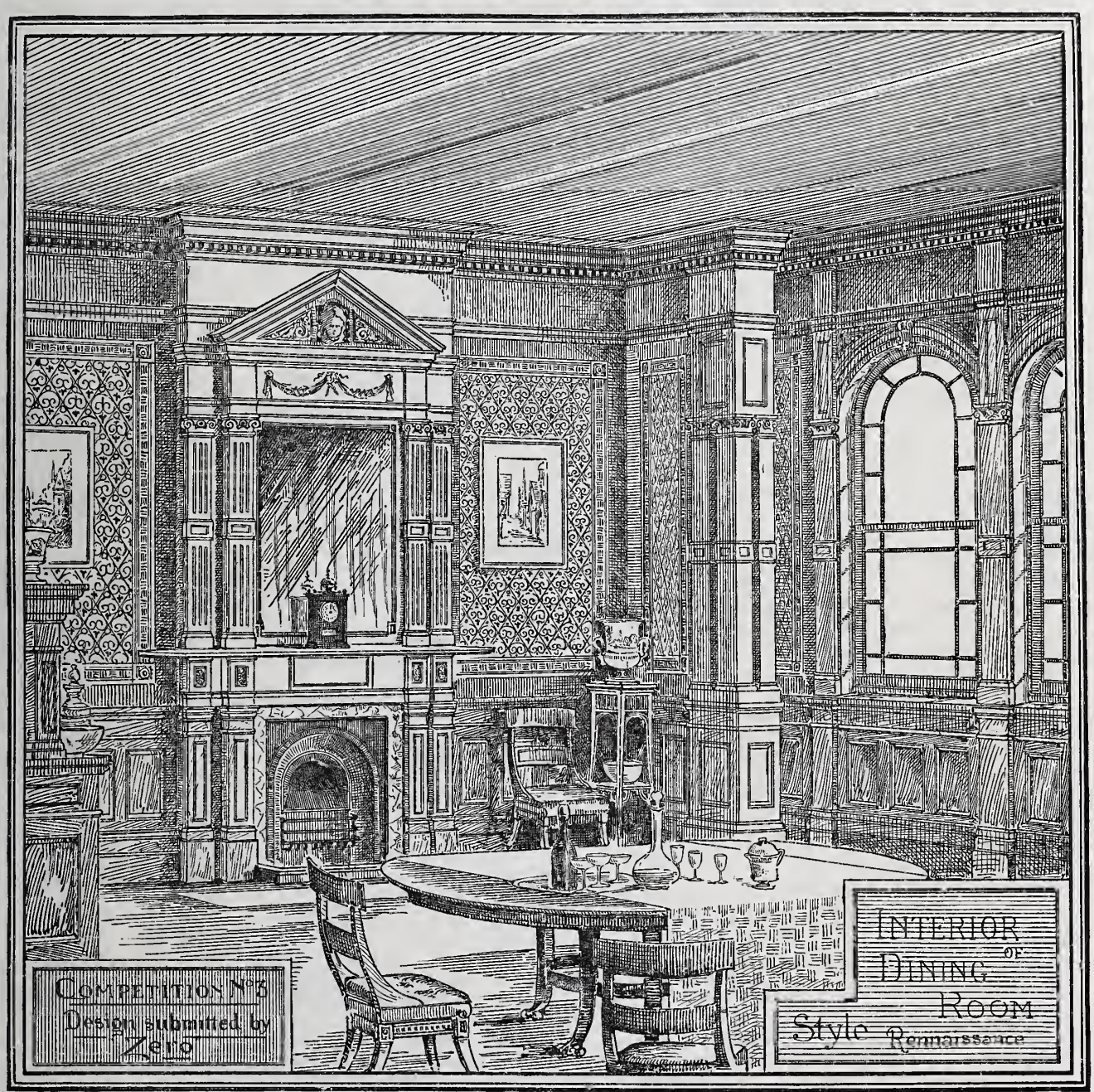
Interior of Dining Room.

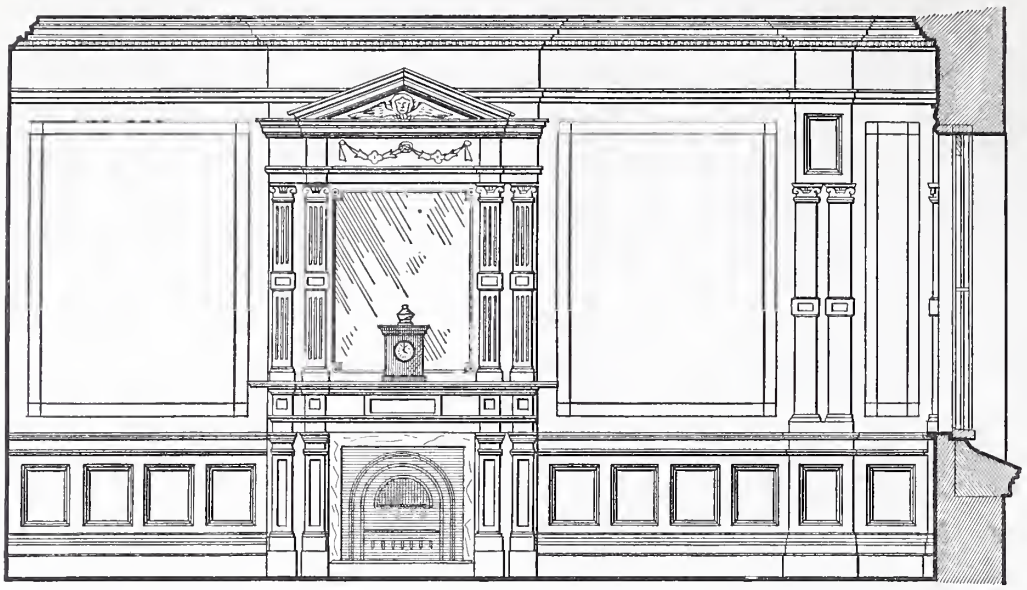
In the July number of *Carpentry and Building* we presented one of the pair of designs submitted by John W. H. Watts, of Ottawa, Can., to which was awarded the second prize in our competition for dining-room finish. We now have the pleasure of laying before our readers the alternative design, together with the details belonging to it. By comparing this first page illustration with that of the July number, it will be seen that the architect has selected two styles radically differing in their general features, as well as their minor details. The plan of the room is the same in the two studies, save that in the latter the two small windows occurring close to the chimney are omitted, and the false chimney breast built out into the room, which was a distinctive feature of the first design, in the present case gives place to a more common style of grate, surmounted by the conventional mantel and mantel mirror. The style of treatment in this case is probably less popular than that of the first one presented, but it should not be one whit less interesting to the studious reader on that account, for it presents a careful study of inside finish in a style which a short time since was very popular, and which in some of its features bids fair to again reign in the not very distant future. The specification for the construction and finish of this apartment is in the main identical with that published in our July number. The wood in which this work is to be executed, according to the architect's ideas, is cherry. The construction to be followed is in all respects the same as that described in connection with the former design, with the exception that no wood pins are to be used. The pediment over mirror, frieze of chimney piece and caps of pilasters are enlivened by a small amount of carving. The grate in style is similar to those in general use in various sections of the country, and is provided with a marble margin. The mirror glass is specified to be put in place after the chimney piece is built, and to be held in position with moldings, as shown in the drawings. The entire woodwork is to receive a wax finish, as described in connection with the first study. The plastered portion of the wall is to be decorated with paper of some geometrical pattern, and arranged by means of suitable bordering into



Alternative Design for Dining Room Finish.—Fig. 1.—Perspective View.—John W. H. Watts, Ottawa, Architect.

panels, as suggested by the perspective. The ceiling is to be finished in distemper and relieved by a margin and lines next to the cornice. The main part of the ceiling is to be light blue.

The estimated cost of this design, assuming, as in the former instance, that the room is made ready to receive the finish, is as follows:



Alternative Design for Dining Room Finish.—Fig. 2.—Elevation of Side of Room showing Mantel, Mirror, Pediment, &c.—Scale, ¼ Inch to the Foot.

ESTIMATE OF DINING-ROOM FINISH.

1000 feet b. m. cherry (dressed), at $100	$100.00	
45 days' labor for carpenter, at $2.50	112.50	
45 days' labor, carpenter's assistant, at $1.50	67.50	
Wax finish	20.00	
Carving	50.00	
Cost of wood finish, &c		350.00
Coloring ceiling	10 00	
Paper and bordering	15.00	
Stone fender	8.00	
Grate and setting	15.00	
Marble	10.00	
Mirror	15.00	
Cost of paper, &c		73.00
Total cost		$423.00

STRAY CHIPS.

At Omaha, Neb., building operations, aggregating in cost $500,000, are said to have been in progress this season. An opera house, two hotels and a number of store buildings are among the improvements.

S. T. Reynolds is building a brick business block at Elmira, New York, at a cost of $14,000. E. B. Gregory is the architect; Mr. Gregory is also the architect of a dwelling house at Corning, costing $7000.

At Glenwood, Iowa, two brick hotels are in progress, one costing about $12,000 and the other $7000. M. Miller has the contract for both buildings. Masons' wages are reported at $4.50 per day at the present time.

At North Easton, Mass., a town hall and Masonic hall building, three stories in hight, costing $75,000, have been erected this season. Oliver Ames is the owner, and Norcross Bros., of Worcester, Mass., were the builders.

The *Post Dispatch* Newspaper Company, of St. Louis, has leased ground on Market street, between Fifth and Sixth streets, and will proceed at once to the erection of a new publication house. Mr. P. McGrath is their architect.

The Improved Industrial Dwellings Company, of London, has recently paid a 5 per cent. dividend, and it was stated that the death rate on their premises was 16.7 only in the thousand, against 23.4 in London generally.

At Faribault, Rice County, Minn., an elevator with a capacity of 50,000 bushels is building. H. W. Pratt is the owner, and W. D. Jones the architect and builder. We understand that Mr. Jones has a similar work in progress at Hector, Minn.

The commissioners of Preble County, Ohio, have recently let the contract for a new infirmary building, the figures being $12,000. J. H. & A. M. Stern, of Indianapolis, are the architects in charge. William McCabe, Eaton, Ohio, is the builder.

The Santa Barbara County National Bank is putting up a fine brick and wood block in Santa Barbara, Cal., with offices, hall and club rooms in the upper part, at an estimated cost of $17,000. Thos. Nickson, of that city, is the architect and builder.

The Pullman Company is building large repair shops in St. Louis, a few blocks west of the Union Depot. Two years ago this company made overtures to locate their main works in St. Louis, but, failing to agree with real estate owners, they finally selected Chicago.

Mr. Frank Furness, of Philadelphia, is the architect for the building for the Commercial Union Insurance Company, now in progress at Philadelphia, on Walnut street, below Fourth. He has also designed the improvements for the American Fire Insurance Co.'s building on Walnut strect.

A correspondent from Wellsburg, W. Va., writes that a large number of dwellings are being built by mechanics and laborers through the agency of building associations. He says there have been more homes erected in that vicinity during the past year than during the entire period of 10 years previous.

Jas Fogerty, architect, of Cambridgeport, Mass., has prepared the plan for a store, two stories high, 30 x 70 feet in plan, to be erected in that place. The upper story is to be used as an Odd Fellows' hall. The cost of the building will be about $4500. M. M. Alden, of Randolph, is the builder.

The new building of the Insurance Company of North America, now being erected on Walnut street, below Third, in Philadelphia, Pa., was modeled after one of the most celebrated of Belgian Guild Halls, with such additions as pleased the architects' fancy. The primary idea of the interior is based on the style of building of a century ago. The arrangement has been adapted to the exact requirements of the case, with a combination of modern improvements. Messrs. Cabot & Chandler, of Boston, are the architects. The cost of the building is about $175,000.

Over one hundred buildings have been erected during the past season at Seymour, Ind. Among those nearing completion at the present time may be mentioned residences for J. M. Vinzant, Conrad Bolinger and Hon. Jasen B. Browne. The plans for all of these dwellings were furnished by J. Balsly, of Seymour.

The plans of the Metropolitan Opera House, which is to be built of Belleville brown stone, brick and terra cotta, on the block bounded by Thirty-ninth and Fortieth streets and Broadway and Seventh avenue, this city, have been filed at the Bureau of Buildings. It will cost $500,000, and the architect is J. Cleveland Cady, of No. 111 Broadway.

At Burlington, Iowa, the C., B. & Q. R. R. Co. are constructing machine shops, at an estimated cost of nearly $500,000. T. E. Courtney, of Chicago, Ill., is the contractor. In the same city a joint stock company is erecting an opera house at a cost of $80,000. Two large grain elevators and a steam saw mill are projected. A number of other improvements are in progress.

Lackawanna County, Pa., is at present building a new court house at its county seat (Scranton), which will cost, when completed, $150,000. A new steel mill is also in process of construction at Scranton by a company recently organized, whose capital stock is $600,000. New dwelling houses are reported to be in progress in all directions.

At Hannibal, Mo., one of the principal buildings erected during the present season was a public school-house, costing $26,000.

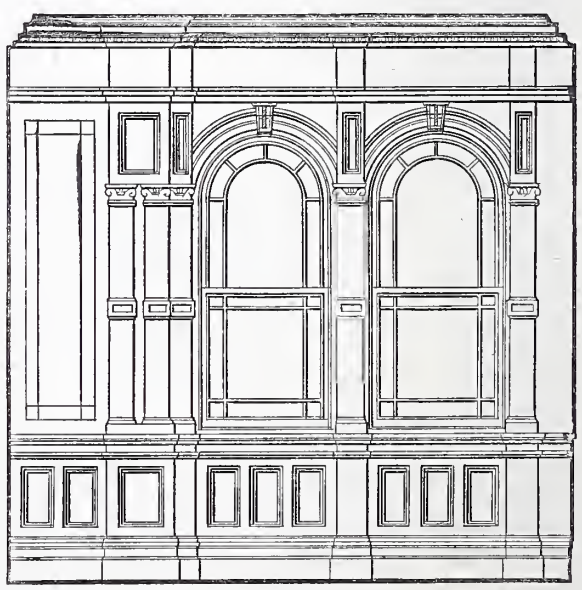


Fig. 3.—Partial Elevation of End of Room.—Scale, ¼ Inch to the Foot.

John Patton, of that city, was the contractor. Henry Heins had the contract for the new Methodist Episcopal Church, costing $12,500. Among other buildings erected may be mentioned a residence for H. W. Shedd, costing $4000, and a Congregational Church, costing $4500. C. V. McDonald was the builder of the former, and Veiley & Co. of the latter, both parties being of Hannibal.

DE-BAR'S GRAND OPERA HOUSE, in St. Louis, has been undergoing a thorough remodeling this summer. The entire inside has been removed, including stage and roof, a large addition has been built at the rear, extending to Sixth street, and the whole interior arrangement has been altered and adapted to the requirements of the modern drama and to the tastes of fastidious audiences.

H. C. HANAKER has recently built a residence costing about $5000 for Mr. A. J. Jessee, of Jesseetown, Virginia. The interior finish is in ash, oak and walnut, the designs being selected from the files of *Carpentry and Building*. The entire work has been carefully executed, and has been pronounced by experts who have examined it as one of the best examples, in all particulars, of work in this line which they have seen.

OLD ST. JOHN'S CHURCH, at Hampton, is said to be the oldest church building in Virginia. The present edifice was rebuilt in 1658 from the ruins and remains of a former one. During the war its interior was burned out, but the walls were left standing. Since that it has been refitted. The walls, which are very thick, are built of bricks which were brought from England, and the mortar was of such superior quality that it is still as good as new, and quite as hard as the bricks.

WATERVILLE, N. Y., the center of the largest hop-growing district in the United States, is a village of about 2800 inhabitants.

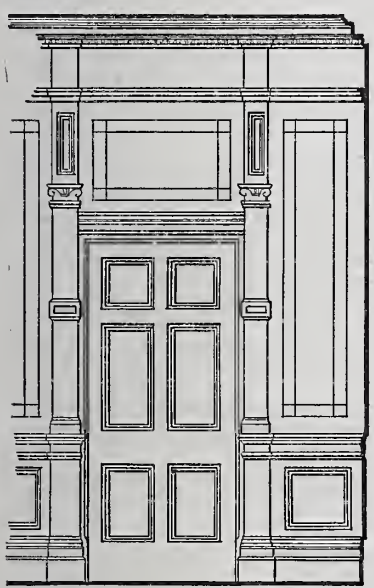


Fig. 4.—Elevation of Door.—Scale, ¼ Inch to the Foot.

Sixty carpenters and builders have been constantly employed in that place this season, and the number of buildings erected will doubtless compare favorably with those put up in any town of similar size anywhere in the country. One residence costing $30,000; several others costing from $4000 to $6000 each, with numerous buildings used directly in the hop industry, go to make up some of the improvements which have engaged the attention of the mechanics named.

THE NEW scientific building of Swathmore College, Pa., has a frontage of 130 feet and a depth of 64 feet. It will be fitted up for a department of chemistry and physics, with qualitative and quantitative laboratories; also a metallugical laboratory, a physical laboratory, a lecture room, &c. The department of engineering is also expected to be accommodated in this building, for which will be provided a lecture room, a recitation room, drafting room, mechanical laboratory and machine shop, a pattern and wood-working shop, a blacksmith shop, foundry, and engine and boiler rooms.

AT SANDUSKY, Ohio, one of the most important building enterprises of the past season has been the new hotel called the Sloane House. This building, when finished, will cost about $150,000, and will be complete in all its appointments. J. B. Sweatt, of Chicago, was the contractor. Another important enterprise in the same city is a new sash, door and blind factory, costing, with machinery, some $40,000. The building is 215 feet long by 60 feet wide, and consists of three stories and a basement. Several residences costing from $5000 to $20,000 each have also been built during the season just closing.

AT GRANT ISLAND, NEB., the shops of the Union Pacific Railroad Co. have been built this season. Their purpose is for car and locomotive building and repairs. A machine shop, 100 x 150 feet, with engine room, 50 x 50 feet; car shops, 100 x 162 feet; car machine shops, 100 x 150 feet, with engine room, 50 x 50 feet; blacksmith shop, 75 x 150 feet—all 22 feet high, with slate roofs, will give some idea of the character of the improvements. The outlay is estimated at $200,000. U. P. Ryler is the engineer in charge. F. Fanning is the architect, and Messrs. Eade, Miller & Patterson are the contractors.

THE BUILDING OUTLOOK in New Haven, Conn., is better than at any period since 1874. The present indications are that the activity will continue through the fall well into the winter. Builders and mechanics generally have been well employed, having steady work at fair wages. Among the buildings completed the present season may be mentioned an eight-room schoolhouse, costing $15,000—L. W. Robinson, architect. The St. Francis Roman Catholic Association has also put up a large school building—Henry Austin, architect. Messrs. Bates & Townsend were the contractors for the mason work of both of these buildings.

ACTIVITY IN new building enterprises continues a noticeable feature in this city, and the amount of capital that is put into them is, in the aggregate, very large. Costly private residences on the avenues and boulevards are multiplying, yet not more rapidly than first-class apartment houses, which rent nowadays, in many cases, much beyond the figure which the average brown-stone front used to command when times were not so flush. The activity in this line of business, however, is not confined to New York; it is now not less noticeable in other large cities, and this, too, notwithstanding the high cost of labor and material.

MESSRS. WILSON BROS., the well-known architects and engineers of the Pennsylvania Railroad Company, are the designers of the new Merrick street station of the Pennsylvania Railroad in Philadelphia. This building is the first in Philadelphia where terra cotta has been used in lieu of brick or stone for the fronts. The walls from the ground to the first floor are of stone, and from that up the front is composed of ornamental stone and figured terra-cotta tiling. It has very much the appearance of carved brick, except that it is much finer. The building will be a unique and undoubtedly durable structure. The cost is about $200,000.

A NEW ARMORY is to be built in St. Louis immediately. The plans have been drawn and accepted and the contract let. The building will be three stories high, with a front of 204 feet by a depth of 109 feet. The location is on Pine street, near Nineteenth street. There will be a drill room for cavalry and artillery on the ground floor, 80 feet by 140 feet. Above will be the infantry drill room, 109 x 204. In the basement will be a rifle range over 200 feet long. Besides the above, there will be the usual company and toilet rooms, parlors, quartermaster's store rooms, stables, &c. The contract price is

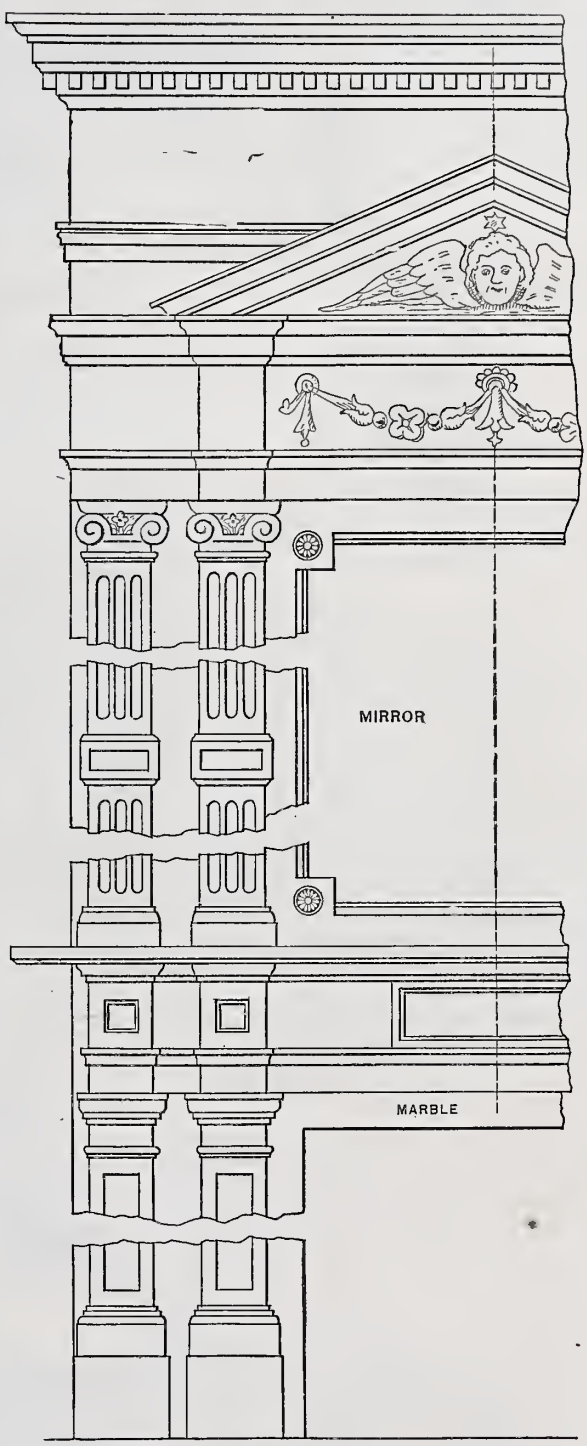


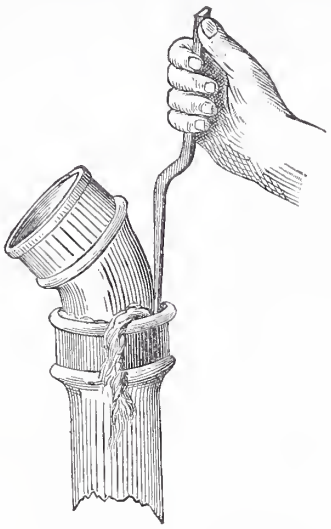
Fig. 5.—Detail of Mantel, Mirror, Pediment and Cornice.—Scale, ¾ Inch to the Foot.

$25,000. It is to be done early in December next.

"WHAT KIND of a house do you want?" asked the architect. "Oh," replied the citizen, wearily, "I don't want a house at all. I just want you to build me three tiers of closets, like jail cells; 130 closets in a tier, and put a roof over the top tier. I want to put up a house that will contain enough closets to satisfy my wife." But the architect, who was a man of broad experience, continues the *Burlington Hawkeye*, told him he

would have to put a thousand closets in a tier and make the edifice six stories high, and then his wife would say when it was completed that there wasn't a closet in the house big enough for a cat to turn around in.

GEORGE A. BLAKE, of Baltimore, is now engaged in the erection of 22 houses on the west side of Calvert street, between Eagle and Chase streets, in that city. The buildings are the property of the McKim estate. Five of the houses in the center block will have a front of 20 feet each, the others being 18 feet front each. All will be 3 stories high, with French roofs. Each house will have a depth of 64 feet. These buildings are novel in construction, artistic in design, and differ in many respects from the conventional form of dwelling houses so common throughout



Plumbers' Joints.—Fig. 1.—Preparing the Joint with Oakum.

that city. Messrs. Wyatt & Sperry are the architects. The cost is estimated at about $200,000.

E. C. AURAND, of Toledo, Iowa, is the architect of the Western College, now being erected upon a commanding site in that city. The straight dimensions of the building are 148 x 89 feet. The college department will be 56 x 75 feet, three stories above the basement; the chapel building, 50 x 80 feet, two stories above the basement. The extreme hight of tower will be 125 feet. The chapel will be surmounted by an open timber roof, the straight hight from the floor being 47 feet. Three colors of brick are being employed in the exterior—Milwaukee white, red and black. Five different patterns of molded brick form the window arches, cornice, belt courses, copings of gables, &c. The roofs are to be of iron. The estimated cost is $30,000.

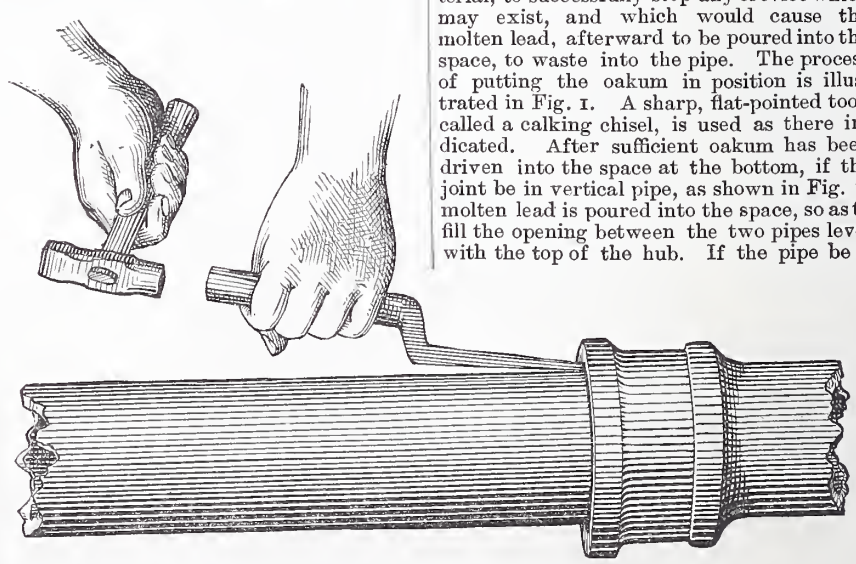
THE NEW library building of Columbia College, this city, is described as English Gothic in style. It will stand in front of the old building, occupying a part of the campus, or playground. The entire cost of the structure will be $250,000. The south elevation, or front, on Forty-ninth street, will extend 120 feet, the rear elevation 66 feet, and the depth is to be 106 feet. A peaked roof will be surmounted by a handsome tower, the walls of which are to be supported on tension girders at the fifth story. The depth of the foundation walls, which are to be laid on a bed of solid rock, will be 6½ feet, while their thickness will vary from 34 to 46 inches. Walls of Philadelphia brick, trimmed with Pottsdam stone, will vary in thickness from 24 to 40 inches. The floor beams and girders to be used throughout the entire building are to be of rolled iron. Four hot-air furnaces will be introduced to heat the structure in cold weather.

THE BUILDERS of Norfolk, Va., have had an exceptionally good season for business, and more work in the building line has been done there this year than for several years past. Among the prominent improvements may be mentioned the extension of the Atlantic Hotel, 113 by 40 feet, five stories in hight. James H. Calraw was the architect and builder. The Norfolk college for young ladies has also received an addition, 61 x 35 feet, four stories in hight. Mr. Calraw also prepared the plans for this. A three-story brick store, four large sheds on the property of the Boston Wharf and Warehouse Co., three cotton compresses, a number of brick dwellings, a building erected by the Norfolk and Western Railroad Co., are among the improvements which have been completed. Many other smaller buildings have also been undertaken.

THE NEW ARCHITECT for the public schools in St. Louis, recently elected, has stirred up a breeze of excitement by condemning certain plans made by his predecessor as unsafe to work from. He declares that the brick partition walls, which are drawn 9 inches thick, should be made 13 inches thick, and wants the work already done on these walls taken down. He brings the testimony of several contractors that the 9-inch walls are not safe. Meanwhile, the former architect is sustained by half dozen or more of the leading architects, who declare the 9-inch walls amply strong for the two story buildings in which they occur, and point to a large number of old buildings constructed in this way whose safety had never been questioned. The School Board is divided on the subject, and the newspapers are discussing the matter in their usual style.

A CORRESPONDENT from Thomaston, Ga., writes as follows: "The spirit of improvement is in our people, and if we were not so poor, we would be doing considerable building. Our citizens are alive to the fact that it is necessary to enter into manufacturing enterprises, especially in the cotton business, in order to compete with other sections of the country. We have recently added materially to our schools, both in teachers and in room, and have raised the grade to a regular collegiate course. This and other features in connection with our town affairs, is attracting the attention of settlers. A number of new buildings are contemplated, and will be erected shortly. The war left our people poor, though this section before the war was rich. Almost the only pursuit was raising cotton by slave labor. We now see that a policy of manufacturing our cotton is our only salvation. An abundance of water-power, cheap and accessible, is waiting the advent of capital to put it to useful employment. Mechanics coming to this place will be cordially received and encouraged."

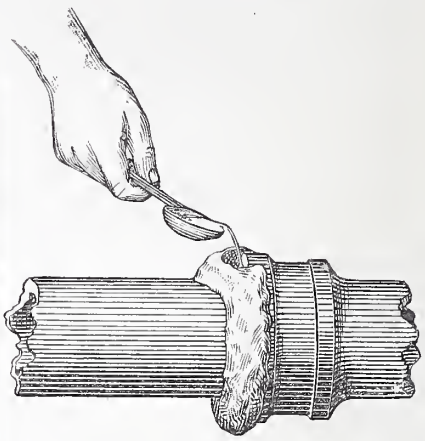
AN ITEM in which members of the architectural profession may be interested recently appeared in some of the daily papers. The government of the Argentine Republic proposes to erect at Buenos Ayres several buildings of importance, and has issued invitations for competitive designs. One building is to be for legislative assemblies, and the estimated cost of it is $180,000. Another building contemplated is a cathedral, to cost $200,000. A third is a palace of justice, the estimated cost of which will be $130,000. A government office, to cost $110,000, and another for a hotel, also to cost $110,000. Each building is to stand in an open square, the dimensions of which are 328 feet on each side. The surrounding streets are 70 feet wide.



Plumbers' Joints.—Fig. 2.—Tamping the Lead Joints, to Avoid the Possibility of Leakage.

How Plumbers' Joints are Made.

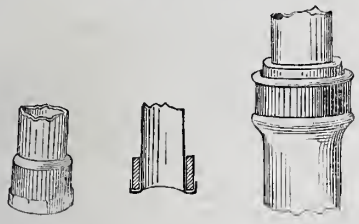
In the last issue we gave some attention to cast-iron pipe, mentioning the fittings which are made to adapt that useful article for the various purposes about house construction. We promised, incidentally, at another time to give attention to the subject of plumbers' joints. Although such matters do not come strictly within the province of a journal devoted to the art of carpentry and building, they do possess sufficient interest to the general builder, who desires to be intelligent upon all the processes and materials employed by mechanics under him, to warrant attention in our columns; hence, at this time we shall give a brief account of how ordinary joints are made in cast-iron pipe, and in passing shall also describe how joints are made in lead pipe.



Plumbers' Joints.—Fig. 3.—Method of Pouring the Lead to Fill a Joint in Horizontal Pipe.

In our last number we remarked that the fillet end of cast-iron pipe fitted into the hub end. The object of a fillet is to center the pipe, when placed in the opening of a hub, in such a manner as to allow an equal space between the two sections of iron. The first operation in making the joint, after the two pieces have been placed together in this manner, is putting into the aperture a sufficient amount of oakum or other similar material, to successfully stop any crevice which may exist, and which would cause the molten lead, afterward to be poured into the space, to waste into the pipe. The process of putting the oakum in position is illustrated in Fig. 1. A sharp, flat-pointed tool, called a calking chisel, is used as there indicated. After sufficient oakum has been driven into the space at the bottom, if the joint be in vertical pipe, as shown in Fig. 1, molten lead is poured into the space, so as to fill the opening between the two pipes level with the top of the hub. If the pipe be a horizontal one, the matter of pouring the lead becomes a little more difficult. The end of the hub is stopped up with clay, which is worked and molded in such a manner as to leave an opening at the top, into which the lead is poured, as shown in Fig. 3. After the lead has cooled, a tool is used, in the manner shown in Fig. 2, to drive the lead still closer into the joint, and thus prevent the possibility of an air-hole.

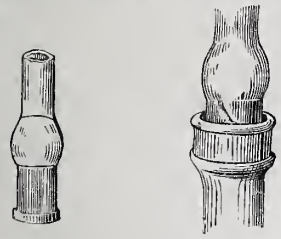
Soil pipes occur in all manner of places, depending upon the character of the buildings in which they are employed. Sometimes they are run against the flat surface of a wall, sometimes they are placed in niches left in the wall for them, and not unfrequently they are required to be put in the angle formed between a wall and a chimney. As may be supposed, it often requires considerable skill and ingenuity upon the part of the plumber to make the joints in cast-iron pipe complete under these varying circumstances. If, for example, it is necessary to run a soil pipe in a corner between a wall and a chimney, the position is such as to make it very difficult, if not absolutely impossible, to calk the joint clear around the pipe. Bent tools may be employed to a certain extent, but there is almost sure to be a place at the back of the pipe which they do not reach. Hence it is in such cases that joints are frequently defective. The builder, by knowing how such difficulties may be overcome, sometimes affords material assistance to the plumber in the way of suggestions. An expedient resorted to in some



Plumbers' Joints.—Fig. 4.—Making a Joint between Lead and Cast-Iron Pipe, Using an Iron Sleeve.

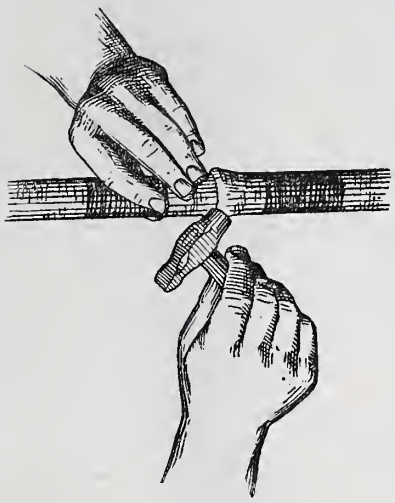
cases of the kind we have just been describing, is to leave the bottom joint—that is, the joint between the vertical and the inclined portion running toward the sewer or drain—until the last, and to turn the pipe around during the operation of making each of the other joints. By so turning the pipe all portions are brought in easy reach of the tools, so that there remains no excuse for making defective joints. By this means only one difficult joint will remain to make, namely, that at the bottom of the vertical pipe, and extra care will produce satisfactory workmanship in it.

The only joint that is worthy of consideration in cast-iron pipe, is that made with lead



Plumbers' Joints.—Fig. 5.—Making a Joint between Lead and Cast-Iron Pipe, Using a Brass Sleeve or Ferrule.

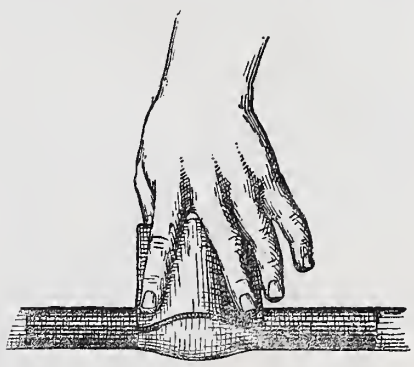
in the manner we have described. Various other materials are sometimes employed, but first-class workmanship, we believe, is impossible with them. Red lead is sometimes used in this connection. It is mixed with oil until it is the consistency of ordinary glaziers' putty. This cement is worked down into the joint with a calking tool, but by the nature of the material it is evident that the joint so formed will not be as reliable as those of the kind already described. In some of the shoddy plumbing work of the day cement joints are employed. In some cases even common mortar is used for the purpose. Joints of these several descriptions are to be condemned outright, for the least movement of the pipe, whether it comes from the settling of building or from contraction and expansion of the parts themselves, will be almost sure to cause a break. A crack in the joint once formed grows larger rather than smaller, and is a source of the greatest danger to the health of the inhabitants of the buildings, on account of the sewer gas thus allowed to escape. Rust joints are in use to some extent. They are made by a mixture of sal ammoniac, flowers of sulphur and iron filings. Joints of this kind are tight beyond question, and make the line of pipe one continuous, rigid piece from end to end The difficulty of getting them apart, how-



Plumbers' Joints.—Fig. 6.—Uniting the Ends of Lead Pipe Preparatory to Making a Wiped Joint.

ever, makes them objectionable in many cases, while the joints themselves are no easier made than in the method we have described and recommended.

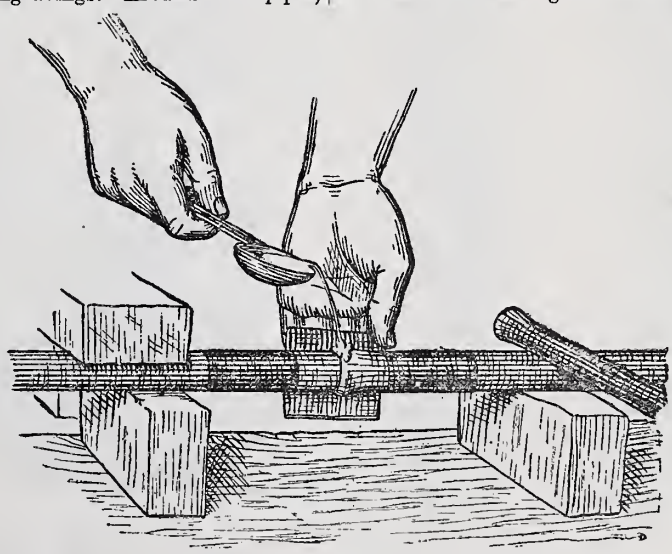
The most common joint which a plumber has to make, in all probability, is that between two lengths of lead pipe. The most approved joint of this kind is commonly known as a wiped joint, and the method of making the same is illustrated in Figs. 6, 7 and 8 of our engravings. In general terms the operation may be described as follows: The plumber first straightens the two pieces of pipe to be jointed, so that all buckles and sags are removed. The surface of the two ends of pipe which are to be united in the joint are made bright by scraping or filing, and in order to prevent oxidation before the solder is applied, these parts are lightly rubbed over with tallow, which also, to a certain degree, answers as a flux in making the soldered joint. The end of one pipe is slightly expanded, and the other fitted into it after the manner shown in Fig. 6 of the engravings. Around both pipes, such a position as circumstances permit, either horizontally or vertically, as the case may be, and fastened temporarily as indicated in Fig. 7. If the pipe runs horizontally, two bricks elevating it from the floor is a very usual method of holding it in place. The solder is applied by pouring from a ladle, as indicated in that figure, a cloth being held by the plumber under the joint, as also there shown, and worked backward and forward around the pipe until a sufficient amount of solder has been gathered and placed to form the joint. It is finally finished as shown in Fig. 8. This operation, although very simple to look at, requires considerable skill upon the part of the operator. Tinners and other amateurs, in attempting plumbing, signally fail in this operation, and frequently resort to joints soldered with an ordinary soldering iron, after the manner of joining tin pipes. Joints of this kind are not reliable, and are to be avoided upon the part of the builder. Nothing less than a wiped joint, made in the manner here described, with a good body of



Plumbers' Joints.—Fig. 8.—Finishing a Wiped Joint, showing the Method of Imparting the Shape to it.

solder, in amount as indicated in Fig. 8, should be accepted by the building superintendent.

One other style of plumbers' joint may be referred to in passing, and that is a joint occurring between lead and iron pipe. Two methods of making joints of this kind are in use, and are illustrated in Figs. 4 and 5 of the engravings. In Fig. 4 the joint is shown made by an iron sleeve which slips over the lead pipe, thus forming an end upon it against which calking can be successfully performed. The sleeve slipped in place, with the lead expanded and turned upward, holding it in position, is shown at A. B is the vertical section through the same pipe. C



Plumbers' Joints.—Fig. 7.—Pouring the Lead for Making a Wiped Joint in Horizontal Pipe.

back of the surface that has been made bright, a band of a peculiar paint employed by plumbers, and generally known by the technical name of "soil," is placed, in order to prevent the solder from adhering where it is not required. After the ends of the pipe have thus been prepared, they are placed in shows the end of the lead pipe with the sleeve in place, slipped into the hub of the iron pipe. After the parts are in this position, a calked joint is made in the same manner as described in Figs. 1, 2 and 3. The second method of making joints between lead and iron pipes is shown in Fig. 5. It is

very similar to the one just described, save that instead of employing an iron sleeve a brass sleeve is used, which is joined to the lead pipe by a wiped joint, as shown at A. The brass sleeve, or ferrule, is provided with a fillet, which centers the pipe in the hub of the cast section, as shown at B. After the parts have thus been arranged a calked joint is made as already described.

NOVELTIES.

SQUARE TURNED WORK.

All of our readers are acquainted with ordinary turned work, by which is meant work produced in a lathe and which usually is round in section. Lathes for turning elliptical forms have been in use for some years, and lathes for turning odd shapes, like lasts, gun stocks, &c., are not uncommon. Lathes have also been constructed for turning octagonal forms, and have been extensively used in factories in the manufacture of newel posts, stair balusters and other forms of a similar character. The New York Turning Company, whose office and factory is No. 523 East Eighteenth street, has adapted the lathe to the production of square forms, which are more in keeping with some of the existing fashions in architecture than those of round or octagonal section. Figs. 1, 2 & 3 of the accompanying illustrations show designs of square turned work produced at this establishment. In a neat pamphlet, recently issued, this company says that the manufacture of this line of goods is a new departure in applying machinery to the production of artistic forms in wood. They say further that it has heretofore been impossible to produce well-proportioned square forms which

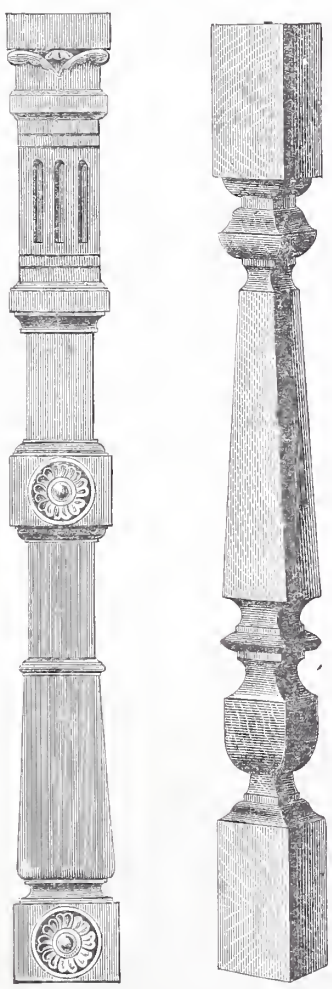
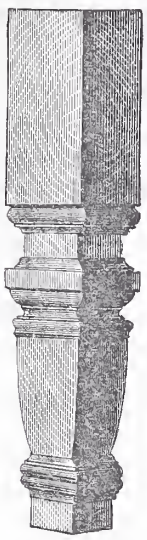


Fig. 1.—Pilaster. Fig. 2.—Baluster.

Novelties.—Specimens of Square Turned Work.

would compare favorably with corresponding round forms, save at an excessively high price. From this it will be seen that their improvement relates specially to the construction and adaptability of the machinery which they have in use. From specimens of workmanship which we have seen, we feel justified in saying that the work they are producing is satisfactory in character, so far as concerns design, proportion of parts and general mechanical execution. Fig. 1 represents a pilaster, which in projection bears the proportion to its face width usual in work of this kind. Fig. 2 represents a square baluster, the four faces of which are alike. The same design is made with a flat back, or, to describe it otherwise, of the character of a pilaster rather than that of a

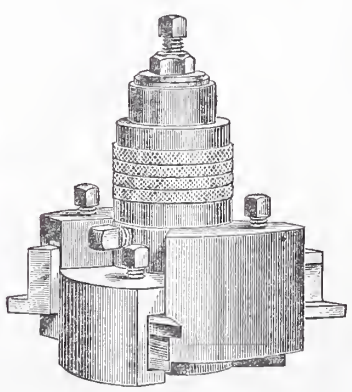


Novelties.—Fig. 3.—Square Turned Chair Leg.

column. Fig. 3 represents a chair leg made in the same general manner. The growing popularity of the Queen Anne and similar styles of architecture has drawn attention to the desirability of square-finished forms, corresponding to ordinary round-turned surfaces. This line of goods is the outcome of the demand indicated, and, inasmuch as the prices are nearly, or quite, as low as charged for ordinary round-turned work, it possesses unusual interest for our readers. Besides the designs of which specimens are here presented, those embracing a combination of square and round forms are made by this company.

AMESBURY EXPANSION MATCHER HEADS.

Figs. 4 and 5 show an improved form of matcher heads, made by G. W. Amesbury & Co., of 3101 and 3103 Chestnut street, Philadelphia, Pa. They present some features of great interest and value which are worthy of the careful attention of wood workers who employ power. These heads are made in double sections, each portion having its own work to do, and being so adjustable that, without moving the hits

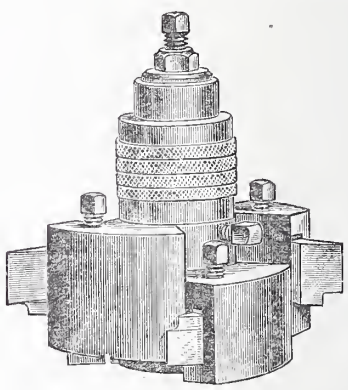


Novelties.—Fig. 4.—Amesbury Expansion Matcher Head, set for Grooving.

from their seats, any thickness of flooring or other matched work can be finished. The time needed for adjustment is only that necessary for loosening a set-screw, and then turning the collars B in the figures until the horizontal distance between the upper and lower cutters is correct for the required width of tongue or groove. The different forms of bits used for the two operations are shown in the cuts, Fig. 1 being that for making a groove and Fig. 2 the tongue; the heads are the same. These are so made that each pair does half of the cutting. They make very smooth work on account of this arrangement, not tearing the timber. The bits themselves are made in such a way that they can be sharpened by grinding instead of filing. The cost of placing them is very small. The user can easily make his own bits if he so desires. The head can be separated and the fixed portion used for any ordinary work, operating, in that case, like any fixed head, but having the advantage of bits inclined away from the plane of rotation, so as to secure a clearing at the leading points, and doing away with friction back of them. It is said on good authority that these heads will turn out an unusually large quantity of first-class work, and make a great saving of time and power. The work itself is said to be of a very superior quality, even when cross-grained or knotty lumber is used. The cost of the improved heads, which are carefully finished in bronze, is the same as the ordinary fixed iron head.

IMPROVEMENT IN PLANES.

Figs. 6 and 7 represent improvements in planes brought out by Messrs. C. Kinney & Co., No. 187 Jefferson street, Detroit, Mich. The first represents a plane gauge, which may be used for either squaring or beveling boards. Its construction is such that it can be readily attached to either jack planes or jointers. By the use of the side thumb-screw, shown in the cut, the gauge is fastened down, forming a square. By slacking the thumb screw, the gauge may



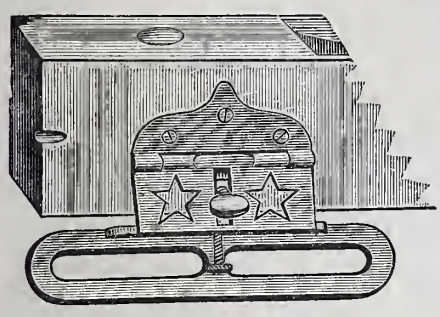
Novelties.—Fig. 5.—Amesbury Expansion Matcher Head, set for Cutting the Tongue.

be set to any bevel desired. It is fastened in position by the thumb-screw shown at the bottom of the plane. By this arrangement it will be seen that a perfect square, or a bevel of any angle required, may be obtained almost instantly. The second improvement, shown in Fig. 7, is known as Kinney's ripping plane. The manufacturers claim for it that it is the only tool made by which either thick or thin lumber can be ripped by hand with ease and precision. In the heel of the plane a small circular saw is so arranged as to be raised or lowered as the thickness of the lumber requires. As the plane is pushed over the board the saw rotates, which makes it follow a straight line instead of being diverted by the grain of the wood. The construction of the tool is such that it can be adjusted to any width with ease. In ripping thick lumber the tool is to be used on both sides.

IMPROVED ROOF BRACKET.

Fig. 8 represents a shingling bracket or roof bracket. The article is shown in position for use, a part of the shingles being removed in order to show how it is kept in place. At one end there are provided two projecting lips, setting out from the sides, at right angles to the face and at about 45 degrees to the top. Another lip, just far enough back of those mentioned to admit of the thickness of a shingle between, is placed at right angles to the top. The manner of using the bracket is as follows: Raise the lower end the thickness of the shingle and slip the upper end between two

shingles. With the two side lips just described below and the other above, push the bracket upward until it is near the foot of the course next above, as shown in the engraving. When the bracket has been thus placed and is pressed down, it will be found to have so firm a hold upon the two shingles engaged that they will be drawn from their places before the bracket will move. A small spur on the foot keeps the lower end in place. Two lugs upon the upper line of the bracket serve to keep the foot boards from slipping. The article is made of malleablo iron, and is quite light, although of sufficient strength for the purposes to which it is put. The



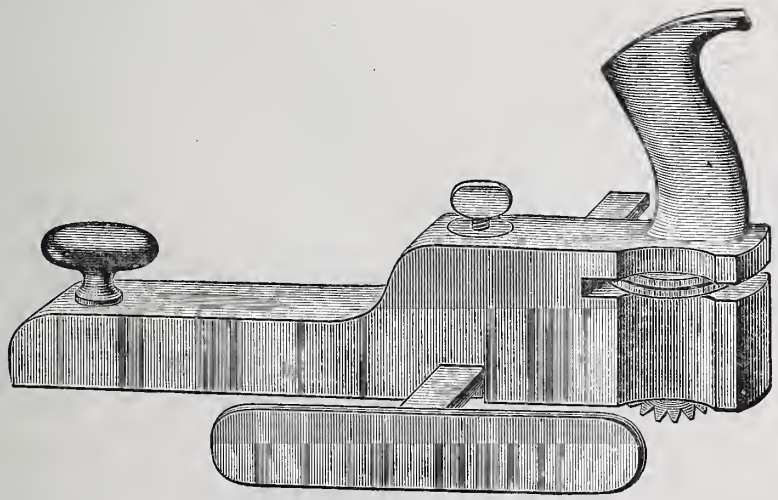
Novelties.—Fig. 6.—Kinney's Plane Gauge.

proportions are such that on a roof of one-half pitch the foot-boards will incline slightly toward the roof. One of the advantages claimed for it is the saving of time by its use. It is the work of but an instant to put it in position. There is a further economy of lumber and nails. The most material consideration, however, is that with its use there are no holes left in the shingles to gather dampness and promote decay. This bracket is made by the Wilder Manufacturing Company, Gardner, Mass., and can be ordered through the hardware trade generally.

The Progress of a Century.

One hundred years is not a very long period, and yet within the last century great things have been accomplished. Among the names closely allied to one of the most important mechanical developments is that of George Stephenson, the centenary of whose birth was recently celebrated in England.

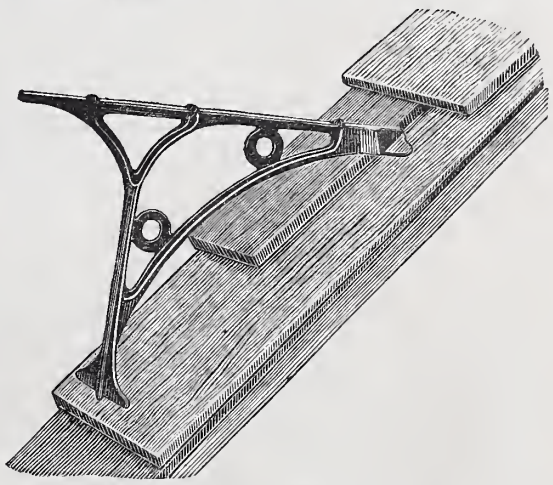
When we consider that Stephenson was a babe 100 years ago, having first seen the light of day in 1781, we marvel at the great results which have grown out of his efforts. He died in 1848, at the age of 67, but the work he accomplished was not only of great importance as he left it, but it has been growing ever since. The record of his career carries with it special encouragement for the young men of the present day, as the opportunities for making important discoveries in the arts and sciences are much greater now than they were in his time. When a boy 14 years of age, Stephenson assisted his father in his labors as foreman in a colliery in England, and by close observation and diligent attention to his duties soon acquired an important fund of practical knowledge, which he turned to good account. He was 31 years old before he reached the position of engineer to the colliery at a salary of $500 per year, and soon afterward he built his first traveling engine to draw the coal wagons along the tramway. While this was a weak and clumsy affair, it was an improvement which commended itself to special favor. From this time one improvement after another followed in rapid succession in the construction not only of the locomotives, but in railway building, until the iron horse is now familiar in almost every town and hamlet throughout the civilized world. It was in 1830—51 years ago, when Stephenson was 49 years old—that the Liverpool and Manchester Railway was opened. He then became one of the most popular men of science of his time, and his advice was widely sought by the promoters of large enterprises. In the light of what has been accomplished in the last century, and especially during the last 50 years, it would seem that another century will doubtless unfold many undreamed-of means of ministering to the temporal necessities of men. When the babe of 100 years ago had reached "middle age," comparatively little had been accomplished in the mechanical arts. Since then progress has been rapid, and never more so than during the last quarter of the century. The mere thought of what the babe of to-day which chances to survive, say, four score years, may see if this rapid progress is continued, overwhelms one's imagination. The past hundred years have been pre eminently the age of steam, and now we seem to have entered upon the age of electricity. What the outcome of the recent discoveries for the conservation of electric force may be remains to be seen, but the outlook —if we may believe recent reports from across the Atlantic—is especially flattering. While the wheels of progress roll rapidly on, let all men show their appreciation of the great privileges which they enjoy. To keep fully abreast of the progress of this latter part of the nineteenth century, it is necessary for one to have his eyes wide open and his mind actively at work.



Novelties.—Fig. 7.—Kinney's Ripping Plane.

The Art of Saw Filing.

The grand secret of putting any saw in the best possible cutting order, says a practical writer on the subject, consists in filing the teeth at a given angle to cut rapidly and of a uniform length, so that the points will all touch a straight-edged rule without showing the variation of a hundredth part of an inch. Besides this, there should be just enough set in the teeth to cut a kerf as narrow as it can be made, and at the same time allow the blade to work freely without pinching. On the contrary, the kerf must not be so wide as to permit the blade to rattle when in motion. The very points of the teeth do the cutting. If one tooth is a twentieth of an inch longer than two or three on each side of it, the long tooth will be required to do so much more cutting than it should that the sawing cannot be done well. Hence, the saw goes jumping along, working hard and cutting slowly. If one tooth is longer than those on either side of it the short ones do not cut, although the points may be sharp. When putting a cross-cut saw in order, it will pay well to dress the points with an old file, and afterward sharpen them with a fine whetstone. Much mechanical skill is requisite to put a saw in prime order. One careless thrust with a file will shorten the point of a tooth so much that it will be utterly useless, so far as cutting is concerned. The teeth should be set with much care, and the filing should be done with great accuracy. If the teeth are uneven at the points, a large flat file should be secured to a block of wood in such a manner that the very points only may be jointed, so that the cutting edge of the same may be in a complete line or circle. Every tooth should be cut a little as the saw is worked. The teeth of a hand-saw, for all sorts of work, should be filed fleaming or at an angle on the front edge, while the back edges may be filed fleaming or square across the blade. The best way to file a circular saw for cutting wood across the grain, is to dress every fifth tooth square across and about one-twentieth of an inch shorter than the others, which should be filed fleaming at an angle of about 40 degrees.



Novelties.—Fig. 8.—Improved Roof Bracket.

Drink for Laborers.—When you have any heavy work to do, do not take either beer, cider or spirits. By far the best drink is thin oatmeal and water, with a little sugar. The proportions are a quarter of a pound of oatmeal to two or three quarts of water, according to the heat of the day and your work and thirst; it should be well boiled, and then an ounce or an ounce and a half of brown sugar added. If you find it thicker than you like, add three quarts of water. Before you drink it, shake up the oatmeal well through the liquid. In summer drink this cold; in winter hot. You will find it not only quenches thirst, but will give you more strength and endurance than any other drink. If you cannot boil it, you can take a little oatmeal mixed with cold water and sugar, but this is not so good. Always boil it if you can. If at any time you have to make a long day, as in harvest, and cannot stop for meals, increase the oatmeal to half a pound, or even three-quarters, and the water to three quarts if you are likely to be very thirsty. If you cannot get oatmeal wheat flour will do, but not quite so well. For quenching thirst few things are better than weak coffee and a little sugar. One ounce of coffee and half an ounce of sugar, boiled in two quarts of water and cooled, is a very thirst-quenching drink. Cold tea has the same effect, but neither is so supporting as oatmeal. Thin cocoa is also very refreshing and supporting, but is more expensive than oatmeal.

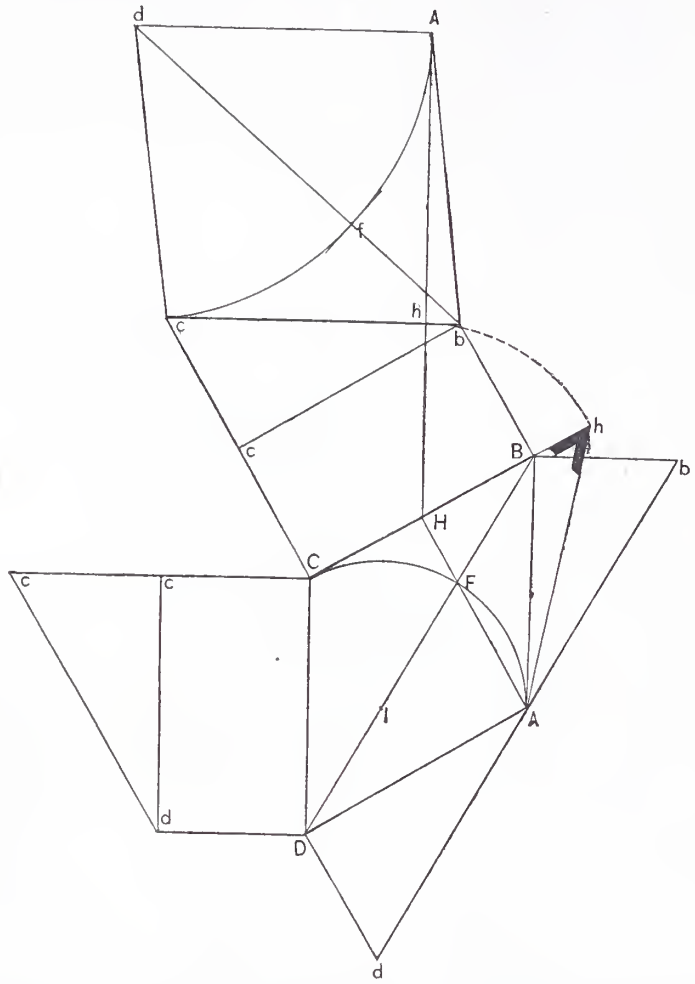
Practical Stair Building.—XIV.

WREATH-PIECES WHICH HAVE A CONTINUOUS RAKE OVER GROUND PLANS THAT ARE MORE THAN QUARTER CIRCLES IN EXTENT.

In Fig. 1 of the accompanying engraving, A C represents a ground plan for a wreath-piece, and is more than a quarter circle in extent. A B and B C are its tangents. The method of procedure in this case is very much the same as in other cases described in former papers. First, produce over this ground plan an elevated center line, having its tangents over A B and B C both on the same pitch. We shall first describe the long method of performing this operation, and afterward the abbreviated method, as shown in Fig. 2, which accomplishes the same results with less lines. The long method shows the reason for the steps taken, while the shorter one is preferable for use after the operations are understood. Referring now to Fig. 1, complete the parallelogram A D C B. Draw the triangles A *d* B and A *b* B according to the proposed rake of the tangents. Draw the rectangles D *d c* C and C *c b* B equal in hight to the altitude of the triangles. Draw the triangles *d c c* and *b c c*, also showing the rake of the tangents. Draw A H perpendicular to B C. From H draw the line H *h* A at right angles with the rake line *b c*. Produce C B to *h*, making H *h* equal to H *h* on the line H *h* A. Connect *h* A as shown. On the line H *h* A make the distance *h* A equal to *h* A of the triangle. Connect A *b* and complete the parallelogram A *d c b*. Draw the lines B D and *b d*. On the line *b d* take the distance *b f* equal to B F. Through *f* draw a short line at right angles with *b d*. With the tangents A *b* and *b c* and the short line at *f* to serve as guides, draw the curved line A *f c*, which will be the elevated center line sought. A *b* and *b c* are the elevated tangents, having their proper angle at *b*. The bevel angle at *h* represents the angle which is formed in the solid figure at the tangent line *b c*.

The accuracy of this diagram may be tested by a cardboard model in the general plan that has been described in connection with similar figures in preceding papers. Make the triangle A *h* H of a separate piece of cardboard. Set it up on the base line A H. Fold the figure upon the heavy lines A B, A D, B C, D C and *b c*. The point *h* in the elevation will meet *h* in the separate triangle, and all the small letters in the elevation will stand over their corresponding capital letters in the plan.

Having obtained the elevated center line, and also its tangents, the method of drawing the rail pattern, as shown in Fig. 3, is as follows: Draw the line *c h b* equal to *c h b* of Fig. 1. From *h*, at right angles with *c b*, draw *h* A equal to the bevel line *h* A. Draw A *b*; then A *b* and *b c* are the tangent lines for the pattern. Bisect the angle at *b* by the line *b f*. Make *b f* equal to *b f* of Fig. 1,



Wreath-pieces which have a Continuous Rake over Ground Plans that are More than Quarter Circles in Extent.—Fig. 1.—General Method of Obtaining Tangent Lines &c.

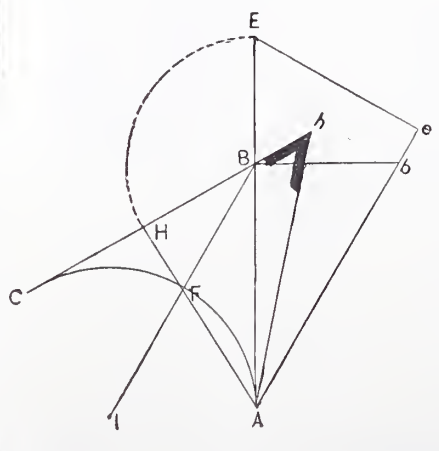


Fig. 2.—Abbreviated Method of Accomplishing the Same Result.

and from *f* as center, draw two short arcs, representing a little more than the width of the required rail. At A and *c* make the pattern about one-quarter wider than the rail, and with short parallel lines to serve as guides; at each end draw the inside and outside lines of the pattern, making them touch the short arcs struck from *f*. The angle at *h* is the bevel for both ends of the piece.

Referring now to Fig. 2, which represents the abreviated method for accomplishing the same results as were reached in Fig. 1. Suppose A C to be a ground line greater than a quarter circle, with its tangents A B and B C. It is required to draw, as shown in Fig. 3, the face pattern for a wreath-piece, having its tangents over A B and B C both on the same rake. Draw the triangle A *b* B, showing the elevation of the tangent A *b* over A B. From A, at right angles with B C, draw A H. Produce A B to E, making the distance B E equal to B H. Extend the line A *b* to *e*, and from E draw E *e* at right angles with A *e*. Produce C B, so as to make H *h* equal to E *e*. Draw *h* A. It may be remarked in passing that by comparison it will be seen that at Fig. 2 the quadrilateral B *b e* E is like the quadrilateral B *b h* H of Fig. 1.

Referring again to Fig. 2, from I the center of the circle of which the ground plan is a part, draw I B. Having thus completed the preliminary work, the pattern for the rail, as shown in Fig. 3, is laid off as follows: Draw the line *c b* equal to A *b* of Fig. 2. Take *b h* equal to *b e*; at right angles with *b c* draw *h* A equal to *h* A. Draw A *b*; then A *b* and *b c* are the tangents for the pattern, having their proper angle at *b*. Bisect the angle at *b* by the line *b f*. Take *b f* equal to B F of Fig. 2, and from *f* as center draw two short arcs representing a little more than the width of the rail. At A and *c* make the pattern about one-quarter wider than the rail. With the usual short parallel lines to serve as guides at each end, draw the inside and outside lines of the pattern as shown, making them touch the short arcs in the center.

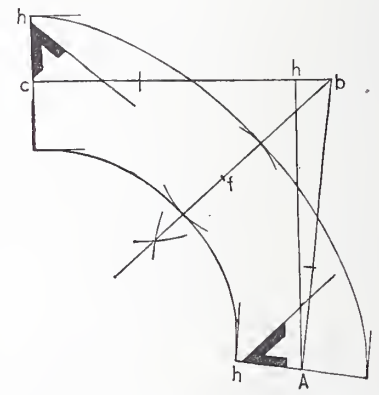


Fig. 3.—Manner of Laying Out the Pattern.

The next case requiring attention is that of

WREATH-PIECES WHICH HAVE A CONTINUOUS RAKE OVER A GROUND LINE THAT IS MORE THAN THE QUARTER OF AN ELLIPSE.

A problem of this kind is illustrated in Figs. 4, 5 and 6 of the accompanying engravings, and need not be described in detail, because the method of procedure is almost identical with that which has just been described, and the lettering of the figures is made to correspond in a way to facilitate investigation upon the part of the learner in case any perplexity arises. For the benefit of such, however, we may remark that in Fig. 4 the line B O bisects the angle A B C. The point O is transferred to the elevation by the line O o. In the elevation the line *b a* bisects the angle A *b c*. In Fig. 5 the line B F bisects the angle A B C, and in Fig. 6 the line *b f* bisects the angle at *b*. Referring again to Fig. 4, the rectangle D *d c* C has the same hight as the triangle A *d* D. The rectangle C *c b* B is of the same hight as the triangle A *b* B.

There is no limit in law to the hight or depth to which buildings may be extended, but the thickness of the walls must be such as to secure adequate strength. There is a practical limit to the depth of buildings in this city. A very deep cellar will in time gather drainage from neighboring sewers. Nevertheless, cavernous excavations of 25 feet depth are quite common.

NEW PUBLICATIONS.

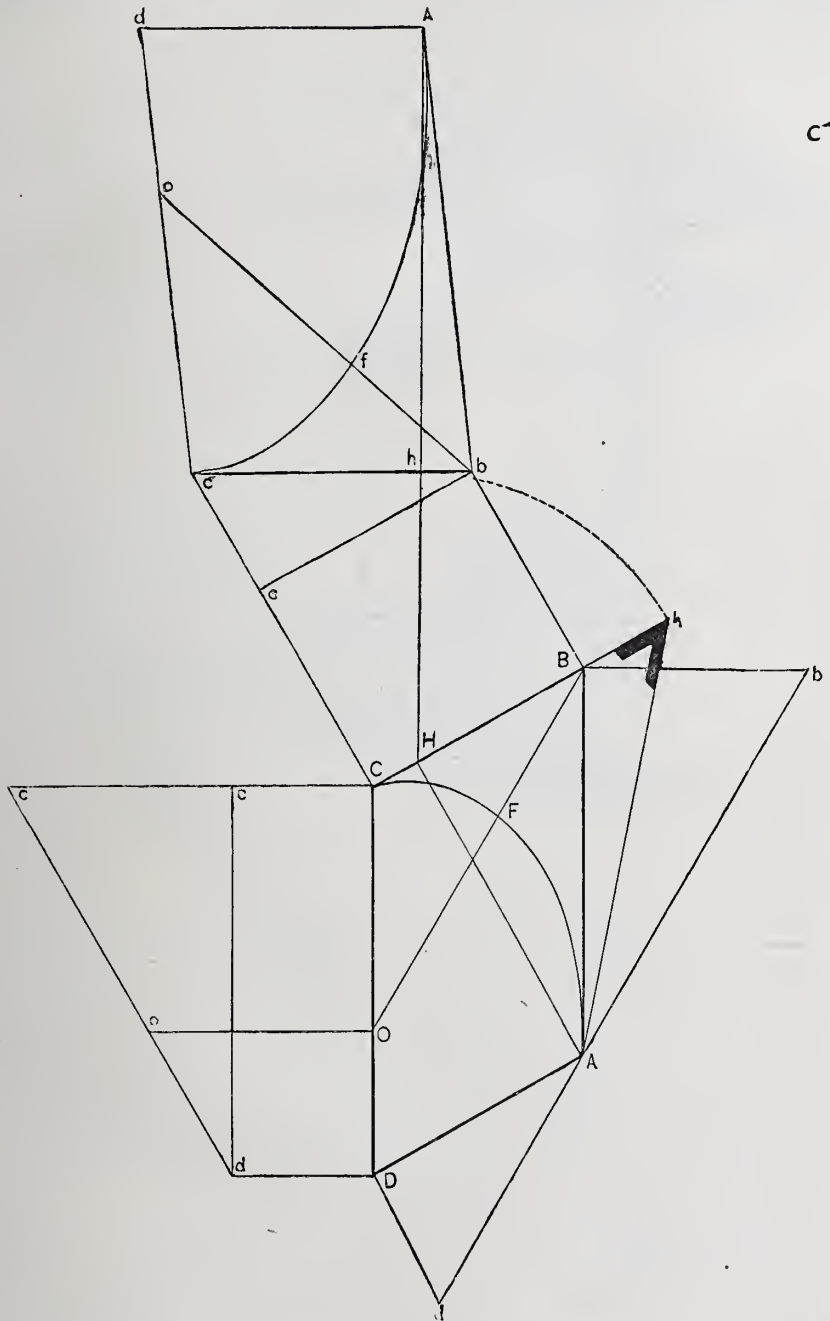
SCIENCE OF ROOF FRAMING. By Aaron T. White. Price, $1.

ROOF FRAMING BY DRAFT. By Aaron T. White. Price, 30 cents. Published by the author.

These little pamphlets, of twenty-six and six pages respectively, present the ideas of the author on the subjects indicated by the titles. In their style the two works are of the nature of a familiar talk upon the part of a mechanic with his fellow workmen. Common terms, rather than unfamiliar expressions, are used throughout. The subject is covered in quite as complete a manner as would seem possible in the limited space occupied. Frequent reference is made to the use of the square in obtaining the proper bevels, cuts, &c., in the first of the pamphlets, while the second is an exposition of the method of obtaining the same results by means of an ordinary drawing. The illustrations are the same in both works, and have the disadvantage of being stock cuts, rather than diagrams prepared expressly for the author's purpose. We understand these two books are but the forerunners of a more elaborate work which the author has in contemplation. There are some things in the methods proposed which we might criticise if our space at this time permitted. We reserve our remarks until the larger and more complete work is received.

THE STANDARD MOLDING BOOK. Containing Designs of Moldings, Doors, Sash and Blinds, Balusters and Newel Posts, &c. Published by the Northwestern Lumberman. Price, 50 cents.

This book is very fairly described by its title. The designs presented are standard in character, rather than of the latest wrinkles in architecture. We notice a few moldings that are of the general form known as reeded. The styles of brackets, scroll work, &c., are similar to those contained in all the planing-mill catalogues, which it has ever been our fortune to examine. A number of designs of stair rails, balusters and newel posts appear at the end of the work. Some price lists of standard moldings for stair-work, together with some house plans showing inexpensive buildings, complete the work. This book is one which would be very useful for builders generally as a matter of reference, although it contains little that may be called other than commonplace. Most of the catalogues issued by local planing mills contain a large proportion of the designs here presented.



Wreath-pieces which have a Continuous Rake over a Ground Line that is more than Quarter of an Ellipse.—Fig. 4.—General Method of Laying Out Tangent Lines.

HOW TO USE WOODWORKING TOOLS. 5 x 7¼ inches in size; 102 pages. Published by GINN, HEATH & CO. Price 75 cents.

This work aims to give, in 14 chapters, the directions and exercises for the use of woodworking tools. It is, in fact, a text book, and we judge was prepared by Mr. George Leonard Chaney, president of the Industrial School Association, of Boston. This industrial school association, during the winters of 1876-7 and 1877-8, conducted schools at No. 23 Church street, in Boston, which were spoken of by the papers as

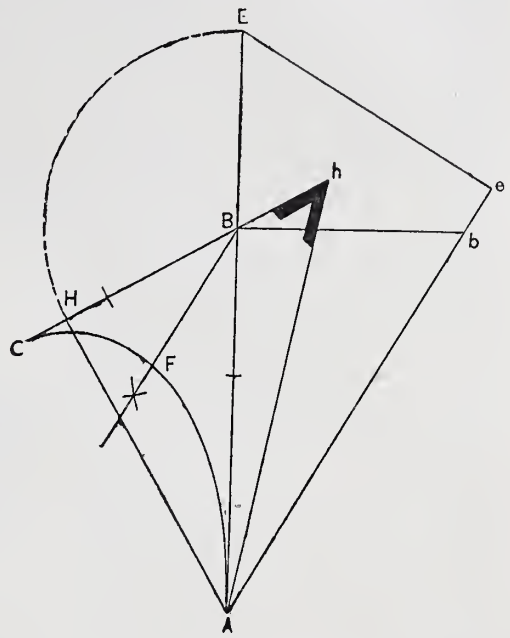


Fig. 5.—Abbreviated Method of Accomplishing the Same Result.

"whittling schools." This manual appears to be the outgrowth of these schools, putting in permanent form the lessons which were there given. It was intended for use in the hands of a teacher. It is, however, so simply written and so well illustrated that any bright boy will find the book alone an efficient teacher in learning the right way to use common tools. The classification is worthy of consideration and even study, being apparently the most perfect and ingenious that has ever been attempted in this exceedingly difficult subject. The chapters are—Striking, Splitting, Cutting, Planing, Sharpening, Adjusting the Plane Iron, Marking and Lining, Scoring and Paring, Sawing, Reducing Warped to Plane Surfaces, Producing Plane Surfaces that are Square with each other,

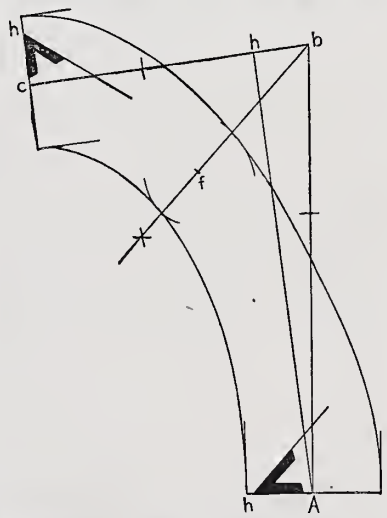


Fig. 6.—Laying Out the Pattern.

Boring, Joinery, Finishing. By any professional system of book making, the number of engravings given would amount to 93 figures, but they are so crowded upon each other and combined together that they are only nominally 13. In many respects it would seem desirable to have the book considerably extended, yet its very brevity is an advantage, and in reducing its bulk the profuse illustrations, applied as they are to almost every operation that can be illustrated, makes the book very complete. In fact, the illustrations themselves are sufficient to form a very good manual without any text.

Builders' Sheet Metal Work.

BY A. O. KITTREDGE.

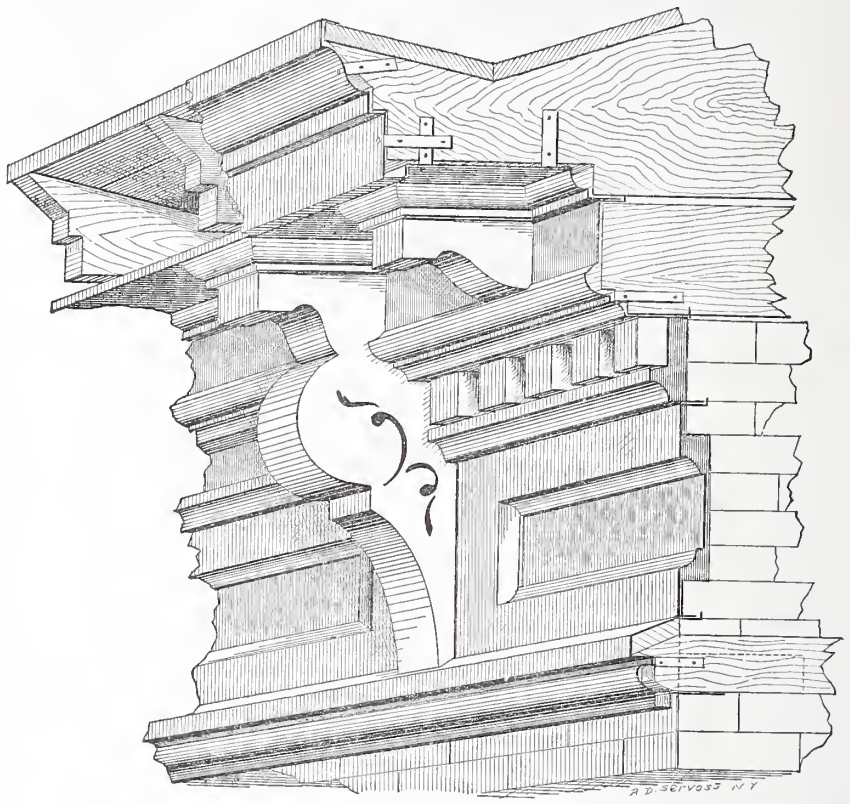
PUTTING UP A GALVANIZED IRON CORNICE.

Every builder who has had galvanized iron cornices put upon the buildings which he has erected, knows by experience that he is required to furnish much of the skill necessary in putting up the cornice, to fit woodwork according to the wants of the cornice worker, and in general to superintend the entire work. Many builders, on account of demands of this kind, have at times become disgusted with galvanized ironwork, and have done all in their power to persuade their clients to employ wood cornices, for no better reason than that their labor in connection with the latter would be no greater than that required with the former. Without any disparagement to the ordinary cornice worker, it may be said that a tinner has very few ideas of construction. Planning work, laying out dimensions, thinking ahead and arranging so that parts shall fit when brought together, is so different from the work to which he is ordinarily accustomed, that when he is called upon to perform it he frequently fails. On the other hand, a carpenter, by long practice, is accustomed to matters of this kind, and, in a majority of cases, finds it necessary to help the tinner out in order to save a greater loss in some other direction. Instead of the builder being opposed to galvanized ironwork on account of the extra trouble caused him, for which ordinarily he gets no compensation whatever, it is better in many cases for him to take charge of the cornice work and manage it the same as he manages other departments of his building. I would not advise this course under all circumstances. Many cornice manufacturers have in their employ men who are entirely competent to plan the work about a building and to see that it is executed in the best manner, promptly and to the best advantage of all concerned. Where such men are not to be had, it is better for the carpenter to take charge of the cornice work, employing a tinner for making such joints as are peculiar to metal work, and which he would find it very awkward to make. The purpose of the present article is to call builders' attention to the best methods of constructing galvanized ironwork in the process of putting up, by which they will, in a great measure, be independent of the tinners, who ordinarily conduct such work.

In the September number I called attention to the joints usually made in galvanized ironwork, both with respect to the lengths of molding and to the horizontal joints between the sections of which a cornice is composed. All that was then said is to be taken as introductory to what follows at this time. Fig. 1 of the illustrations shows a cornice constructed upon wood lookouts, and put up in a manner which experience has shown to be quite satisfactory. The brickwork is leveled off on a line with the bottom of the foot molding, and this member is then set by means of lookouts, clearly shown in the engraving, and a strip of board nailed upon the top of them. The foot molding is formed with a dip or gauge joint as described in the last article, which greatly facilitates the work of putting up. The object of the board upon the top of the lookouts is to provide a solid base for the feet of the brackets. After the foot molding has been put in place the brickwork is carried up to the top of it, and then the brackets are placed in position, being fastened temporarily by any means most convenient. The frieze pieces or panels are next placed in position, being fastened to the brackets by a process technically termed "hooking." Edges are bent inward upon the sides of the brackets, and edges are turned outward on the ends of the panels. After a panel has been slipped in place, the edge of the latter is turned over the edge in the side of the bracket, thus hooking the two parts together. Along the bottom of the panel an edge is turned inward, which, meeting the edge turned upward on the top of the foot molding, serves as a gauge in lining the panel, and a means of fastening it to the course below. The two flanges should be riveted together, and the edge, which is turned up on the foot molding, bent over so as to form a water-tight joint. After the panels have thus been placed, the brickwork may be carried even with their top. Should the panels be very high, straps should be riveted to them at intervals and drawn into the brickwork, thus securely fastening them in position. When the brickwork has been carried to the top of the panels, the dentil course, into which the dentils had been fastened before the work was carried to the top of the building, is put in position. The lower edge of the dentil course fits back against the edge on top of the panels, as shown in the engraving, thus forming a gauge by which it may be readily placed, and also forming a means of joining the two sections together from the back, which is to be done as described in connection with the foot molding. After the dentil course has been placed in position, the brickwork may then be carried to the top of it, after which the woodwork for sustaining the modillion course is to be put in position, and the same operation described for the preceding section repeated. In practice it seems to be better to fasten the modillions against the modillion course on the ground, leaving the planceer loose to lay flat upon the modillions and the brackets, and to be fastened in position after all are up, rather than to put it upon the moldings on the ground. Slight irregularities will occur in work of this kind, and some means of compensating for them, and of obtaining a straight line in the final members, should be provided, and, accordingly, by placing the planceer on the modillions after they are in position, it may be shifted one way or the other, as may be necessary to provide a straight line along its outer edge, against which to hook the crown molding. The planceer may be joined to the modillions by cutting through in the center of them, and turning down edges and bending them around so as to clinch with the edge in the top of the modillion. Instead of cutting out the entire size of the modillion and joining in this way, only a portion of the iron should be cut away, so as to leave as much strength in the planceer as possible. The same course is to be pursued in the tops of the brackets.

When the work has reached this stage the principal lookouts may be put in position, and straps, which have previously been riveted at proper intervals to the planceer, are to be carried up alongside the lookout and fastened to them by nailing, as shown in the engraving. This means of fastening the planceer is much better than nailing through it directly into the lookouts. The last operation in putting up the cornice is to hook on the crown molding and fasten it in place by means of straps just described.

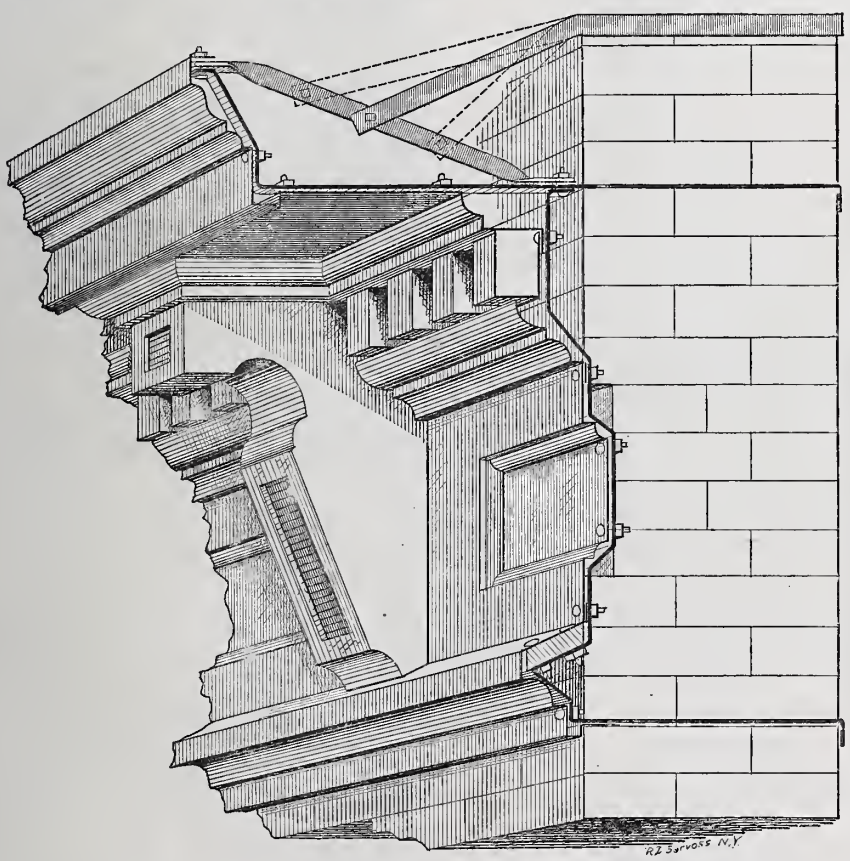
This process of putting up galvanized ironwork is different in some particulars from that generally employed by cornice makers, but, on the other hand, it has the sanction of some of the most experienced mechanics in the country, and long practice has shown it to possess actual merit. No builder who has a pride in the quality of the work constructed under his superintendence, should allow a cornice to be put up from the outside—that is, simply nailed on the face of the building. A great deal of work has been done in this way, and has brought reproach upon sheet-metal cornices, besides producing buildings which have an appearance that is anything but satisfactory to their owners, or a recommendation to the builders in charge. It frequently happens that work is fastened to the outside after the walls are up, because the cornice was not ordered in time or not shipped promptly. Excuses of this kind are frequently offered, but are insufficient when the quality of the work is taken into consideration.



Putting up a Galvanized Iron Cornice.—Fig. 1.—Approved Construction, Using Wood Lookouts.

Fig. 2 of the illustrations shows an approved method of constructing a cornice by means of wrought-iron lookouts. Wooden lookouts inside of an iron shell, which, by a fire in an adjacent building, may be ignited, cannot be considered fire-proof. An iron cornice will fend off a fire for a considerable length of time, but if the lookouts within it are ignited the sheet iron is an effectual barrier against the water which otherwise might put out the fire, and, therefore, in many instances an iron cornice becomes a veritable fire trap. Fire-proof construction demands the absence of woodwork inside of the cornice. In some cities galvanized ironwork is prohibited unless erected upon iron supports. The construction of the cornice upon iron lookouts is a matter that concerns the builder perhaps less than that in which wood is employed, because wrought-iron work is in most cases under better superintendence than ordinary sheet-iron, and therefore work of this kind needs less attention from him than that I have just been describing. It is well,

however, in this connection to call attention to some general features, so that the builder may know what is really good in work of this kind. One mistake which seems to be very generally made by makers of fire-proof cornices, is in the weight and dimensions of the wrought-iron supports used within the cornice. It is hardly necessary to use a 2 x 2 T or a 2 x 2 angle iron, as I have frequently seen employed in work of this kind, for sustaining sheet iron which, at most, weighs only about a pound to the superficial foot. It is very generally the practice in the cities to construct the cornice upon the ground in sections, and hoist the same to the roof and place it in position, and then allow the brickwork to be carried up afterward. While this plan has merits, it is not in all cases satisfactory. Some styles of cornice make it almost necessary to construct them in this manner. In other cases the cornice can be divided into sections horizontally, and a part at a time placed upon a building. Experience seems to indicate that this plan is calculated to afford the best results. The engraving shows very light lookouts employed, to which the cornice is fastened by bolts. The construction is such that the lower portion of the cornice may be in position, and the wall carried up level with the top of the brackets, before the other part is placed. If an outside scaffold can be provided, which in many cases (especially where pressed-brick fronts are used) is a matter of no expense or trouble, it is a simple matter to construct the cornice in sections and put it in position as the brickwork is carried up, thus making it a part of the building and getting the joints straight and perfect from one end to the other. The dotted lines in the upper part of the engraving show a means for providing the fall necessary in the gutter. The brace running from the principal tie to the point of the crown molding is punched with a number of holes, or else the several braces are calculated beforehand and punched accordingly, while the upper tie, which is placed edgewise, is bent according to the requirements of the case, higher or lower, as it may be nearer one end or the other of the gutter. There are various ways of constructing the gutter on the top of lookouts of this kind. A very common way is to line the gutter with heavy sheet iron, fastening the iron to the lookouts either by cleating or with wires, and then laying a tin or copper gutter above this. In some cases I have seen wood gutter lining introduced, even though iron lookouts were employed. This I do not recommend. So much depends upon the general construction of the building, that at best only suggestions in matters of this kind can be offered. Construction of the cornice must be varied from time to time to suit requirements, and the intelligent manufacturer and superintendent will know how to adapt the work to circumstances.



Putting up a Galvanized Iron Cornice.—Fig. 2.—Construction with Iron Lookouts.

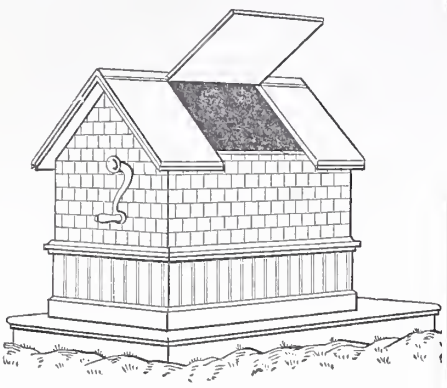
NOTES AND COMMENTS.

Mr. Wm. P. Esterbrook, the present inspector of buildings in New York City, and one of the authors of "The American Stair Builder," has always taken a prominent part in building matters in this city, having been in the business for a number of years. Mr. Esterbrook is a native of England, having been born in that country in 1816. He was taught drawing by his father, who was a master builder and architect. At the early age of 16 he decided to seek his fortune in the new world, and arrived in this city in the spring of 1832. One of his first engagements was on the Colonnade row of buildings in Lafayette Place, where he was employed with the late R. G. Hatfield, the author of several prominent mechanical works, who commenced learning the carpenter's trade in that year. Mr. Esterbrook, as a mechanic, was for several years employed at stair building, and during his practical work in this line discovered the scientific principles of hand-railing, which he afterward incorporated in the book he published. Besides publishing this work, he gave private instruction to many stair builders from all parts of the country. After being employed as a foreman by one of the most prominent builders of the day, and being engaged upon buildings for many of the old merchants of New York, Mr. Esterbrook commenced business on his own account, and continued in the line of a builder and architect for 30 years. He has resided in New York constantly, with the exception of a few years, when he lived in Westchester County, just beyond the city limits. While residing there he was elected a supervisor of the town of Eastchester, and was appointed by the County Board chairman of a committee to erect an addition to the county courthouse. This work was carried through to completion at 18 per cent. less than the amount appropriated, a thing that had never before occurred under like circumstances. Mr. Esterbrook was also three times elected trustee of the village of Mt. Vernon, and also elected as a member of the Board of Education of the same village. He planned and superintended the erection of a large school-house, costing $50,000, which was completed for less than the original appropriation. He was appointed to his present position in August of last year, and his administration has resulted in a reduction of expenses and greater efficiency than has heretofore been known in the bureau of buildings.

Improved Siding Machines.—One of the recent improvements in the manufacture of lumber is in machines for cutting siding directly from the log. The fact that the great pine forests of the country are rapidly vanishing under the ax of the woodsman and the saw of the lumber manufacturer, has already put the inventive minds of pine land owners to work to devise some means by which the waste of material can be checked. This desire to save and utilize all parts of the log, has stimulated two of the leading manufacturers of Michigan to invent machines for making siding directly from the log, in a manner that will enable them to get twice as much from a given log as could be obtained by the old method. The old style of sawing siding was to cut it from the log flatwise or across the sap, the same as ordinary boards are cut. This made a very inferior article, on account of its liability to warp and shrink. It was also full of knot holes, save only when cut from logs that were free from knots. Siding made by the new machine does not shrink or warp, because it is cut from the sap or surface toward the heart of the log down through the grain, instead of across it. In cutting this way a log full of knots will yield a fair quality of siding, because the board is sawed lengthwise of the knot, and accordingly, it either comes in two at the knot or the knot may be afterward sawed out in cutting the siding up into different lengths. This affords opportunity of using poor logs, while by the old method the very best had to be used, and even then the siding would occasionally have knot holes. One knot in a log would make a hole in every piece taken off as far down as the knot extended. In the new method one knot can only appear in one board, unless it be unusually thick, and then two boards will generally take it entirely out, thus enabling the operator to get a large number of pieces of siding which are entirely free from deformity or defects of any kind, though the log may be an inferior one and have a large number of knots in it. The process of cutting is very simple. The log is quartered to begin with. The quarter is then placed on a carriage and fed radially to the saws by steam. The siding is cut off with a circular saw, and both edges of it are trimmed at the same time by two small saws, set the proper distance for 5 or 6-inch siding, as the case may be. Every piece cut by the machine is true in thickness and width. When sawed up into different lengths, the ends are trimmed so as to make perfect joints. It is said that a log under this process yields the manufacturer twice as much profit as when put in ordinary lumber. The hearts of the logs are made into shingles, and thus all except the strip trimmed off the siding is converted into saleable product. The machines referred to make from 18,000 to 25,000 feet of this new siding each per day.

A well-known landmark in this city, known as the Washington Hotel, and which occupies ground at the corner of Broadway and Battery Place, is about to be destroyed. This building enjoys the notoriety of being the oldest building now standing in the city. It derived its name from being the headquarters of Gen. Washington on his occupation of the city after the evacuation by the British troops. The house was built in 1742. Previous to that time the site had been occupied by a tavern, which had been built in the seventeenth century by Pieter Kocks. The

present house when built was a copy of that of the British Ambassador at Lisbon, and the plans were sent here from the Portuguese capital. At the timo it was erected it was considered one of the finest mansions in the country. One of its rooms (26 x 40 feet) was a famous banqueting room, and was used on all great occasions. Major André, who was in the family of Sir Henry Clinton, who occupied the house during a portion of the time after the British forces held New York, went from it on his fateful journey up the Hudson River to meet Benedict Arnold.



Design for Well House.—Fig. 1.—Perspective View.

The brick making industry along the Hudson River shows in a remarkablo manner the influence of the present activity in building matters in this city. During the season of building prosperity, just prior to the war, a large number of uew brick-making establishments were started in this section of the country, occupying almost every available point on the river. Clay banks near the channel proved almost as valuable as gold mines. The industry was overdone, and the war coming on and building interests becoming paralyzed, a large number of failures occurred, resulting in closed establishments, some of which remained shut from that time until the present era of activity set in. Now not a single yard along the river can be found unoccupied. Old yards have been largely extended, and working facilities have been greatly increased by the introduction of steam and other modern mechanical appliances. Many new yards have been constructed at various points. The total product of the river section during 1880 amounted to 500,000,000 bricks. There is reason to believe that a much larger number will be made the present year. There are about 175 different yards in operation on both banks of the river. Few of theso make less than 20,000 per day, and one or two have a daily capacity of 125,000. Estimating the average capacity of each at 40,000 per day, gives a grand total for seven months' season of very nearly 1,250,000,000 of bricks. Deducting the 250,000,000 for losses from bad weather, bad burns and breakage in handling, a round 1,000,000,000 is left for the market.

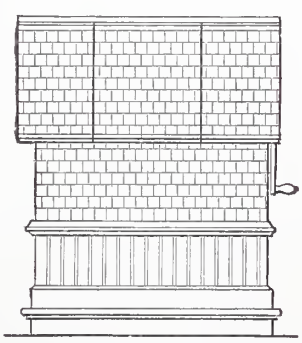


Fig. 2.—Side Elevation.

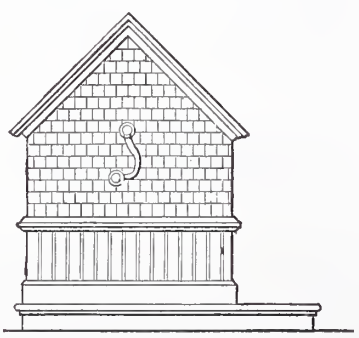


Fig. 3.—End Elevation.

Design for Well House.—Scale, ¼ Inch to the Foot.

In a recent number of the paper we gave a summary of tho report of the Fire Department of New York City for last year. One of the marked features of this report was the large number of fires which are constantly occurring in this city. In contrast with this, the reports of European cities are quite interesting. Everybody who has visited England and the Continent, knows the comparative infrequency of fires in the well-built European cities. Sometimes a thoughtless American, in his comments on the scarcity of local news in the London papers, cites the few reports they print of fires as if it were true that serious fires occur and do not get reported. The fact is that fires, though few, are always chronicled whenever they entail any considerable loss. From Ediuburgh has just been received a report of fires which forcibly illustrates what is true of most other cities in Great Britain. The total number of alarms for the year was 339, of which 55 were false alarms, 61 proved to be merely chimneys burning out, and four were outside of the city, leaving the real number of fires only 219. Of these fires, 66 were extinguished with buckets of water, 94 with hand-pumps, 17 by persons on the spot before the firemen arrived, 40 with hydrants, and only two with engines. Not one of the 219 resulted in very serious loss or damage. Although there was an increase of 73 fires over the number for 1879, the total loss was less. As a still further evidence of the lack of serious conflagrations, it may be added that during the past three years, out of 608 fires in Edinburgh, only three resulted in serious loss. These facts appear still more striking when the strength of the department is considered. The permaneut staff comprises 28 men, and the auxiliary staff 10, making 38 in all. Of stations there were 9; of hand engines, 5; hose carts, 2; hand-drawn hose reels, 10; fire escapes, 2; hand pumps, 16; horses 4, and steam engines, 1.

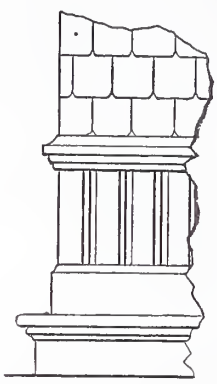


Fig. 4.—Detail of Base and Siding.—Scale, ½ Inch to the Foot.

Mr. William Pickhardt is credited with building the tallest private residence which has so far been erected in New York City. The building referred to is located at the corner of Seventy-fourth street and Fifth avenue, and is now in process of erectiou. It will be 6 stories in hight, with a basement and cellar and a sub-cellar, making nine stories between roof and foundation. To balance the hight above the curb, 120 feet, there will be a breadth of 125 feet. The depth below the curb is 26 feet. The total cost is estimated at uearly $300,000.

Repairing an Old Spire.—Those of our readers who live in New York and who visit the lower part of the city, have undoubtedly had their attention called to the scaffolding which at present encircles the spire of St. Paul's Church, just opposite the *Herald* office. Some thirteen men have been at work upon this building for upward of a month, their object being to repair the spire. Up to the time of writing very little has beeu accomplished beyond the erection of the scaffolding and ascertaining what parts really needed attention. St. Paul's Church is the oldest church building in the city. The building proper was finished in 1766 aud the tower in 1794. The clock was made in London in 1798, and was placed in position shortly afterward. The fact that the present is the first repairing that the tower has received, speaks well for the character of material used in its construction and the workmanship employed. Examination has shown that the oak timbers of which the structure is framed are as good as when they were placed in position, some 87 years ago, and they look as if they would last a century longer without needing repairs. The outside work, however, is not in so satisfactory a condition. It is mostly pine, and has rotted very badly. The entire hight of the tower is 150 feet. Nineteen thousand feet of lumber have been consumed in the scaffolding, making its cost upward of $1000.

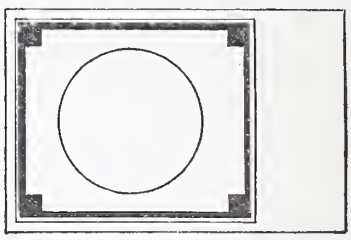


Fig. 5.—Plan of House and Platform.

Steam Elevators are gradually being introduced in private residences. An elevator runs through four stories of the house that William H. Vanderbilt is building ou the northwest corner of Fifth avenue and Fifty-second street. Elevators are also in operation in the residences of J. Pierpont Morgan, Frederick F. Thompson, in Madison avenue; F. W. Stevens, Fifth avenue and Fifty-seventh street; J. A. Bostwick, Fifth avenue and Sixty-first street; E. N. Dickenson, East Thirty-fourth street, and in many others.

Design for Well House.

The accompanying design for a well house, with details, is from Mr. W. L. Morrison, Rochester, N. Y., and accompanied the design for the stable and summer house which we have already published. As will be seen from inspection of the perspective, the old style windlass is the means employed for raising the water. The platform sills are to be 6 x 6 inches in size and the floor to be 1⅜-inch clear, dry, planed and matched pine. The posts are to be 4 x 6 inches, and the pieces to support windlass 6 x 6, all well framed and strongly braced. The windlass is to be constructed in the usual manner, and provided with an iron crank. A battened door, shown opened in Fig. 1 of the sketches, is to be properly fitted and shingled on the outside. It is to be hinged at the upper edge and provided with suitable means for fastening open as may be required. The sides of the well-house are to be ⅞-inch matched and beaded stuff, well nailed to the posts and braces, all to be covered with ⅜-inch pine shingles, laid 5 inches to the weather, and with the ends cut, as shown in the engraving. The ends are to be finished with ⅞-inch matched and beaded stuff, with base and molding, all as per detail. The roof boards are to be covered with shingles the same as above specified. The structure should be painted two coats linseed oil and lead paint, of the best quality, two tints of brown being used according to taste. The shingles should be painted indian red, to match the summer-house presented in the last number of the paper, provided the two are erected near each other. The cost, when executed to the above specifications, is put at $35.

An Unsafe Building.—One of the most prominent buildings recently erected in the lower part of the city is the United Bank Building, occupyiug tho corner of Wall street and Broadway. This building has

been recently declared unsafe by the Bureau of Buildings. The specification is that the material used in filling in between the iron beams of the several floors, inclusive of plastering on the same, was unsafe. Examiner Esterbrook has ordered the floors propped up for safety while the parts are being replaced in a proper manner. The building was finished in May last. Its cost when completed was $450,000. The design and superintendence was by Boston architects. The builder was B. L. Darragh, of this city.

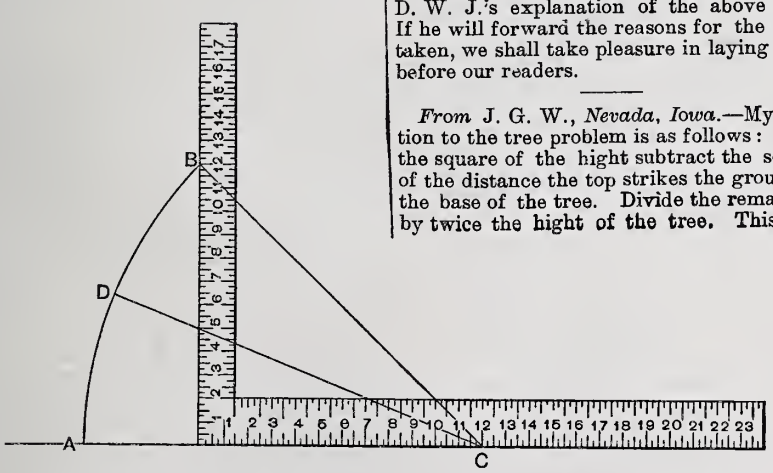
CORRESPONDENCE.

Our correspondence this month embraces a great variety of topics, and will, we think, prove of unusual interest to our readers. Wawayanda's house has received a fair measure of attention. We publish a portion of the letters received, all of which contain valuable suggestions, and one or two of which are quite readable, aside from the mechanical points covered. Now that some of our readers have expressed themselves upon the questions raised by Wawayanda, their suggestions are open to criticism, and if our readers will show wherein better methods can be employed than those now presented, we shall take great pleasure in publishing such letters as they may send us.

A. L. S.'s fallacy has called out an unusual number of replies. We publish several of the letters, which may be taken as fair samples of the opinions of our readers. To have published all we have received relating to this subject would have occupied more space than we could spare. Those who have sent us communications concerning this matter and who only find their initials mentioned, are reminded that we appreciate their attentions just as much as though we had published in full all that they have written. We shall be glad to hear from them again whenever opportunity may present itself.

Where the Inch in an Octagon Miter Goes to.

From S. O. E., *Evergreen, La.*—I inclose a sketch (Fig. 1) showing W. W. C. where the inch goes to in the octagon miter. Place the square as shown. Bisect the arc at D. Draw a line from D to 12 of the blade. The reason that this line crosses the tongue of the square at the 5 mark is apparent upon inspection of the sketch. It is because the measurement is taken near the center of the circle.



The Inch in an Octagon Miter.—Fig. 1.—Explanation Offered by S. O. E.

From J. L. B., *Auburn, N. Y.*—I noticed in the June number an inquiry concerning where the inch goes to in an octagon miter. The question reduces to this: Since 12 and 12 of the square give an angle of 45 degrees, why will not 12 and 6 give the half of that angle, or 22 degrees 30 minutes? Why is it necessary to use 12 and 5? This I will attempt to answer. In the accompanying sketch (Fig. 2) let A B and B C be equal, each being 12 inches, making the angle A 45 degrees. Bisect this angle by the line A D. Describe the arc B E. Draw E. D. Since the triangles A B D and A E D are equal, E D and B D are equal. From D as a center, with radius D E, describe the arc E F, then evidently D F will be equal to D E, and therefore equal to B D; then the line B C will be made up of three parts, B D, its equal D F and the part F C. B D and D F will each be equal to 5 inches, or more acurately 4.97+, and F C will be equal to 2 06. One-half of this, or 1 inch, will be the difference between B D and one-half of B C.

Construction of a Right Angled Triangle.

From D. W. J., *Oakwoods, Texas.*—An arithmetical solution of C.'s problem may be presented as follows: Tho sum of the squares of the two sides of a right-angled triangle must equal the square of the hypothenuse. Suppose the tree to break off 20 feet from the base. This gives $50 \times 50 - (20 \times 20 + 20 \times 20) = 1700$, the first error. Next, suppose the tree to break off 30 feet above the base; we then have $40 \times 40 - (20 \times 20 + 30 \times 30) = 300$; second error. The difference between these two errors is 1400, and the difference between the supposed lengths at which the tree should break is 10. From this we have the following formula: 1400 : 10 : : 1780 : ×. The answer to which will be the difference between 20, the first supposition, and the number sought. The fourth term of the above proposition is 12.142 +. This, added to 20, as just stated, gives 32.142 +, which is the distance, in feet and decimal parts of a foot, from the base at which the tree will break.

Note.—The readers of *Carpentry and Building* will undoubtedly be interested in D. W. J.'s explanation of the above rule. If he will forward the reasons for the steps taken, we shall take pleasure in laying them before our readers.

From J. G. W., *Nevada, Iowa.*—My solution to the tree problem is as follows: From the square of the hight subtract the square of the distance the top strikes the ground to the base of the tree. Divide the remainder by twice the hight of the tree. This will give the hight of the stump, or, to give it in formula, we have the following:

$$\frac{H^2 - B^2}{2H} = P.$$

To find the length of the part broken off or the hypothenuse, we have the following:

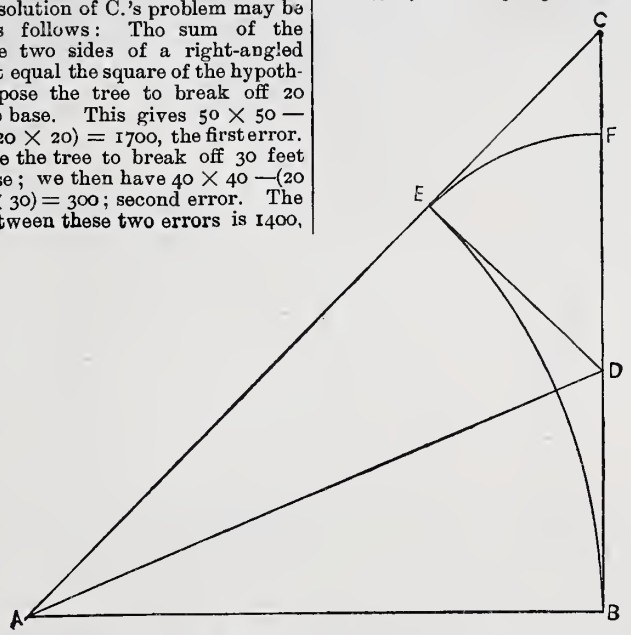
$$\frac{H^2 + B^2}{2H} = H.$$

In the above formula H equals hight of tree, B equals base, or the distance from the foot of tree to where the top strikes the ground; P equals hight of stump. These formulæ are based on the principle that the square of the hypothenuse is equal to the sum of the squares of the other two sides.

From B², *St. Paul, Minn.*—Let x represent the distance above the ground where the tree must break. Now, by the conditions of the problem, we have a right angled triangle with x the perpendicular and $70 - x$ the hypothenuse; consequently

$$x = \sqrt{(70 - x)^2 - 20^2}.$$

Squaring we have $x^2 = (70 - x)^2 - 20^2$. Squaring and transposing we have $x^2 = 4500 - 140x + x^2$. From this we find that $140x = 4500$, or $x = 32.131$ feet.



The Inch in an Octagon Miter.—Fig. 2.—Diagram Accompanying Letter from J. L. B.

From Robert Jones, *Waynesburg, Ohio.*—The problem published in *Carpentry and Building* for June attracted my attention, inasmuch as it required an arithmetical solution. The proposition may be stated as follows: In a right-angled triangle, whose base is 20 feet and perpendicular 70 feet, required at what point the perpendicular shall be divided, so that the part cut off will form the hypothenuse of a new right-angled triangle whose base shall be 20 feet. In my school days, when we had mastered the "Western Calculator" we were passed as good enough. It is by a rule from this book, called the rule of double position, that I propose to solve the problem.

The rule may be stated as follows: Measuring from the base, suppose two points at which to cut the perpendicular, and proceed as if each were correct. Each operation will develop an error. Now cross multiply the supposed numbers by their errors, divide the difference between these products by the difference between the errors, and the result will be the correct solution. Let us try this problem by the rule just stated. First, suppose 30 feet above the base to be the point at which the perpendicular should be cut. This would leave 40 feet for the hypothenuse. For the second supposition we will assume 32 feet as the point above the base at which the perpendicular is cut. This will leave 38 feet for hypothenuse. Referring now to the first supposition, the square of the perpendicular would be $30 \times 30 = 900$. The square of the base would be $20 \times 20 = 400$. The sum of the squares would be 1300. Extracting the square root of this, we have 36.05. The supposed hypothenuse in this case was 40 feet. Subtracting 36.05, we have 3.95 as the first error.

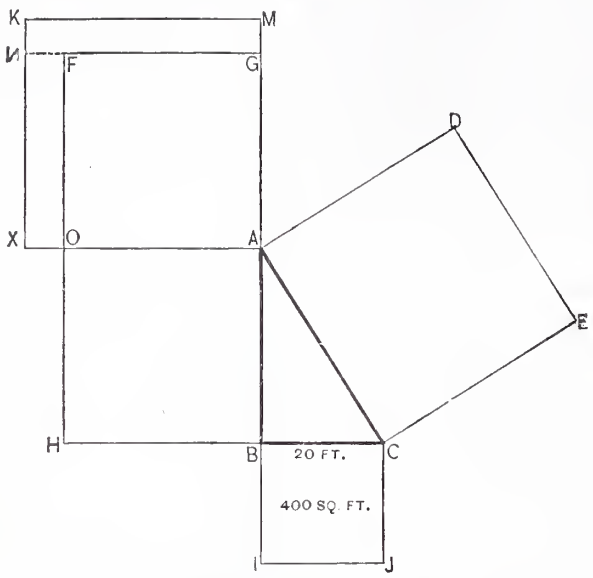
Taking the second supposition and squaring the perpendicular, we have $32 \times 32 = 1024$; squaring the base, $20 \times 20 = 400$, the sum of the two being 1424. Extracting the square root of this gives 37.73. The supposed hypothenuse in this case was 38 feet. Subtracting 37.73 leaves .27 as the second error.

The first supposed perpendicular, 30 feet, multiplied by .27, the second error, gives 8.10. The second supposed perpendicular, 32 feet, multiplied by 3.95, the first error, gives 126.40. The difference between these

products is 118.30. The difference between the two errors is 3.95 − .27 = 3.68. Dividing 118.30 by 3.68 gives 32.14 +, the correct perpendicular. Subtracting this from 70 feet gives 37.85 + as the correct hypothenuse.

A correspondent, whose communication reaches us without address or signature, sends the following as an answer to the problem:

The square A X K M or the square A D E C is composed of the two squares A O H B and B I J C. By taking the square A O H B out of the square A X K M, there will be left the two parallelograms M K N G and N X O F, which, by the conditions of the problem, must be equal to the square B I J C, or, in other words, 400 square feet. Now,



Constructing a Right Angled Triangle.—Solution by an unknown Correspondent.

the length of the parallelograms M K N G and N X O F is equal to 70 feet, the hight of the tree. By dividing the number of square feet contained in these parallelograms, namely, 400 by 70, the length, we get the breadth of these figures, which is 5.7 + fect, which is the distance M G. Now, M B and M C equal G B, which will be twice the hight of the part standing, or, expressed arithmetically, 70 — 5.7 + equal 64 2 +, which is twice the hight of the part standing. One half of 64.2 + equal 32.1 +, which is the hight of the part standing. From this statement the following rule is deduced: Divide the square of the base by the hight of the tree. Subtract the quotient from the hight of the tree and divide the remainder by 2; the result will be the hight of the part standing.

Squaring a Board With a Pocket Rule.

From O. R., *Springfield, Mass.*—Referring to the rule for squaring a board, furnished by G. W. P., and published on page 119 of the volume for 1880, I would say that it is an adaptation of the proposition that lines drawn from any point in a circle to the two ends of a diameter will form a right angle In the inclosed sketch (Fig. 1), A B C D are the same points as used by G. W. P. The center B can be changed into any other position, so that the circle may cut the board in two points. This may be illustrated by placing it so that A E will be the edge of the board; then E B will be at right angles to it.

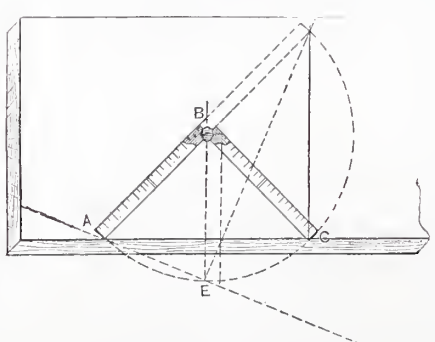
From C., *Lowell, Mass.*—Let H C I J in the accompanying sketch (Fig. 2) be a piece of board, and A the point at which it is to be cut. Draw the line, F G, 6 inches from and parallel with H C. Measure from A to B 8 inches, then lay the rule on the board with the 10-inch mark at B, and swing it around until the corner touches the line F G, as indicated at D, then a line drawn from A through D, as indicated by A E, will be at right angles to the edge of the board H C.

Learning to be an Architect.

From W. B. H., *Hannibal, Mo.*—I will state my case briefly and request advice. I have no trade, but am very desirous of learning one, and of becoming proficient in the architectural calling. To bring this about successfully I wish to know how to proceed.

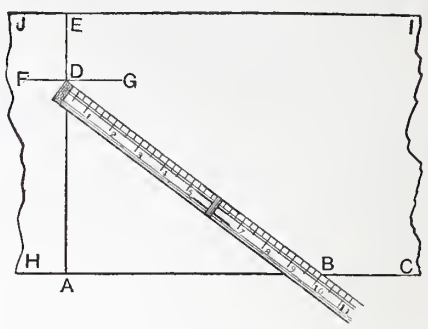
1. What studies is a beginner required to know thoroughly?
2. Is my age—21 years—any objection?
3. Are fees required? What amount?
4. How long must one serve to master architecture?
5. Which city would you advise going to —St. Louis, Quincy or Chicago?
6. Is it better to learn the carpenter's trade first and then the profession, or *vice versa*?
7. What hooks would benefit one in my circumstances?

Answer.—Our correspondent's questions cover enough ground to justify a volume, rather than a brief answer in the columns of a journal like this. However, in the limited space which we can devote to his questions, we will attempt to give him some general directions and advice. Answering his second question first, we would say that his age may or may not be against him. Some people at 21 years are no older than others at 16. Some people at 21 have certain habits formed which makes it very difficult for them to learn new things. Others find themselves with encumbrances which hinder them in their progress in learning a trade or profession. On the other hand, a young man of 21 years of age, who is deeply in earnest in the pursuit he has



Squaring a Board with a Pocket Rule.—Fig. 1.—Diagram Accompanying Letter from O. R.

chosen, is better able, in a great many cases, to push himself forward than a boy of 16 or 18. The question of age, also, affects the case in some measure with reference to the studies of which he must be the master. If he has a good common school education, which the letter from our correspondent seems to indicate is the case in this instance, such attention as he can give to studies in overtime, when not engaged upon work, will probably render him sufficiently proficient in special branches for all practical purposes. Referring now to his first question, as to the studies of which he should be master, it may be said, in general terms, that there is no branch of knowledge within ordinary limits of which the architect cannot make good use. Mathematics, including algebra and plane geometry, are quite desirable. Some architects who have been successful have had a thorough education in all the ordinary branches of study



Squaring a Board with a Pocket Rule.—Fig. 2.—Diagram Accompanying Letter from C.

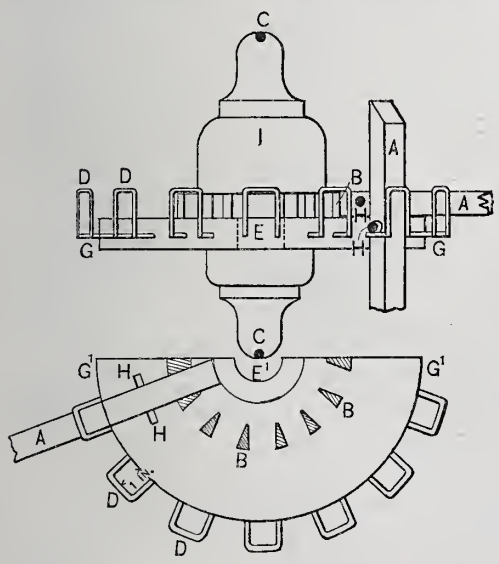
pursued at school, including a collegiate course, while others have started out with the mere rudiments, and have picked up what they required from time to time as circumstances have made necessary. Accordingly, it seems difficult to set any fixed bounds in matters of this kind. Our correspondent asks the question in a peculiar form. He desires to know what is necessary for a beginner? This, we think, may be satisfactorily answered by saying that an ordinary school education will answer. Upon this almost any trade or profession may be successfully based, provided study is kept up and the best use made of the opportunities which arise in active business. Referring to our correspondent's third question, we presume his inquiry refers to work in an architect's office. Ordinarily the services which a young man can render are deemed sufficient for all instruction that he receives. In many cases a small salary is paid after the first few months. Matters of this kind are subject to negotiation, and no general rule can be laid down. The time necessary to devote to learning architecture depends very much upon the aptitude of the pupil and circumstances. There are more who call themselves architects who have served too short a time than who have served unnecessarily long. The actual time which a man serves does not determine his ability, but, rather, the use he makes of that time, and the fund of knowledge and experience which he acquires. We should suppose about three years, under favorable circumstances, with careful instruction upon the part of a competent architect, would be sufficient to fit a young man of ordinary attainments to commence practice for himself. As to the city to which it is best for a young man to go in order to obtain the opportunities he requires, it is hard to advise him without a better knowledge of persons and circumstances than we possess in this case. We think that, of the three places named, the two larger cities will offer better opportunities than the smaller one, although the openings may be harder to find and the ranks more crowded in the former than in the latter. Concerning the advantage of the carpenter's trade, and whether it should be learned first and the profession afterward, or *vice versa*, we think that either plan, provided the trade is actually learned, will result satisfactorily. It may seem best to learn the practical part first and the theoretical afterward, and we believe there are more architects who have pursued this plan than the other. Some of the best men in the profession have come up out of the carpenters' ranks, and from observation we think that a knowledge of the building business is an excellent beginning.

Concerning books, our correspondent can hardly go amiss. He should become familiar with what is published upon the subject of building and construction, as well as upon

theoretical architecture. A few books will not answer his purpose if he carries out the general programme suggested in his letter. Should he bind himself to an architect for a definite term, he will undoubtedly have access to an architectural library, or be guided for the selection of special books by his instructor. Without knowing what he has read it would be very difficult to advise him, limiting the suggestions to one volume or a small number of volumes. He will not go amiss, however, in buying "Building Construction," in three volumes, prepared to meet the requirements of the Science and Art Department of the South Kensington School; "Hatfield's American House Carpenter;" "Gwilt's Encyclopedia of Architecture;" "Tredgold's Elementary Principles of Carpentry," &c.

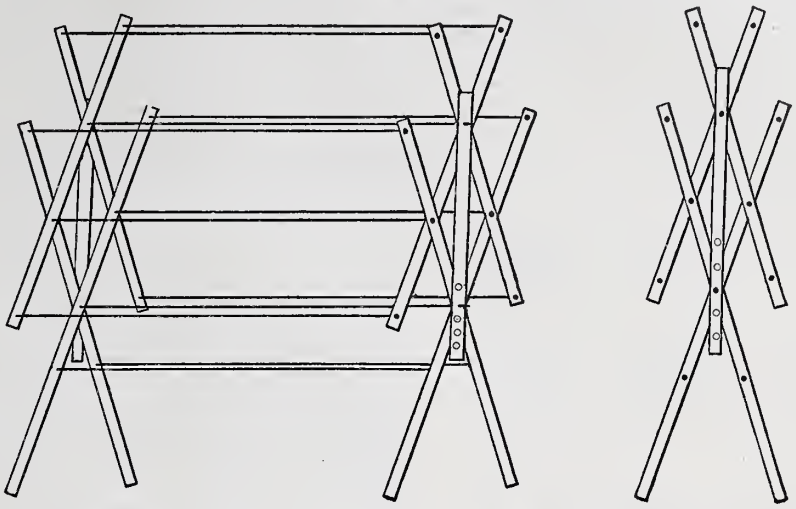
Clothes Rack.

From H. A. G., *Houston.*—In response to the request of J. S. R., published in a recent number of the paper, I inclose herewith a sketch of a clothes rack which I think may possibly answer his purpose. It is a piece of wood turned to the shape indicated in the sketch, the purpose of which is to sustain the half hub E. The section through the wheel is indicated in elevation by E, and in plan by E'. Seven rods marked A in the sketch—⅝ x ⅞ of an inch in section, and 3 feet long—are fastened to the wheel by means of the pins B and the staples D, in such a manner that when the arms are wanted for use they are spread and held in place, as indicated, to the left of the plan, and when not in use are suspended, as shown, to the right of the elevation. When hanging, the arms are suspended by the pins H. The staples D form hanging hooks when the rods or arms are not used. C C are fastenings by which the rack may be adjusted to the wheel. I have one of these racks in use in my own house. I made it about five years ago, and think it the handiest thing of the kind I ever saw, from the fact that it takes up but very little room when not in use. It is easily made and handsome in appearance. The design is original, having been studied out by myself. I have made a great many racks of this pattern since the first one above mentioned. A modification of construction may be suggested. The pins B, between which the arms project, may be made round instead of wedge-shaped, as shown in the sketch.



Clothes Rack.—Fig. 1.—Construction Submitted by H. A. G.

From S. O. E., *Evergreen, La.*—In response to the request of J. L. R., who inquires for a design for a clothes rack, I inclose a sketch of one which has been in use in different sections of the country for at least 30 years. The ladies say it is very convenient, because when folded up it occupies but little space. The one used in my own family has 12 rounds, each 3½ feet in length, placed 10 inches apart in the supports. I think the sketch inclosed is sufficiently plain to require no description.



Clothes Rack.—Fig. 2.—Elevations of Frame Contributed by S. O. E.

Three Men Sawing off a Log.

From T. W., *Pulaski, Tenn.*—The inclosed sketch represents my solution to the problem of three men sawing off a log. I solve the problem by lines as follows: Find the side of the largest triangle that can be inscribed in the given circle. Divide it into three equal parts, and through the points of division E and F draw perpendiculars to it, touching the circumference at the points H K and H¹ K¹. These points will be the lines to saw to.

From W. H. C., *Kingsport, Tenn.*—I submit my solution of the problem of three men sawing off a 3-foot log. To find the area of the surface of a circle, multiply the square root of the diameter by .7854. Applying that rule in this case, the area of the log in question is 7.0686 feet. Laying aside the decimal as of no special importance, and reducing 7 square feet to square inches, we have 1008 square inches, which, divided by 3, gives 336 square inches, the amount each man is required to saw. By experiment it will be found that a section through the log 9½ inches in depth will figure very nearly 336 square inches. By subtracting 9½ inches from 36 inches gives 26½ inches, which, divided by 2, gives 13¼ inches, the depth for the first and third man, and 9½ inches as the depth for the second man to cut.

From B. F. D., *Lima, Ohio.*—In response to the question proposed by J. R., in the April number of *Carpentry and Building*, concerning the distance through a 3-foot log that each man should saw in order that all might cut equal portions, I submit the following solution: By turning to the tables of areas of segments, it will be found that the versed sine or hight of arc of a segment, whose diameter is one and the area of the segment equal to one-third of the area of the whole circle, is .36775, but the diameter of the log is 36 inches, therefore .36775 × 36 = 13.239, the distance for the first and likewise for the third man. The total of this subtracted from 36 gives 9.522 as the distance for the second man, or the one who saws through the middle of the log.

Where is the Fallacy?

From CIVIL ENGINEER, *Philadelphia, Pa.*—A. L. S. can help himself out of his difficulty if he will measure his boards accurately after sliding them upon each other. If he slides them so far that the distance between the 13-inch side becomes 12 inches, he will find that the 11-inch side has become 11.8182, and that each projecting triangle is not ½ square inch in area, but that the two in reality are 1 × 1.1818. The entire area of the pieces when placed as he describes is as follows:

11.8182 × 12 =	141.8184
1 × 1.1818 =	1.1818
	143.0002,

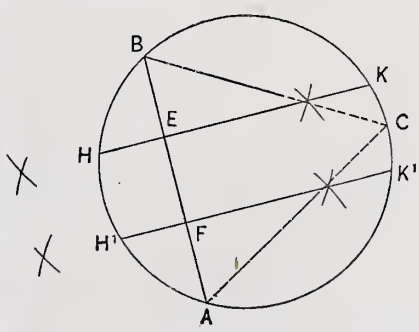
which is equal to the product of the original, 11 × 13.

Note.—We publish the above letter from "Civil Engineer" just as we receive it, so far as concerns results reached. Since he takes it upon himself to show the inaccuracies of A. L. S.'s premises, he should be careful as to his own conclusions. A. L. S. now has the opportunity of calling this correspondent's attention to the fact that 11 × 13 does not equal 143.0002. The discrepancy here is even more apparent than that in the original proposition.

From N. F. M., *Westmoreland, N. Y.*—The fallacy in A. L. S.'s problem consists in his supposing that the two pieces of the 11 x 13 board, when slipped along far enough to make the 11-inch way measure 12 inches, will measure the same in the opposite direction. If he experiments accurately he will find that it lacks just enough one way to make the 2 inches surface increase, which he seems to think is produced when the pieces are arranged as in Fig. 2 of his illustrations.

From H. M. R., *Providence, R. I.*—The fallacy in A. L. S.'s problem is this: When he slips the pieces from 13 to 12, it does not bring them 12 x 12, as he asserts. It lacks just enough to need the two projecting corners to make up the area of 143 square inches.

From P., *Saginaw, Mich.*—The question of your correspondent in the September number of *Carpentry and Building*, entitled

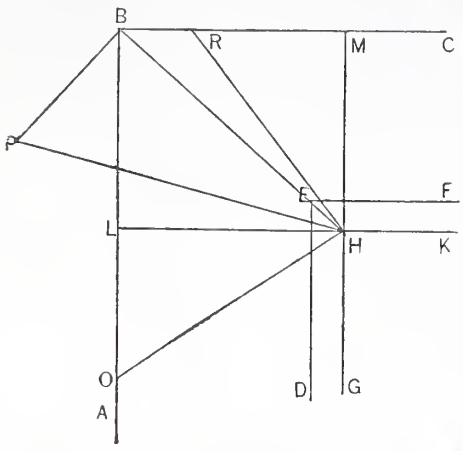


Three Men Sawing off a Log.—Diagram Contributed by T. W.

"Where is the Fallacy?" reminds me of the old conundrum, "Brothers and sisters have I none, yet this man is my father's son," the evident answer to which is the fellow lied. The measurement of Fig. 2 is not 12 × 12 inches, with two half inches projecting at opposite corners. On the con-

trary, from the nature of things it must measure 12 × 11 11-13ths, which would give an area of 142.153846 inches, with two triangles projecting, each of which is the half of a parallelogram measuring 1 × 11-13ths inch, giving an area of .846153. Adding these two areas together, it will be seen that the figure has the same surface as above.

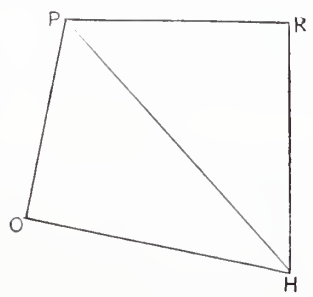
From J. C. R., *Mt. Vernon, N. Y.*—The fallacy of the proposition of A. L. S., published in the September number of *Carpentry and Building*, may be found in his premises.



Joining Roofs of Different Pitches.—Fig. 1.—*Plan of Roofs.*

He assumes that the parts when placed as shown in Fig. 2 measure 12 × 12, whereas in reality they measure 12 × 11.846 inches. The two projecting corners contain .846 of one square inch. Now (12 × 11.846) + .846 = 143 square inches. If your correspondent cannot "see it" with the above hint, I suggest that it will be well for him worry it out by way of experiment. The practice will undouhtedly he beneficial.

From J. H. M., *Brewsters, N. Y.*—Concerning the fallacy in the proposition of A. L. S., I would say that if a board 13 × 11 inches is cut diagonally, the line of cut will not be at an angle of 45 degrees, and that consequently in sliding the piece down from 13 to 12 inches, it will not slide out an inch over the 11 inches as he supposes it does. It will in reality go only 11-13ths of an inch, forming a parallelogram 12 × 11 11-13ths inches. The two points that projected downward when the pieces are placed together will make 11-13ths of an inch; 12 × 11 11-13ths = 142 2-13ths, to which add 11-13ths,



Joining Roofs of Different Pitches.—Fig. 2.—*Development of the Surface.*

making a total of 143 inches, showing that the area of the pieces when placed in the second position is the same as of the original pieces before cutting.

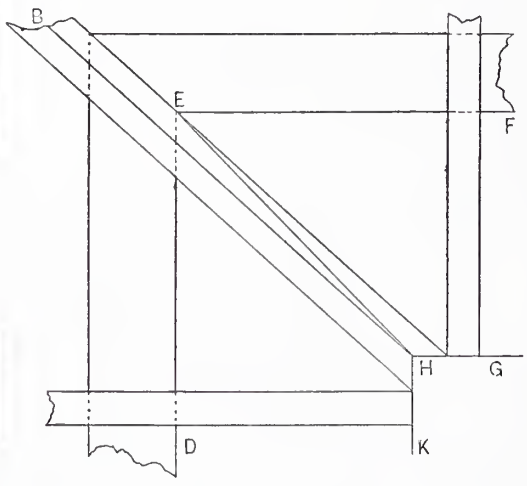
The following correspondents have also written us concerning the above:

R. I. T., Toronto, Canada.
J. E. C., Danvers, Mass.
E. P. D., Portland, Me.
C. C., Hyde Park, Pa.
W. M., St. Louis, Mo.
S. D. L., Rochester, N. Y.
A. S., Cincinnati, Ohio.
G. H., Salem, Ohio.
W. L. G., Remington, Ind.
M. G., Cincinnati, Ohio.
F. J. B., Brooklyn, N. Y.
R. H. H., Philadelphia, Pa.
J. B. T., Fond du Lac, Wis.
O. F. R., Pen Yan, N. Y.
W. B. S., Flemington, N. J.
R. N. T., La Crosse, Wis.
M. O. B., Dorchester, Mass.
R. H. H., Pickton, Ontario.

Joining Roofs of Different Pitches.

From T. H. C., *Buffalo, N. Y.*—In the March number of *Carpentry and Building*, S. McE. requested a solution of the problem of joining roofs at different pitches having equal projection of cornice. I submit the inclosed diagrams, with necessary explanations. Fig. 1 shows the plan. Draw A B and B C, representing the ridges of the roofs of main building and wing, respectively. Draw E D and E F, representing the outside edge of wall plate. Let E D be 8 feet from B A, thus representing the half width of main building, and let E F be 7 feet from B C, or, in other words, the half width of wing. Draw H C and H K, say, 15 inches from E D and E F, respectively, to represent the projection of the cornice. Draw H L, H B and H M, representing the sides of main rafter, valley rafter and wing rafter, respectively. From these lines square off the rise, heing one-third pitch on main huilding, equal to 6 feet 2 inches, as shown by L O, B P and M R. Joining the extremities of these lines with H gives the lengths and plumb cuts of the several rafters.

Fig. 2 represents the development of the surface. It shows the roof as it would appear if the jack rafter were hinged to the

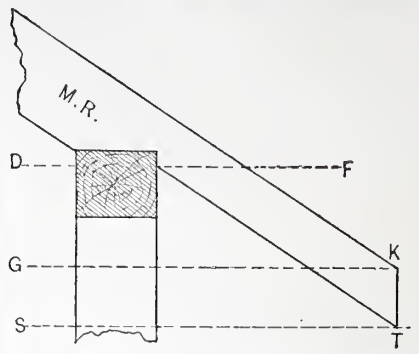


Joining Roofs of Different Pitches.—Fig. 3.—*Enlarged Plan at Foot of Rafters.*

valley rafters and the whole flattened out. Draw H O and H R, representing the lengths of main valley and wing rafters, respectively, and P R and P O the seat of main and wing rafters, then the angles O P H and R P H give the horizontal cuts for jack rafters on main and wing sides of valley, respectively.

Fig. 3 shows the plan of a portion of the roof at foot of rafters on a larger scale. The letters in this figure correspond with those used in Fig. 1. On each side of the line B H draw a line parallel with it, and supposing the valley rafter to he 3 inches wide, make the distance hetween the lines 1½ inches. Join E H. It will be seen that the valley rafter does not fall directly over the corner of the plate. The joint in the soffit or planceer lies directly under the line E H; therefore, in hacking the underside of this rafter a triangular piece comes off of the wide side, and a trapezoidal piece off the main side.

Referring to the construction of the roof I have supposed, as mentioned above, that the



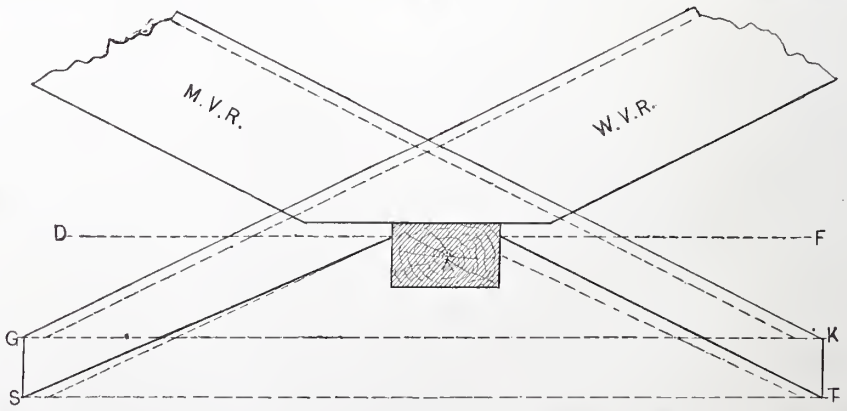
Joining Roofs of Different Pitches.—Fig. 4.—*Side Elevation of Main Rafter.*

valley rafter is 3 inches thick. Since making the drawings, it has occurred to me that two pieces, 2 inches thick, spiked together would form a hetter construction, especially if backing is required on the top.

Figs. 4, 5 and 6 represent side elevations of the rafters, and corresponding letters in the several figures refer to the same parts. Draw the dotted line G K (see Figs. 1 and 3), representing the line of upper edge of bottom end of rafters, and upon it, at the proper angles shown in Fig. 1, draw the line of main rafter, valley rafter and wing rafter. As the valley rafter runs diagonally across the edge of the plate, the sides are not alike, and, therefore, both re quire to be drawn, all as shown in Fig. 5. From G K draw down the plumb cut, and from it measure hack for the wall plate. This, it will be ohserved, is not the same on both sides of the valley rafters, as may he seen by inspection of Fig. 3. Size down the main rafter (see Fig. 4) as required, and through the intersection of the under side, with wall plate and end cut, draw dotted lines D F and S T, hy which corresponding points are to be located in the other rafters. The dotted lines shown in connection with the valley rafter in Fig. 5 show the hacking. As this matter has lately heen discussed in the columns of *Carpentry and Building*, I do not feel justified in enlarging upon it. Suffice it to say that the extremities of the lines of backing the underside must lie in the dotted lines D F and K G.

Rule for Calculating Rafters.

From J. H. M., *Brewsters, N. Y.*—I do not think D. M. W.'s rule for getting the



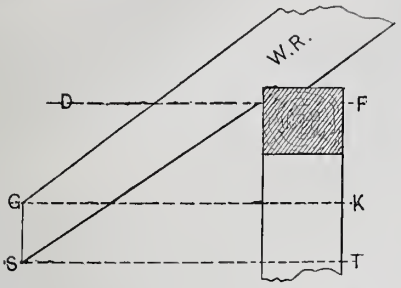
Joining Roofs of Different Pitches.—Fig. 5.—*Elevation of Main and Wing Valley Rafters.*

length of rafters for one-third pitch roofs can he called sound. Rafters gotten out hy it will he too short by over 1½ inches on a

building 18 feet wide. By his rule the rafter in this case would be 10 feet 8 inches. I think 10 feet 9¾ inches would be nearer right.

Using India Ink.

From G. F. L., *Boston, Mass.*—Answering C. E. W., who inquires about india ink and water colors in a recent number, I would recommend him to grind his ink slowly in fresh water. By adding Prussian blue (Windsor and Newton) the ink will become

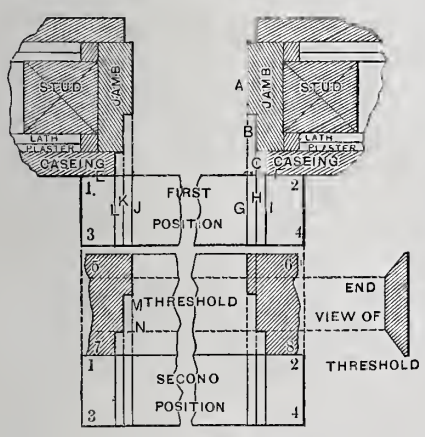


Joining Roofs of Different Pitches.—Fig. 6.—*Elevation of Wing Rafter.*

quite permanent. Another way to fix the ink is to grind it in strong ammonia water. This cuts it quickly and renders it permanent, so as to allow a wash of color over it without causing it to run. The best ink, however, for all such purposes, from my experience, is Keuffel & Esser's indelible ink, which costs 50 cents per bottle. It is impossible to make it run, though it should be washed all day. Those who desire instructions in the use of water colors I recommend to obtain the Course of Neutral Tints first, and afterward the Course of Water Color Painting, by R. P. Leitch.

Cutting a Threshold Piece.

From C., *Lowell, Mass.*—I inclose a sketch illustrating the method I employ for cutting a threshold piece. Let 1, 2, 3, 4 in position No. 1 in the sketch, represent a piece of board a little longer than the opening, and say about 5 or 6 inches in width. Place it in front of the opening shown in the sketch, taking care to have its edge E F in the same place as the corresponding edge of the threshold when in position. Take a small



Cutting a Threshold Piece.

straight-edge and lay it on the board parallel with the base of the jamb A, and mark across the board with a fine pencil, as represented by the line G. Repeat the operation in the rebate B, also where it cuts off at the end C, as indicated by the lines H and I. Repeat the operation at the other side of the opening, as shown by the lines J K L. When this is accomplished, take the piece of board and, placing it on the floor a little way from the opening, as shown by 1, 2, 3, 4 in position N 2, lay the threshold piece down in front of it, as shown by the diagram 5, 6, 7. Use the straight-edge again, placing it against the lines already drawn, and make corresponding lines across the threshold. Measure the width of the rebate from M to N, and cut out as represented in the diagram. After the board has been used once, plane off the marks from the face and use for the next threshold in the same manner.

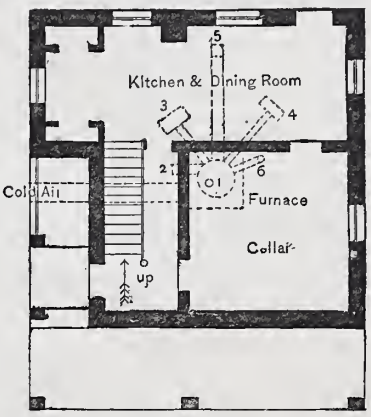
Wawayanda's House.

From A. & L., *New York.*—Referring to the letter from Wawayanda, published in a recent number of the paper, so far as his desire to heat his dwelling is concerned, we would advise him to put in one of Graff & Co.'s hot-blast furnaces, giving preference to a portable casing rather than the brick-set furnace. There will be no difficulty in connecting the smoke pipe of the furnace with the bottom of the flue in the front chimney, which will obviate the necessity of extending that chimney to the ground. A suitable connection, or cold air inlet, should be provided making the line as direct as possible. From what little information we have as to your correspondent's wants, a furnace of the kind we have nominated, with the necessary pipes for heating the rooms on the first and second floors, need not cost to exceed $125 or $150. We would recommend a damper in the smoke pipe from the furnace, and also in the hot-air pipes connecting with the various registers.

From A. S., *Shelburne, Mass.*—Wawayanda can extend his front chimney down to the ground floor as follows: Cut out the two opposite sides of the chimney a suitable distance above the floor that now supports it. Run a timber through this opening, supporting one end on blocks and the other end upon a jack-screw. Turn up the screw until the timber supports the weight of the chimney. Then remove that portion of the chimney below the timber, cut away the floor, and, beginning at the bottom, carry the brickwork nearly up to the timber, extending the two freed sides until they meet the old chimney. When the mortar has set turn down the screw, take out the timber, close up the opening in the remaining two sides, and the chimney will be nearly as good as though it were built from the ground in the first place. By this same means a chimney may be moved in any direction where there are no timbers to interfere.

From NEMO, *Ottawa, Canada.*—I have carefully read the communication from Wawayanda, and having had some experience in remodeling old houses, I would suggest that your correspondent's best way out of his many difficulties is tearing down the present structure, and constructing in place thereof a new house under the supervision of a good practical architect. By this means he will have a building complete, including all modern, sensible and sanitary improvements, with probably less cost, and certainly more completeness, than he can hope to obtain by alterations in the present structure. Especially will this be the result if the present building is a very old one. I write from an experience that will not be repeated in my own case.

From FULLER, WARREN & Co., *Troy, N. Y.*—We have read with interest the letter from Wawayanda, published in the August issue of *Carpentry and Building.* We think we can, without much difficulty, present a practical solution of some of the questions propounded by him. For years we have made a specialty of the practical application of the hot-air furnace system to buildings of every description, and, therefore, know whereof we speak when we assert that we can heat his building more satisfactorily and at lower cost, both for erection and maintenance with a furnace, than can be accomplished by steam or hot water. The furnace system presents none of the disadvantages of bursted water or steam pipes which occur at times when plumbers are the least accessible, nor is it necessary that a person should previously serve as an apprentice as a boiler tender before being able to operate the system we recommend. Repairs are seldom necessary with furnaces, but when needful they can be obtained of any tinman or dealer in stoves. By drawing a supply of air to be heated directly from the outer atmosphere, and passing it immediately over the great radiating surface of the furnace, from whence it is thrown directly into the apartment to be warmed, we furnish a constant supply of fresh air and derive the greatest possible benefit from the fuel consumed. The system of ventilation which may be applied in connection with our range or fixtures cannot be surpassed. The entire atmosphere of the room may be changed at short intervals. With reference to the leakage of gas complained of by users of some furnaces, we would merely state that we have never been compelled to remove a furnace from this cause, and we have set more than 50,000 furnaces since we commenced the business. These are only a few of the reasons why a hot-air system is best to use in a country house of ordinary size. We should recommend our "Ruby" furnace. From examination of the plans presented, would say that No. 31 or No. 41 would be sufficiently large to warm the house in question. Upon the principle that a large furnace is more economical than a small one, we would suggest that the latter



1, Vertical Pipe and Register into Parlor.—2, Vertical Pipe through Wall to Second Story, Front Chamber.—3, Horizontal Pipe to Sitting Room.—4, Horizontal Pipe to Chamber on First Floor.—5, Horizontal and Vertical Pipe to Back Chamber on Second Floor.—6, Smoke Pipe to enter Bottom of Chimney.

Wawayanda's House.—Fig. 1.—*Plan for Heating by Furnace Submitted by Fuller, Warren & Co.*

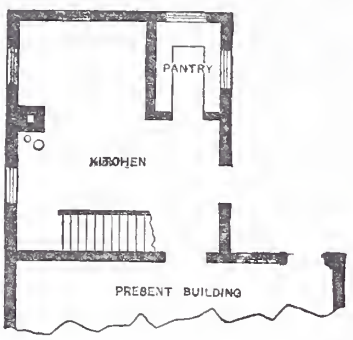
size is preferable. The furnace may be set either in brick or with portable casings, as may be most to the taste of those in charge. We think, however, that a brick-set furnace gives the best satisfaction in most cases. It is not necessary to carry the front chimney down to the cellar, as the smoke-pipe connection from the furnace may be made through the bottom of the present chimney directly into the flue. It would be necessary, however, to stop all air passages around the entrance of the pipe into the flue. After an experiment in this manner, should it still seem desirable to carry the chimney down, it could be easily done at any time under the charge of a practical mason without disturbing the upper portion of the chimney.

The rear chimney described by your correspondent should be replaced by one having a vertical flue 8 x 8 inches in size. This would readily accommodate a kitchen range and dining-room stove. The necessity of having a grate in the sitting room would be obviated by connecting these rooms with the furnace. The chimney should be carried up to a hight which would clear the peak of the roof; or in lieu thereof, should be supplied with an automatic rotating chimney cap which would prevent the downward draft of wind from that quarter. If the furnace should be set in a portable casing, we think the heat which would be radiated from its surface would evaporate, or, at least, check the accumulation of moisture upon the front wall of the cellar, thus obviating the difficulties to which your correspondent refers.

Any style of floor would serve on which to place the furnace. We usually lay a brick floor directly beneath the furnace, extending it a short distance beyond the base. We leave the question of water supply, sewage, &c., to those who have had a greater experience than ours has been; but would say in conclusion, that we are prepared to furnish a large variety of stoves and ranges having hot-water promoters. We purposely omit any mention of size of pipes, registers,

&c., as the enumeration of details of this kind would consume too great space. The accompanying sketch shows our idea of the location of the furnace, the direction of the pipes, &c.

From W. B., *Springfield, Mass.*—In answer to the plaintive cry of a wayward wanderer, I will attempt to give some hints. Inasmuch as your correspondent has omitted a very important element in the case—uamely, his family—I may not be able to get at the matter in the best shape. I think the best way to plan a house is to set the family down and build around it. When Mrs. B. and I started, 45 years ago, we commenced in this way, and considered a house of two stories, consisting of four rooms, ample; but as the little B.'s began to arrive we found



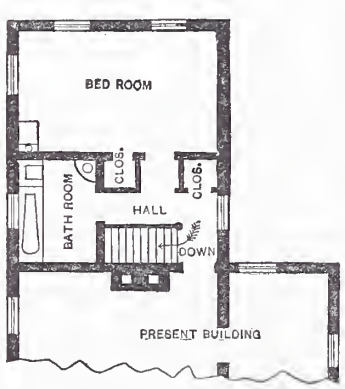
Wawayanda's House.—Fig. 2.—Suggested Plan for First Floor of Proposed Addition.

it was necessary to add an L occasionally, and now when I am questioned as to the peculiarities of the plan of my house, I reply that it is owing to placing big L's for little B.'s.

To question first, "What is the best plan of heating a house?" I answer, by combustion, but as the modes of supplying combustion are as various as "the moods that tremble in the heart," I would advise your correspondent to consult with a number of those who make a specialty of heating. Afterward he should learn the amount of satisfaction which their work has given to their respective customers, and then judge for himself. I regard the heat from hot water as pleasanter and less severe on woodwork than hot air, but I think that experience proves that the system of heating by hot water is somewhat troublesome to take care of. Whatever mode he adopts, my advice would be to have grates in the different rooms, to be used in case the heater should be insufficient or when it is not cold enough to have a fire in the heater, and too cold to sit without a fire in the room. Referring to his second question, the chimney can be extended downward by any skillful mason, and also additional flues provided, which take up less room than brick. Various sized flues of this description made of fire-proof material are to be bought in the market, and are quite convenient for use in cases of this kind. Inasmuch as this flue is unsatisfactory in its present condition, I should recommend taking it down. A defective flue, or one which is unsatisfactory in point of draft, is a very hard thing to correct. In building the flues, place them where they will give the greatest accommodation and prove the most convenient, rather than try to group them together at any one point.

With reference to question No. 4, about the damp wall on the front of the cellar, I would advise your correspondent to dig a trench to the bottom of the foundations, and cement back of the wall with a good coat of hydraulic cement, or, better still, asphaltum. Throw into the bottom of the trench, before filling up, cobble stones or broken pipe, to allow a passage for the water. Give it an inclination to one end of the house to allow the water to run off. If the wayward wanderer has sufficient hight back of the house for the water pressure, I would advise him to build there a brick tank or reservoir, cylindrical in form and well cemented, for storing his water. Raise the water from the spring by wind power. The inlet to the tank should be at the bottom, so that every discharge of the pump will disturb the whole body of water. I believe in agitation. The supply pipe should rise a little above the bottom of the roservoir—sufficient to allow for such sediment as may collect. An overflow pipe, entering the cistern at the bottom and running up to the hight at which the water is desired to stand, then turning down again, should be provided. The bottom of this pipe should be the discharge pipe, in case it is desired to empty the cistern. The object of this is to always draw the overflow from the bottom. The water in the discharge pipe will always stand as high as the water in the cisteru, thus preventing any vermin from crawling up the overflow pipe. A tank about 8 or 10 feet in diameter, and the same in depth, will be large enough for all purposes. It should be ventilated by a 6-inch pipe entering at both sides. It should have a hole in the center large enough for a man to pass through for cleaning and repairs. This hole should be kept closed, except when in use for the purpose above stated. If he has high enough ground, it should be sunk deep enough to protect it from the frost; also to keep it cool in the summer. If the ground is not high enough, it might be banked up and terraced. The overflow pipe should be entirely independent of any connection with the sewer. As regards the mill and pump, I do not recommend any particular make. I know of a number throughout the country that are giving great satisfaction. I think that those in the business are best qualified to give information on this subject. As regards the bath room, I should say place it as high up as possible. On no account put it where you cannot have a dry room, with plenty of sunlight and air.

I inclose some a sketches showing how the proposed extension can be arranged. Place the bath room (Fig. 3) at a convenient point, providing for a circulation of air over the bath tub through the hall door and window opposite. A good-sized room, with plenty of light and ventilation, is provided on the same floor. The plan of the kitchen (Fig. 2), judging from the statements of your correspondent, is about what he requires. The fixtures in the bath room and the chimney for the kitchen are located in such proximity to each other as to make the plumbing very compact and combine several important features requisite. The soil pipe should be run up in the angle between the chimney and the side of the house. The position of the bath tub and water-closet is such as to make connection with the soil pipe in the easiest possible



Wawayanda's House.—Fig. 3.—Suggested Plan for Second Floor of Proposed Addition.

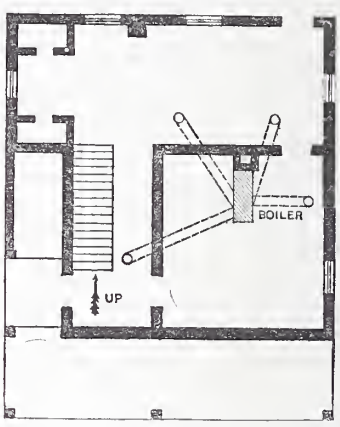
manner. This arrangemeut of fixtures admits the use of laundry tubs in the kitchen if desired. I would locate them immediately under the bath room for convenience in connecting with the supply and waste pipes. The back stairs provided in the new building make the route from the sitting room and bedrooms on the first floor very short and convenieut. I would reach the cellar, if one is put under the new part of the house, by a stairway under the chamber stairs. This will be convenient to the outside door and to other points.

With regard to the drainage, I think if the house is for an ordinary family in the country, a 4-inch pipe will be sufficient to carry away the waste. There is nothing gained by having a pipe larger than is necessary. Run the pipe as far as possible from the house into a shallow well, lined with stone in a loose manner, so that the water can soak into the ground. Cover this and ventilate by a standing pipe. Rapid growing trees, such as willows, should be planted, so that their roots will reach the moisture. The soil pipe should be continued through and above the roof and be left open at the top. All the traps should be as near to the water-closets, basins, &c, as possible.

Now, Mr. Editor, if the wayward wanderer does not find the wisdom he needs in the multitude of counsel called out by his appeal to the readers of *Carpentry and Building*, let him send for me on any day of any month that has an "R" in it, and I will visit his place. After seeing the grade of his ground and the size and shape of his family, I will give him the best advice that can be offered by W. B.

From GEORGE W. INGILS, *Dedham, Mass.*—In the issue of *Carpentry and Building* for August, Wawayanda, in improving his house, has asked your readers to help him. I inclose some sketches, giving him my plans for heating a building and supplying it with water.

The first question asked is, What is the best plan of heating the house? I would



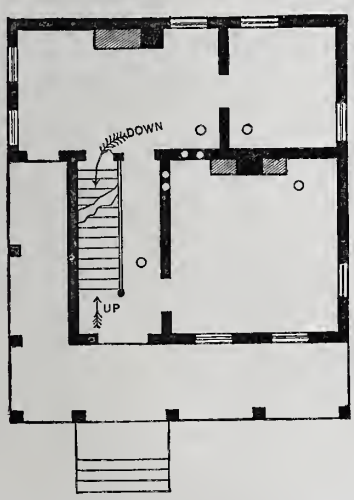
Wawayanda's House.—Fig. 4.—Location of Boiler and Pipes in Basement for Indirect Steam Heating.

recommend low-pressure steam, with indirect radiation for first floor and direct radiation for the second floor. I should place the boiler in the cellar of the main house, inclose it with brick, and attach to it a brick chamber with a nest of indirect radiators. This chamber should be supplied with air from the outside by a proper box, and from it each one of the register pipes should extend to the first floor. For the second I should use radiators, with direct pipes running to them. Wawayanda will find that low-pressure steam will cost less than hot water, and if he is looking at the matter from a point of expense, a furnace will undoubtedly be the cheapest of all; but I am quite sure it will not give the satisfaction of the system recommended. From the sketches, it will be seen that I have made an alteration in his second story, and have added a bath room, with bowl and closet. This arrangement I think will be far better than placing the bath room in the basement, as he suggests. I have also taken an attic room for a tank room for the water supply. Two ways are open to him in arranging the latter. One is to have a low-pressure steam pump, which would work with from three to five pounds of steam. Undoubtedly in reply to this he will say that he doesn't want steam on in the summer time. This may be obviated by putting in a tank of sufficient size in warm weather. When steam was necessary for pumping, the heating apparatus should be shut off, the regulator valve should be closed, and the steam being allowed to go up to 15 pounds; the tank would soon be filled. The second plan would be to erect a windmill over the spring, which would keep the tank supplied with water. For my part, I should much prefer the pump above described. I should make a tank to hold about 500 gallons. This in size would be 6 feet long, 4 feet high and

3 feet wide. When full it would weigh about 2½ tons. This would be sufficient in size to afford a liberal supply of water from the house, and also run a pipe to the barn. The range will undoubtedly be set in the new kitchen, and so also will the hot-water boiler. The pipes leading from the tank above will pass down close to the rear of the chimney, and so will also the waste pipe. By this arrangement there will be no danger of any of them freezing in winter time.

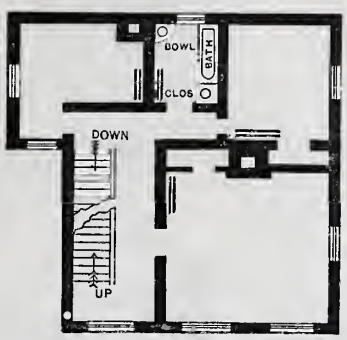
From BILLEE TURNPIN, *New York City.*—[A writer in *The Metal Worker*, whose *nom de plume* is "Billee Turnpin," narrates a discussion which took place in a plumbing shop, of the problems presented in Wawayanda's letter. We cannot make room at this time for the whole of his communication, but present so much of it as seems to be of special interest to our readers, remarking that the figures given, while probably correct for the items described, are undoubtedly far above what satisfactory work can be obtained for under conditions as described by our correspondent.]

The first question discussed was the water supply. A tank in the attic, a tank above the new bath room (wherever it may be located), an elevated tank somewhere near the spring, a cistern in the ground up above the house, which, as we understand from the letter, is practicable, and other schemes were discussed. From this, we took up the motive power for pumping. Low-pressure steam engines were considered, windmills were discussed, compressed air had an advocate, and the Ericsson new caloric pumping engine came in for a share of the criticism, pro and con. We finally concluded that a brick cistern, located as far above the house as might be necessary, finished by cementing inside, and an Ericsson engine, located in the house, presumably in the cellar, near the furnace or whatever apparatus may be employed for heating, would be the best



Wawayanda's House.—Fig. 5.—Registers on Principal Floor for Steam Heating.

arrangement. This, of course, was irrespective of cost, and the estimate which we made out, in order to see what the job would amount to, will undoubtedly scare your correspondent if cost is an item in his calculations. After having thus determined in our minds what we would recommend in the way of water supply and motive power, we discussed the bath-room fittings. It was agreed on all hands that a Zane closet would be desirable for the purpose; that a wooden bath tub, copper-lined, ought to be provided, and that a marble-slab basin, with properly fitted cocks, should be placed in the bath room. A range boiler of copper would, of course, be required in connection with the kitchen fire, in order to provide hot water. A kitchen sink would also be necessary and form an item of the estimate. Ventilating pipes from the kitchen sink and also from the fixtures in the bath room, which, by general consent, was located in the present cellar or basement, as Wawayanda suggested, were also taken into account. The pumping engine we assumed should be of a 6 inch cylinder, with a capacity of 200 gallons per hour. A ¾-inch lead pipe would be required to run from the engine, wherever located, to the spring for suction. A pipe of like size should run from the engine to the cistern for discharge, and a lead pipe of 1¼ inches in diameter should lead back from the cistern to the house as a service pipe. For drainage we concluded that a cesspool should be located down below the house, as indicated to the left in Fig. 2 of your correspondent's sketches, say 200 feet away. Leading to this should be a drain of 5-inch clay pipe. The cesspool, we concluded, should be about 13 feet by 8 feet by 5 feet. With this much of a specification, I will now present our estimate in detail,

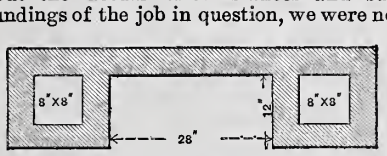


Wawayanda's House.—Fig. 6.—Suggested Changes in Arrangement of Second Floor to Accommodate Bath Room.

which I will venture to say is at least double what your correspondent will be able to get the work done for satisfactorily to himself:

Ericsson caloric engine, 6-inch	$220.00
180 feet ¾-inch lead pipe for suction, 585 pounds at 7 cents	40.95
300 feet ¾-inch lead pipe for discharge from pump, 975 pounds at 7 cents	68.25
300 feet service pipe, 1¼-inch, lead, 1200 pounds at 7 cents	84.00
10 pounds of solder for making joints, &c., at 15 cents	1.50
Estimated cost of cistern	45.00
Bath tub	17.00
Two cocks for same, plated	4.50
Zane closet	30.00
Marble-slab basin and cocks	32.00
Range boiler, copper	27.00
Sink and cocks in kitchen	11.00
Lead traps for the various fixtures	6.00
35 feet 5-inch cast-iron soil pipe at 40 cents.	14.00
60 feet 4-inch ventilating pipe at 36 cents	21.60
60 feet 2-inch sheet-iron pipe for ventilating kitchen sink, at 14 cents	8 40
200 feet 5-inch drain pipe at 15 cents	30.00
Labor of digging trenches, &c.	15.00
Plumbers' labor	40.00
Estimated cost of cesspool properly bricked and cemented	80.00
Total	$796 10

We were all astonished when we saw the total of the figures, and the boss at once said that the job could never be obtained at the price indicated. He goes in for first-class work and is great on sanitary appliances, theory of ventilation, best quality of material and all that sort of thing, but he said in such a case as this there was no use talking, there was nobody in the country who would pay $800 for the accommodations provided in our estimate. Inasmuch as we knew very little about the actual circumstances and surroundings of the job in question, we were not



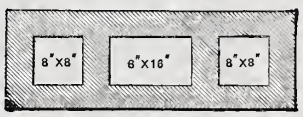
Wawayanda's House.—Fig. 7.—Diagram of Flues in Parlor and Sitting Room, Accompanying Letter from Edwin A. Jackson & Bro.

prepared to correct our estimate, and therefore I have no revised figures to present. I am not giving my own ideas of this matter, but rather a report of the general discussion which took place in the shop.

From A. J. CORCORAN, *New York City.*—I have noticed the questions propounded by Wawayanda in the August number of *Carpentry and Building*. Inasmuch as he is open to suggestion with reference to his water supply as well as in other directions, I beg leave to call attention to the desirability of a windmill for his purposes. A windmill can be advantageously employed to elevate water from the spring shown in his diagram, forcing it to a tank in the upper part of his house, or to one built in the ground, if enough elevation for his purposes can be found in the neighborhood; or a windmill can be used to draw water from a well, in case he sees fit to use a well instead of the spring referred to. There are several ways in which the windmill may be arranged. It may be erected by means of a skeleton frame, or upon a mast supported by guy rods, or upon a tower built in connection with his barn, carriage house or other outbuildings. The best results are obtained by locating the windmill directly over the well or spring, although it may be placed elsewhere. In case of a well, I would place the pump in the well somewhat below the surface of the ground, in order to protect it from the winter's frost. A windmill 8½ feet in diameter will pump 1500 gallons of water, daily average. An estimate of cost is as follows: Mill, $95; pump, $12; frame or mast, $50; pipe and fittings for conveying and distributing the water to destination, $25; time, expenses of erecting, &c., $20. This cost might be reduced by putting the mill in an outbuilding and having the tank in the vicinity of the well. Windmills, although invented a long time ago, are not generally understood, and those of your readers who contemplate improvements of the character suggested by the correspondent in question, will do well to inquire into their merits.

From EDWIN A. JACKSON & BRO., *New York.*—Your correspondent Wawayanda, in the August number of *Carpentry and Building*, asks a number of questions in reference to the improvement of his house, of which those relating to heating and ventilating we essay to answer.

First, we would advise taking down both the chimneys from top to foundation, and for the parlor building a chimney-breast wide



Wywayanda's House.—Fig. 8.—Plans of Flues Above Parlor and Sitting Room.

enough to accommodate an open ventilating grate, and also a flue on either side of it—one to carry off the smoke from the furnace, the other to convey the hot air from furnace to the rooms above. (See annexed plans giving section of this chimney at floor level, also just above the parlor fire-place.)

There should be a register in the floor for furnace heat in the parlor, and also a large register in the floor in the hall for heating both the upper and the lower halls. Also a register in floor of sitting room and in the bedroom back of the parlor. The furnace should be located as nearly under the center of the building to be heated as possible, or better, perhaps, a little to the north or northwest of the center, as heat does not carry well against the prevailing cold winds, particularly through a great length of nearly horizontal pipe in the cellar before reaching the ascending flue or register.

It seems to us that there are two causes for the smoking of the back chimney. The first and greatest fault is that it is too small, being only 4 x 8 inches, and perhaps quite rough inside. The friction of the ascending air current against the inner surface of a chimney of considerable length with a flue so small, probably retards the current sufficiently to overcome the draft. Surely nothing but a small stove which admits of but a small quantity of air entering the flue at a very high temperature, would work at all in such a flue. And the circumstance that this chimney smokes when the wind is in certain directions, points to the fact that it probably does not extend to the hight of the highest part of the building, in which case, when the wind strikes a higher object, a back and dowuward pressure is produced, and the feeble draft of the flue is entirely stopped or perhaps reversed.

We would recommend a chimney breast of sufficient size (say 5 feet wide) to accommo-

date the range in the kitchen; also a flue for the dining room, and a fire-place for a ventilating grate in the sitting room, arranged for heating the chamber above it. The flue for the dining room is not particularly essential, especially if a stove is used here for heating, as the flue of the range will carry off also the smoke of the dining-room stove.

The flues for the ventilating grates should be carried up straight over the fire-places, and when required for heating a room above from the same grate, they should be 8 by 16 inches (certainly not less than 8 x 12 inches) to accommodate the hot-air pipe and still leave room for the draft of the grates. Where the grates are required to heat but one room, a flue 8 by 8 inches is sufficiently large.

The plan suggested above will secure for your correspondent well heated and perfectly ventilated rooms where the family is most wont to assemble. The parlor and the sitting-room will have an atmosphere not less healthful than the pure air of the surrounding hill-sides, while it will possess a temperature exactly suited to the comfort of the occupants of the rooms.

After all, the most important fact to remember in building a home, is to provide a method for admitting an abundance of pure warm air into, and for taking out an equal amount of the contaminated cooler air from the rooms, forgetting which, the story of the neglect will be written upon the pale faces of the children, and imprinted upon the weakened fabric of their lives.

Hanging a Screen Door.

From J. C. B., *Philadelphia, Pa.*—I desire to inquire how to hang a wire screen door in the best manner? The door has brackets in each corner and the wire tacked on the back, the edge being protected with a half bead. Should the brackets show to the front, or should the wire side be put out? The door in question is to be hung in a vestibule.

Answer.—A question of this kind ordinarily would be determined by the taste and preferences of the parties indicated. Arguing altogether from analogy, taking into consideration the way window sash are placed, we should suppose the wire side of the screen door should be placed outward.

Prices of Building Materials in New York, September 20, 1881.

Blinds.—OUTSIDE.

Per lineal, up to 2.10 wide	$	....	@ 0.24
Per lineal, up to 3.1 wide		....	@ 0.26
Per lineal, up to 3.4 wide		....	@ 0.28
Per lineal, paint'd and trim'd		0.45	@ 0.55

INSIDE.

Per lineal, 4 folds, Pine		....	@ .53
Per lineal, 4 folds, ash or chstnut		....	@ .78
Per Hn'l, 4 folds, cherry or bntternut		....	@ .96
Per lineal, 4 folds, bl'k wal't.		....	@ 1.06

Brieks—(Afloat.)

Pale	₱ M.	$7.50	@ 4.00
Jersey	"	5.00	@ 5.50
Long Island	"	....	@ ....
Up-River	"	5 25	@ 5.75
Havers'aw Bay, 2ds	"	6 00	@ 6.50
Havers'aw Bay, 1sts.	"	6 75	@ 7.00
Croton—Brown	"	11.00	@ ....
Croton—Dark	"	13 00	@ ....
Croton—Red	"	13.00	@ ....
Philadelphia Fronts	"	....	@ 23.50
Trenton	"	....	@ 25.50
Baltimore	"	...	@ 38.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2.00 for Crotons aud $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh	$35.00	@ ....
Scotch	30.00	@ ....
English	30.00	@ 32.00
Silica (English)	35.00	@ ....
Silica (Welsh)	50.00	@ ....
Stourbridge	50.00	@ ....
American, No. 1	.....	@ 40.00
" " 2	.....	@ 30.00

Afloat, 500 ₱ M less

Cement.—(Cargo rate.)

Rosendale, ₱ bbl		$1.30	@ ....
Portland Saylor's American, ₱ bbl		2.25	@ ....
Portland (imported) ₱ bbl		2.70	@ 3.00
Roman	"	2.75	@ 3.00
Keene's Coarse	"	6.00	@ ....
Keene's fine		....	@ 10 50

Add 25 cts. to above rates for yard prices.

Doors.

RAISED PANELS, TWO SIDES.

2.0 x 6.0 1¼ in.	$1.90
2.6 x 6.6 1¼ in.	1.20
2.6 x 6.8 1¼ in.	1.25
2.8 x 6.8 1¼ in.	1.30
2.10 x 6.10 1¼ in.	1.40
3.0 x 7.0 1¼ In	1.62

MOULDED.

Size.	1¼ in.	1½ In.	1¾. In
2.0 x 6.0	$1.48	....	....
2.6 x 6.6	1 77	2.25	....
2.6 x 6.8	1.80	2.28	....
2.6 x 6.10	1.83	2.33	....
2.6 x 7.0	1.97	2.36	....
2.8 x 6.8	1.88	2.39	3.33
2.8 x 7.0	2.04	2.46	3.47
2.10 x 6.10	1.98	2.54	3.56
3.0 x 7.0	2.21	2.69	3.80
2.6 x 7.6	2.15	2 63	....
2.8 x 7.6	2.26	2.7-	3.85
2.10 x 7 6	2.36	2 87	4.05
3.0 x 7.6	....	3 00	4.22
2.6 x 8.0	2.25	2.75	....
2.8 x 8.0	....	2.88	....
2.10 x 8.0	....	3.02	4 47
3 0 x 8.0	....	3.15	4.70

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Bends & Elbows, Each.	—Branches— Sing. D'bl.	Traps, & V. Each.
2 in.	$ .13	$ .40 $ .48	$ ... $1.00
3 "	.16	.50 .61	... 1.25
4 "	.20	.65 .75	1.30 1.75
5 "	.25	.85 .90	1.55 2.50
6 "	.30	1.15 1.05	1.80 3.50
7 "	.35	1.50 1.20	2.05 5.00
8 "	.45	2.00 1.45	2.45 6.00
9 "	.55	2.50 1.70	2.85 7.00
10 "	.70	3.00 2.00	3.30 8.00
12 "	.80	3.75 2.52	4.24 10.00
15 "	1.25	5.00	House Sewer
"	1.60	7.50	Branches Branches
			pr. lin. ft. pr. lin. ft.,
			15x6 $1.75 15 in. $2.25
			18x6 2.50 18 " 3.00

Longer than 1 ft., charged as pipe

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$8.25	$7 50	$7.00	$6.50
11x14—15x24	9.25	8.50	8.00	7.25
16x24—20x28	10.75	9.75	8.75	7.75
15x31—24x30	12.25	10 75	9 00	8.50
26x28—24x36	13.00	11 50	9.75	9.00
26x36—26x44	14.50	13.25	10.75	9.50
26x46—30x50	15.00	14 00	11.25	6.50
30x52—30x54	16.00	14.50	12.00	...
30x56—34x56	17.25	15.50	13.50	....
34x58—34x60	18.25	17.25	15.00	....
36x60—40x60	20.75	18.75	17.25	....

DOUBLE.

6x 8—10x15	$12.75	$11.75	$10.75	$10.00
11x14—15x24	14.50	13.25	12.50	11.25
16x24—20x28	17.25	15.75	14.00	....
15x34—24x30	19.75	17.25	14.50	....
26x28—24x36	21.00	18.50	15.75	....
26x36—26x44	23.25	21.25	17.25	....
26x46—30x50	24.00	22.50	18.00	....
30x52—30x54	25.75	23.25	19.25	....
30x56—34x56	27.75	25.00	21.75	....
34x58—34x60	29.25	27.75	24.00	....
36x60—40x60	33.25	30.00	27.75	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: Single, 70 %; Double, 70 %.

French

WINDOW, PICTURE AND CAR GLASS.
Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$6.50	$5.75	$5.50	$5.25
11x14—16x24	7.25	6.75	6.25	6.00
18x22—20x30	9.25	8 50	7.75	7.25
15x36—24x30	10.25	9.25	8.25	....
26x28—24x36	11.00	10.00	9.00	....
26x36—26x44	11.75	10.75	9.50	....
26x46—30x50	13.25	12.50	10.50	...
30x52—30x54	14.00	13.00	11.25	....
30x56—34x56	15.00	13 75	12 50	....
34x58—34x60	15.50	15.00	13.25	..
36x60—40x60	17.50	16.00	15.00	. ..

DOUBLE.

6x 8—10x15	$8.25	$7.75	$7.50	$7.00
11x14—16x24	10.00	9.25	8.75	8.25
18x22—20x30	12.75	11 75	10 75	....
15x36—24x30	14.25	13 00	11.25	....
26x28—24x36	15.25	13.75	12.50	....
26x36—26x44	16.25	14 75	13 00	....
26x46—30x50	17.50	16 75	14.25	....
30x52—30x54	18.50	17.25	14.75	....
30x56—34x56	19.50	18.25	16.25	....
34x58x34x60	20.50	19.50	18.00	....
36x60—40x60	23.00	21.00	20.00	....

Sizes above—$10 per box extra for every five inches.

An addftional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches In length, and not making more than 81 united inches. will be charged in the 84 united inches' bracket.

Discounts: 50, 10 & 5 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS
Per square foot, net cash.

⅛ Fluted plate, case 100; cut to size				16c.
3-16 Fluted plate	"	13c.	" "	18c.
¼ Fluted plate	"	16c.	" "	20c.
¼ Rough plate	"	16c.	" "	20c.
⅜ Rough plate	"	21c.	" "	27c.
½ Rough plate	"	28c.	" "	33c.
¾ Rough plate	"	45c.	" "	55c.
1 Rough plate	"	55c.	" "	65c.

Hair.

Cattle	₱ bushel,	$11.00 @ 14 00
Goat	"	14.00 @ 18.00

Lath.

Cargo rate	₱ M	$1.90 @ 2.00

Lime.

Glen's Falls, or Keenan's common, cargo rate	₱ bbl	@ 1.00
Glen's Falls, or Keenan's finishing Jointa		1.15 @....
Rockland. common		1.25 @....
Rockland. finishing		1. 50 @....

Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Prices firm, with upward tendency.

Pine, very choice and ex.. dry, ₱ M. ft. thick	$70.00 @ $75.00
Pine. clear	60.00 @ 65.00
Pine. selects	50.00 @ 55.00
Pine. pickings	40.00 @ 45.50
Pine. selected. box	22.00 @ 25.00
Pine. common box	18.00 @ 22.00
Pine, common box, ¾	16.00 @ 17.50
Pine 1¼x10, 13 ft.. matched. each	.42 @ .45
Pine. 1¼x10, 13 ft.. culls	... @ .30
Pine, 1x10, 13 ft., good matched. each	.30 @ .32
Pine, 1x10, 13 ft.. common. matched. each	.25 @ .28
Pine. 1x4½. clear, match'd, each	.24 @ .26
PIle. 1x4½, merchantable, matched, each	... @ .18
Pine, 1¼x4½, cl'r, match'd, each	.35 @ .38
Pine, 1¼x4½, merchantable. matched. each	.30 @ .32
Spruce. 1x9, 13 ft., rough.	.20 @ .21
Spruce. 1x9, 13 ft. matched, each	.23 @ .25
Spruce, 1¼x9, 13 ft., rough,	.23 @ .25
Spruce, 1¼x9, 13 ft., matched, each	.28 30
Sprnce. 2x9. 1 ft., rough	.37 @ .39
Spruce, 2x9, 13 ft., match'd, each	.43 @ .46
Spruce, 2x4, 13 ft.	.15 @ .16
Spruce timber, flat, ₱ M ft	20.00 @ .....
Spruce timber, square, ₱ M ft	..... @ 22.50
Hemlock, 1x10, 13 ft., each.	.16 @ .18
Hemlock, 2½x4, 13 ft.,each.	.16 @ .17
Hemlock, 3x4, 13 ft., each..	.19 @ .20
Hemlock, 4x6, 1 ft., each..	.40 @ .44
Ash, good, ₱ M ft	45.00 @ 55.00
Oak	45.00 @ 55.00
Oak, quartered	70.00 @ 90.00
Maple, common	25.00 @ 35.00
Maple, good to 2 in	40.00 @ 45.00
Maple good thick	45.00 @ 55.00
Maple white	55.00 @ 65.00
Chestnnt	45.00 @ 60.00
Bl'k walnut, good to choice	95.00 @ 110.00
Black Walnut 2d	65.00 @ 75.00
Black walnut, ¾	85.00 @ 95.00
Black walnut, selected and seasoned	120.00 @ 140.00
Bl'k walnut counters, ₱ ft.	.15 @ .25
Cherry, wide, ₱ M ft	95.00 @ 105.00
Cherry, ordinary	75.00 @ 85.00
Whitewood, or Poplar ¾ in.	30.00 @ 35.00
Whitewood, or Poplar ¾ panels	35.00 @ 45.00
Whitewood, or Poplar 1 to 1½ inch	40.00 @ 50.00
Whitewood or Poplar. 2 in. and upward	45.00 @ 50.00
Shingles, extra sawed pine, 18 in.,	5.00 @ ....
Shingles, clear sawed pine, 18 in., 2 md	4.00 @ ....
Shingles, cypress, 7x24	15.00 @ 18.00
Shingles, cypress, 6x20	12.00 @ 14.00
Shingles, Cedar, 6x24, No. 1	— @ 22.00
Shingles, Cedar, 6x 14, A's..	— @ 16.00
Shingles, Cedar, 6x20, No. 1	— @ 12.50
Shingles, Cedar, 6x20, A's..	— @ 10.00
Shingles. Cedar Eastern.	— @ 3.50
Shingles, Hemlook	— @ 3.75
Shingles, Pine	4.00 @ 5.00
Shingles, Spruce	— @ 3.50
Shingles, Redwood (California), ordinary, per bnnch.	— @ .85
Shingles Redwood (California) 6x16 cut	— @ 1.85
Yellow pine dressed flooring, wide, ₱ M ft	35.00 @ 37.00
Narrow ditto	35.00 @ 40.00
Yellow pine timber	30.00 @ 45.00
Locust posts, 8 ft., ₱ in	.18 @ .20
Locust posts, 10 ft.,	.24 @ .25
Locust posts, 12 ft	.25 @ .30
Chestnut posts, ₱ ft	.03 @ .3½
Mahogany, ¼ in. ₱ ft	.05 @ .07
Mahogany, ⅜ in. ₱ ft	.08 @ .10
Mahogany, ½ in. ₱ ft	.10 @ .12
Mahogany, ⅝ in. ₱ ft	.12 @ .14
Mahogany, ¾ in. ₱ ft	.14 @ .16
Mahogany 1 in. ₱ ft	.16 @ .20
Rosewood, ⅛ in. ₱ ft	.11 @ .15
Rosewood, ¼ in. ₱ ft	.16 @ .20
Rosewood, ⅜ in. ₱ ft	.24 @ .28
Rosewood, ⅝ in. ₱ ft	.40 @ .45
Rosewood, 1 in. ₱ ft	.60 @ .75
Satin wood, ⅛ in. ₱ ft	.25 @ .35
Satin wood, 1 in. ₱ ft	.35 @ .50
White holley ¼-inch	.10 @ .12
White holley ⅜-inch	.15 @ .18
Cedar (Cuban and Mexican) ₱ ft	.10 @ .14
Cedar (Florida) Less than 1 inch	.16 @ .24
1 inch and over	.25 @ .30
Redwood (California) 1 to 2 in., dry, per M	@ 60.00
3 in. and over, per M	@ 60.00

Mouldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof building, ₱ lb.	16c @	17c
Rosin Sized Sheating, ₱ lb.	4c @	5c
Dry Sheating ₱ lb	3c @	3½c
Tarred Felt. ₱ lb	.... @	3c

Plaster.

Calcined City	Millrate.	$1 25 @ ....

Sash.

GLAZED.

Dimensions of windows.	12 Lights.	8 L's.	4 Lights.
1¼pl. 1¼c. 1½c.	1½c.	1¾c.	1¾c.
2.1X3.6	$0.00	0.96	....
2.4X3.10	.98	1.05	.... 1.15 ....
2.7X4.6	1.18	1.25	.... 1.45 1.54
2.7X4.10	1.32	1.38	.... 1.52 1.62
2.7X5.2	....	1.47	.... 1.77 1.87
2.7X5.6	....	....	.... 1.86 1.93 2.04
2.7X5.10	....	....	.... 1.54 2.02 2.16
2.10X4.6	1.32	1.41	1.50 ....
2.10X4.2	1.40	1.58	1.71 1.90 1.95 2.08
2.10X5.6	1.59	1.68	1.84 2.03 2.05 2.21
2.10X5.10	1.80	1.96	2.12 2.14 .... 2.38

c. means counted checked—plowed and bored for weights.

Hot bed sash, glazed		$2.35

HEAD LIGHT.
Two or three Lights, Glazed.

Size.	1¼	1½	Size.	1¼	1½
2.6X1.0	40	45	2.10X1.0	45	55
2.6X1.6	50	55	2.10X1.6	60	65
2.8X1.0	45	50	3.0X1.0	50	60
2.8X1.6	55	60	3.0X1.6	67	75

Slate.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're.	$5.50 @	$6.00
Green slate	6.00 @	6 50
Red slate	11.00 @	....
Black slate, Pennsylvania	4.50 @	5.00
Tiles, 1¼ in. rubbed, ₱ sq. ft.	@	.30
₱ sup. ft.		
Steps and platforms, 1½ in. thick; Risers, 1 inch thick, prices nominal		
" " 2 "		
Red tile and borders		
Coping, 1½ "		
" 2 "		
Lineal ft.		
Window sills, 4x7		
" 3x7		
Window caps, 4x10, plain		
" 4x8, "		
" 3x10, "		
" 3x8, "		

Stair Material.

BALUSTERS.

Black Walnut. 1½ in.	1¾ in.	2 in.	2½ In	
Fancy Turned	8c	10c	11c	17½c
Neck Turned	10c	11c	13½c	21c
Fluted or Octagon	15c	16c	18c	26c

OCTAGON PANELLED NEWELS,
Panels Vencered with French Walnut.

8-inch Newels, with Cap				$8 30
9 "	"	"	....	9 20
10 "	"	"	....	9.75

SOLID NEWELS, WITH CAPS.

Black Walnut.	5 in.	6 in.	7 in.	8 in.
Fancy Turned	$1.75	$2 30	$3.15	$4.30
Octagon	2.25	2.75	3.62	4.75

STAIR RAIL.
Worked out and finished ready to put up. Easements and cylinders counted double. Price per foot Newels and Balusters not included).

Black Walnut.	3 in.	3½ In.	4 in.	4½ In
Molded	43c	48½c	55c	60c
Toad Back	62c	57½c	63c	72c

STAIR RAIL, UNFINISHED.
Price per foot.

Black Walnut.	3 in.	3½ in.	4 In.	4½ In
Molded	12½c	15c	17½c	20c
Toad Back	14c	16c	18½c	21c

Stone.

Cargo rates. delivered at New York.

Amherst Blue		$1.00
Amherst freestone, in rough.	₱ C ft	1.00
Bay of Fundy, Wood Point, brown		0.80 @ 1.00
Bay of Fundy, Mary's Point, brown		0.80 @ 1.00
Bay of F'dy, Mary's Pt., olive.		0.80 @ 1.00
Berlin Blue		@ 1.00
Berlin freestone. in rough		@ 1.00
Berea freestone. in rough		0.85 @ .90
Brown stone, Portland, Ct		1.25 @ 1.50
Brown stone, Belleville, N. J.		1.00 @ 1.50
Corsehill (Scotch) Red Sandstone		@ 1.00
Granite rough		.50 @ 1.00
Dorchester, N. B., stone, rough	₱ foot.	.... @ 1.00

BLUE STONE

Rubbed hearth, 10 ft. or under	25c
Rubbed hearth, 20 ft. or under	35c
Rubbed hearth, 30 ft. or nnder	45c
Rubbed hearth, 40 ft. or under	50c
Rubbed sills	30c
Sawed & Planed	40c
Sills and lintels	@ 18c
Sills and lintels, fine quarry cut sills	@ 35c
Coping, 11 to 18 in. wide	20c @24c
Coping, 20 to 28 in. wide	38c @ 6-c
Coping, 30 to 36 in. wide	65c @80c
Steps, 8 in	@60c
Steps, 7 in	@55c
Steps, 6 in	@35c
Steps, door. per in. wide	@ 3c
Platforms, promisc uous, 4 in	@32c
Wyoming Valley, promiscuous, per cubic ft	1 30@1.35

Vault Lights.—Nominal.

Platform, sq ft	$3.50
Step and risers, sq. ft	3.50
Floor light, sq. ft	2.50
Roof light, sq. ft	2.50
Platform, 2d quality, sq. ft	2.60

COVERS.

Diameter.	Round.	Hexagon.
14 inch	$3.00	$0.00
16 "	3.75	4.00
18 "	5.50	6.00
20 "	8.00	8.50
24 "	14.00	15.00
26 "	16.00	17.00
30 "	23.50	25.00
36 "	31.00	33.00

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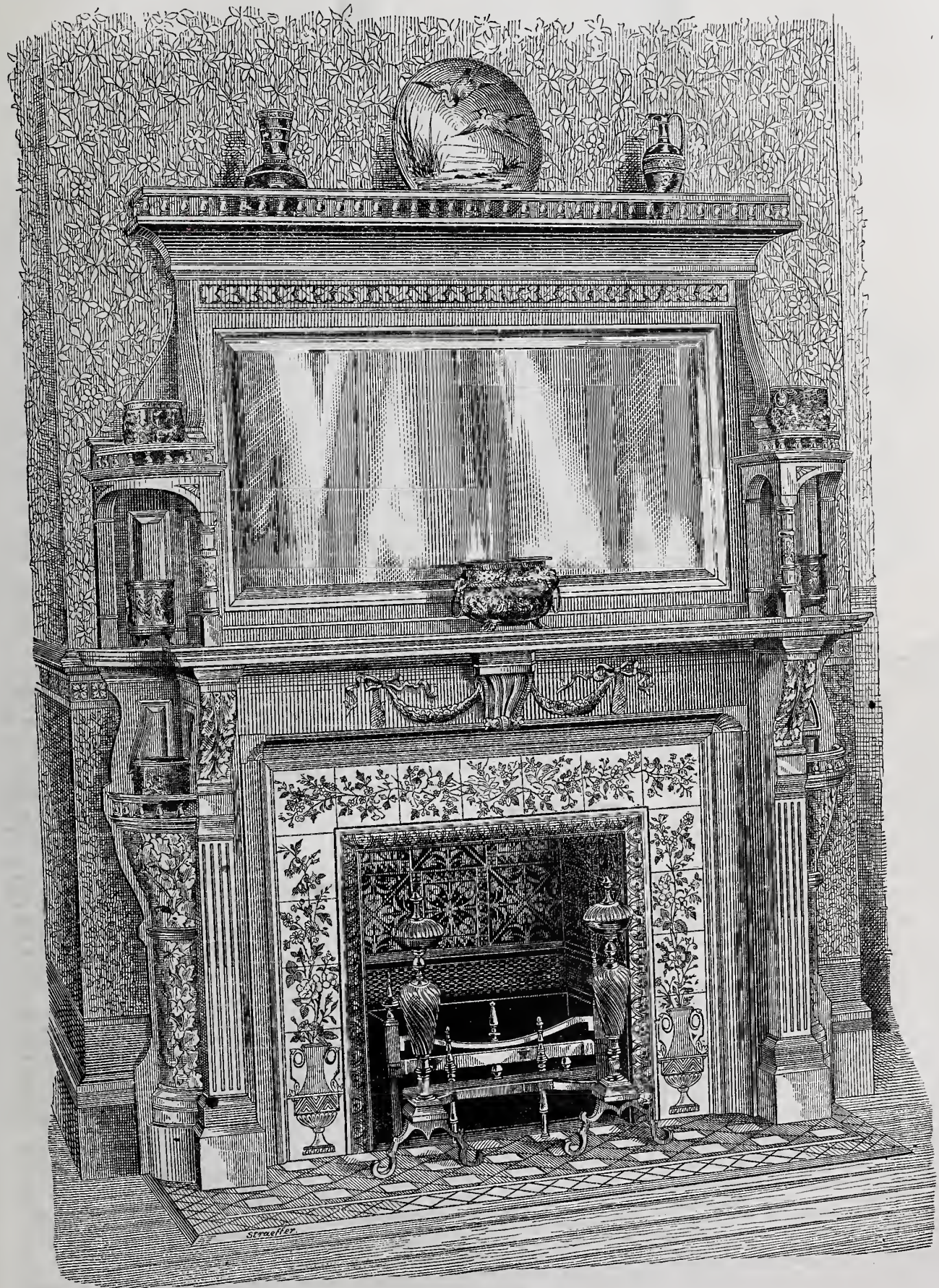


Mantel in Curly Maple.

A Handsome Mantel.

Every visitor to the fairs held in Boston this fall who is interested in building matters, must have been pleased with some the wood mantels exhibited by Messrs. Irving & Casson, of 32 Sudbury street, of that city. One of the handsomest mantels displayed (an engraving of which we present upon our first page) formed a part of their exhibit in the fair of the Massachusetts Charitable Mechanic Association. No picture can do an article of cabinet work full justice. The delicate tints and shades, the texture of the wood, the fine members of the moldings, the detail of the carving and other important, though minor, features are for the most part lost. What we show, however, conveys a fair idea of the beauty of this piece of work. The material is white curly maple. Under the shelf is placed a molded keystone, on either side of which is a garland carved with oak leaves and ribbons. The pilasters supporting the shelf are fluted in the upper part and finished with a beaded fluting in the lower part. The brackets surmounting them are carved with acanthus leaves. On the outside corners of the mantel are placed some little balconies supported by round columns carved with ivy leaves. The mirror has beveled edges, a feature which adds to the spirit of the design.

This mantel deserves special attention, because it is executed in a wood which has rarely been used for cabinet work in recent times. It is the well known rock or sugar maple (*acer saccharinum*). When first worked the wood is nearly white, but it readily takes a golden yellow under a varnish. The grain is either straight or waved. In this case the waved has been employed, which greatly adds to the beauty of the work. The designers, taking advantage of the fact that maple is almost as dense and solid as boxwood, have produced elaborate carvings. They have used the peculiar fillings of the exterior angles to form a base for very beautiful carved work representing an ivy vine. Carved work is also used to form a delicate band beneath the cornice. The light color of the wood and the closeness of the grain render it possible to employ very delicate and finely-cut moldings, which, it will be seen, is one of the characteristics of this design. The formation of the bracket at each side beneath the mantel, and of the shelves above, is rather odd, and in these days of the bric-a-brac rage they make very convenient receptacles for treasures of this kind. Light-colored tiles are very effectively used as a border between the woodwork and the fire-place frame. One peculiarity of the wood employed is that the grain is perfectly straight in every portion. There would have been no difficulty in obtaining still larger pieces without a flaw.

Design for Cottage.—Fig. 1.—Front Elevation.—Scale, ⅛ Inch to the Foot.—Wm. H. Penn, of Lowell, Mass., Architect.

Design for a Cottage.

The story and a half cottage shown in the accompanying elevations was designed by Mr. William H. Penn, of Lowell, Mass. The house has in all eight rooms, arranged in such a manner that there is an abundance of closet space and very little waste room anywhere. The entrance is from the porch, which occupies the inner angle of the front of the building. A hall affords ready access to the parlor on the right and to the sitting-room on the left, and directly up-stairs. A bedroom 7 x 9 feet is placed upon the lower floor, the greatest objection to which we imagine will be the fact that it is rather small in dimensions, and that it opens directly from the kitchen. In some sections, however, this will not be considered a disadvantage. Some inconveniences are doubtless inevitable in a story and a half cottage of the general description here shown.

On the second floor four chambers are provided, all communicating directly with the hall. Three of them are quite commodious in size. The roof of the building sets high enough to give a vertical hight to the walls of 6 feet before the rafters are reached, while the middle of the rooms has a ceiling nearly 9 feet in hight. The design of the roof is such as to give a very pleasant effect to the outward appearance of the house. The main roof extends over the porch and also over the projecting building at the rear, in which the pantry is located, in such a way as to give some very pleasing roof lines. The hall on the chamber floor is lighted by the triangular dormer window shown over the front door. The small chamber directly back of the stairs, and also the chamber coming over the kitchen, are lighted by dormer windows, a view of which is afforded by Fig. 6 of the engravings.

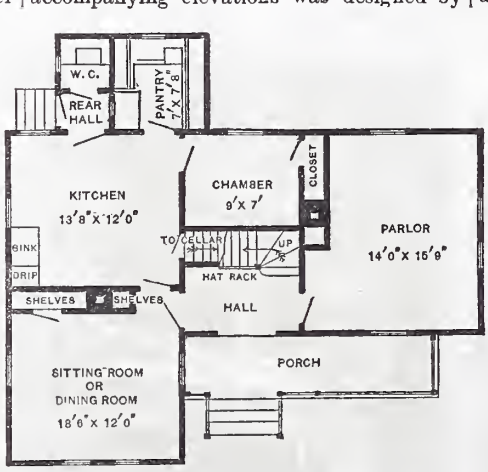


Fig. 2.—First Floor Plan.—Scale, 1-16th Inch to the Foot.

The cellar may be extended under the entire house, or only under a portion of it, as may be preferred. The house stands high, so that good-sized windows are possible in the cellar, affording abundance of light and free ventilation. The architect's idea of material and construction may be gained from the following abstract of his specifications:

The cellar is to be 7 feet in the clear and to be constructed with a suitable wall, extending 2 feet 4 inches above grade and 1 foot below the bottom of the cellar. The exposed surface of the outside wall is to be faced with block granite or ashlar. The joints, both horizontal and vertical, are to be raked out and pointed with cement to match the color of stone employed. The posts under the piazza are to be of stone, 5 feet long and 8 x 8 inches in size. The sills and

lintels of cellar windows are to be 4 x 8 inches—the sills to be 4 inches longer than the width of the openings, and the lintels 8 inches longer. The stone employed is to be of even split faced granite. The chimneys are to be built where shown on the plans. Hard burned brick are to be used, and the mortar is to be made in the proportion of 1 of cement, 3 of lime, and 12 of clean, sharp sand. The flues are to be plastered inside their entire length and are to be troweled smooth. The brick at all

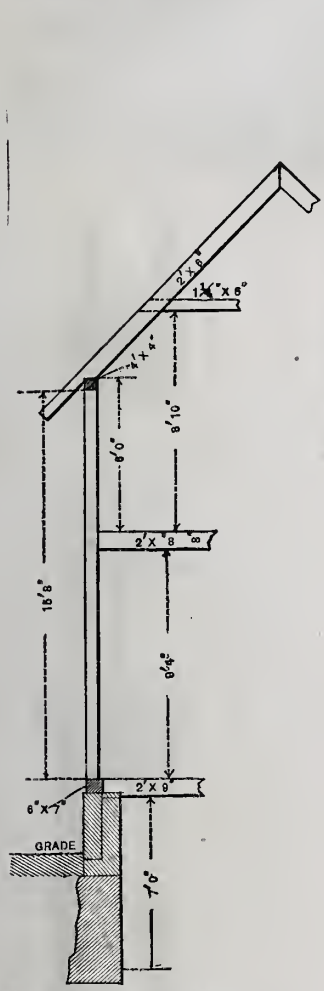


Fig. 3.—Vertical Section.—Scale, ⅛ Inch to the Foot.

places is to be kept 1 inch clear from the woodwork. Sheet-iron thimbles with galvanized iron flat stoppers are to be placed in the flues where required. The thimbles in all cases are to reach from the face of plastering to the inside of the flue. The brick is to extend out around the thimbles to the face of the studding.

The outside finish is to be of good Michigan pine, free from large, loose or black knots, shakes or other damaging imperfections, and is to be wrought in the forms indicated in the drawings. The under floors, and roofs where shingled, are to be covered with sound, dry spruce boards, well seasoned. The outside walls are to be covered with matched spruce boards, also well seasoned. Joints are to be well broken and the boards well nailed to every stud, post, joist or rafter, as the case may be. The roofs are to be covered with cedar shingles of best quality, with joints properly broken and laid with the proper lap. Hips and valleys, and all places requiring it, are to be well flashed with three-pound lead. The outside walls of the building are to be covered with sheathing felt of linen fiber, over which 6-inch pine clapboards, laid 4 inches to the weather, are to be placed. The cellar window frames are to be of 1¾-inch white pine, rebated for 1½-inch sash. The sash to be hung with stout iron butts, furnished with buttons and hooks and eyes. All other window frames, except those in the second-story hall, are to be made of Georgia pine for the stiles and parting beads, the balance of frame being as described for the outside finish. Each frame is to be fitted with axle pulleys, and each stile is to have a pocket neatly cut. Each frame is to be fitted with two sashes, 1¾ inch for first story and 1½ inch for second story, properly hung with flax sash cord and round iron counterweights. The window in second-story hall is to have colored glass of different shades, and to be hung at bottom and arranged to be operated by cord upon suitable apparatus. The outside door frames are to be rebated for 1¾-inch doors. The threshold to be made 1¾ inches thick, of Georgia pine. The doors are to be constructed with raised molded panels outside, the inside to be flush. The top panels of the front doors are to be of ornamental ground glass, that of the rear door of plain ground glass. The inside doors are to be 1½ inches thick, and all made in four panels.

The top floors of kitchen and rear projection are to be of narrow, matched, kiln-dried Georgia pine, blind nailed in laying. All other floors are to be of good square edged, 8-inch wide, well-seasoned, dry pine boards, well planed, ⅞ inch thick; all to be set close, joints well broken, nailed and left smooth. Manila paper is to be laid between floors of first story. The inside finish of the house throughout is to be of Michigan pine, free from knots, stains or damaging imperfections, and in character to be as represented by the details. All closets are to be provided with shelf and cleats and hooks on three sides. The kitchen and rear projection are to be furnished with plain wainscoting 3 feet in hight above floor, finished with a neat chair rail at the top. The sink in kitchen is to be sheathed about recess, 2 inches at front, and set off 2 inches at the back for water pipes. Ash sheeting to be used for the purpose. The pantry to be fitted up as indicated in the plans. The flour-barrel case to be provided with movable front, secured with dowels at the bottom and hasps at the top; the cover to be hung with brass butts. Drawers to be provided under the kneading board. The cupboards on each side of the pantry are to be in two parts, upper and lower; the upper to have four shelves, 15 inches wide, which is the full width of the part. The lower part to be 20 inches wide and to have one shelf 10 inches wide placed 1 foot 8 inches above floor; the division shelf being placed 2 feet 8 inches above the floor. The fronts and doors of cupboards to be properly cleated and hung and trimmed with snap catches. The stairs are to be built as shown on the plans. The trimmer over-head room of upper staircase to be splayed under the passage. The stairs to be constructed with return molded nosings. The newel at the foot of stairs to be 7 inches, turned and square. The rail to be 2¼ x 3; balusters, 1¾ turned and square. Newels, rail and balusters are to be of cherry. The string skirt, treads and risers to be of white pine. The balusters are to be dovetailed into treads. Carriages are to be of 2-inch spruce plank. The parlor and sitting room are to be provided with marble mantels of suitable size, having molded edge. The kitchen is to have a black walnut or ash mantel, 4 x 8 feet and 1 inch thick. The back to be 3 inches wide and ½ inch thick rebated into the edge of the shelf. The mantel to be

Design for Cottage —Fig. 4.—Side Elevation.—Scale, ⅛ Inch to the Foot.

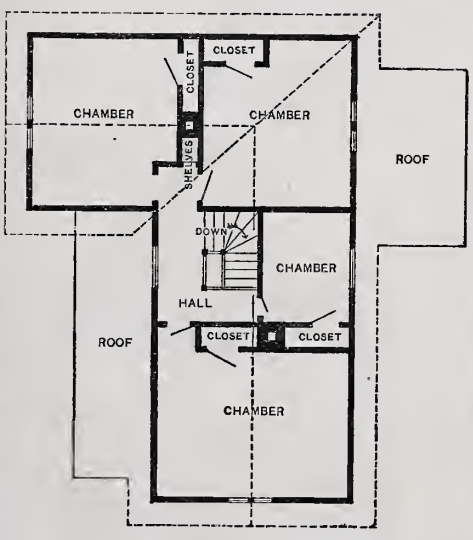


Fig. 5.—Second Floor Plan.—Scale, 1 16 Inch to the Foot.

constructed with round corners, square edge, and to be supported on bronzed iron brackets. Wood furrings are to be placed for all mantels previous to plastering and set ¼ inch back from the stud.

The outside of the house is to receive two good coats of linseed oil and lead paint. All knots to be well shellacked before priming, and holes to be well and neatly puttied after priming. The tinning on window hoods and gutters is to receive two coats of linseed oil and mineral paint. All hard wood inside to be properly filled and finished in the natural color. The doors and window finish of kitchen, also of cupboards and pantry, to be grained in oil to match the ash sheeting on the walls. The doors of all the rooms, except the parlor, to be grained. The remainder of the house to be painted white with lead and linseed oil, as usually applied to inside work. The inside of sash to receive two coats of bronze green and two coats of coach varnish.

The house shown by the drawings here presented, constructed in a thorough manner and in the spirit of the specification, an abstract of which we have just given, would cost, in the vicinity of New York, at the present time, about $2000. Variations in the construction would reduce or increase this cost, according to circumstances.

Design for Cottage.—Fig. 6.—Partial Elevation of Rear.—Scale, ⅛ Inch to the Foot.

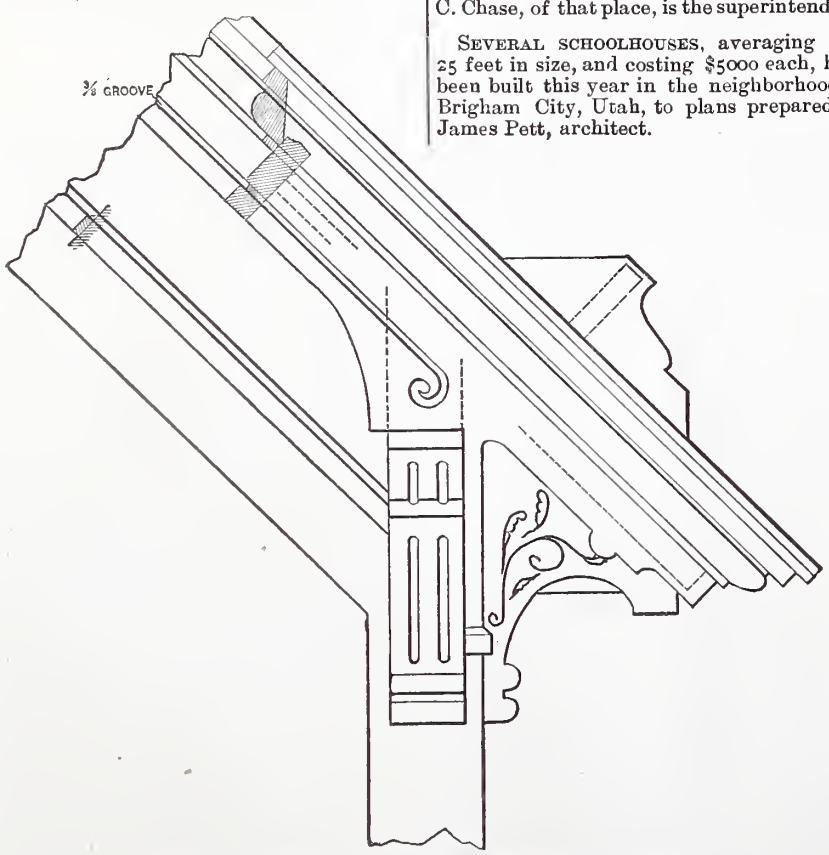


Fig. 7.—Detail of Cornice.—Scale, ½ Inch to the Foot.

STRAY CHIPS.

WARSAW, IND., is to have a court house costing $80,000.

PORTER & PERCIVEL, architects, of Buffalo, N. Y., have in progress a $10,000 Catholic church at Ellicotville, N. Y.

A SMELTING WORKS, costing $30,000, is being built at Central City, Col., by Messrs. Randolph & Co. Robert McFarlane, of Central City, is the architect.

A TWO STORY addition containing ten rooms is to be built to the United States Marine Hospital in St. Louis, to cost $10,000. The work is already under contract.

A CHURCH IN THE quaint Queen Anne style of architecture has been recently designed by Lawrence Valk, architect, for erection in West Eleventh street, this city.

J. S. MCKEENE, of Kansas City, is the architect of the Campbell University Building, now being erected at Holton, Kan. J. C. Chase, of that place, is the superintendent.

SEVERAL SCHOOLHOUSES, averaging 50 x 25 feet in size, and costing $5000 each, have been built this year in the neighborhood of Brigham City, Utah, to plans prepared by James Pett, architect.

THE CORNER STONE of the armory in St. Louis was laid October 6th, 1881. The original plans have been considerably enlarged, and the cost increased from $25,000 to $35,000. Messrs. Miller & Pitcher are the architects.

W. LAWRENCE, of Junction City, Kan., has finished a business block, 60 x 120 feet in plan, costing $20,000, the property of B. Rockwell & Co. T. A. Carr, of Leavenworth, is the architect.

A $26,000 HOTEL, owned by C. C. Black, has been built recently at Winfield, Kan. Messrs. Nichols and Squires, of Emporia, Kan., were the architects, and Messrs. Ray, Johnson & Co., the builders.

AT COLORADO SPRINGS, COL., a hotel to cost $100,000, and an addition to the Deaf Mute Institution, to cost $20,000, are in progress. F. A. Weston, of Colorado Springs, is the architect of the latter.

THOMAS HADDEN, of White Plains, has recently completed a residence on the stock farm of N. D. Higgins, of New York City, from the design published in the number of *Carpentry and Building* for October, 1880.

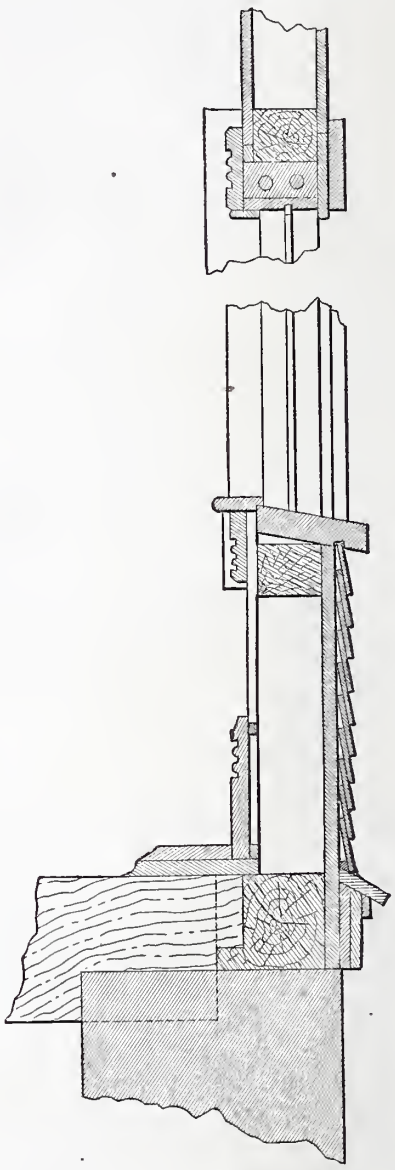


Fig. 8.—Vertical Section through Window.—Scale, ½ Inch to the Foot.

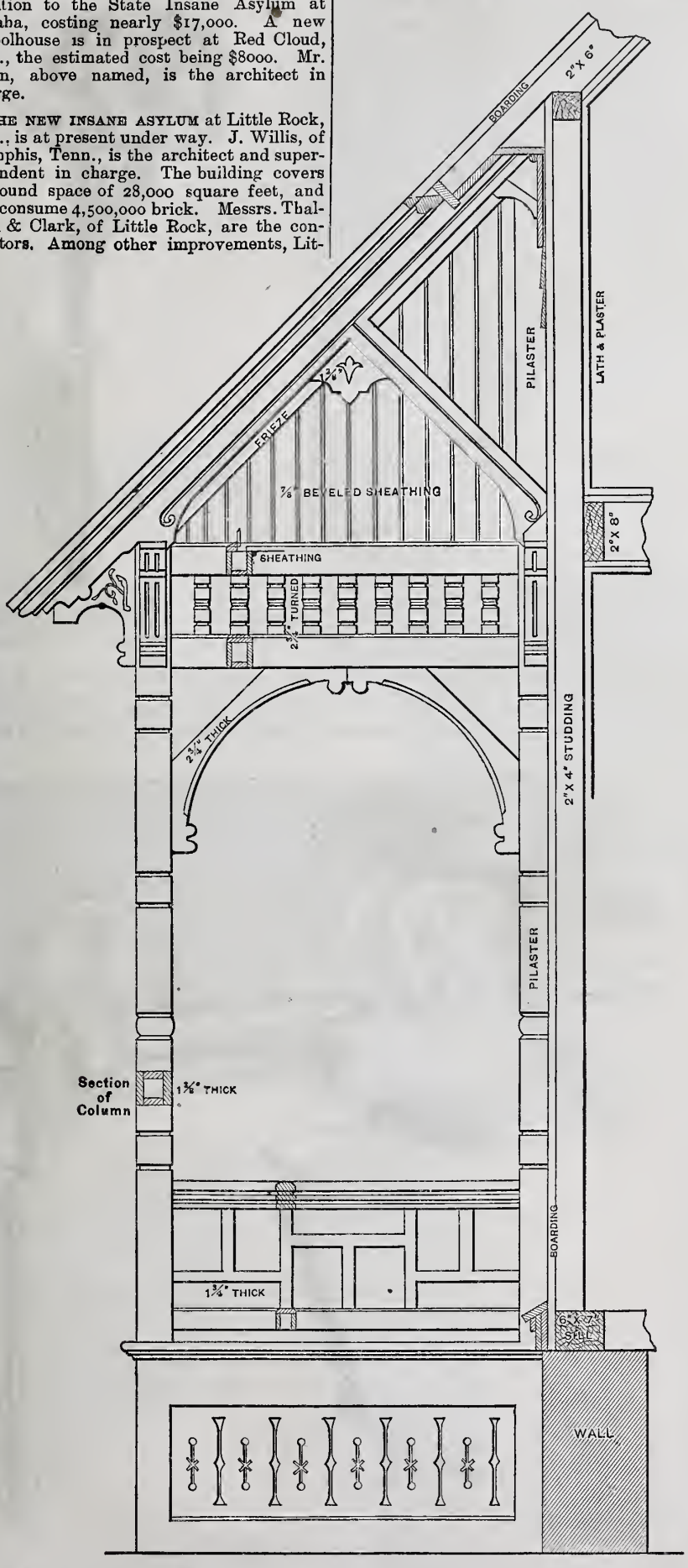
AT BRAINERD, MINN., the Northern Pacific Railroad Co. are erecting a locomotive house 316 feet in diameter, with 44 stalls; also a machine shop 120 x 244 feet in size, with engine and boiler house. A. Anderson, of St. Paul, is the engineer-in-chief.

THERE IS A MOVEMENT in St. Louis to establish a new sanitarium for the benefit of inebriates and victims of morphine and opium habits. The capital stock is $35,000. A suitable location has been selected, and it is expected that the necessary improvements will soon be commenced.

S. S. ENNIS, of Marcellus, Mich., is the architect of a new hotel now being built at that place at a cost of about $5000. A school building costing $6000 is also in progress, the designs of which were prepared by the same architect. Emes & Buel are the builders of both buildings.

A $25,000 SCHOOLHOUSE has been built the present season at Kearney, Neb. The plans were prepared by T. B. Allen, of that place; W. L. Van Alstyne, of Lincoln, had the contract. The same builder erected the addition to the State Insane Asylum at Omaha, costing nearly $17,000. A new schoolhouse is in prospect at Red Cloud, Neb., the estimated cost being $8000. Mr. Allen, above named, is the architect in charge.

THE NEW INSANE ASYLUM at Little Rock, Ark., is at present under way. J. Willis, of Memphis, Tenn., is the architect and superintendent in charge. The building covers a ground space of 28,000 square feet, and will consume 4,500,000 brick. Messrs. Thalman & Clark, of Little Rock, are the contractors. Among other improvements, Little Rock has also built a schoolhouse the past season, the cost of which was about $10,000.



Design for Cottage.—Fig. 9.—End Elevation of Porch.—Scale, ½ Inch to the Foot.

BUILDING OPERATIONS at Jacksonville, Fla., have been quite brisk during the summer, on account of the enlargement of several of the hotels and the erection of numerous new buildings. The demand for material has been greator than the mills could supply; in fact, the supply of material seems to have been the only limit to the enterprises set on foot. Three large saw mills, located near Jacksonville, have a capacity of 40,000 feet per day, and have been running day and night upon orders.

ONE OF THE recent building enterprises in Baltimore has been the erection of three warehouses on South Sharp street for Mr. John King, Jr., vice-president of the Baltimore and Ohio Railroad Company. Each of the buildings is 26 x 116 feet in plan and five stories in hight. The fronts are of pressed brick, with stone trimmings. The buildings are surmounted with mansard roofs formed with Hayes' patent skylights, glazed with half rough glass. The cornices are galvanized iron. Mr. E. F. Baldwin, of Baltimore, was the architect in charge, and John S. Hogg the contractor.

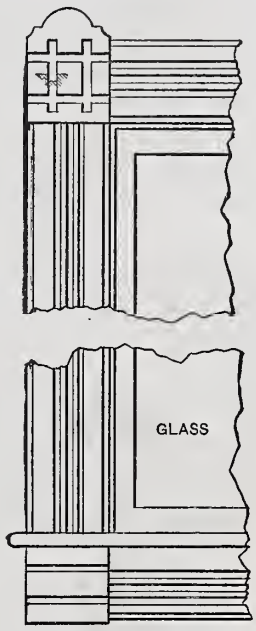


Fig. 10.—Detail of Inside Window Trimming.—Scale, ½ Inch to the Foot.

THE ST. LOUIS BRANCH of the American Express Company has just completed a fine addition to their stables in that city, with stalls for 50 horses and room for 50 more. The main floor is paved with patent asphaltum blocks on a substratum of concrete, and is impervious to water. The ventilating arrangements are so complete that there is scarcely any perceptible odor even when the stable is full of horses. Since the new building has been occupied sickness among the horses has almost disappeared, there being but three animals on the sick list, when other stables of the same size report from 20 to 30. The architect is Mr. P. B. Wright, of Chicago.

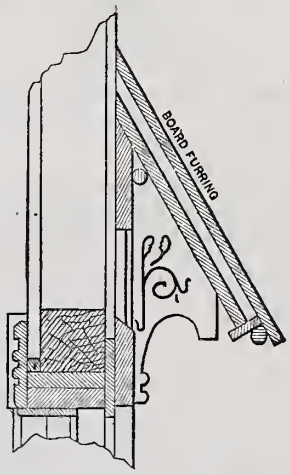


Fig. 11.—Section through Hood over Windows.—Scale, ½ Inch to the Foot.

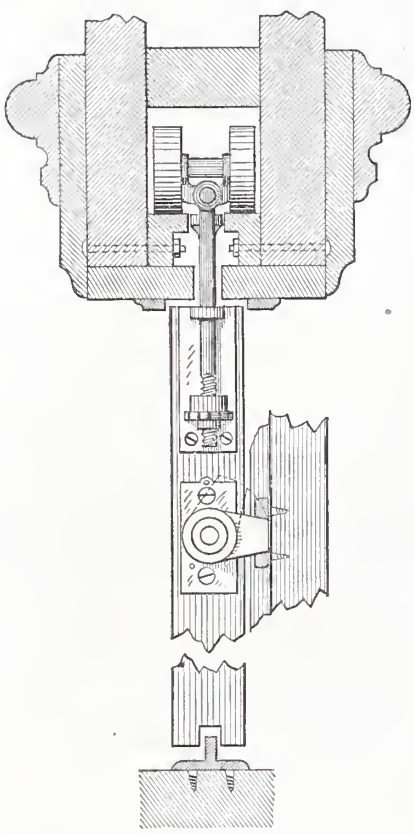
BUILDING OPERATIONS at St. Louis, Mich., during the season have been upon a somewhat extensive scale. An opera house 62½ feet front by 110 feet deep, having a basement under the entire building, and providing accommodations for a bank and two stores on the first floor, has been erected at a cost of about $25,000. H. L. Holcomb is the owner. Watkins, Hidden & Arnold, of Bay City, were the architects. An extensive

addition has been made to the sanitarium located at the St. Louis Magnetic Springs. The size of the building is 44 x 86 feet, three stories high above basement. The building is of brick, and cost about $15,000. A hotel, bank and store building 73 x 85 feet is now in progress. H. Harrington is the contractor for the latter.

NOVELTIES.

WARNER'S ADJUSTABLE DOOR HANGERS.

Anything which relates to the perfect working of sliding doors is of special interest to our readers, and therefore we take pleasure in presenting a somewhat extended description of a new adjustable door hanger now being introduced by Messrs. E. C. Stearns & Co., of Syracuse, N. Y. A general view of the hanger is presented in Fig. 2 of the engravings. Fig. 3 shows one of the hangers fitted with an astragal plate for the front edge of the door. Fig. 1 is a vertical

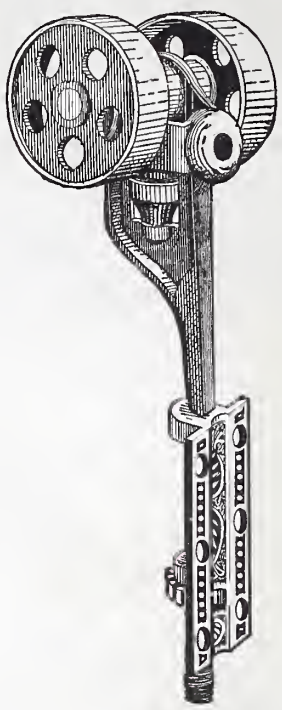


Novelties.—Fig. 1.—Warner's Adjustable Door Hanger.—Vertical Section at the Back of Door.

section taken near the back of the door showing the back hanger as fitted, and the construction employed for the track. The front and back hangers are connected by a rod shown broken in Fig. 2, thus making the running gear substantial and adequate for the work it is to perform. The hangers are made of wrought and malleable iron, and in a measure overcome all the objections hitherto pertaining to the running of sliding doors. An important feature is the adjustability. The doors may be raised or lowered by means of the ratchet nuts on the rods of the hangers. One of these is clearly shown in Fig. 1, while that used on the front of the door is indicated in Fig. 3. By this means the door may be raised so as to clear the carpet, or to overcome any sagging or settling of the building after construction. A double track is employed, and by means of a universal joint in connecting the hanger, the carriage is made to conform at all times to the track, causing an equal bearing on both rails. The tracks are made of hard wood, bolted in position as shown in the engravings. The bearings of the hangers being finished and lined with anti-friction metal, are noiseless and require no oiling. No track is required upon the floor, and carpets may be extended through the opening. Short guides are placed in the pockets into which the doors slide. A section of one of these is shown in Fig. 1. A special feature of this apparatus is the gravity stop used upon the back edge of the door, and shown below the hanger in Fig. 1. The object of this device is to prevent the doors running too far into the opening. By inserting a knife blade between the jam and door the stop may be raised, allowing the door to be drawn into the opening for the purpose of adjusting or removing. A rubber bumper is provided for the stop to strike against, and is indicated by the dark shaded portion under the stop in Fig. 1. The dotted lines show how the stop may be raised by the knife blade, as mentioned. In framing for the reception of these hangers, the general plan followed is indicated in Figs. 1 and 2. A header, as shown, is inserted between the beams in order to keep the studding from spreading or contracting, and to maintain a uniform space between the tracks to prevent binding the small friction roll clearly shown in Figs. 1 and 3. A pocket is provided in framing the track, into which the hangers are inserted when being attached to the door. A special casting accompanies the hangers for use in the construction of this pocket, but which is not shown in the engravings.

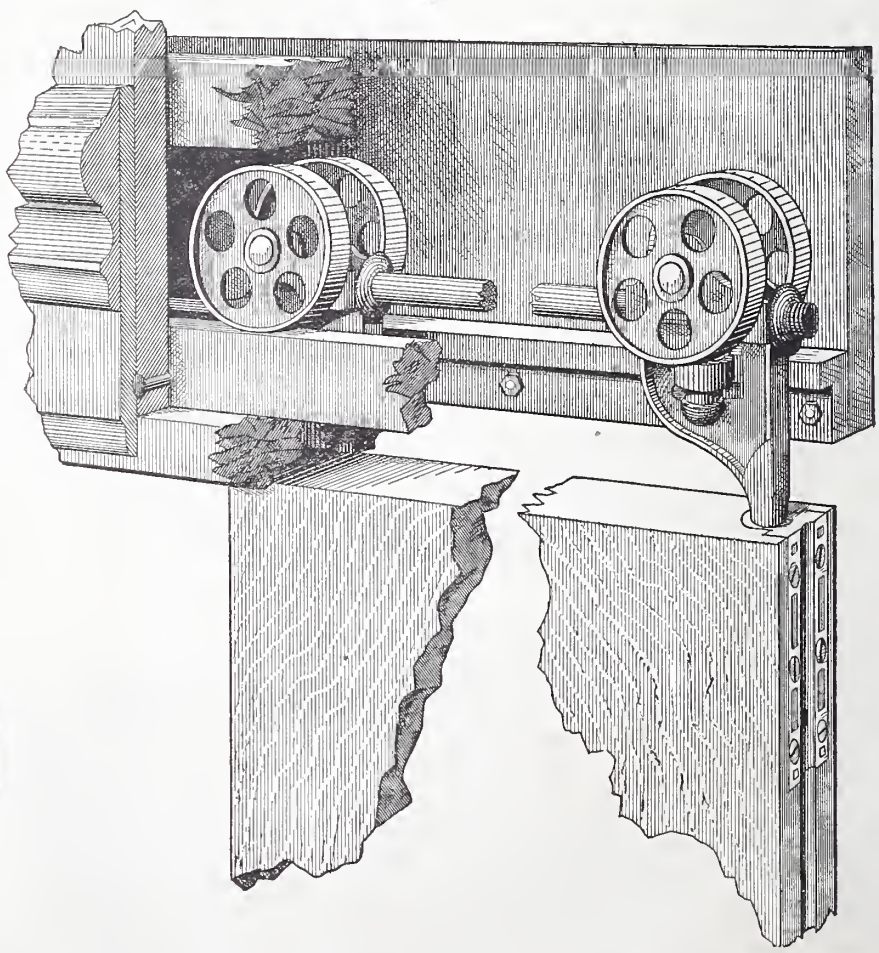
MINERAL WOOL.

We called our readers' attention to the advantages of mineral wool as a non-conducting material some time since. We also alluded to its use for purposes of deafening. The application of this material to ordinary frame houses upon a somewhat extensive scale seems to warrant further mention. Experience is demonstrating in a practical manner the truth of the well-known principle in physics, that air-confining or porous bodies are the poorest conductors, and that the passage of heat is retarded in proportion to the volume of air the insulating material holds from circulation. The fibers of mineral wool lie in all possible directions with relation to each other, forming angular air spaces almost microscopic in size. These retain enough air to make it a good non-conductor. It is also indestructible and fire-proof. There is no organic matter in its composition, and it has the further merit of being vermin proof. Rats and mice can neither dig through it nor live in it. The fine particles of which it is composed are glass-like in their texture, and the material is therefore proof against the inroads of all kinds of vermin. All these advantages combined render it a very



Novelties.—Fig. 3.—Warner's Adjustable Door Hanger.—General View of Hanger.

desirable filling for the spaces in frame houses. Figs. 4 and 5 of our illustrations show the general method of application, the details of which may be varied to suit cir-



Novelties.—Fig. 2.—Warner's Adjustable Door Hanger.—Perspective View of Construction.

cumstances. Those who have not seen samples of this material will do well to procure a small quantity for the purpose of examination. We understand that the manufacturers, the United States Mineral Wool Co., of 16 Cortlandt street, this city, are sending specimens gratis to all applicants.

THE "COMMON SENSE" DRYING ROOM.

The accompanying cut (Fig. 6) shows a dry-room and drying apparatus of a new and very peculiar character. The inventor in constructing it aims to supply hot and dry air, and, when this air has become saturated with moisture, to remove it, condense the moisture and return the dried air to the heating pipes. The air is taken from the dry-room by means of a fan. It is then forced into a condenser, where a coil of pipes, through which cold water is flowing, condenses the moisture, which finds

Novelties.—Fig. 4.—The Use of Mineral Wool in Frame Houses. Longitudinal Section Showing Walls and Floors Protected by Mineral Wool.

its way out of the condenser by means of a suitable drip pipe. After having been dried and at the same time cooled, it passes from the condenser down through a pipe, shown in the engraving, and, following the course of the arrows, is delivered into the bottom of the drying-room among the steam pipes used for heating. So far the apparatus and its working differs but little in principle from that ordinarily used, except that the moisture is squeezed or condensed from the air, and the air returns to the dry-room. In addition to the apparatus for drying the air, it will be noticed at the right of the engraving that there is a steam jet. The object of this may not at first be apparent, because forcing steam into the atmosphere of a dry-room would seem to be wetting the air, which would have to be dried again. The action of the steam jet is not unlike "water seasoning" of lumber. Seasoning by immersion in water takes place because the water dissolves the sap and other juices of the timber, together with the soluble solids, and carries them off. The steam injected from time to time into the drying-room appears to have a somewhat similar action. The moisture penetrates and expands the somewhat seasoned outer fibers of the wood and permits and, perhaps, forces the sap to reach the surface, or it may act simply by dissolving the sap, and, when the jet is shut off, the dry air and sap evaporate together. It is sufficient to say, however, that lumber seasoned in this way does not show that excessive checking which renders lumber rapidly seasoned

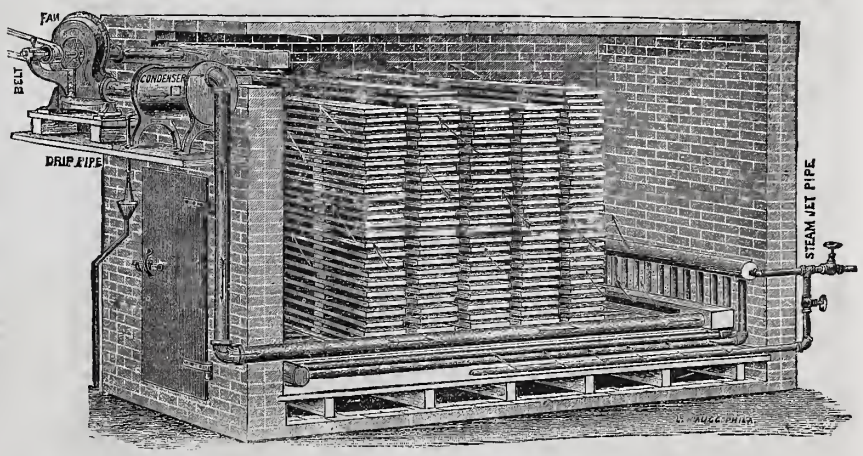
Novelties. — Fig. 5. — Transverse Section through Floor shown in Preceding Cut.

by the ordinary process so undesirable. The use of steam and dry air alternately, presents many advantages over the old method of water seasoning, because it leaves the wood in the end thoroughly dry as well as seasoned, and at the same time there is no danger from souring or fermentation, or the other evils occasioned by too much moisture. The necessary apparatus for building a dry-room upon this plan is manufactured by G. E. Foss, of St. Albans, Vermont.

NEW PUBLICATIONS.

HOUSE PAINTING, CARRIAGE PAINTING AND GRAINING. By John W. Masury. 5 by 7¼ inches in size; 244 pages. Price, $1.50.

The key to the scope of this work is found in the last clause of its title page, "What to do and how to do it." It is essentially a practical book by a practical man, who is also a very pleasant writer and a scientific color manufacturer. In one chapter only do we find the color manufacturer running away with common sense and sound judgment, and that is in the one which treats of Paris green as a pigment. We may say that when it is used as oil color its behavior is altogether different from what it is when laid upon the surface of wall paper. When mixed with oil or varnish and applied as an oil color, there is little or no danger of its appearance in the air in the form of a powder. When applied to wall paper, the sizing soon loses its hold upon the color and the poisonous pigment is easily brushed off, and is likely to produce serious results. Mr. Masury cites the cases of the workmen in the factories where Paris green is made, and shows that if they are healthy there is no reason why we should not use Paris green on our walls. The cases are very different, and any physician would easily point out the reasons of these differences. It is sufficient for us to say that the chapter is decidedly wrong in its reasoning. On the subjects of house painting in general, graining in all its branches, carriage painting and varnishing, the work is exceedingly complete and valuable.



Novelties.—Fig. 6.—General View of the "Common Sense" Drying Room.

THE FRENCH POLISHER'S MANUAL. By a French Polisher, 4½ x 6½ inches in size; 46 pages. Price, 20 cents.

This pamphlet is evidently written by an English workman, and contains, besides the directions for handling French polish, several pages devoted to the art of staining or preparing different woods for the final polishing. The idea in general is that every wood can be treated in some way to improve its appearance before the polish itself is applied. The directions for the polish seem to imply some previous knowledge of the art. We notice that there are several useful hints not found in the "Furniture and Cabinet Finisher," nor in "Practical Hints for Furniture Men," and those who are interested in the subject and wish for everything to be had in this connection, will find it a convenient appendix to the two manuals we have named.

WORKSHOP RECEIPTS. By Ernest Spon. 4¾ by 7 inches in size; 450 pages. Price, $2.

This is a dictionary of receipts, directions and instructions for the workshop. The various subjects are classified, and though no classification appears upon the pages, yet all matter relating to any particular subject is placed together. The work in many respects is admirable, because it does not give the recipes alone, leaving the reader to use his own judgment as to the best method of employing them, but gives directions in regard to the most common usage in the art, and generally a great deal of collateral information, which enables one to use the specific information intelligently. Like all works of the kind, it contains matter good, bad and indifferent; but from long familiarity with the book, we have placed it among a half dozen of the most reliable works of the kind in our library. Though written for the English workshop, it is equally applicable to this country. Cements, dyeing, electro-metallurgy, fluxes, fulminates, gums, varnishes, marble working, nitro-glycerine, gilding, bronzes and pottery all have special sections. Etching, fire-works, japanning, lacquers and photography are considered at considerable length, outside of the special recipes which are given. Several of the subjects are treated in a more satisfactory way than in any other easily accessible work that we know.

STEEL SQUARE PROBLEMS. By L. D. Gould. Eight plates, 6 by 9 inches, with explanatory text; paper cover. Price, 50 cents.

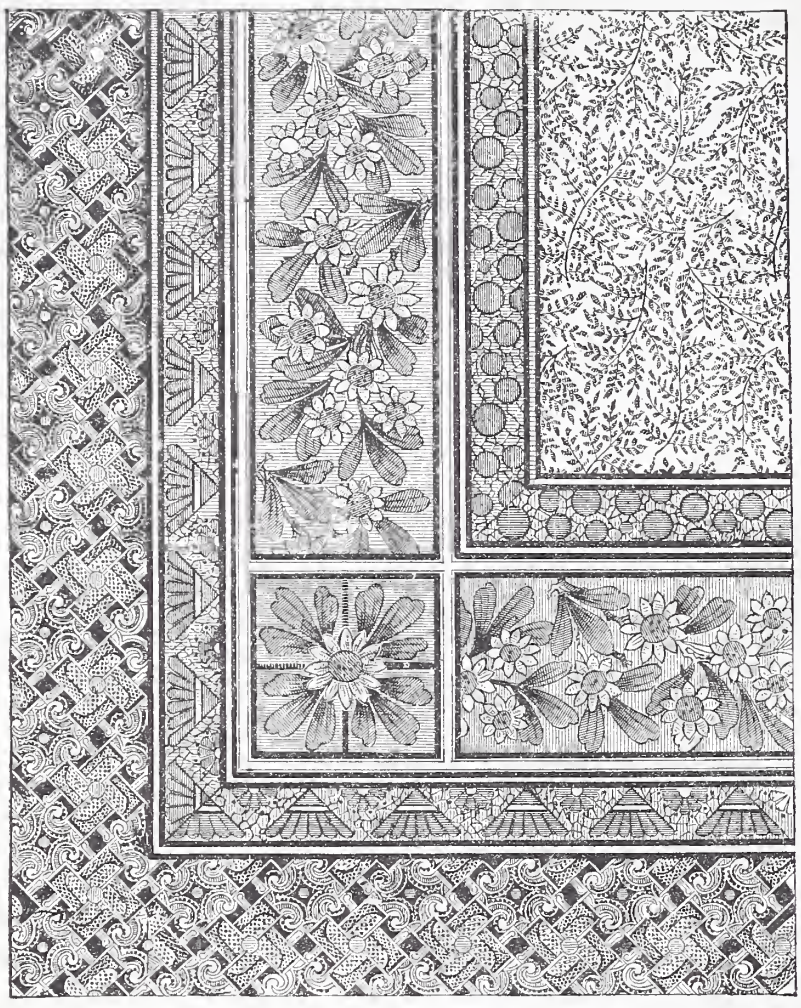
The steel square is so important a tool that it is not strange that many should turn their attention to a consideration of its uses. Additions to its literature will ever be welcomed by intelligent mechanics. We fear, however, that those of our readers who examine this book, having in mind what has already been published in these columns from W. B., G. H. H., F. M. S., and others, will be disappointed. The expectations created by the announcement of a new work on the subject are not likely to be realized. There is quite enough resemblance between some of the matter presented and that published a short time prior to its appearance, to leave the unpleasant suspicion in the mind of the reader that the work is not entirely the result of original investigation. It is true that like problems, for the most part, appear in a new dress, and in one which, perhaps, it was calculated would make them sufficiently attractive to warrant a second study, but the wording of the accompanying description is such that those who have not had the advantage of fuller demonstrations and an explanation of principles, will have difficulty in comprehending much that is here set before them. The author presents some things as absolute facts which mathematicians generally regard simply as approximations. Among these may be mentioned the rule for squaring the circle. The last plate in the pamphlet is devoted to problems in surveying, but the rules given are not likely to be of service to the average mechanic for lack of more intelligent explanation. In employing the briefest possible demonstration, and in using unusual and technical terms in cases where simpler expressions could have been made to answer, the author has failed to improve the opportunity which was before him, of giving mechanics a work which would be really useful to them. The standard manual of the steel square, we believe, is yet to be written, but its author, whoever he may be, we venture to say will come down to the level of his readers, not only in the terms employed, but also in the character of the diagrams and the methods of demonstration. The work will be clear and straightforward in all particulars, and nothing will be done obscurely, even though it be possible thereby to better display the wisdom of the writer.

Chestnuts don't have wings, but are sort of burred-like.

The Use of Paper for Ceiling Decorations.

The idea is gradually gaining ground in the minds of the people generally that white walls are not just the thing. Accordingly we find that tints are being freely employed where the walls are left plain, that painted walls are quite popular in some localities, and that wall papers are being extensively used almost everywhere. The decree of fashion but a short time since was that walls must be frescoed in order to be really nice. The same idea prevailed with regard to ceilings, and the reign of the fresco painter was kept up longer with respect to the latter than in the case of the former. In some instances where wall papers have been employed the ceiling has been treated in the old way, presenting the absurdity of the extravagant designs which only a fresco painter can devise on ceilings of rooms the walls of which were really well treated with paper hangings. The introduction of good designs in ceiling papers is correcting this, and from present indications it will not be long before the walls and ceilings of our houses will be harmonious and in good taste. That the ceiling is a proper field for decoration is now generally recognized. Its importance as a part of the interior has become apparent, and the necessity for some simple means of decorating it has brought ceiling papers to the attention of designers. Paper, it is true, has been used upon ceilings in the past, but only in the way of covering up the ravages of time. No special attention was paid to the design employed. Almost anything was considered good enough for the purpose. All this is at present changed, and since the best designers have given it careful consideration, new importance has been imparted to ceiling papers.

In character, the ceiling papers at present produced by the best houses in the trade are superior, artistically, to everything save only hand-work of a few of the very best decorators. Their expense, on the other hand, is so inconsiderable as to bring them within the reach of all. In the style of ceiling papers to be found in the stores, the Japanese element is very generally observed. While the individual designs are numerous, the styles are really very few. A certain irregular grouping of simple forms is one of the most characteristic features which the observer will notice, and which, for the most part, is pleasing. Rayed stars are sometimes employed, and those who like to discover analogies take pleasure in their suggestion of the heavens. For this reason



Design for Ceiling Paper.

pale blue grounds find favor. It is hardly good taste, however, to regard the ceiling as a part of the immensity of space. It is better to look at the matter only decoratively, and to find our pleasure in the balancing of forms irregularly, without considering them realistically. This the Japanese have shown us how to do in many of their designs, which are deservedly popular.

The color of ceiling papers is a very important item for consideration. From floor to ceiling the color in the decorations of the room should gradually lighten. Accordingly, we find that the prevailing tints in most of the ceiling papers at present manufactured are cream, light olive, blue, gray and pale blue. In the papers represented by our engravings the grounds are light cream and very pale olive respectively. The stars have gold rays with white centers. The border of the latter design is olive, with a gold fret and dogwood blossoms in crimson, with dark olive foliage. This arrangement makes a pleasing band of color about the light center. The border of the other design is not less striking, but the true effect of neither is to be obtained from the engraving. The designs must be seen in order to be fully appreciated.

All of the designs here shown are from papers manufactured by Messrs. Fr. Beck & Co., 206 West Twenty-ninth street, New York City. Of the two borders presented, the first is a dark red flock, with flowers in lighter shades of red and yellow on a dark green ground. The corner pieces are appropriate to this arrangement. The second border is different in tint and is one specially adapted to use in rooms which are not too well lighted. It is composed of a fret of gold on light olive ground. The vine and blossoms are correspondingly light, the latter being in delicate salmon tints outlined in black. The foliage is in light, warm olive, and is similarly outlined. The tints are laid on perfectly flat.

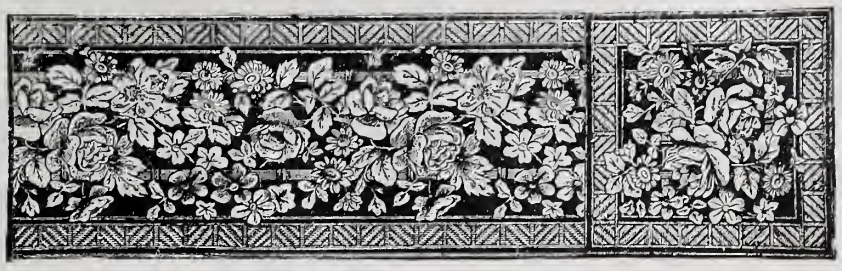
Design for Ceiling Bordering.

The Fall Exhibitions.

During September and October a number of industrial and mechanical exhibitions have been in progress throughout the country, some of which deserve more than passing notice. At one of them special efforts have been made to present such a display of building materials and appliances as would be of interest and value to architects, builders and house owners generally. None of them have been lacking in features the careful study of which would be to the advantage of all mechanics in the building trades. Although these fairs are instituted primarily for advertising purposes, their value as educators is hardly second in importance. A visit to one of them is, in many cases, of more practical benefit to a mechanic than a month of experimental labor in seclusion. More ideas may be picked up in an hour's ramble among the machines and tools ordinarily displayed at a fair, than can in most cases be obtained by a great deal of reading. One must see a fair in order to appreciate it; a mere description conveys but a poor idea. We may say the display was grand or beautiful, that the building was well adapted to the purpose, that visitors attended in large numbers, and that the various parts were well balanced, forming a charming picture as a whole. The mind grasps the idea, being unencumbered with minor details. But when we enter into particulars and single out individual features for description, the task is less easily performed, and lucky indeed is the writer if his words do not entirely fail of their purpose. For this reason and because our space is limited, we shall present our account of the fall exhibitions in the shape of fragmentary notes and isolated paragraphs.

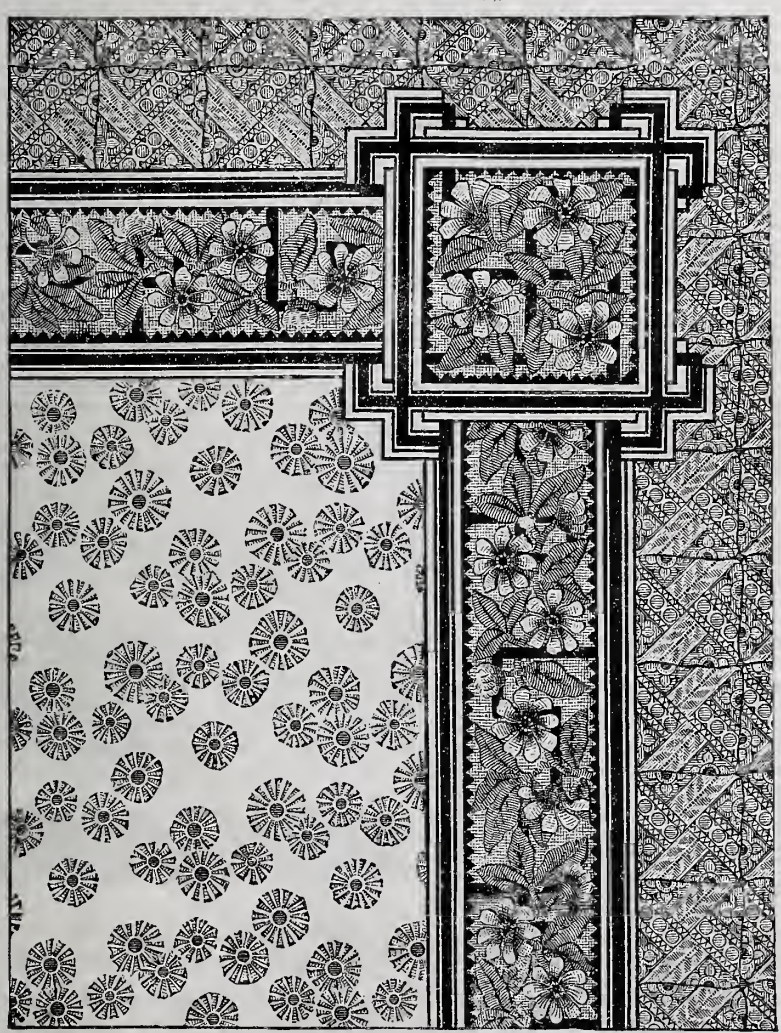
Our ideas of what was to be seen at the exhibition of the Massachusetts Charitable Mechanic Association, held at Boston, were perhaps too high, for we were disappointed at what we found there. This association undertook to conduct an exhibit of building materials and appliances, and to this end issued a circular describing five groups in which the goods presented were to be arranged. The groups were as follows: Material, Construction, Sanitation, Comfort and Convenience, and Decoration. The first group was to contain gross materials, such as wood, plain and fancy, domestic and foreign; stone of all kinds, brick, plain and ornamental; iron, cement, lime, plaster, paints, glass, &c. The group entitled Construction was to contain departments of

tools, including machines for working wood, iron and stone, together with brick and tile machines; fire-proofing, including fire extinguishing apparatus; structural devices, including portable houses, trusses, roofing systems and scaffolds, and builders' hardware. Sanitation was to comprise the display of sanitary appliances, which meant such items as models of drainage systems, water-closets, disinfecting apparatus and plumbers' supplies generally; heating, ventilation and hygienic establishments. Comfort and Convenience was to include elevators, pumps, communication, which was explained to mean speaking tubes and telephones; safety, meaning fire escapes, automatic hatchways, &c.; lighting, including chandeliers, gas fixtures, gas machines, electric lights, &c. The last group, Decoration, was to embrace interior finish, including wall papers, tiles, furniture, hangings, &c. This programme, had it been successfully carried out, would have presented an exhibit of building materials not exceeded in importance by anything which has ever appeared in this country. It was not, however, successfully carried out. Odd exhibits belonging to each of the several groups named were to be found in various parts of the exhibition building, but nothing like a complete display in any one of the departments was to be met. The reasons for this were obvious upon a moment's reflection. At the present time the building business is experiencing an unwonted activity. People in the trade have no time for exhibiting their goods for the mere benefits likely to be derived in an educational way, and they are so full of orders that in many cases they do not care to exhibit them for advertising purposes. It would seem, therefore, that a complete array of the materials and appliances entering into buildings at the present day is hardly possible to gather together except in the way of establishing a museum. Detached portions may be found at any of the fairs, and the exhibition of the Massachusetts Charitable Mechanic Association showed scarcely more than would have been displayed had not this special programme been arranged. Nevertheless the effort put forth was a creditable one, and should it be repeated at some future time we trust it will be more successful.



Another Design for Ceiling Bordering.

TWO RIVAL FAIRS at Boston have served to divide the interest of citizens and visitors. A disagreement in the management of the Massachusetts Charitable Mechanic Association, the parent institution, which occurred about the time of its last triennial exhibition, resulted in the formation of an opposition association, known as the New England Mechanics' Institute. The new organization conducted its first fair the present year, and the competition which has existed between the two associations has doubtless resulted in many features of interest which might otherwise have failed to appear. The building of the New England Fair, as it is familiarly termed, is one of the finest which has ever been erected for exhibition purposes. In construction it is substantial; the interior space is well lighted; the hight is ample, while the peculiar construction of the roof imparts to the whole an appearance of lightness and grace which well befits the purposes for which it was intended. The architect of this structure was Mr. Alden Frink, assisted by Messrs. Grafts & Forbes, engineers. The iron roof was erected by D. H. Andrews, and the mason-work was under the control of J. H. Coon. Leach & Harney supplied the foundations, while Messrs. Greesy & Noyes furnished the woodwork of the building. While the two exhibitions in some senses were rivals, the displays in very few cases were duplicates, and had the two formed one large exhibit, the display would undoubtedly have been better than anything that has ever been seen in this country, excepting only the Centennial Exhibition at Philadelphia.



Another Design for Ceiling Paper.

MANY OF THE well-known hardware establishments of the country were prominently represented at the fair of the New England Institute. The Providence Tool Company, of Providence, R. I., besides showing many samples of heavy hardware, ship hardware, nuts, bolts, &c., exhibited a very fine case of tools. The Stanley Rule and Level Company, of New Britain, Conn., showed a handsome case containing specimens of levels, screw drivers, tri-squares, pocket rules, gauges, bevels, &c. The Millers Falls Company, of Millers Falls, Mass., exhibited a fine line of the goods they manufacture, among which may be mentioned the Langdon Miter Box and an improved form of vise. E. M. Boynton, the well-known saw manufacturer, of 80 Beekman street, New York City, exhibited a very handsomely arranged case of saw blades, circular saws, &c., so displayed as to present a symmetrical appearance as a whole, and to admit of a careful examination of the individual pieces. The New England Butt Company, of Providence, displayed a fine line of locks, butts, shelf brackets, counter scales, scrapers and specimens of Murphy's bench clamp, which has already been mentioned in our columns. Messrs. Goodnow & Wightman, of 176 Washington street, Boston, presented a display which was instructive as well as interesting. A working model of an electric engine of diminutive size was a feature which attracted marked attention upon the part of visitors generally. Drills, reamers, blow-pipes, lathe chucks, improved tool rests, scroll saws, foot-power lathes and similar articles were of special interest to mechanics. The Prentiss Vise Company, of 23 Dey street, New York city, exhibited a fine line of the vises manufactured by them, a description of which appeared in our columns some time since. Other exhibits are well deserving of mention in this connection, but space forbids.

AMONG THE wood-working machinery exhibited at the New England Institute Fair may be mentioned the display made by the S. A. Woods Machine Co., of Boston, New York and Chicago. A number of standard wood-working machines were exhibited, the exhibition being in charge of Mr. Jerome S. Mosley, inventor of the Eureka Scroll Saw. This machine was also a feature of the exhibit, and being at times operated by the inventor, was a center of attraction to those interested in this department. John A. White, of Concord, N. H., also showed a number of standard wood-working machines of his own manufacture, and included the Amesbury Band Saw Filing Machine, which has already been described in our columns. The special features of the machines manufactured by Mr. White are the thoroughness of their construction, their heavy weight and their suitability for heavy work without undue wear and tear. A number of wood-working machines were also displayed by W. W. Carey, of Lowell, Mass. H. S. Hapgood, of Athol, Mass., exhibited a standard buffing and sand-papering machine. Messrs. G. W. Parker & Co., of 1388 Tremont street, Boston, Mass., exhibited a dovetailing machine by which the same kind of a joint

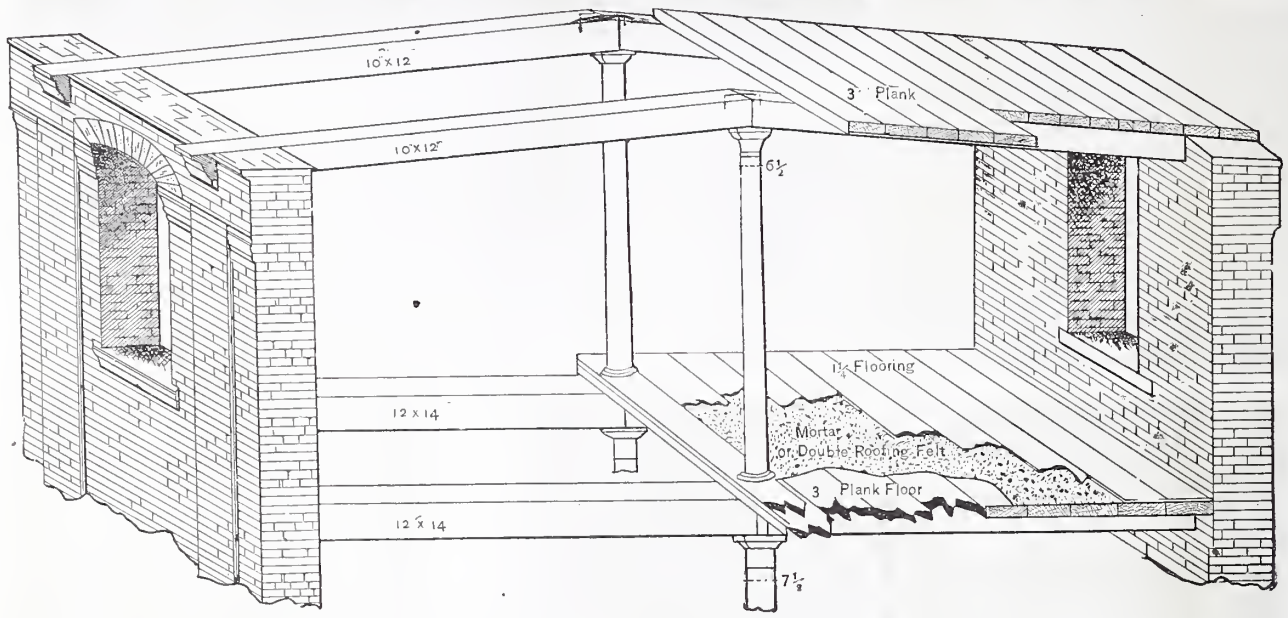
usual in handwork is made. B. F. Sturtevant, the well-known manufacturer of blowers, showed machines specially adapted for use in planing mills for carrying away chips. Numerous other machines and labor-saving tools were prominently exhibited.

THE EXHIBITION of the American Institute (New York) the present season is much better than for several years past. While in some particulars the fairs of any two years resemble each other, on account of being held in the same building, with the same general divisions of space, there is a pleasing variety in the present instance, and a notable absence of some of the old stand-bys, exhibitors had failed to comprehend the possibilities of the occasion, and to keenly regret their lack of enterprise.

A MUCH-NEEDED LESSON to builders was splendidly illustrated by some pine columns, to which tests had been applied by tho United States Government machine at the Watertown Arsenal, and which were exhibited at the fair of the Massachusetts Charitable Mechanic Association. Ono of these columns, originally 12 feet in length, yielded to a pressure of 190,000 pounds, the weakest spot being a largo knot, which acted as a wedge and caused the destruction of the post at less than the weight which,

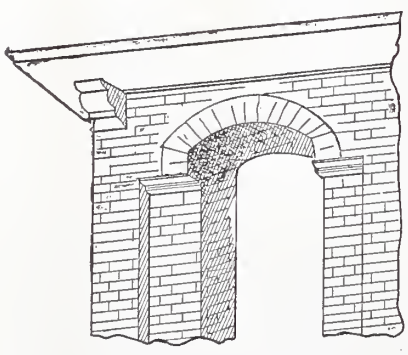
Slow Burning Construction for Factory Roofs and Floors.

The question of building factories, warehouses and tho like in such a way as will best adapt them to resist fires, is one in which insurance companies, as well as property owners, are deeply interested. Accordingly, we find various companies giving practical attention to details of construction, and, in one case, issuing circulars and diagrams for the information of architects and builders. An insurance company occupies a peculiar position in the discussion of a subject of this character. In adjusting



Slow Burning Construction.—Fig. 1.—Perspective View showing Arrangement of Floor Beams, Rafters and Columns, and Manner of Laying Floor.

with the appearance of which every visitor has become quite familiar. In tho machinery department a number of wood-working machines are in practical operation. Numerous small tools and structural devices are shown in different places. Sanitary appliances and plumbers' goods are well represented. The model of a portable house attracts considerable attention. Heating apparatus, skylights, gas burners, electric lighting, &c., all possess features of interest to builders and house owners. We have not space at this time to particularize, but shall give



Slow Burning Construction.—Fig. 2.—Substitute for the Old Box Cornice.

further attention to some of the novelties shown in a future number.

THE WIGHT FIRE PROOFING COMPANY, of Chicago, was conspicuous at the fair of the Massachusetts Charitable Mechanic Association because it was the only one making a display of fire-proofing systems. The exhibit was one of the most complete and most to the purpose of any contained in the fair. It showed the various applications of the process peculiar to this company by means of full-sized models of construction. Floor, walls, mansard roof, ceiling, and the manner in which iron columns are protected by the construction employed by this company were well illustrated. An examination of this exhibit caused ono to feel how other theoretically, it should have sustained. Another of these columns was a stick 12 feet long, tapering from about 7¾ inches to about 6½ inches in diameter. It was practically a perfect stick, and the test has shown that its weakest point is at the smaller end; the crumbling of the fibers incident to the crushing strain has taken place at this point. As an argument against the prevalent custom of turning down wooden columns at the end, this test stands unquestioned. A seasoned hard-pine girder, 10 feet long and 11 inches square, when tested, bore the astonishing load of 751,000 pounds—a convincing proof of the value of such material for columns. Besides tests applied to columns, the same exhibit contains material showing the results of tensilo strain, among which may be mentioned a cable of the same kind as used in the construction of the East River Bridge. The diameter of this cable is 1¾ inches, and though tested up to a strain of 155,000 pounds, or 75 tons, it remained intact. The bail of the socket, however, parted, which shows that in constructions of this kind the weakest point sometimes lies not in the cablo itself, but in its fastenings. An ordinary latticed iron column, 10 feet long, of a pattern quite common in bridge work, was ruined by a pressure of 574,500 pounds, while a circular flanged column of the pattern known as the Phœnix, although of smaller size, sustained a weight of 50,000 pounds greater. An 8-inch column of the Phœnix pattern shows, by the symmetry of its present crushed form, how perfectly it is adapted for supporting weights. Several other tests of steel bars, cast bars, boiler plates, &c., complete the display referred to. Many engineers who have examined the exhibit have expressed the greatest interest in the specimens. It is a graphic method of showing facts that are of interest to all connected with building and engineering operations. It is also a popular presentment of facts frequently published in technical journals, but which are not easily accessible to the average reader.

losses it is brought face to face with fires occurring under all manner of circumstances and arising from various causes. In inspecting buildings where applications for insurance are made, it has the opportunity of examining the construction current in different and remote sections of the country, and of noting results. It is the only one of all the agents at work in the community that possesses such opportunities of seeing and knowing what is good and bad in the construction of buildings. When, therefore, an insurance company, through its officers, issues a circular advising upon points of construction, and giving reasons for their adoption, it is pretty conclusive evidence that the suggestions offered are based upon practical experience, and that they are entitled to the careful consideration of all who are connected with work of the kind described. We think our readers will be interested in the subject matter of a cir-

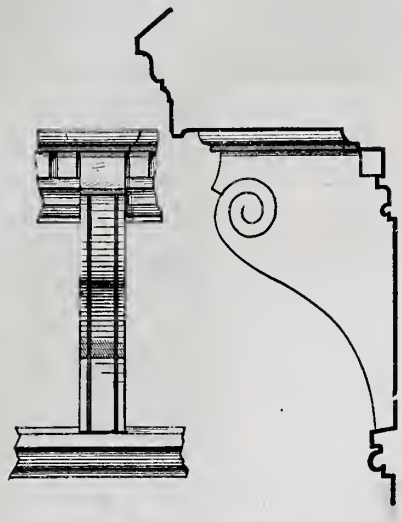
Slow Burning Construction.—Fig. 3.—Detail of Floor.—Scale, 1 Inch to the Foot.

cular of this kind recently issued by the Boston Manufacturers' Mutual Fire Insurance Company. Contrary to what may be generally supposed to be the best construction irrespective of cost, this company does not advise iron as a material to the exclusion of those which are generally considered combustible, but recommends wood so arranged that the building of which it is one of the principal elements shall be slow in burning in case it takes fire. Facts seem to demonstrate that this construction may more properly be called fire-proof than the usual ironwork which has received that name.

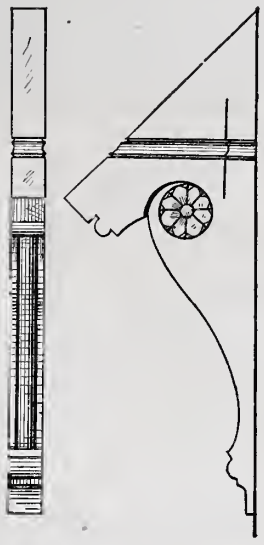
One of the most striking features in the construction recommended applies to the roof. It is composed of timbers, split or single, as the case may be, of large dimensions, placed upon the walls at the outer

They call it a bay window, because you go there when you would look out to sea.

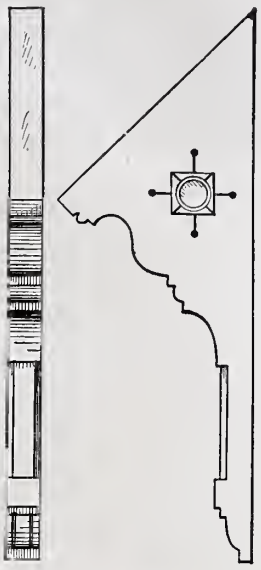
Piazza Column.



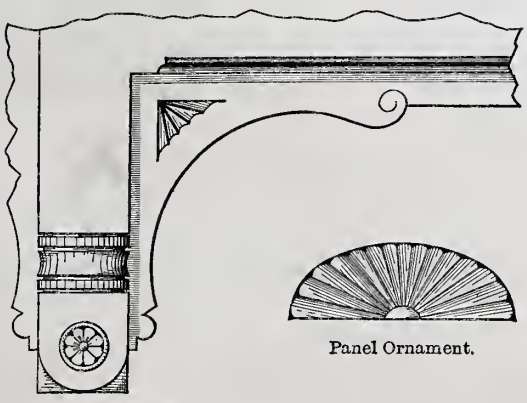
Design for Cornice.



Bracket.

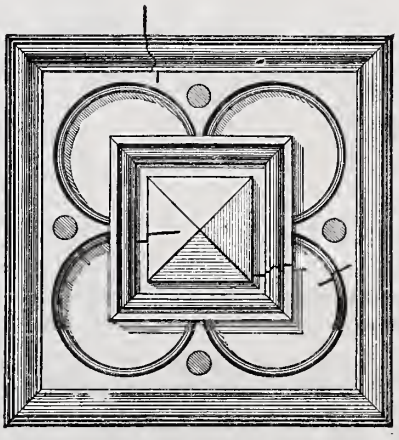


Bracket.

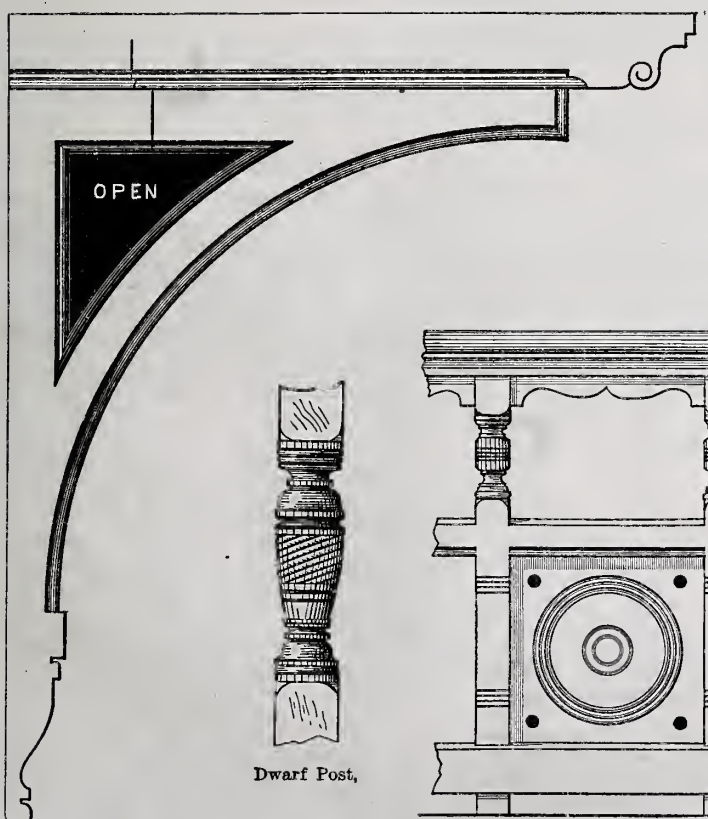


Corner Arch for Piazza.

Panel Ornament.



Design for Panel.



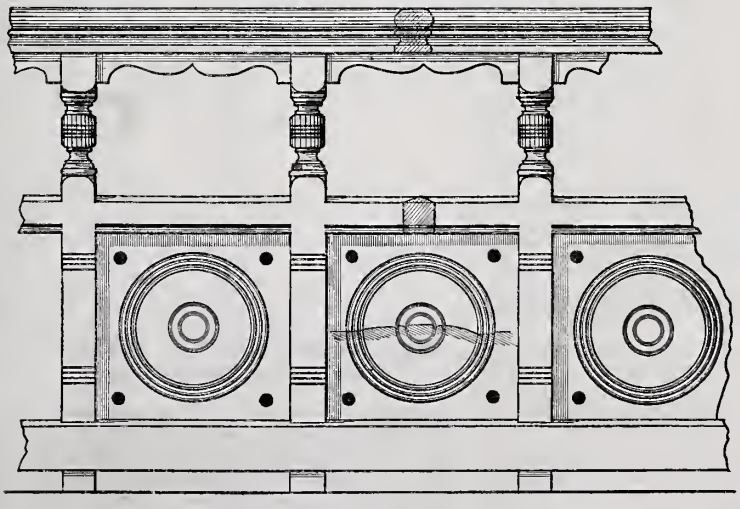
Balcony Bracket. (Side.)

Drop.

Cap.

Balcony Bracket. (Face.)

Dwarf Post.



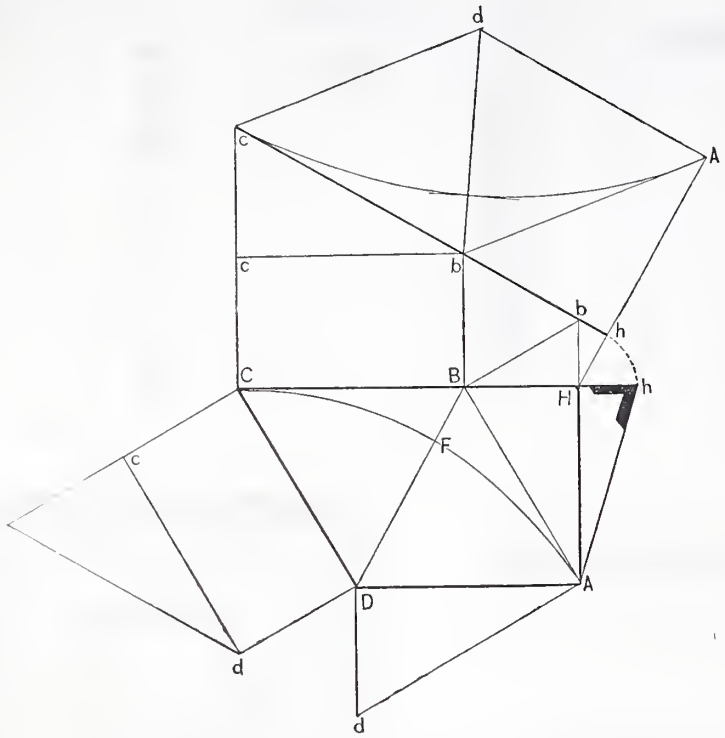
Piazza Railing.

Miscellaneous Details.—Scale, 1 Inch to the Foot —Published in Response to Requests from Various Correspondents.

ends and supported in the center upon iron columns. On top of the rafters just described, a covering of plank, 3 inches thick, is placed, which is solidly held in position by spiking. The brickwork between the rafters or floor beams is carried tight up against the sheeting plank, as shown in Fig. 1 of the engravings. Over this course of sheeting either a metal covering or some of the approved composition roofs is laid. This apparent excess of thickness of plank is essential to safety, says the circular, because there is always a very much better chance to save property before a wood roof is burned through than afterwards. The great thickness of sheeting adds to the time necessary for the flames to reach the open air. Practically considered, it is found essential to the stability of the covering, whatever it may be, to have a considerable thickness of wood on top of the rafters; it serves to keep the upper room warm in winter and cool in summer, and at the same time overcomes what is so frequently an annoyance—condensation or dripping from the roof. In Northern climates this thickness and strength of roof is frequently necessary to resist the weight of deep snow. Especially is this the case if the snow be followed by a light rain, as not infrequently happens. In such cases the load upon a roof is estimated to be greater than a full complement of machinery in a cotton or woolen mill.

It will not surprise our readers that the circular in question condemns the conventional box cornice so common upon mills, factories, warehouses, dwellings, store fronts, &c. A box cornice, whether of wood or metal, is considered dangerous in the extreme. The circular phrases it "uselessly dangerous." The architectural effect produced by an open cornice, as suggested at the left hand of Fig. 1 of the engraving, and as shown more in detail by Fig. 2, is better than that usually made by a box cornice, and aside from the advantages of this character to which we are now giving attention, is to be preferred.

The flooring recommended by this company deserves special mention. It is illustrated in Fig. 1. It consists, first, of 3-inch plank laid upon beams spaced 8 feet between centers. The spans are restricted to 24 feet when the timbers are of the dimensions shown in the engraving. On top of the bottom floor plank, which is put together with tongues as shown in the detail, Fig. 3, a layer of roofing felt or mortar is placed. Above this a top flooring of 1¼-inch stuff is laid. To cover the joints in the plank flooring, and also to enhance the appearance of the ceiling in the room below, a half-round bead is placed, which effectually covers the crack that would be produced by the shrinkage of the wood. This bead is fastened in position by nailing on one side only, in order to avoid splitting it as the shrinkage progresses. This finish is liked by many persons, as it relieves the otherwise flat surface of the ceiling. Floors made as here recommended are essentially fire resistant. A very long time is necessary for the fire, whether it occurs on top or beneath one of them, to burn through in a way to cause a draft. We shall not attempt to present the cost of construction of this kind. Our readers are prepared to estimate it for themselves. We think, however, it will be found that, when the durability and the lessened insurance are taken into account, the construction is quite as economical as the more flimsy plans usually employed.



Wreath-pieces which have a Continuous Rake over Ground Plans that are Less than a Quarter Circle.—Fig. 1.—General Method of Obtaining the Elevated Center Line, &c.

Practical Stair Building.—XV.

WREATH-PIECES WHICH HAVE A CONTINUOUS RAKE OVER GROUND PLANS THAT ARE LESS THAN A QUARTER CIRCLE.

In Fig. 1 of the engravings, A C represents the ground plan of a wreath-piece which is less than a quarter circle. A B and B C represent its tangents. It is required to draw an elevated center line having its tangents over A B and B C, both on the same rake. Complete the parallelogram A D C B, as shown in the engraving. Draw the triangles A *d* D and A *b* B, giving them such hight as will represent the proposed rake of the tangents. Draw the rectangles D *d c* C and C *c b* B equal in hight to the triangles just mentioned. Draw the triangles *d c c* and *b c c*, also showing the pitch of the tangents. Extend the line C B indefinitely in the direction of *h*, cutting A *b* in the point H. Draw H A indefinitely perpendicular to *c h*. Produce the rake line *c h* until it cuts A H in the point *h*. From H, as center, with radius H *h* in the line H A, describe the arc *h h*. From the point *h* in the line H A, set off *h* A equal to A H. From the point A thus determined, draw the line A *b* and complete the parallelogram A *b c d*. Draw the diagonal B D of the original parallelogram and *b d* of the parallelogram last constructed. Take the distance of this last diagonal line *b f* equal to B F on the diagonal B D. Through *f* draw a short line at right angles to *b d*. A *b* and *c b* on the last parallelogram constructed are the elevated tangents of the required curve. With these lines and the short line drawn through *f* as guides, draw the elevated center line A *f c*.

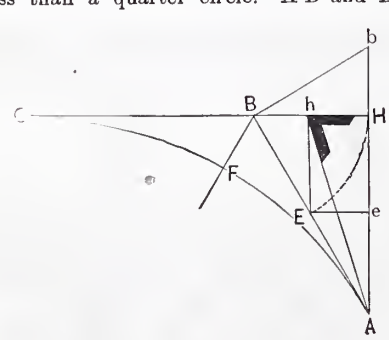


Fig. 2.—Short or Practical Method of Accomplishing the same Result.

Part of the work that has been described in connection with this diagram serves to demonstrate its correctness. By drawing the figure upon a piece of cardboard, with the triangle A *b* B upon a separate piece, and folding the figure upon the heavy lines A H, A D, D C, H C and *c h*, it will be seen that the point A in the elevation will lap over and meet A in the ground plan, and that the elevated tangents and center line will be found in their places over the plan, and that the bevel at *h* will just fit the solid angle formed at the line *c h h*.

With the elevated center line determined, the drawing of the pattern of the wreath-piece is substantially the same as that described in preceding problems. Referring to Fig. 3, draw the line *c b h* equal to *c b h* of Fig. 1. At right angles with *c h* draw *h* A equal to the level line *h* A of the original figure. Connect A to *b*; then A *b* and *b c* are the elevated tangents of the required shape, having their proper angle at *b*. Bisect the angle A *b* C with the line *b f*. Take the distance *b f*, equal to B F of Fig. 1, and from *f* as center, draw two short arcs, measuring a little more than the width of the rail. At A and *c* make the pattern about one-fourth wider than the rail, and, with the short parallel lines shown in the engraving to serve as guides at the ends, draw the inside and outside lines of the pattern, touching the short arcs as shown.

Fig. 3.—Laying Out the Pattern.

Fig. 2 represents the same operation as illustrated in Fig. 1, divested of the superfluous work introduced to facilitate a proof of the accuracy of the method. A C represents the center line, with its tangents A B and B C. Draw the triangle A *b* B, showing the proposed rake of the tangents, over A B and B C. Extend C B to H in the line A *b*. Take B E equal to B H, and from E draw E *e* perpendicular to A *b*. Take H *h* equal to E *e* and draw *h* A. Draw B F, bisecting the angle C B A. From this diagram the face pattern of the wreath-piece is laid out as follows: Referring again to Fig. 3, draw the line *c b h*, making *c b* equal to A *b* of Fig. 2, and *b h* equal to *b e*. At right angles with *c h* draw *h* A equal to the bevel line *h* A. Draw A *b*; then A *b* and *b c* are the elevated tangent lines sought, having their

proper angle at *b*. Bisect the angle *c b* A by the line *b f*. Take the distance *b f* equal to B F of Fig. 2, and from *f* as center draw two arcs as already described in deriving this pattern from Fig. 1. In other respects complete the pattern as above indicated. The angle at *h* is the bevel for both ends of the wreath-piece. In Fig. 2 the quadrilateral E B *b c* is the same as H B *b h* of Fig. 1.

WREATH-PIECES .WHICH HAVE A CONTINUOUS RAKE OVER GROUND PLANS WHICH ARE LESS THAN A QUARTER ELLIPSE.

A problem of this class is illustrated in Figs. 4, 5 and 6, and is in all particulars very similar to the one just demonstrated. Corresponding letters relate to corresponding parts. In Fig. 4 the line B O bisects the angle at B. The point O in the ground plan is transferred to the elevation by the line O o. In the elevation the line *b* o bisects the angle at B. The rectangle D *d c* C is equal in hight to the triangle A *d* D. The rectangle C *c b* B is equal in hight to the triangle A *b* B. Fig. 5 shows the short method of obtaining all necessary points for describing the pattern of the wreath-piece. The wreath-piece, as described either from Fig. 4 or Fig. 5, is shown in Fig. 6.

NOTES AND COMMENTS.

AT THE TIME of this writing New York City is again pondering the lessons of a destructive fire. On the evening of the 10th ult. a fire broke out in the stables of the Fourth Avenue Horse Car Co., and soon gained such headway that it was not got under control until the entire building had been destroyed, as well as the storage ware houses in an adjacent block. The total loss is estimated at not far from $2,000,000. Every great fire brings to light some defect in the provisions for the public safety. In this case the ready supply of water was insufficient. There was too little pressure in the mains, and there were not enough hydrants in the neighborhood to meet the extraordinary emergency. The city has already outgrown its Croton facilities, and every year, at the present rate of increase in population and territory occupied, will greatly add to the dangers that threaten from fires and neglected sanitary conditions. At the best, there is no absolute security against great fires in great cities. Even if all the recommendations of insurance companies were adopted by the city and the citizens, destructive fires would still occur occasionally. The best that can be hoped for is to limit their seriousness by the prompt, abundant and skillful use of water. How best to increase the water facilities of New York City is the practical question growing out of this fire and others which have occurred in the past, and is one to which every citizen should give thoughtful attention, to the end that the best means may be devised and put into operation at the earliest possible moment.

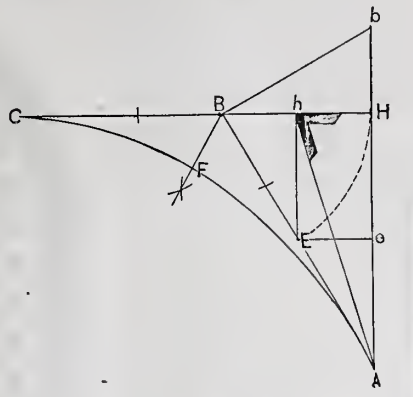


Fig. 5.—A Short and Practical Method of Accomplishing the Same Result.

MR. MORRELL, the proprietor of the storage warehouses in Thirty-second street, which were destroyed in the fire of Oct. 10, is reported to have said, regarding the building, that it was the best and most complete for the purpose that could be found in the country, if not in the world. Admitting this to be so, we fear other great losses are to be met before people learn to provide safe places for the storage of their valuables, for the building was not what it might have been. The front, facing the stables in which the fire originated, was not even provided with iron shutters, although any reflecting person who viewed the premises must have foreseen that sooner or later danger would arise from that quarter. A large wooden sign was placed on the roof which, quickly catching fire, did much toward igniting the building. If Mr. Morrell really thought he had the right sort of an edifice for safe storage, he must be ill informed upon the subject. Hard experience will now have taught him better. It will be well for the community if other warehousemen learn the lesson now, and take the necessary precautions to avoid similar disasters in their own buildings.

A STORAGE WAREHOUSE, to be absolutely safe, should, in the first place, be entirely detached. It should be built around a court, and the windows, protected by iron shutters, should all face inward, and be as few and as far between as is consistent with needful light. The building should be in many sections, being subdivided by strong brick walls, the necessary connections being by double iron doors—that is, by doors with a space of at least a foot between them. The court-yard of the building should be provided with several hydrants, and, in a shed adjoining, a fire engine, with an engineer always on duty, should be placed, the still further protection of electric communication with the Fire Department being provided. Each floor of the building should be furnished with a hydrant with hose attached, and the floors should be so arranged as to be slow burning, if not made of fire material. The roof also should be fire-proof in character. Were these features of construction embodied in a building of the general character above indicated, the community would be justified in feeling that goods stored within it were as nearly safe from such disasters as overtook the Morrell warehouse as is possible at the present state of the arts. With the constant and increasing demand for storage, we think, as a business enterprise, the erection of a building entirely safe would prove a profitable investment.

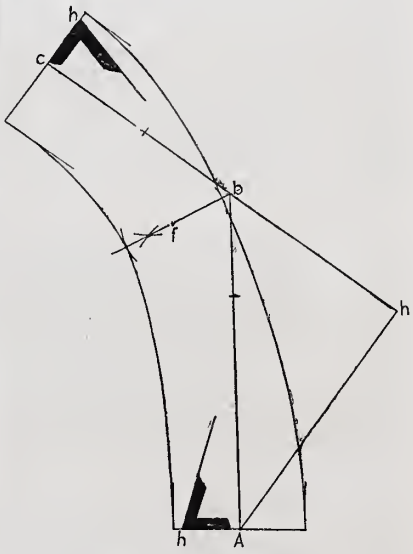
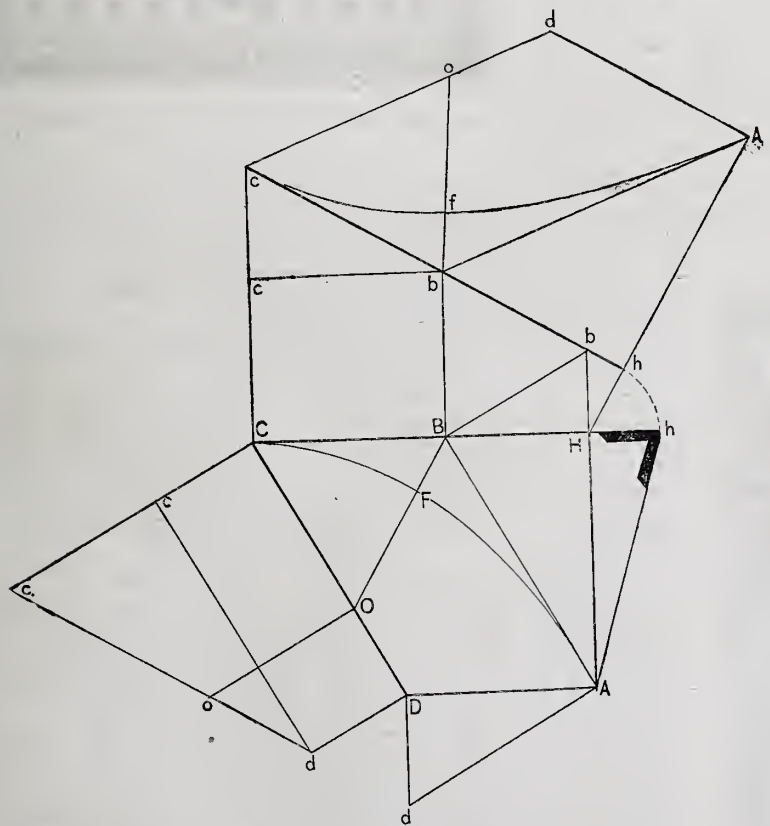


Fig. 6.—Manner of Laying Out the Pattern.

THE NEW CITY HALL at Broad and Market streets, Philadelphia, is making progress toward completion. A portion of it has already been occupied for city offices, and still other rooms are expected to be completed within a very short time. The iron girders to support the roof of the southern portion of the building have been raised and put into position. The trestle-work at the southern and eastern entrances is 147 feet in hight, and the engines for hoisting purposes are located on the top of it. At the northern entrance the scaffolding has been removed, and the bronze capitals of the six great columns have been unboxed and exposed to view. The capitals represent Art and Science, Agriculture and Mechanics, and Navigation and Commerce blended together on the four sides of each capital. They were made from the designs of Mr. Alexander M. Calder, who is in charge of this class of work. In the model rooms Mr. Calder and his assistants are hard at work designing and shaping the figures yet to be placed about the edifice. The designs of two enormous companion pieces, representing



Wreath-pieces which have a Continuous Rake over Ground Plans which are Less than a Quarter Ellipse.—Fig. 4.—General Method of Obtaining the Necessary Measurements for Laying Out the Pattern.

Law and Liberty, are completed, as are also the models for the coat-of-arms of the city of Philadelphia and State of Pennsylvania, which are to be 24 feet long and 8 feet high. These are to be placed on the four fronts of the building. It is an interesting fact (in connection with the art work with which this building is so profusely adorned) that when Girard College was being erected it was found necessary to send to Italy to have the capitals of the fluted columns around the building carved. Although the work on the new City Hall is much more elaborate and of a finer order than that employed in the college building, it is all done at home and principally by American workmen.

Among some tools found in a temple in Thebes was a square, which is the most satisfactory evidence we have of the early use of this instrument. From marks upon it, it has been estimated to have been made nearly 35 centuries ago. Since the arts in Egypt at that time were at the hight of their development, the square must have been known for some time previous, and therefore it is believed that the use of the square dates back not less than 4000 years. The square known to the ancients, and the tool with which they accomplished marvels of construction and calculation, was not, by any means, the square known to mechanics of the present day. This instrument as now employed, with blade and tongue and heel and the graduated lines which appear upon its surface, is an invention known only within a comparatively short time. The square, as an instrument, has been brought to its present state of perfection within a very few years.

In house painting, graining in imitation of wood or marble is to be condemned, on the ground that all shams are despicable. Besides, the result achieved is less pleasurable as an object to look upon than would be the natural wood, however common its quality, if it were properly filled and oiled. Shams of all kinds are to be avoided, and as graining, however little it may succeed in its aim, is intended to deceive, it is a sham, and therefore should never be countenanced by persons of taste.

Plans for the new Produce Exchange Building, to be erected on the corner of Broadway and Beaver street, this city, have been completed by Mr. G. B. Post, the architect, and have recently been on exhibition. The structure will be 300 feet in the front, 150 feet deep and 110 feet high. In style the building may be described as modified Renaissance. It will be constructed of brick, stone, iron and terra-cotta. The lower story and the floor above the Exchange are to be used for offices. The building will be fire-proof throughout. The stair and elevator accommodations will be ample. Special care will be taken with the heating and ventilating. The cost of the building is estimated at upward of $1,000,000. The land on which it is to stand is valued at about $67,000. It is now expected that this mammoth structure will be ready for occupancy about May 1, 1882.

Decorative Cut Metal Work.—Fig. 1.—The Application of Cut Metal Work to the Ornamentation of Doors.

The progress which has been made in the manufacture of wall papers, evidenced by the goods produced, is something wonderful to contemplate. Only two hundred years have elapsed since wall papers were first introduced into Europe. Up to that time walls were either painted, as was the custom in Southern countries, or hung with tapestry, as prevailed elsewhere. Spain introduced leather hangings as panels set into woodwork. From this the French copied. In place of tapestries the English introduced hangings of silk and satin. About the beginning of the seventeenth century the Dutch began the manufacture of printed papers, evidently stimulated by the Chinese papers brought over in their trade with Eastern nations. These papers were square pieces pasted together, being printed on blocks in designs imitating Spanish leather. Following this were other improvements, among which was the use of flock. Papers were made to imitate stamped velvets, but the designs for the most part were bold, large scrolls, and in color were generally blue on a drab ground. The texture was very coarse, European manufacturers by no means equaling the papers made in China. The invention of machinery, which produced paper in long lengths, gave the necessary stimulus to wall papers, and progress since that time has been more apparent. Many improvements in the production of wall paper have followed in rapid succession. Equally rapid changes have taken place in designs. The importance given to decorations of late years has enlisted the attention of trained artists, until, at the present time, designs of the very highest character are to be purchased at prices so low as to bring them within the reach of every one.

At a recent test of Philadelphia pressed brick in the powerful hydraulic press at the Watertown Arsenal, a sample from a lot intended for the City Hall, in that city, was subjected to a compression of 500,000 pounds. The brick remained between the plates for five minutes, and was not affected in the least. From appearances it was estimated that the pressure might have been increased another 100,000 pounds without damage.

A new art industry announced is house decorations in antique brass. The material is a species of clay baked to the hardness of stone, and then, by a special process, overlaid with brass or bronze. It is molded into artistic and decorative forms, such as tiles, pillars, panels, heads, vases, &c. The application of this work is said to be quite effective, and several specimen studies have been executed.

Decorative Cut Metal Work.

At the Paris Exposition in 1878 Madame Delong, the leader and manager of a company manufacturing cut metal work for decorative purposes, made a conspicuous display of what can be done in this line, by means of a kiosk almost entirely constructed out of material of this kind. It naturally attracted a great deal of attention, although the industry had been conducted in comparative obscurity up to the time of the Exposition. Cut metal work is now one of the prominent decorative materials, both for interior and exterior embellishment, in Paris. Some little attention has been given to the subject by American manufacturers, and in some instances architects and decorators have employed it in their work. Fig. 1 of our illustrations represents a pair of doors, in the ornamentation of which perforated metal work has been employed. In the upper panels the work is shown over glass, and in the lower panels, to the left, it is shown over wood. Fig. 2 represents the design of a screen or panel, and indicates the fine lines which may be produced by this process. There appears to be nothing required, from a memorial brass to a palace gate, from a door panel to a Gothic window, or from a jewel-box to a fender, that the wonderful instrument which has been invented for this work cannot turn out. Some of the smallest articles, such as monograms, manufactured by this company, show lines almost as minute as hair-work, and where designs are colored and applied upon cornices and ceilings, the shading is said to be so minute that the visitor naturally supposes the intricate fretwork is merely painting, and seldom suspects it is metal. In Paris and vicinity, cut metal has been employed for decorative purposes, among other places in the Gymnase Theater, the entrance doors of the memorial monument of Bourget, the communion rails and chapel gate of St. Ambroise Church, the residences of the Rothschilds and of the ex-Queen of Spain.

Decorative Cut Metal Work.—Fig. 2.—Design for a Screen or Panel.

CORRESPONDENCE.

We invite the special attention of all our readers to the series of competitions announced in another portion of this issue. The subjects chosen and the general features of the contest possess many elements of popular interest. The scheme has been devised in an attempt to present a systematic study in house building, embracing all particulars, from the floor plans and digging the foundations to making the estimate and painting the house in the most tasteful manner. There are many hundreds of people among our readers who are competent to draw floor plans so as to express their ideas of what an eight-room house should be. We trust every one of them will prepare a set of plans and send them in competition for the prizes offered. We are particularly anxious to make this series of competitions popular, and we trust our readers will accept the broad invitation hereby extended to them and respond freely.

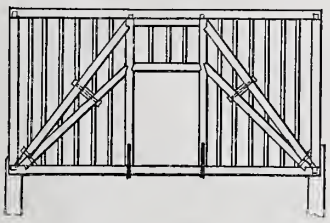
A number of letters relating to our stair-building articles, critical, complimentary and otherwise, have been received, and it was our first intention to have used them in the current number, making a prominent feature of them. In the make-up which we finally adopted, and with which we think our readers will all be pleased, less space has been devoted to correspondence, and this has necessitated laying them over to another number. Those who have contributed to the discussion of the stair-building problems are assured that their articles are very acceptable, and will appear in our columns as soon as we can find space for them. In the meantime, we invite letters upon the subject from all our readers who may see fit to write upon it.

Carpenters' Wages.

From E. H. C., *East Rochester, N. H.*—A correspondent in a recent number of the paper desires to know why it is that carpenters receive less wages than bricklayers, plasterers, painters, &c. I think there are several reasons why this is the case. I will attempt, briefly, to present my views on the subject. In the first place, carpenters are themselves to blame for getting small wages. They persist in working against each other and in cutting prices. For example, A agrees to do a certain job of work for $25, which, to begin with, is at least $5 less than a fair price. B hearing about it and being jealous of A, says: "I think that is a big price; I would like to have such a job at $20." Consequently, when there is another piece of work of the same kind to be let, if B gets the chance he will take the job out of A's hands by bidding at $20. While he succeeds in beating A, he also beats himself by taking the work at two-thirds what it is really worth. Again, some carpenters will take jobs at half price simply for the sake of being boss. It would seem that some of them are foolish enough to work for nothing and find themselves, provided always that they can be boss. Again, our ranks are full of wood butchers, men who do not know a horizontal line from a vertical line—men who will take jobs at a quarter what they are worth and butcher them through to the best of their ability. They never make money and are always at the foot of the ladder. I know a great many of this class; in fact, I am led to believe that there is not more than 1 in 25 who call themselves carpenters that is really competent to take charge of work, much less to contract for buildings. Your correspondent says the carpenter is required to possess as much brains as a plasterer, bricklayer or painter. That is certainly the case, only he might have said that the carpenter is required to possess more ability, for he must know about his own work and about that of other mechanics also. He must be able to direct the bricklayer, the plumber, the painter, the tinner and all other mechanics employed about the building. After doing all this he gets less wages than those he superintends. A builder who is competent to take the lead must be a man of good sound mind and of common sense, to say the least. There is something coming up all the time for a builder to contend with, while in bricklaying, for example, it is one brick upon another, and the largest structure is finished—that is, provided the carpenter will help him out of all the hard places. A plasterer's work is very simple compared with the work of a carpenter. I think the painter is required to have as much skill as any of the mechanics whom a carpenter is expected to superintend, provided he is a master of his business; but, after all, his work is to a certain extent a constant repetition. I do not think that plasterers, masons or painters get more pay than they are entitled to, but I do think that all candid persons must admit that a master builder, the man who directs the building operations for all the mechanics employed, is entitled to more than he now receives. For my part I think he should have at least 20 per cent. advance upon the wages paid to bricklayers. I hope others will write upon this subject.

Trussing Partitions.

From C. T. A., *Clarksburgh, W. Va.*—I inclose sketches representing two methods of trussing partitions for use where there is no support beneath, showing how a door



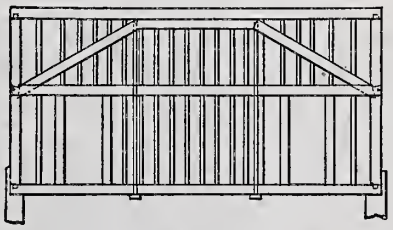
Trussing Partitions.—Fig. 1.—Sketch with Letter from C. T. A.

opening may be arranged. I think the publication of these sketches in *Carpentry and Building* will undoubtedly be of interest to many in the trade. The drawings are sufficiently explicit, requiring no special description.

Repairing a Metal Roof.

From F. H. P., *Waupaca, Wis.*—I have an iron roof to fix which leaks badly. The plates are laid in sections, with edges turned up about 2 inches high. I would prefer not to use coal tar in the effort to stop the leaks, as it has not proved reliable in this vicinity. I want something to cover the roof with that will be permanent and make a first-class job. Will you please advise me in the matter?

Answer.—If the iron roof to which our correspondent refers leaks from having rusted through, we fear there is no preparation which he can put upon it that will make it tight and satisfactory in all respects. Even if he finds some means of closing the holes for the time being, the process of rusting will continue, so that after a period he will have the same difficulties over again. The best plan, and no doubt the cheapest in the long run, will be to remove the present

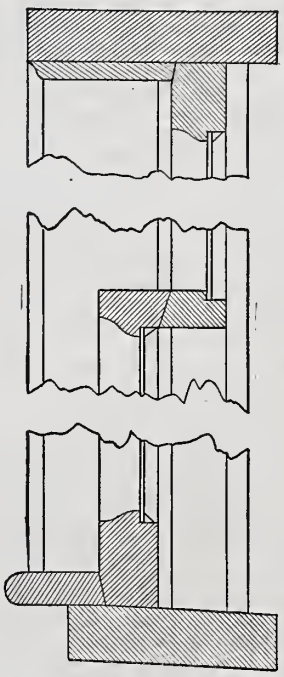


Trussing Partitions.—Fig. 2.—Sketch with Letter from C. T. A.

roof covering and substitute another one of better quality. Concerning the use of coal tar upon iron or tin roofs, we would utter a word of caution to our readers generally. Experience has shown that ordinary coal tar is very injurious to tin and iron roofs, and that they are really better without any protection than with a coating of this material. There are certain acids in coal tar which are very destructive to metals, and, accordingly, a coating of it serves to injure roofs rather than to preserve them. Our remarks are restricted to coal tar. Certain qualities of pitch, asphaltum, &c., are free from the objectionable qualities mentioned, and, therefore, may be used with satisfactory results.

Fitting Window Sash.

From L. W. F., *Las Vegas, N. M.*—W. G. M., of Warrensburgh, Mo., in the April number of the paper, asks for the best plan for making and fitting windows. Responding thereto, I would say that hard wood should be selected for the pulley stiles. For the frames, Southern or yellow pine is the best material. This should receive two coats of linseed oil as a protection from the weather; not a particle of paint should be allowed on them. Great care should be taken to keep the frames perfectly square until ready for the sash. Instead of plowing heads of frame for parting bead, a stop should be used wide enough to go out against



L. W. F.'s Construction of Window Sash.

the top of the upper sash and beveled ⅛ inch. The sash should be beveled down the thickness of the stop to correspond. The stool cap of the inside and the bottom rail of the lower sash should be beveled in the same manner. The meeting rails should have a beveled lip. The inside stops should be nailed or screwed close to the lower sash, and tapered from meeting rail to top of frame ¼ inch, which will allow the lower sash to run freely. When closed, the sash will be firmly wedged between inside stops and the inside casings or blind stop, which will prevent rattling during windy weather. This construction will also effectually shut out storms and dust. Care should be taken that the sash fit the frame very closely, just allowing room enough for the sash to run freely. If too loosely fitted, the sash will catch on the cornice like a drawer that is made too short for the place intended to receive it. The best hangings are pulleys, cords and weights. A sash lock should be used for the fastening on the meeting rails.

What Mechanics Read.

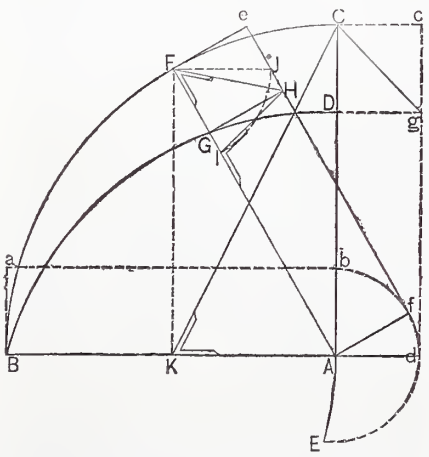
From ROBERT RIDDELL, *Philadelphia, Pa.*—I am convinced that not more than five per cent. of the vast number of men engaged in the building trades are subscribers for the few papers which are published specially in their interest. On the other hand, I believe that nearly 95 per cent. of the same class are patrons of dime novels and papers making fiction a specialty. It is humiliating in the extreme that so few should patronize that which instructs and educates. I raise the question: Can any means be devised to change the current of thought in the minds of the men in the building trades? Every intelligent mechanic must deplore the state of affairs here mentioned, and I am sure that every patron of *Carpentry and Building* will gladly co-operate in any scheme which

promises to work a reform in such matters. I shall be glad to have correspondents give this matter attention.

Hopper Bevels.

From C. R. P., *Pittston, Penn.*—Although I am a recent subscriber to *Carpentry and Building*, I wish to join in the discussion on hopper bevels, if the same is still in order. I first thought I was too far behind to offer anything on the subject, but recent papers have still continued the topic, and therefore I take liberty to send herewith a diagram, showing my way of getting the bevel for a hopper. I do not know that it is original, but it is a method I studied out when in need and when situated where I had no help to go to. To me it appears simple and easily understood.

I proceed on the theory that if I lay the side of my hopper down level, as shown in the diagram by the face line B A, the section being represented by the dotted lines *a b*, that in this position the joint will be a miter on the face of the board and square across the head. Then, if I revolve the board to a perpendicular position, using the point A as an axis and as represented by A C, the joint will be a miter on the edge and a square joint on the face, or a square joint for a butt joint. The miter joint is shown in the diagram by the line C *g*; therefore any position taken between the two will require bevels varying from one and approaching the other in proportion to the distance. From this we have the following rule: Draw the level line B A as long as the width of the side of the hopper. Perpendicular to it draw the line A C the same length, then with A for a center describe the arc from B to C, which will give the line of travel of the corner of the hopper in going from B to C; then with B as a center, describe the semicircle shown by the dotted lines from *b* to E. With the point of intersection E for a center, describe the arc from B to D, which gives the variation of the joints at the different angles. Now, at any angle at which it is desired to make the face of the hopper side, draw a line from the center A to intersect the arc B C, as, for example, at F. From this line set off the section of the hopper side, as shown by the lines *e f*. From F draw a line to K, perpendicular to the line B A, and from K thus located draw a line to C, which will give the bevel joint of the fire-board, taking the line K A for the top edge and K C for the joint. From G draw a line to H, at right angles to A F. Draw a line from F to H. This will give the miter joint for the top edge of the board, taking A F for the top face corner. Draw

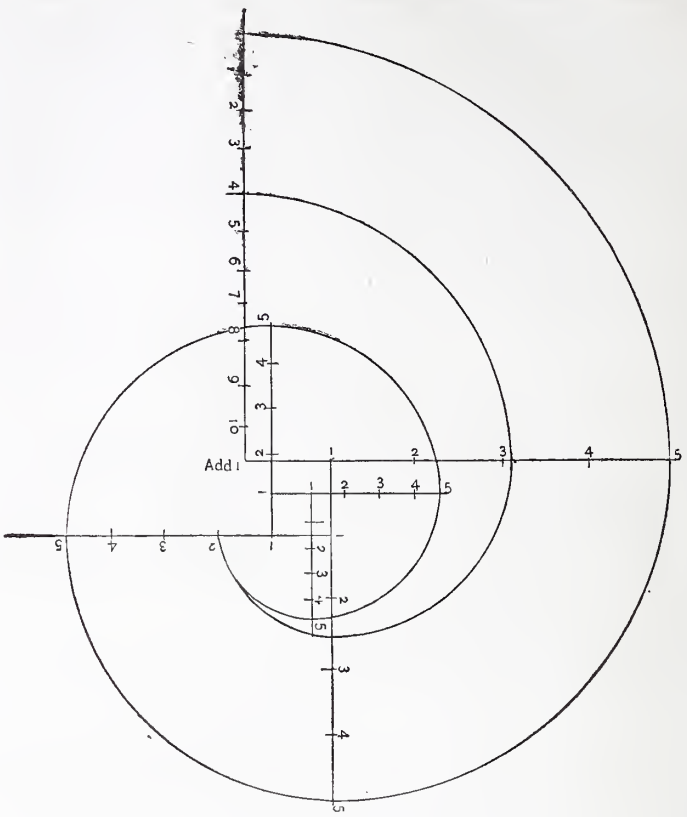


Hopper Bevels.—Letter from C. R. P.

a line from F to J parallel to the line B A; and with F for a center and F J as a radius, describe the arc J I. From I draw a line to H, which will give the bevel for the butt joint on the top edge of the bevel, taking A I for the face corner.

I do not present this as the only true method or the best way for obtaining hopper bevels, but rather as one way out of many, and one which I think is easily comprehended by beginners.

From L. W. T., *Upper Alton. Mo.*—Reviving the subject of hopper bevels, I desire to direct the attention of the readers of the paper to the rule submitted by T. S. V., page 134 of the volume for last year. This rule I find given in other places besides in *Carpentry and Building*. A well known author and architect publishes it, but does not explain the reasons for it. His instructions are entirely arbitrary. I would like to have some correspondent of the paper analyze this rule and show the reasons for the steps taken. Perhaps our old friend W. B., or A. S. L., will give this some attention.



Describing a Scroll.—Diagram Accompanying Letter from T. M.

Describing a Scroll.

From T. M., *New York City.*—The following is an easy way to describe a scroll, and is the method given by William Clarke: Referring to the inclosed sketch, divide half the diameter into ten parts and add one part, which will give the center for the first quarter. Divide the radius into five equal parts; reduce the compasses by one of these parts and continue the curve to the next quarter. Divide into five parts, as before; reduce one part and strike the next quarter, and so continue until the eye is the size required.

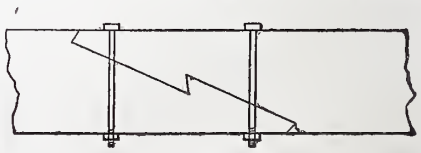
Splice in the Tie Beams of Roof Trusses.

From W. S. E., *Ohio*—I have taken considerable interest in the sketches of roof trusses which have appeared in the paper from time to time. The one contributed by W. A. M. in the November number of last year, page 216, and by M. V. H. in the January number of the current volume, page 15; also the one in the June number by W. E. L., page 116, are all, it seems to me, open to one objection—that is, the manner of making the splices in the tie beam. It seems to me the splice, as provided, would not resist the strain to which it would be subjected. I inclose a sketch of the plan I employ, which I think is more suitable for the purpose. I shall be pleased to have this plan criticised by readers of the paper.

Clay for Modeling.

From H. C. B., *Ronson, Ont.*—I take your valuable paper, and when the lessons in carving were commenced I was delighted. In odd moments I made a set of tools and got ready to commence modeling. I got a good lump of blue clay from a neighboring bank to save the expense of buying, as you describe, and attempted to prepare it myself. Well, there is something about it I don't understand. It is so sticky and greasy that I can do nothing with it. You say "clay is a very peculiar substance," and I thought if this is learning to model I would rather be excused. After getting my hands and tools nicely daubed, I came to the conclusion that "perfectly pure clay is much too soft and greasy for use," and needs to be tempered to make it smooth and pleasant to work with. Now, if you will direct me what to mix with it so as to make it less sticky and easier to manage I will be obliged, as I am desirious of following up the subject and hope to succeed after a while.

Answer.—We find upon investigation that the "blue clay" of the Eastern States, which is evidently what the auther had in mind when writing the article, is probably not known by that name in any other part of the country, and hence his direction may be misunderstood. This clay, when wet, is very dark and can be molded as easily as putty, providing, of course, that it is not too wet, when it becomes sticky and altogether disagreeable. We believe that some of the so-called blue clays of the Western part of the country are always sticky, and never become plastic, even when partly dried. Potters' clay is in its workings like the blue clay of which we spoke. Very fine sand, or, perhaps, coal ashes sifted through lawn or muslin, and mixed with the clay, would make it more suitable for plastic work. Sand is used in regular modeling clay. The quantity would depend very much upon the character of the clay, and we suppose there may be some kinds which could not be made fit to use even by this means. Any clay when first mixed becomes sticky, and can hardly be used until it has had an opportunity to dry and have the moisture equally distributed through the whole mass. There must be no moisture standing upon the surface, and the easiest method to get the proper consistency is to

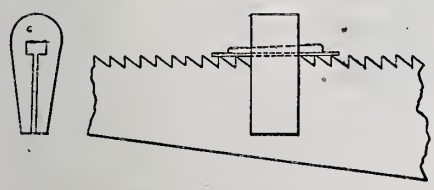


Splicing Tie Beams of Roof Trusses.—By W. S. E.

mix the clay rather soft, allow it to stand and evaporate until it is about right and then work it over. If our correspondent has any "potter's clay" in his neighborhood he will probably find that more like the article we had in mind. The finer kinds of clay used for brickmaking will also answer the purpose. The color, it must be remembered, has little to do with the result; it is the character of the material. We should say that whatever material is put into the clay to counteract the greasiness and sticky character, it ought to be so fine as not to interfere with the smooth working of the clay. Some experimenting will be necessary to find out the proper proportions, but this can be done on a small scale. We have seen clays from under salt water that were perfectly smooth to the touch and beautiful to handle in their natural state. Sand, however, added to their value, as it diminished their shrinkage when drying. Potters grind up old ware and use it instead of sand, or use it to lessen the quantity of sand needed. We hope our correspondent will not be discouraged, but will try again and see if he cannot get the material into a better condition, or else get some that will be exactly right. We shall be glad to hear from him further.

Home-made Jointer.

From B. O., *Philadelphia, Pa.*—I notice by recent numbers of the paper that saw filing is being revived as a subject for correspondence. I have what I call a jointer, which I made for myself, a description of which may be of interest to your readers. Take a piece of walnut 2 x 3 inches in size and about 8 inches long. Cut a mortise through it the 3-inch way, extending it



B. O.'s Saw Jointer.

about 5 inches from one end. Divide that end in the same direction that the mortise passes through the wood, so that when a flat file is placed in the mortise and fastened there, and the saw blade, teeth foremost, placed in the slot, it will form a perfect jointer for the saw. The inclosed sketch shows the idea proposed better than my words indicate.

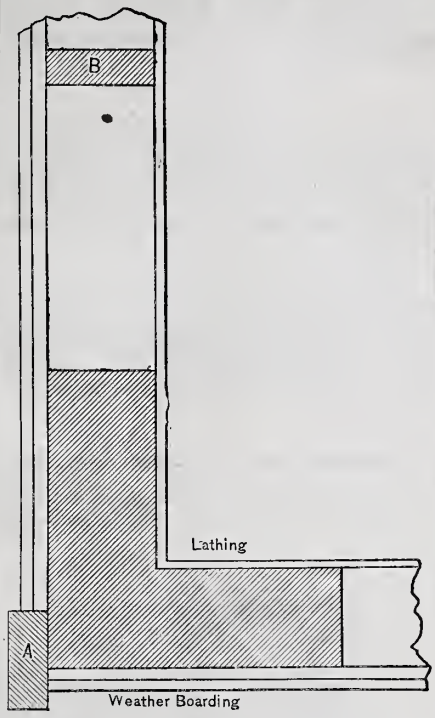
From T. M. to W. B.

From T. M., *New York.*—W. B., in his criticism of my letter published in the April number, says that I asserted that backing a corner post upon the plan outlined in "Some Problems in Framing," could not be done. Inasmuch as I distinctly specified the line that was wrong, and stated that the operation could not be performed by applying the line in the manner described, I cannot see how W. B. arrived at the conclusion named. With regard to putting roofs on without common rafters in them, there is nothing funny about that, as there are plenty of such roofs. However, I was not thinking of that when I wrote to *Carpentry and Building*. What W. B. means by saying "I simply meant to give the run and rise of the post," is not clear to me. However, I suppose it is all right. As to the short lines on them, W. B. makes a poor defense, as the question is not the possibility, but the practicability, of the two systems. As W. B. has never yet said anything about the bevels for cutting purlines against a hip rafter, I suppose it is reasonable to conclude that he never uses them. If he does, I think he ought to forego another noontime nap and finish up the hip question. I hope the readers will excuse this letter coming so long after time.

Hips in Curved Roofs.

From R. N. I., *New York.*—Will some reader of the paper give a method for framing hips on curved octagonal roofs, such as surmount bay windows and summer houses?

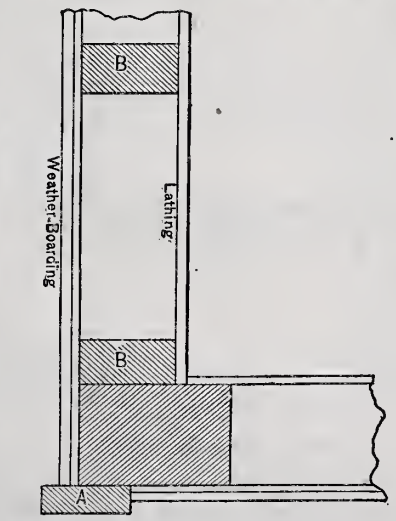
Note.—If our correspondent refers to the method of obtaining the profile of the hip rafter, he will find this and similar questions discussed in back numbers of the paper. If he means literally what his question indicates, the method of framing the hips, perhaps some of our readers will answer him.



Method of Framing Corners.—Fig. 1.—The Old Plan of Rebating the Corner Post.

Method of Framing Corners.

From S. & Son, *Gallatin, Tenn.*—There is an old negro named "Wes," who has been in our family since auld lang syne. Some of our boys have been reading *Carpentry and Building* to him, and he has taken a lively interest in it. He has requested us to write you, giving a plan for the corner post for a dwelling house which he has devised. You are aware that we build a great many of our houses of wood. It is very difficult to keep the corners from cracking on the inside of the house. In old times we used to rebate the corners out of solid wood, as indicated in Fig. 1 of the inclosed diagrams; but since timber is getting scarce, ways have been devised which use less of that material. "Wes" struck on the plan indicated in Fig. 3 of the sketches. Three pieces of 2 x 4 studding, spiked together as indicated in the drawing, are placed in such a manner that the weather board on the outside and the plaster on the inside bind the corner in both directions. There is a common way of making a corner post with one piece of 4 x 6. A strip is nailed to the side of it (Fig. 2) after one face has been lathed up by the plasterers; but as the 4 x 6 pieces are often sprung or crooked, it is difficult to get a straight corner by this means. Where there are 200 or 300 studding employed, it is generally very easy to find enough straight pieces to make the corner as suggested by "Wes." If this idea is deemed worthy of insertion in *Carpentry and Building*, it will afford great satisfaction to "Wes," who has been one of the most faithful servants we have ever known.



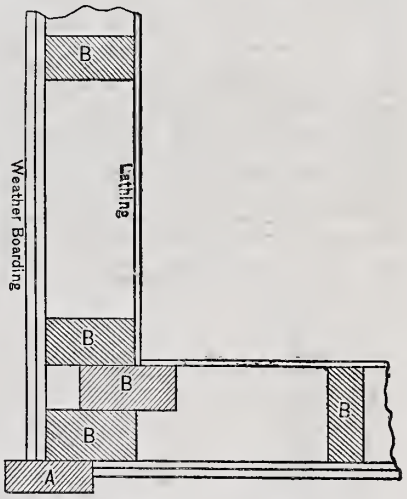
Method of Framing Corners.—Fig. 2.—A More Recent Plan of Construction.

Construction of Window Screens.

From T. R. D., *Topeka, Kan.*—I construct window screens as follows. The stiles are 2 inches wide and from ⅞ to 1⅛ inches thick, as required. The muntins are 1 inch. I plow the frame outside with ⅛-inch plow bit ⅜ inch deep. I put a half round over the wire, which I tack on the inside. I make the screen to fit between the inside stops, and in length make it 1½ inches shorter than the bottom sash, measuring from the stool to the top. I use screw eyes, putting one on each side 10 inches from bottom and one on each side toward the top at proper distance, to hold the frame in place when it is raised. By this construction, whenever it is necessary to take the screen out it is only necessary to remove the two screw eyes.

Saw Filing.

From A R. R., *Marysville, Ohio.*—I have had a long experience in saw filing. I find that a saw for cutting off should be filed by holding the point of the file toward the handle, giving it as much bevel as circumstances demand. Filed in this manner the teeth will have the best advantage. The point of the file should be lower than the handle also. If the point of the file is held toward the point of the saw a wire generally will be produced on the cutting side of the teeth. I always file a ripping saw on the same principle, only giving the teeth as little bevel as possible. What bevel there is should be on the front side of the tooth.



Method of Framing Corners.—Fig. 3.—The Plan Proposed by "Wes."

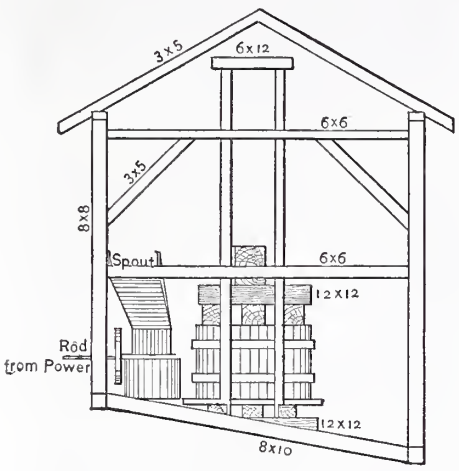
"Pargeted."

From R. S. R., *Wilmington, N. C.*—I notice on page 102, third column of the June number of *Carpentry and Building*, that in the chimney specification the flues are required to be well "parged." Is there any such word as this in the language? I know what "pargeted" means, but I am not acquainted with the word here used.

Answer.—The word to which our correspondent alludes is the result of a typographical error merely, and we presume has not escaped notice upon the part of many of our readers. The correct word is "pargeted."

A Country Cider Mill.

From J. F. W., *Danville, Pa.*—Thinking it would be of interest to the readers of *Carpentry and Building* to inspect a country cider mill, I send you herewith sketches of a mill of this kind which I recently constructed, and which cost about $125. The dimensions of the timbers for the most part are marked upon the drawings, and the construction is so simple as to require no detailed explanation. The general dimensions of the building in which the mill is located is 32



A Country Cider Mill.—Fig. 1.—*Cross Section.*

feet long by 16 feet wide. If any of your readers have comments to make I shall be pleased to hear from them.

Decimal vs. Vulgar Fractions.

From H. N. S., *Orbisonia, Penn.*—Enough has already been said about the fallacy of the question suggested by A. L. S., yet I cannot help noticing the way in which you trip up "Civil Engineer" for saying that 11 by 13 is equal to 143.0002. For a certainty his calculation is not absolutely correct. Why not trip up P., of Saginaw, Mich., in the same way? He says that $142.153846 + .846153 = 143$. In this he makes the same mistake as the correspondent already alluded to, namely, that of using decimal fractions where vulgar fractions could have been used as well. The difference in their calculations arises from the fact that one supposes the short side of the figure to be increased to 12 inches, while the other supposes the long side to be diminished to 12. Both would have reached the same result had they employed vulgar fractions instead of decimal. Anybody who has used decimal fractions to any extent knows that they cannot always be employed where absolute accuracy is required.

Note.—We shall be much surprised if some of our readers do not take this correspondent to task for his assertions with reference to the use of decimal fractions.

Supporting Resistance of Piles.

From M., *Winona, Minn.*—In answer to E. B. B., of St. Paul, Minn., who inquired in the July number as to the supporting resistance of piles, I would say that the following rule has been deduced by Brevet-Major John Saunders, United States Engineers, by which to estimate the weight that may be safely placed upon a pile. Divide the distance which the ram falls in inches by the distance which the pile is sunk by the blow, also expressed in inches Multiply this quotient by the weight of the ram in pounds. Divide this sum by 8. This rule reduced to formula is as follows:

$$\frac{R \times (h \div d)}{8} = W$$

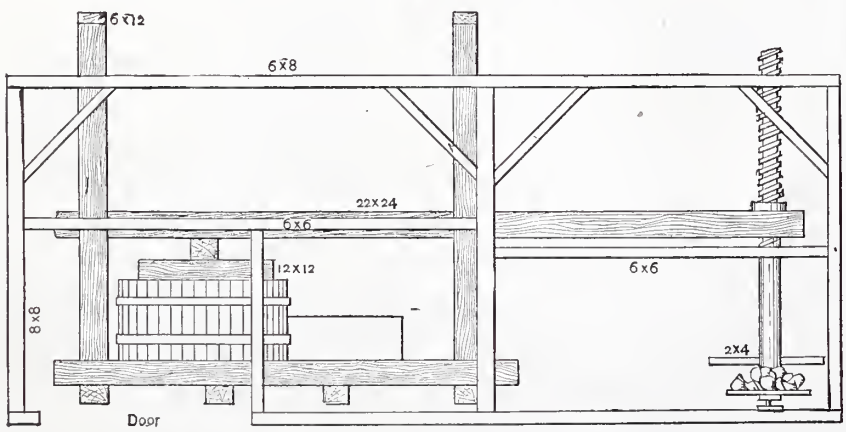
In this formula R represents the weight of the ram in pounds, and h the hight of fall; d the distance the pile is depressed by the blow, both in inches. Thus, in solving the problem propounded by your correspondent, we have:

$$\frac{2500 \times (240 \div 3)}{8} = \frac{200{,}000}{8} = 25{,}000,$$

which is the weight the pile will bear with safety. For other information regarding pile driving, I would refer the correspondent to Haswell's Engineers' and Mechanics' Pocket Book.

Experiment with a Spool and Card.

From W. C. G., *Salamanca, N. Y.*—The interest taken by your correspondents in the fallacy problem encourages me to send something of a similar sort. Take a common spool and place an ordinary card or piece of pasteboard, say 3 or 4 inches square, flat on one end of it. Pass a pin down through the card near the center into the hole in the spool. Now, as the card rests loosely upon the spool, it would be naturally supposed that by blowing steadily up through the spool, the card and pin would be blown off. As several who have tried this experiment do not think it can be done, I submit it to the larger circle of your readers, and shall be pleased to hear from them their success.

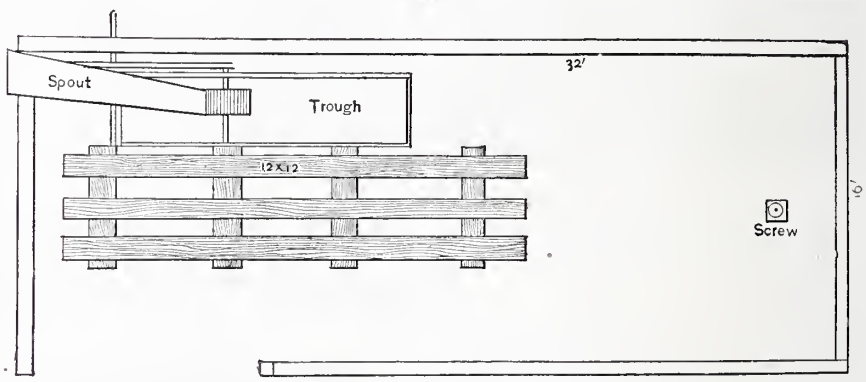


A Country Cider Mill.—Fig. 2.—*Longitudinal Section.*

Backing Hip Rafters.

From T. M., *New York City.*—In the July number D. E. D., of New Jersey, says that he wants to see something about my way of backing hip rafters published in the February number of the current volume. Since I have never given any method for performing that operation I cannot see where his criticism comes in. However, I am obliged to the correspondent for calling my attention to the letter, as I think it requires some explanation. With your kind permission I will try to make it plainer. The first part of the letter down to and including "G. H. H." in the 20th line, was intended as an indorsement of that correspondent's system. Then commenced what I intended for a criticism of W. B.'s system of getting the bevels for cutting jack rafters, as shown by his sketches, page 177 of the volume for last year. Then follows my method for the same purpose. I hope this explanation will enable D. E. D. to better understand me. I beg leave in this connection to call his attention to the rule he has sent, which, by the way, is the same as the rule originated by G. H. H., which has caused so much discussion. D. E. D. says it will work on any kind of a roof, for he has tested it and found it correct. I think he ought to show the readers of the paper how the relative positions of 12 and 17 come in on a roof over an octagon plan.

The method of backing hip rafters which I prefer has already appeared in *Carpentry and Building*, having been sent by A. S. L. and several others. There is no need for me to go into that part of the question. The method can be found in Peter Nicholson's work revised by Tredgold. It is one that



A Country Cider Mill.—Fig. 3.—*Plan.*

would answer for a roof over any kind of a plan, octagon bay window or elsewhere. It is one that would answer every requirement named by F. C. S. of Rochester, N. Y.

Calculating the Length of Rafters.

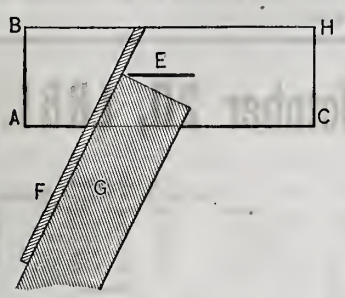
From J. E. W., *Royalton, Wis.*—In the September number D. M. W. presents a rule for calculating the length of rafters for a roof having a third pitch. For fear some one may be misled by the rule given, I offer a correction. I have used the rule for years. Instead of calling the figures cut off from the right inches, they should be called tenths of a foot. Thus, on a building 18 feet wide multiply by 6, which gives as a product 108, which is to be read 10 feet and 8-10ths of a foot. By reducing the fraction to inches, this gives 10 feet 9 6-10ths inches as the length of the rafter. Making the same calculation by the usual rule of square root, I find the length to be 10 feet 9 7-10ths inches, which is nearly 2 inches more than the length given by your correspondent.

From W. A. E., *Coral, Mich.*—Referring to the communication from D. M. W., published in a recent number of the paper, which relates to calculating the lengths of rafters, I would say that the correspondent has been misled, or else he does not understand his business as well as he ought. The rule named will not work upon any width of building. By it the rafters will be cut too short for roofs of one-third pitch, and they will not fit exactly at either point or heel. If he will take his square, using the figures 6 and 9 on the tongue and blade respectively, he will by this means get the exact miter of ends which will correspond to his rafters. He will find that they should measure 10 feet 10¼ inches, as near as is possible to measure in this manner. By his rule

the rafters would be cut 10 feet 8 inches. Both of these measures are based upon an 18-foot building. Upon buildings 12 to 18 feet wide they will gain 1 foot 2½ inches in every 2 feet, there being a difference of 4 feet 10 inches from the narrowest to the widest building. This, divided by four, gives a difference of 1 foot 2½ inches. I presume other readers of the paper have noticed the error and will call attention to it.

Coving a Timber with a Circular Saw.

From H. E. D., *Pullman, Ill.*—I desire to present to the readers of the paper a way to cut a large cove molding or bushing for mill-stones and similar construction with a



Cutting a Cove in a Timber with a Circular Saw.

circular saw. I have seen cases where more than half the time was saved by using this method. Take off the guide, leaving the table clear. Put on a guide with hand screws, so that it may be removed easily, placing it across the table, as shown by F in the accompanying sketch, at an angle to suit the timber to be cut. Referring to the sketch, E represents the saw, and G the timber to be cut. The saw is to be raised or lowered according to the size of cove to be cut. The saw can also be changed from large to small, according to the requirements. A D in the sketch represents the front of the saw table.

Joining Level and Raking Frieze.

From J. H. P., *Orange, Cal.*—In the case of a cornice around a house a part of which runs horizontally and a part with the gables of the building, should the frieze be the same width throughout, or should it be constructed in such a manner that the raking and horizontal parts will miter?

Answer.—This question, like some others, is open to various answers, and the only criterion is the taste and preferences of the parties most interested. In general, mitering the raking frieze with the horizontal frieze, makes, we think, the better job. We would treat the frieze in the same manner as the molding of the cornice. Our correspondent incloses two sketches, one showing the frieze mitered as above described, and the other showing the raking frieze cut to the same width as the horizontal frieze and made to join the latter, the difference in width being equalized by cutting off the corner which would hang down below the end of the horizontal part. We think this would be awkward construction, and that if the plan above recommended is not satisfactory, still other means of making a finish at the place named can be devised which would be less objectionable than the one referred to.

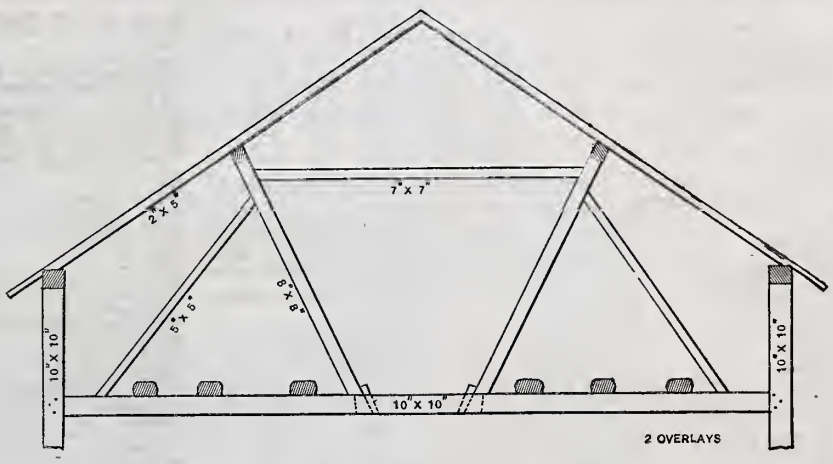
Roof Trusses.

From D. M. W., *Caledonia Station, Mich.*—I submit herewith a plan that I have followed in the construction of roof trusses for barns, which I desire to exhibit to the readers of *Carpentry and Building*. The purlin posts are dovetailed into the beam and keyed. In other particulars the construction is the same as employed in common frames. This truss I know from experience will hold all the grain that can be piled upon it.

REFERRED TO OUR READERS.

Calculating the Strength of Trusses.

From F. W. S., *Greencastle, Ind.*—I have a question I desire to submit to the readers of *Carpentry and Building* which possibly may be of general interest to the craft. How shall I calculate the supporting strength of a given truss? or, conversely given, a roof of a certain span required to support a given upright, what is the best method of determining the sizes of timbers, bolts, &c.? I had occasion to design a roof for a shop, 50x80, some time since, to be covered with felt. It was necessarily a flat roof. The trusses were required to be strong enough to support a depth of 18 inches of snow over the entire surface, together with shafting, belt tension, &c., the whole being at eight tons. Further, the roof was required to be sufficiently rigid to allow the successful running of wood-working machinery in the building. I was limited to a depth of 3 feet below girder for the trusses in the center. I decided upon the form of truss shown in the inclosed sketch, using two iron rods 1¼ inches in diameter to each truss, the rods being provided with turn buckles in the middle by which to provide the necessary adjustment in length. I employed four trusses, thus dividing the weight between the walls and truss, and making five spans or bents of 16 feet each. The shop is now running, and, so far as I know, is giving satisfaction. Taking this truss as an example, I would like to know what will be the amount of strain upon the truss rods if the weight upon center of span is 1000 pounds? Also, the proper way of calculating the amount of weight each truss would actually be required to support under the conditions named? I believe this is one of the branches of carpentry which needs more light thrown upon it, and hence I take the liberty of addressing myself to the paper, requesting the practical men to give this subject attention, for the benefit of all who are interested. I shall be pleased to see criticisms of the craft generally upon the proportions employed in the truss shown in the inclosed sketch.



Design of Roof Truss Accompanying Letter from D M. W.

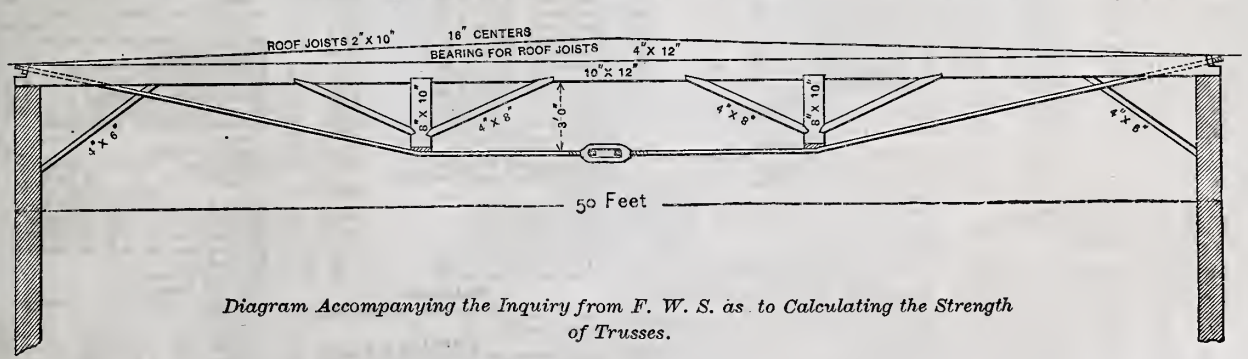


Diagram Accompanying the Inquiry from F. W. S. as to Calculating the Strength of Trusses.

Working Moldings Around Curved Surfaces.

From J. H. W., *Shelburne.*—It is sometimes necessary to run base boards, molding, &c., around curved surfaces both inside and outside. In this neighborhood it is done in two ways. One is by working out sections to fit the curve, and the other is by bending straight pieces by sawing them nearly through at regular intervals. What I want is a method which will enable me to space off a piece of a given thickness, so that when sawed and bent around a given circular ellipse the saw gashes will close tight on the inside. I think there must be a rule or way of doing this work without first cutting two or three pieces to try, although I have never seen it done in any other way.

Snow Brakes.

From A. S., *Shelburne, Mass.*—Will some of the readers of the paper give me through its columns a cheap and easy way of securing a railing on the eaves of a slate roof for preventing snow slides? I want something that can be put in place after the roof is finished.

Portable Tool Box.

From H. G., *Medina, Ohio.*—A long while ago some one suggested the desirability of a better device for carrying tools than the ordinary box now employed for that purpose. I have been watching anxiously for some reader to present a description of a box suited to the purpose. I am afraid those who are able to enlighten us upon this subject have forgotten it, and, therefore, I desire to renew it.

Wooden Sinks.

From O. W., *Hempstead, N. Y.*—In *Carpentry and Building* for August, a reference is made to the poor quality of wooden sinks as commonly constructed. Will some reader of the paper who has had experience explain how a good one may be built?

Solid vs. Compacted Beams.

From O. W., *Hempstead, N. Y.*—In the specification of timbers accompanying Mr. Morrison's design, published in the August number, the plates and girders are described as being composed of different pieces nailed together. Will some one tell me why those plates and girders should not be one solid piece, instead of being of such flimsy construction as he specifies?

Staining Black Birch.

From C. A. W., *New York City.*—Will you kindly inform me through *Carpentry and Building* of a method for staining black birch so that it will resemble black walnut? I am informed that there is such a method extant, and I do not know of any better source to which to apply for information than the readers of *Carpentry and Building*. An early answer will be a favor.

Ice House and Milk House.

From C. S. L., *New York.*—Will some of the numerous correspondents of the paper furnish directions for building an ice house and milk house combined? The size of the building should be about 10 x 12 feet. I desire something suitable for erection upon a farm, substantial in all respects and neat in design.

Saw Filing.

From J. B. T., *Fond du Lac, Wis.*—The several articles on saw filing from A. F. F. were excellent. As I am a practical filer of several years' experience, I possibly criticised them more closely than some of your readers. The author did not tell us how much we must pitch the teeth forward or back, or whether they were straight up. In filing saws for others I am soon told if I do not give the teeth the right pitch. If A. F. F. is so disposed, I suggest to him that he give this feature of saw filing attention at some future time.

Circle Head Door Frames.

From J. H. M., *Brewsters, N. Y.*—I desire to learn the rule for circular head door frames where the jambs are set on an angle with the wall, say an angle of 45 degrees; or to describe my wants in other words, there is a passage-way through a wall at an angle of 45 degrees, and the jambs are set on a line with the passage-way. Will some reader show me how a circular head adapted to an opening of this kind may be made?

Prices of Building Materials in New York, October 20, 1881.

Blinds.—OUTSIDE.

Per lineal, up to 2.10 wide	$	@	0.24
Per lineal, up to 3.1 wide	....	@	0.26
Per lineal, up to 3.4 wide	....	@	0.28
Per lineal, paint'd and trim'd	0.45	@	0.55

INSIDE.

Per lineal, 4 folds, Pine	....	@	.53
Per lineal, 4 folds, ash or chestnut	....	@	.78
Per lin'l, 4 folds, cherry or butternut	....	@	.96
Per lineal, 4 folds, bi'k wal't	....	@	1.06

Bricks.—(Afloat.)

Paie	₱ M. $4.25	@	4.75
Jersey	" 0.50	@	7 00
Long Island	" 7 75	@	8.00
Up-River	" 7.25	@	7.75
Havers'aw Bay, 2ds	" 7.75	@	8.00
Havers'aw Bay, 1sts	" 8.00	@	8.25
Croton—Brown	" 11 00	@	....
Croton—Dark	" 13 00	@	....
Croton—Red	" 13.00	@	....
Philadelphia Fronts	"	@	29.00
Trenton "	"	@	29.00
Baltimore	"	@	39.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2.00 for Crotons and $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh	$35.00	@	....
Scotch	30.00	@	....
English	30.00	@	32.00
Silica (English)	35.00	@	....
Silica (Welsh)	50.00	@	....
Stourbridge	50.00	@	....
American, No. 1	....	@	40.00
" " 2	....	@	30.00

Afloat. 500 ₱ M ie's

Cement.—(Cargo rate.)

Rosendale. ₱ bbl	$1.25	@	....
Portland Saylor's American, ₱ bbl	2.25	@	....
Portland (imported) ₱ bbl	2.70	@	3.00
Roman	2.75	@	3.00
Keene's coarse	6.00	@	....
Keene's fine	....	@	10 50

Add 25 cts. to above rates for yard prices.

Doors.

RAISED PANELS, TWO SIDES.

2.0 x 6.0	1¾ in.	$0.90 ....
2.6 x 6.6	1¾ in.	1.20 ....
2.6 x 6.8	1¾ in.	1.25 ....
2.8 x 6.8	1¾ in.	1.30 ....
2.10 x 6.10	1¾ in.	1.40 ....
3.0 x 7.0	1¾ in	1.62 ....

MOULDED.

Size.	1¾ in.	1⅝ in.	1¾ in.
2.0 x 6.0	$1.48	....	....
2.6 x 6.6	1.77	2.25	....
2.6 x 6.8	1.80	2.28	....
2.6 x 6.10	1.83	2.33	....
2.6 x 7.0	1.97	2.36	....
2.8 x 6.8	1.88	2.39	3.33
2.8 x 7.0	2.04	2.46	3.47
2.10 x 6.10	1.98	2.54	3.66
3.0 x 7.0	2.21	2.69	3.80
2.6 x 7.6	2.15	2.63	....
2.8 x 7.6	2.25	2.72	3.85
2.10 x 7 6	2,36	2.87	4.05
3.0 x 7.6	....	3.00	4.22
2.6 x 8.0	2.25	2.73	....
2.8 x 8.0	....	2.88	....
2.10 x 8.0	....	3.02	4 47
3.0 x 8.0	....	3.15	4.70

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Elbows, Each.	Branches—Sing.	Branches—D'bl. & V.	Traps, Each.
2 in.	$ .13	$ .40	$ .48	$ ...	$1.00
3 "	.16	.50	.61	...	1.25
4 "	.20	.65	.75	1.30	1.75
5 "	.25	.85	.90	1.55	2.50
6 "	.30	1.15	1.05	1.80	3.50
7 "	.35	1.50	1.20	2.05	5.00
8 "	.45	2.00	1.45	2.45	6.00
9 "	.55	2.50	1.70	2.85	7.00
10 "	.70	3.00	2.00	3.30	8.00
12 "	.80	3.75	2.52	4.24	10.00
15 "	1.25	5.00	House Branches pr. lin. ft.		Sewer Branches pr. lin. ft.,
"	1.60	7.50	15x6 $1.75		15 in. $2.25
			18x6 2.50		18 " 3.00

Longer than 1 ft., charged as pipe.

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15	$8.25	$7.50	$7.00	$6.50
11x14—15x24	9.25	8.50	8.00	7.25
16x24—20x28	10.75	9.75	8.75	7.75
15x34—24x30	12.25	10.75	9.00	8.50
26x20—24x36	13.00	11.50	9.75	9.00
26x36—26x44	14.50	13.25	10.75	9.50
26x46—30x50	15.00	14.00	11.25	9.50
30x52—30x54	16.00	14.50	12.00	....
30x56—34x36	17.25	15.50	13.50	....
34x58—34x60	18.25	17.25	15.00	....
36x60—40x60	20.75	18.75	17.25	..

DOUBLE.

6x 8—10x15	$12.75	$11.75	$10.75	$10.00
11x14—15x24	14.50	13.25	12.50	11.25
16x24—20x28	17.25	15.75	14.00	....
15x34—24x30	19.75	17.25	14.50	....
26x28—24x36	21.00	18.50	15.75	....
26x36—26x44	23.25	21.25	17.25	....
26x46—30x50	24.00	22.50	18.00	....
30x52—30x54	25.75	23.25	19.25	....
30x56—34x56	27.75	25.00	21.75	....
34x58—34x60	29.25	27.75	24.00	....
36x60—40x60	33.25	30.00	27.75	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 50 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: Single, 60 & 20%; Double, 70%.

French

WINDOW, PICTURE AND CAR GLASS.

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x13	$6.50	$5.75	$5.50	$5.25
11x14—16x24	7.25	6.75	6.25	6.00
18x22—20x30	9.25	8.50	7.75	7.25
15x36—24x30	10.25	9.25	8.25	....
26x28—24x36	11.00	10.00	9.00	....
26x36—26x44	11.75	10.75	9.50	....
26x46—30x50	13.25	12.50	10.50	...
30x52—30x54	14.00	13.00	11.25	....
30x56—34x56	15.00	13 75	12 50	....
34x58—34x60	15.50	15 00	13.25	....
36x60—40x60	17.50	16.00	15.00	....

DOUBLE.

6x 8—10x15	$8.25	$7.75	$7.50	$7.00
11x14—16x24	10.00	9.25	8.75	8.25
18x22—20x30	12.75	11.75	10.75	....
15x36—24x30	14.25	13 00	11.25	....
26x28—24x36	15 25	13.75	12.50	....
26x36—26x44	16.25	14 75	13 00	....
26x46—30x50	17 50	16.75	14.25	....
30x52—30x54	18.50	17.25	14.75	....
30x56—34x56	19.50	18.25	16.25	....
34x58x34x60	20.50	19.50	18.00	....
36x60—40x60	23.00	21 00	20.00	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: 50 & 10 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS

Per square foot, net cash.

⅛	Fluted plate, case 10c; cut to size			16c.
3-16	Fluted plate	"	13c.	" " 18c.
¼	Fluted plate	"	16c.	" " 20c.
¼	Rough plate	"	16c.	" " 20c.
⅜	Rough plate	"	21c.	" " 27c.
½	Rough plate	"	28c.	" " 33c.
¾	Rough plate	"	45c.	" " 55c.
1	Rough plate	"	55c.	" " 65c.

Hair.

Cattie	₱ bushei, $15.00	@	....
Goat	" 18.00	@	....

Lath.

Cargo rate	₱ M $2.00	@	....

Lime.

Glen's Falls, or Keenan's common, cargo rate ₱ bbl		@	1.00
Glen's Falls, or Keenan's finishing Joints		1.15	@....
Rockland, common		1.10	@....
Rockland, finishing		1.25	@....

Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Prices firm, with upward tendency.

Pine, very choice and ex. dry. ₱ M. ft. thick	$70.00	@	$75.00
Pine. clear	60.00	@	65.00
Pine. selects	50.00	@	55.00
Pine. pickings	40.00	@	45.50
Pine. selected. box	22.00	@	25.00
Pine. common box	18 00	@	22.00
Pine. common box, ⅝	16.00	@	17.50
Pine 1¼x10. 13 ft., matched, each	.42	@	.45
Pine, 1¼x10. 13 ft., culls	...	@	.30
Pine, 1x10, 12 ft., good matched. each	.30	@	.32
Pine, 1x10. 13 ft., common matched, each	.25	@	.28
Pine. 1x4½. clear. match'd, each	.22	@	.24
Pine. 1x4½, merchantable. matched, each	...	@	.18
Pine, 1¼x4½, cl'r, match'd, each	.35	@	.38
Pine, 1¼x4½, merchantable. matched. each	.30	@	.32
Spruce, 1x9, 13 ft., rough.	.20	@	.21
Spruce. 1x9, 13 ft. matched, each	.23	@	.25
Spruce, 1¼x9, 13 ft., rough.	.23	@	.25
Spruce, 1¼x9, 13 ft., matched, each	.28		30
Spruce. 2x9, 13 ft., rough	.37	@	.39
Spruce, 2x9, 13 ft., match'd, each	.43	@	.46
Spruce, 2x4, 13 ft	.15	@	.16
Spruce timber, flat, ₱ M ft	20.00	@	....
Spruce timber, square, ₱ M ft	....	@	22.50
Hemlock, 1x10, 13 ft., each.	.16	@	.18
Hemlock, 2½x4, 13 ft., each.	.16	@	.17
Hemlock, 3x4, 13 ft., each	.19	@	.20
Hemlock, 4x6, 13 ft., each	.40	@	.44
Ash, good, ₱ M ft	45.00	@	55.00
Oak	45.00	@	55.00
Oak, quartered	70.00	@	90.00
Maple, common	25.00	@	35.00
Maple, good to 2 in	40.00	@	45.00
Maple good thick	45.00	@	55.00
Maple white	55.00	@	65.00
Chestnut	40.00	@	60.00
Bl'k walnut counters, ₱ ft	.18	@	.50
Black walnut, selected and seasoned, ₱ ft	.12½	@	.15
Bl'k walnut, good to choice	105.00	@	125.00
Black Walnut 2d	85.00	@	95.00
Black walnut, ⅝	90.00	@	100.00
Cherry, wide, ₱ M ft	100.00	@	110.00
Cherry, ordinary	85.00	@	95.00
Whitewood, or Popiar ⅝ in.	35.00	@	40.00
Whitewood, or Popiar ⅝ panels	45.00	@	60.00
Whitewood, or Popiar 1 to 1½ inch	45.00	@	55.00
Whitewood or Popiar. 2 in. and upward	50.00	@	55.00
Shingies, extra sawed pine, 18 in.	5.00	@	....
Shingles, clear sawed pine, 18 in., 2 md	4.00	@	....
Shingles, cypress, 7x24	15.00	@	18.00
Shingles, cypress, 6x20	12.00	@	14.00
Shingles, Cedar, 6x24, No. 1	—	@	22.00
Shingles, Cedar, 6x24, A's	—	@	16.00
Shingles, Cedar, 6x20, No. 1	—	@	12.50
Shingles, Cedar, 6x20, A's	—	@	10.00
Shingles. Cedar Eastern.	—	@	3.50
Shingles, Hemlock	—	@	3.75
Shingles, Pine	4.00	@	5.00
Shingles, Spruce	—	@	3.50
Shingles, Redwood (California), ordinary, per bunch.	—	@	.85
Shingles Redwood (California) 6x16 cut	—	@	1.85
Yellow pine dressed flooring, wide, ₱ M ft	37.00	@	40.00
Narrow ditto	40.00	@	45.00
Yellow pine timber	35.00	@	50.00
Locust posts, 8 ft., ₱ in	.18	@	.20
Locust posts, 10 ft	.24	@	.25
Locust posts, 12 ft	.25	@	.30
Chestnut posts, ₱ ft	.03	@	.3½
Mahogany, ¼ in. ₱ ft	.05	@	.07
Mahogany, ⅜ in. ₱ ft	.10	@	.12
Mahogany, ½ in. ₱ ft	.10	@	.16
Mahogany, ⅝ in. ₱ ft	.12	@	.16
Mahogany, ¾ in. ₱ ft	.14	@	.16
Mahogany 1 in. ₱ ft	.18	@	.22
Rosewood, ⅛ in. ₱ ft	.11	@	.15
Rosewood, ¼ in. ₱ ft	.16	@	.20
Rosewood, ⅜ in. ₱ ft	.24	@	.28
Rosewood, ⅝ in. ₱ ft	.40	@	.45
Rosewood, 1 in. ₱ ft	.60	@	.75
Satin wood, ⅛ in. ₱ ft	.30	@	.40
Satin wood, 1 in. ₱ ft	.40	@	.55
White holley ¼-inch	.10	@	.12
White holley ⅜-inch	.15	@	.18
Cedar (Cuban and Mexican) ₱ ft	.10	@	.14
Cedar (Florida) Less than 1 inch	.16	@	.24
1 inch and over	.25	@	.30
Redwood (California) 1 to 2 in., dry, per M	....	@	60.00
3 in. and over, per M	....	@	60.00

Moldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof building, ₱ lb.	16c	@	17c
Rosin Sized Sheating, ₱ lb.	4c	@	5c
Dry Sheating ₱ lb	3c	@	3½c
Tarred Felt, ₱ lb	....	@	3c

Plaster.

Caicined City	Mill rate. $1 25	@	....

Sash.

GLAZED.

Dimensions of windows.	12 Lights. 1¼pl.	8 L's. 1¼c.	1½c.	4 Lights. 1¼c.	1½c.
2.1x3.6	$0.90	0.96	....	....	....	....
2.4x3.10	.98	1.05	....	....	1.15	....
2.7x4.6	1.18	1.25	....	....	1.45	1.54
2.7x4.10	1.32	1.38	....	....	1.52	1.62
2.7x5.2	....	1.47	....	....	1.77	1.87
2.7x5.6	....	....	....	1.86	1.93	2.04
2.7x5.10	....	....	....	1.94	2.02	2.10
2.10x4.6	1.32	1.41	1.50	....	....	....
2.10x5.2	1.49	1.58	1.71	1.90	1.95	2.08
2.10x5.6	1.59	1.68	1.84	2.03	2.05	2.21
2.10x5.10	1.86	1.96	2.12	2.14	....	2.38

o. means counted checked—piowed and bored for weights.

Hot bed sash, glazed			$2.35

HEAD LIGHT.

Two or three Lights, Glazed.

Size.	1¼	1½	Size.	1¼	1½
2.6x1.0	42	45	2.10x1.0	45	55
2.6x1.6	50	55	2.10x1.6	60	65
2.8x1.0	45	50	3.0x1.0	50	60
2.8x1.6	55	60	3.0x1.6	67	75

Slate.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're.	$5.50	@	$6.00
Green slate	6.00	@	6.50
Red slate	11.00	@	....
Black slate, Pennsylvania	4.50	@	5.00
Tiles, 1¼ in. rubbed, ₱ sq. ft.		@	.30
Steps and platforms, 1½ in. thick; Risers, 1 inch thick, prices nominal		₱ sup. ft.	
" " 2 "			
Red tile and borders			
Coping, 1½ "			
" 2 "			
			Lineal ft.
Window sills, 4x7			
" 3x7			
Window caps, 4x10, plain			
" 4x8, "			
" 3x10, "			
" 3x8, "			

Stair Material.

BALUSTERS.

Black Wainut. 1½ in.	1¾ in.	2 in.	2½ in	
Fancy Turned	8c	10c	11c	17½c
Neck Turned	10c	11c	13½c	21c
Fluted or Octagon	15c	16c	18c	26c

OCTAGON PANELED NEWELS.

Panels Veneered with French Walnnt. 8-inch Newels, with Cap				$8 30
9 " " "				9.20
10 " " "				9.75

SOLID NEWELS, WITH CAPS.

Black Walnut.	5 in.	6 in.	7 in.	8 in.
Fancy Turned	$1.75	$2.30	$3.15	$4.30
Octagon	2.25	2.75	3.62	4.75

STAIR RAIL.

Worked out and finished ready to put up. Easements and cylinders counted double. Price per foot Newels and Balusters not included).

Black Walnut.	3 in.	3½ in.	4 in.	4½ in
Molded	43c	48½c	55c	60c
Toad Back	52c	57½c	63c	72c

STAIR RAIL, UNFINISHED.

Price per foot.

Black Wainut.	3 in.	3½ in.	4 in.	4½ in
Molded	12½c	15c	17½c	20c
Toad Back	14c	16c	18½c	21c

Stone.

Cargo rates. delivered at New York.

Amherst Blue			$1.00
Amherst freestone, in rough. ₱ C ft			1.00
Bay of Fundy, Wood Point, brown	0.80	@	1.00
Bay of Fundy, Mary's Point, brown	$0.80	@	1.00
Bay of F'dy, Mary's Pt., oilve.	0.80	@	1.00
Berlin Blue	....	@	1.00
Berlin freestone. in rough	....	@	1.00
Berea freestone. in rough	0.85	@	.90
Brown stone, Portland, Ct	1.25	@	1.50
Brown stone, Belleville, N. J.	1.00	@	1.50
Corsenill (Scotch) Red Sandstone		@	1.00
Granite rough	.50	@	1.00
Dorchester, N. B., stone, rough ₱ foot.	....	@	1.00

BLUE STONE

Rubbed hearth, 10 ft. or under			25c
Rubbed hearth, 20 ft. or under			35c
Rubbed hearth, 30 ft. or under			45c
Rubbed hearth. 40 ft. or under			50c
Rubbed sills			30c
Sawed & Planed			40c
Sills and lintels		@	18c
Sills and linteis, fine quarry cut sills		@	35c
Coping, 11 to 18 in. wide		@	24c
Coping, 20 to 28 in. wide		@	30c
Coping, 30 to 36 in. wide		@	65c
Steps, 8 in		@	80c
Steps, 7 in		@	55c
Steps, 6 in		@	35c
Steps, door, per in. wide		@	3c
Platforms, promise uons, 4 in		@	32c
Wyoming Valley, promiscuous, per cubic ft			1 30@1.35

Vault Lights.—Nominal.

Piatform, sq ft			$3.50
Step and risers, sq. ft			3.50
Floor light, sq. ft			2.50
Roof light, sq. ft			2.50
Platform, 2d quality, sq. ft			2.00

COVERS.

Diameter.	Round.	Hexagon.
14 inch	$3.00	$0.00
16 "	3.75	4.00
18 "	5.50	6.00
20 "	8.00	8.50
24 "	14.00	15.00
26 "	16.00	17.00
30 "	23.50	25.00
36 "	31.00	33.00

CARPENTRY AND BUILDING

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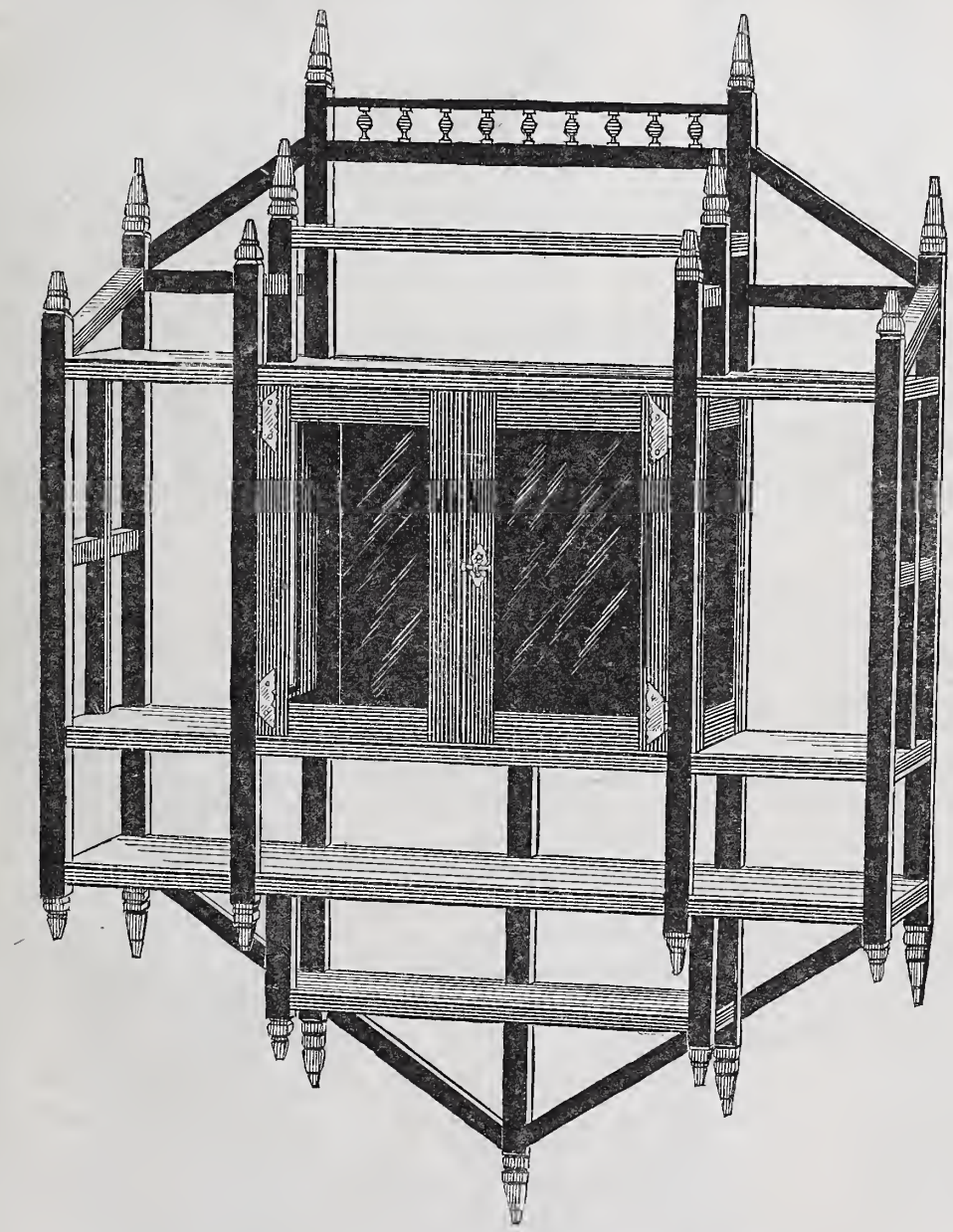
Design for Hanging Cabinet.

By means of our first-page illustration this month we add another to the list of articles which, by their simplicity of form and construction, are adapted to the wants of amateur cabinet makers who desire to make pretty things, either for their own homes or in a business way. The hanging cabinet we display contains many features to recommend it for use. A small cupboard with glass doors forms the central feature, and in it may be placed such articles as it is specially desirable to keep away from the dust and air of the room in which the cabinet is hung. The largest possible amount of shelf room for the display of bric-a-brac and odd ornaments is provided, the whole design forming a very pretty piece of room decoration, and withal a useful article of furniture. Fig. 2 presents the front elevation of the cabinet, drawn to a scale of 1½ inches to the foot. Fig. 3 shows a side elevation, and also serves to indicate what a sectional view of such a piece of work would be greatly improved by the judicious use of cabinet hardware. We refer to the hangers for suspending the cabinet against the wall, a view of which is given in Fig. 2, and the hinge plates and the escutcheon shown on the doors. This design would look well executed in any of the cabinet woods. If made of cherry and carefully ebonized, it would present a very handsome appearance. Of whatever wood it is made, much of its beauty will depend upon the care with which it is finished. The edges of the shelves are formed in a very simple manner by means of three beads worked in a sunken surface. A full-size section through the edges of the shelves is shown in Fig. 4. The posts of the main framework are finished at both top and bottom with an ornament easily produced, a detail of which is shown in Fig. 5. The spindles used in the railing across the top of the cabinet are also shown in this illustration. The appearance



Design for Hanging Cabinet.—Fig. 1.—Perspective View.

Black Birch.

This is a close-grained, handsome wood, and may be stained so as to closely resemble walnut. It is quite easy to work, and is suitable for nearly, if not quite, all the purposes to which walnut is at present applied. Birch is much the same color as cherry. The latter wood, however, is now scarce, and consequently very dear. It is with difficulty that cherry can be obtained at $50 per 1000 feet, while birch can be purchased in many localities for $10 per 1000 feet. When properly stained, it is said to be almost impossible to distinguish the difference between it and walnut. It is susceptible of a beautiful polish, equal to any wood now used in the manufacture of furniture. There is a great difference in the wood of different sections. Where the land is high and dry, the wood is firm and clear; but if the land is low and wet, the wood has a tendency to be soft and of a bluish color. The tree, under favorable conditions, grows to a considerable size.

Heating and Ventilation of the Vienna Opera House.

The inauguration of the Imperial Opera House of Vienna goes back scarcely a dozen years. It was the first building in Vienna whose cost was deferred from funds devoted to city improvements, and great care was taken to make it complete in all its appointments. Some general remarks concerning the system of heating and ventilation employed will be of interest to our readers.

The area occupied by the opera house contains about 13,150 square yards, of which the buildings cover 9560. The greatest length of the building is 397 feet; the greatest width 302 feet. The stage is one of the largest and best arranged on the Continent. The auditorium will hold about 2700 people. There are 92 public boxes arranged in four tiers; a gala box facing the stage; two similar boxes on the level of the parquet,

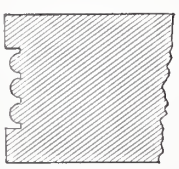
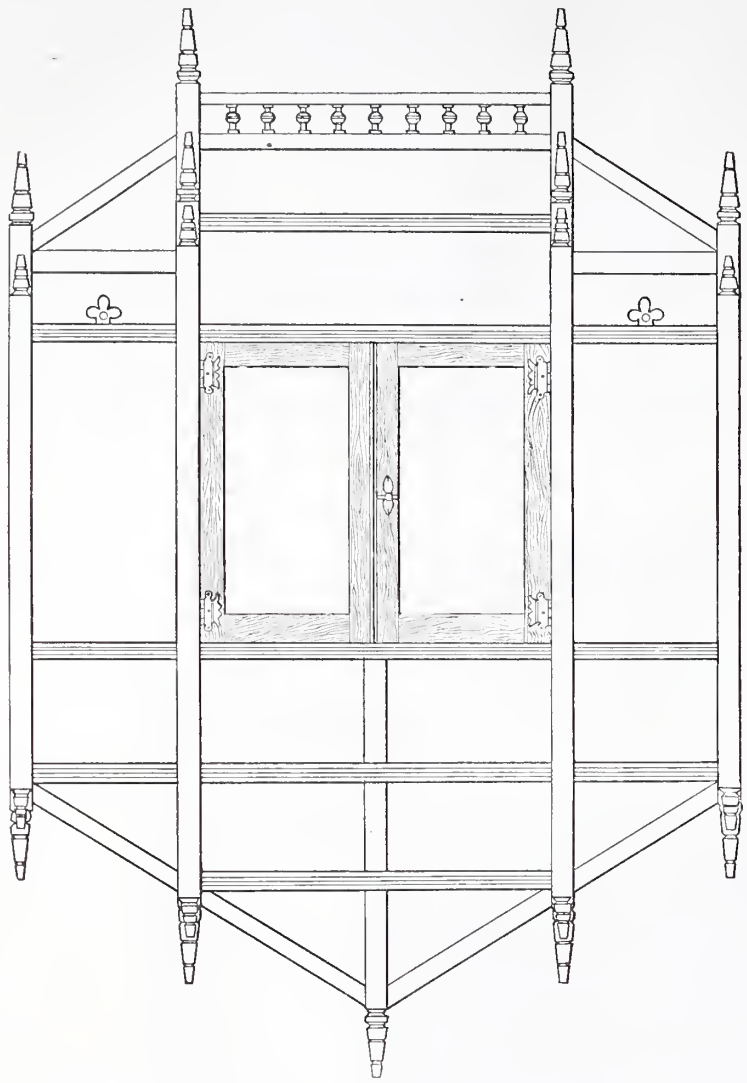


Fig. 4.—Full Size Section Through Shelves.

and two artists' boxes on the third tier. Stalls and standing room in the pit, as well as in the third and fourth galleries, are provided. The house is lighted by a gasalier of 90 jets, supplemented by a ring comprising 16 reflectors, each provided with 25 burners, which surround the opening of the gasalier in the ceiling. For special occasions the uprights of the boxes are furnished with lights. Ventilation is secured by the action of two ventilators, the one by induction from below, the other by exhaustion operating in the main passage above the gasalier. The apparatus we refer to is located as shown by W in Fig. 1 and S in Fig. 3 of the engravings. The movement of air caused by the operation of the ventilators passes through the auditorium from the lowest level to the roof. It is accelerated by the heat of the gasalier and of the 16 sun burners already mentioned. The heat discharged from the audience also contributes to the general upward movement. The pure air of the surrounding gardens is drawn into the theater, and warmed in winter by contact with steam heaters. This air passes into the auditorium at a temperature of 63 to 65° F., through the flooring of the pit and at the lower points of the boxes and galleries. The arrows in Fig. 1 show the course of the air described. On the two upper floors, with seats arranged in amphitheater form, the air is introduced all through the risers, which are furnished with gratings of fine mesh. During warm evenings additional air is drawn into the auditorium by apertures arranged all around it at the ceiling level. The lobbies likewise receive a certain quantity of air from the subchambers reserved for the thermometric preparation of the air, and these same lobbies are maintained at a temperature at least equal to that of the main room. The stage is also provided for independently at the same temperature as the room. The air passages opening near the spectators are furnished with gratings of fine mesh, to sift the air and prevent any sensible current being perceived by the audience. The speed of entry is about 1 foot per second. The moderate temperature at which the air introduced is maintained is not only free from any qualities of discomfort, but it preserves in the zone occupied by the individual a fresh and agreeable atmosphere. No uncomfortable currents of air are produced at the box doors or elsewhere by the excessive volume. The absence of currents of air is particularly due to the employment of mechanical suction and the care bestowed in keeping the lobbies and stage in an even condition with the halls in a barometric and thermometric sense.

The mechanical details by which these results are accomplished will be of interest to our readers. The apparatus for inducting air is a screw ventilator designed by M. Haeger, professor of mechanics at the Polytechnic School at Vienna. This ventilator has an external diameter of about 11 feet 6 inches. At each side of the screw are cone-like shells, forming conductors, one in front and the other behind the apparatus. The ventilator will furnish in summer a maximum of nearly 4,000,000 feet of air per hour. The amount consumed is usually from 2,800,000 to 3,000,000 per hour, being an allowance of 1000 feet per person, supposing every seat to be occupied. The ventilator for eduction is located in the discharge flue above the gasalier, and is a simple screw. Its utility, considering other features of the arrangement and the natural tendency of the currents of the air, may be questioned. The two ventilators described are driven by a steam engine of 16 horse-power, which is located in the basement and connected with the lower ventilator and with the upper screw by means of a cable.



Hanging Cabinet.—Fig. 2.—Front Elevation.—Scale, 1½ Inches to the Foot.

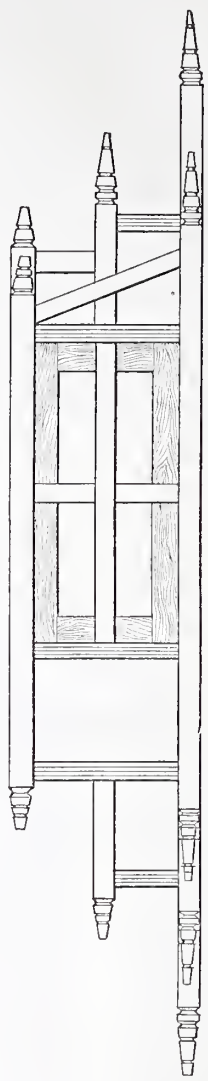


Fig. 3.--Side Elevation.

The method of thermometric preparation of the air for ventilating purposes may be briefly described. The two inlets for air consist of two large wells, about 20 by 13 feet in section, and formed in the gardens at the sides of the theater. From these the air passes into a tunnel 24 feet 6 inches high, forming a large reservoir, where in summer a cold-water fountain, playing a fine spray, serves to produce a certain freshness. Passing on, the air reaches the lower ventilator, which, in proportion to its speed, forces more or less air into the theater, according to the season. Forward of the screw apparatus the supply canal measures 7 feet 10 inches in diameter. It enlarges around the ventilator to a diameter of 11 feet 6 inches, afterward reducing to carry an area of about 48 square feet. This conduit communicates with the space bounded by the limits of the building, comprising both that portion beneath the auditorium and that covered by the lobbies. This space is divided

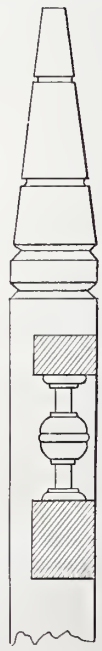
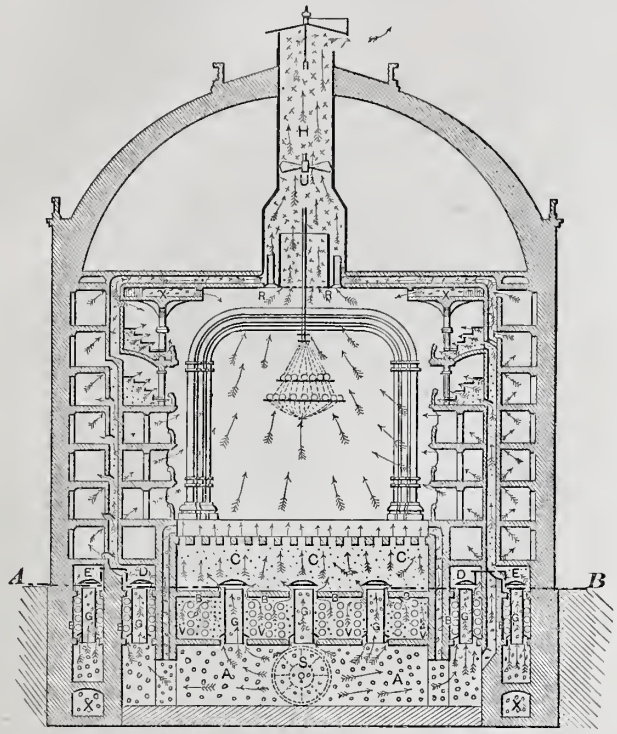


Fig. 5.—Spindles, &c.—Half Size.

into three floors, one over the other, each having its particular duty. The lowest floor receives the air from the ventilator. It is divided into distinct chambers, corresponding respectively with the pit, the boxes and the lobbies, each division being provided with a special register to regulate the introduction of the air. The intermediate floor, divided in a similar manner, is provided with steam heating apparatus, arranged conveniently for each of the chambers. The total heating surface of this apparatus is formed by 58,600 feet of 1-inch iron pipe, grouped in batteries and worked by a pressure of five atmospheres. The upper floor, situated immediately under the pit and the lobbies, is composed of chambers for mixing the air corresponding to the divisions in the lower floor. By means of this arrangement, which Fig. 1 of the illustrations will explain, it is possible that the cold air can reach the upper of these floors directly by vertical cylinders, about 3 feet in diameter, provided for the purpose, and passing through the middle floor. The middle floor is itself in direct communication either with the upper or lower floor, by means of annular openings around the above-mentioned cylinders. The passage of cold or warm air into the mixing chambers is regulated by the plate covers about the annular openings or above the main cylinder. By an ingenious mechanism these covers are opened or closed at will, and independently for each series of chambers. This duty is in the hands of a chief operator. A mixing chamber is provided also for the orchestra and pit seats, and the temperature of each of these divisions is under instant control. The result obtained is so satisfactory that both orchestra and pit in this building are much frequented, even in the hot season.



Heating and Ventilation of the Vienna Opera House.—Fig. 1.—Vertical Cross Section.

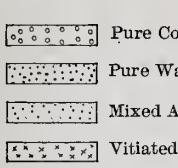


Fig. 2.—Key to the Symbols Employed in Figs. 1 and 3.

Having thus far followed the movement of pure air to the audience, it is proper to give brief consideration to the vitiated air. This air leaves the corridors and galleries to ascend with that proceeding from the pit toward the ceiling, to escape by the main flue over the gasalier and the 16 smaller tubes of the sun burners. In the amphitheater tiers on the third and fourth galleries, where numerous spectators may be gathered in the seats, the vitiated air is more particularly drawn into the flues extending from the high points of these galleries, and which lead into the cylindrical spaces about the 16 metallic flues of the sun burners. The vitiated air in the third and fourth galleries, being strongly heated, is evacuated with more energy. The air to be discharged from all points of the theater unites in a central chamber above the gasalier, to escape by a flue 13 feet 6 inches in diameter, in which is placed the screw for eduction. Finally, this flue is surmounted by a large movable bonnet furnished with a wind vane, which also facilitates the egress of the vitiated air. To supplement the good qualities of the general system here described, and to profit thereby in the most perfect manner, the direction of the heating and ventilating of this building is placed in the hands of an engineer, and, what is not one of the least curiosities of this theater, at a certain point immediately under the room near the mixing chambers we have just described, the said engineer stands like a captain on his ship, controls the maneuvers, opens and closes the registers without moving from his office, and, in fact, guided by the indications which are furnished to him instantly by electric thermometers corresponding to different parts of the building, distributes, according to necessity, air fresh or warm, and thus assures to all parts, and wherever required, a convenient temperature and perfect ventilation. All this is accomplished without noise, with a limited staff, and without apparent effort.

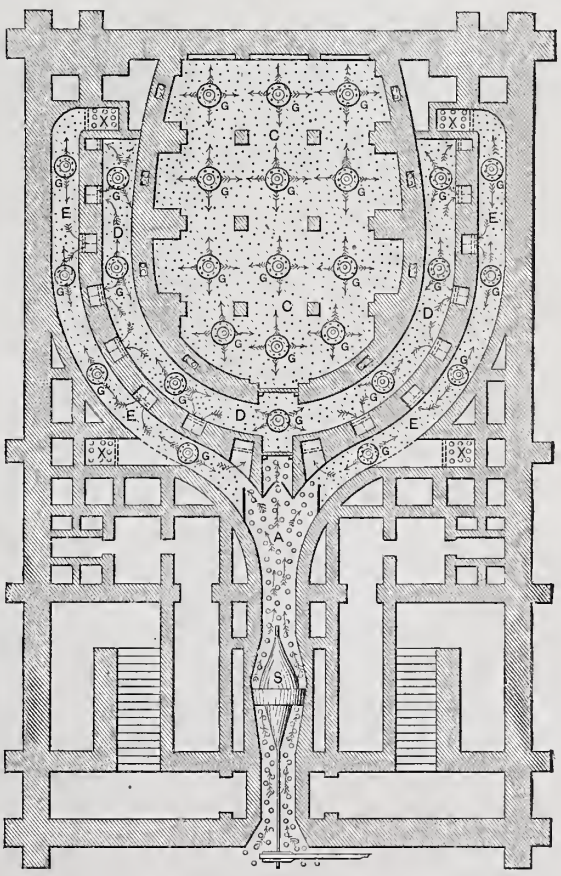


Fig. 3.—Horizontal Section on the Line A B of Fig. 1.

Inlaid Floors.

Mr. Gardner, in his work entitled "Home Interiors," says concerning inlaid floors: "There is another attribute of these parquet floors which proves them to be in good accord with the eternal verities; the most simple and natural patterns are the most beautiful. I can't imagine who first promulgated the insane idea that a wood floor must look as much as possible like oilcloth, and oilcloth as much as possible like a Merrimack print. Beyond all question, those designs for parquetry that are most consistent with the natural grain of the wood and facility for working it, are pleasant to look upon, to walk upon, to prepare, to lay, and to pay for. As facetious persons sometimes hang a curved mirror where a plain one is expected, so a pattern composed of wooden triangles and trapeziums may be laid that, by trick of form and color, will make the floor appear like a lot of little cubes set cornerwise, a succession of troughs or miniature mountain ranges. Such ought to be looked upon as practical jokes, not sober realities. We have a right to demand that a floor shall be level and smooth. It would be folly to make it actually rough and uneven; it is foolish to try to cause or even allow it to appear so."

Southern Residence.—Fig. 1.—Front Elevation of House.—Scale, ⅛ Inch to the Foot.—A. Chamberlain, Architect, New Rochelle, N. Y.

A Southern Residence.

The request has been made by various correspondents to *Carpentry and Building* for a set of plans representing a typical Southern home. We take pleasure in submitting to our readers at this time a design furnished us by Mr. A. Chamberlain, architect, of New Rochelle, N. Y., which represents a house recently built on the banks of the Weekiver River, Fla., for Mr. F. C. Fleming. A home in the South is a very different thing from one arranged to meet the requirements of a colder climate. Space for free ingress and egress of an occasional breeze is one of the most important considerations. Compactness is valuable only as securing economy in construction, and as affording convenient relationship between the several parts of the building. Shaded retirement within doors, rather than life out of doors, is the condition that is to be met ; therefore, what in a Northern house would be an ample provision of architectural shade in the way of verandas and porches, does not constitute all that is to be thought of in planning a Southern house. The elements of construction, too, in some particulars, differ widely from those to which mechanics in the North are accustomed. The roofs of our buildings have to withstand at times direct pressure from the weight of accumulated snows. The roofs of the Southern buildings have, upon occasions, to resist the lateral assaults of heavy winds, tornadoes and the like. These two influences exert an important influence upon the other parts of the design. It is a necessity in the Southern house to make the walls strong, and yet to pierce them freely with large openings for doors and windows. The frame is generally light, and derives its strength from scientific framing. Mere weight would only tend to weaken the structure.

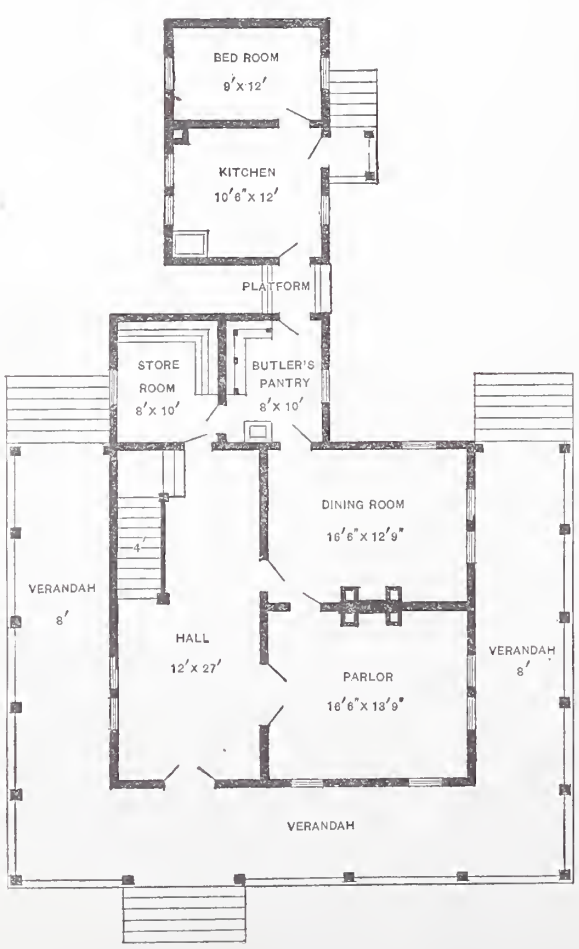


Fig. 2.—First Floor Plan.—Scale, 1-16 Inch to the Foot.

The internal arrangement and distribution of rooms in a Southern house differ as much from those to which we are accustomed in the North as other features in the building. It is desirable that the kitchen should be cut off from the main dwelling, and yet be so near as to allow all the machinery of living to be fully attended to. The dining or living room may be on the side nearest the kitchen buildings. The connection is in many cases an airy, well lighted vestibule. The kitchen should be much lighter and more spacious than anything that would be contrived for a Northern home. In fact, the domestics of the South require a distinct house and a separate establishment. The house itself should have wide and spacious halls, spacious only, however, where ventilation can be served.

The general features to which we have called attention, and which underly the construction of any well-arranged Southern home, have been happily embodied in the design contained in the accompanying illustrations. Verandas 8 feet wide flank the house on three sides. A hall, 12 by 27 feet, is one of the leading features of the lower story. The kitchen is detached from the building proper, back of which is provided a servants' bedroom. The kitchen is connected with the main house by a covered passageway open at the sides. The entrance to the dining-room is through a butler's

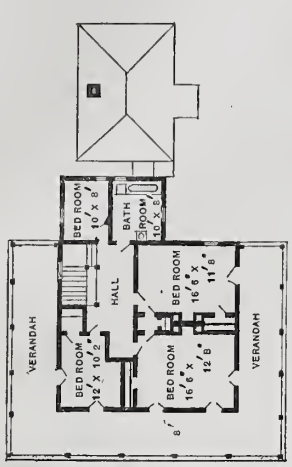
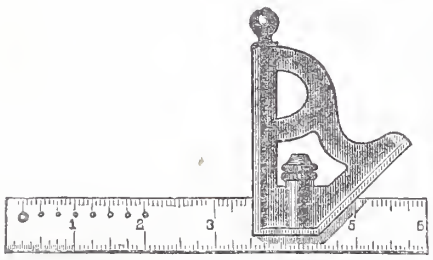


Fig. 3.—Second Floor Plan.—Scale, 1-32 Inch to the Foot.

Southern Residence.—Fig. 4.—Side Elevation.—Scale, ⅛ Inch to the Foot.—A. Chamberlain, Architect, New Rochelle, N. Y.

pantry. The second story is provided with verandas, and contains some large bedrooms amply provided with closets, and well ventilated by means of windows. The shape of the roof is such as to adapt it to the requirements of the location, and to form a good-sized attic, which, for purposes of ventilation, is pierced by four double windows, a pair facing each of the sides of the house. A noticeable feature about the building is the absence of the foundations to which we are accustomed in the North. The house is erected upon piers built several feet above the ground, leaving the whole surface which the building occupies free to all the winds that may sweep across the site. For ornamental purposes the space between the piers is inclosed by lattice-work, or fancy scroll work, as shown in the design.

From the architect's specification we learn that this building was constructed with ordinary mortise and tenon framiug. The sills were 4 x 10 inches, post, girts and plates 4 x 6 inches, joists 3 x 10 inches, placed 16 inches between the centers. The veranda was framed of the same kind of timbers as the house proper. Southern pine was the wood employed throughout. The floors were laid of 4 inch stuff 1¼ inches thick, matched. The outside sheeting was of board 9 inches wide and ⅞ inch thick. The shingles were of spruce. The clapboarding of the building was 6 inches wide and 1 inch thick, rebated. The gutters were formed above the roof, in a way to constitute an ornamental feature, as shown in the elevations. The windows in the second story were of the character known as French windows,



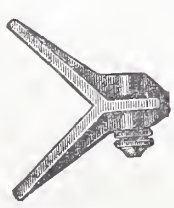
Novelties.—Improved Try Square.—Fig. 1.—Try and Miter Without Level.

hung with loose-jointed butts. The windows in the first story were hung with weights. The outside doors were made in halves, a plan allowing the lower part to be closed as a barrier against the intrusion of "varmints," while the upper part is left open for purposes of ventilation. It is not necessary to enter into further particulars of the specification, because in the main they do not differ from current practice elsewhere. The plastering was three-coat work, done in the best manner. The plumbing was of a character current in other sections of the country, using the best material and workmanship.

NOVELTIES.

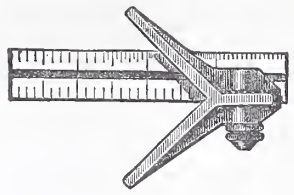
AN IMPROVED TRY SQUARE.

The frequency with which a try-square is used by the carpenter, joiner and cabinet maker, makes it desirable that the instrument should be not only accurate in every particular, but also arranged in such a manner as to be convenient and effective in use.



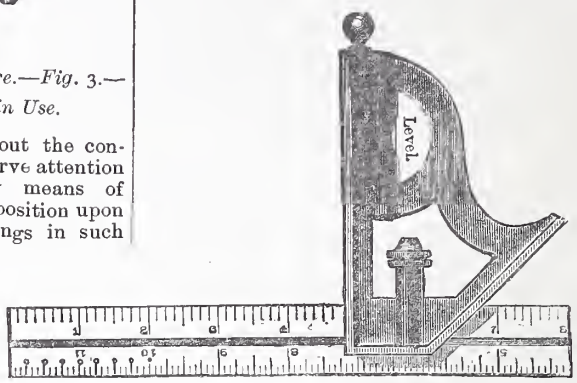
Novelties.—Improved Try Square.—Fig. 2.—The Center Head Detached from the Blade.

Figs. 1, 2, 3 and 4 of our illustrations present an improved try-square, which, on account of the numerous advantages attending its use, seems likely to supersede the common try-square with all mechanics who take a pride in the tools which they employ. It consists of a blade either 6, 9 or 12 inches long, according to the work for which it is intended, one side of which is grooved for receiving a stud in the head for keeping the latter in position, and the two heads shown in the engraving. What is called the center head is shown in Fig. 2 of the engravings detached from the blade, and in Fig. 3 in position on the blade. When arranged for use as a try and miter, a different head is employed, as illustrated in Figs. 1 and 4.



Novelties.—Improved Try Square.—Fig. 3.—The Center Head Shown in Use.

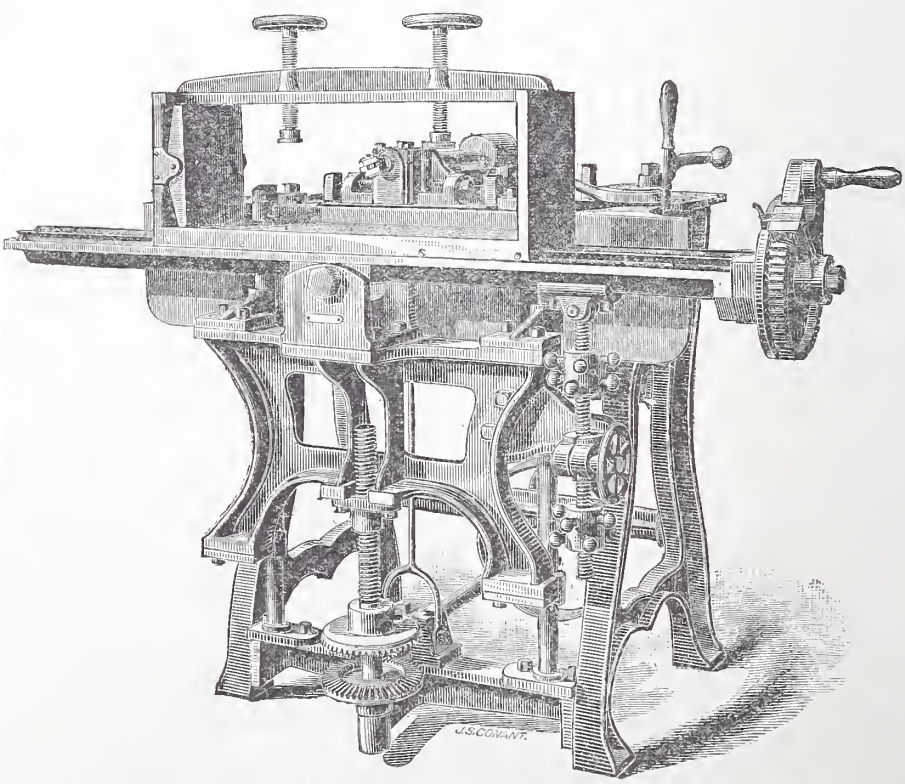
There are several features about the construction of this tool which deserve attention in passing. The screws by means of which the heads are held in position upon the blade are fitted with springs in such a manner as to keep the blade and head in proper position, even though the screw be partially released. A steel scribe is furnished with the tool, and is carried in a sheath just to the left of the level shown in Fig. 4, in which it is held by a spring. The ball at the top is the handle of the scribe. This tool, as a try-square, is a substitute for every size of the common kind, from the smallest up to the length of the rule. It may also be employed as a set-miter, with either short or long tongue. It is convenient for use as a scribe and mortise gauge, forming a quick and accurate way for laying out work. As a pencil-marking gauge, it may be used to advantage by draftsmen and joiners in line drawing or for laying out lines at right angles or at angles of 45 degrees. It serves also as a depth gauge for p'aner work, and is convenient to square in a mortise. The spirit level with which it is provided adapts it for still other purposes, which will suggest themselves to the intelligent reader, both as a level and a plumb. When slipped from the stock, the blade forms a steel rule and straight-edge. By means of the auxiliary head, an inside and outside center square is provided. By using the ends of center head arms, a T-square is arranged. The tool is neatly made and quite accurate. The manufacturer is L. S. Starret, of Athol, Mass.



Novelties.—Improved Try Square.—Fig. 4.—Try and Miter With Level.

THE PARKER DOVETAILING MACHINE.

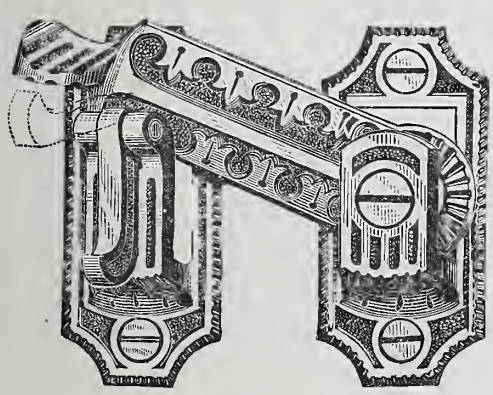
The common dovetail joint involves parts the shapes of which are somewhat unusual for a machine to make. Not that they are impossible to make, for the machine represented in Fig. 5 is a substantial contradiction of that, and other devices more or less ingenious have been invented for the purpose. Various modifications of the ordinary hand-made dovetail have been brought out, adapted to construction by power machines, and specimens of such joints may frequently be found in the drawers of bureaus and other articles of furniture. A machine designed to make dovetail joints of the old-fashioned hand-made variety is, however, a novelty, and we think a description of such a tool, recently perfected by Messrs. G. W. Parker & Co., of 1388 Tremont street, Boston, will be of interest. The machine consists of a substantial upright frame, across the top of which is placed a horizontal shaft carrying the cutter. This shaft is driven by means of a belt and pulley, which is shown near the center of the top of the engraving. The boxes in which the cutter shaft revolves slide on the top of the framework, and are thrown back and forth by an eccentric lever



Novelties.—Fig. 5.—The Parker Dovetailing Machine for Making the Old-fashioned Dovetail Joint.

attachment, the handle of which is shown at the right. The carriage which contains the work consists of a frame, seen in the front part of the cut, which slides up

and down upon guides. On the top of this frame is a long tilting table, to which in turn is fastened the box which holds the boards to be dovetailed. The work is fastened in position by means of screws operated by hand. This long table is inclined to any desired angle by means of a screw, shown at the right and beneath it. In operating the machine as many boards are placed in the box as are required for use, or as it will contain. The distances between the joints are gauged by the index gear shown at the extreme right of the engraving, and the double dog attached thereto in combination with a spring stop. The long tilting table has ranging through its center, and through a nut fastened to the bottom of the box, a screw with a quadruple thread, on the end of which the index gear before mentioned is fastened. One full turn of the handle moves the box along one inch. The carriage and tilting table fastened to it are raised or lowered in front of the cutter by a screw feed, shown at the bottom in the foreground. In making the ends of the box a bevel cutter, as shown in the engraving, is used, and the table is kept in a horizontal position. When the boards have been put in place the spring stop is adjusted for the required distance. The feed is shoved in and a cut made either up or down, as the case may be, through the entire mass. The box is then run along to the right distance, and another cut made, which is repeated until the required number of cuts have been produced. This operation makes the ends. To make the pieces for the sides of the drawers, or the pins, as they

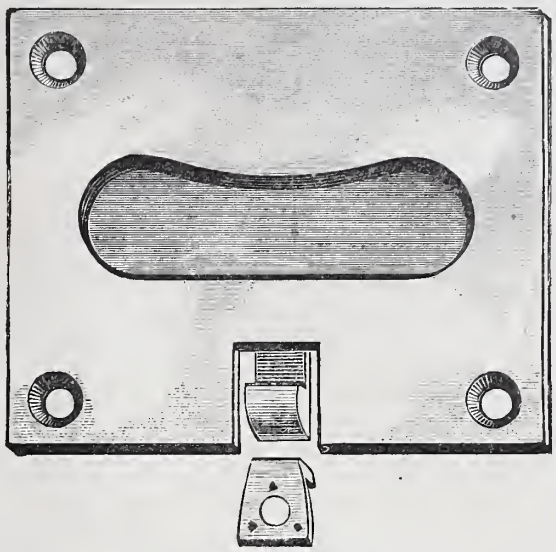


Novelties.—Fig. 6.—Self-Locking Shutter Bar.

are sometimes called, and which feed this bevel cut, a straight cutter is substituted and the table is tipped to correspond with the angle of the bevel cut. The table is first inclined to one side to the required angle, and is held in place by the check nuts provided for the purpose. After the cut has been made with the work in this position, the table is tipped to the opposite side and a second cut is made back through the same holes, thus completing the two sides or angles of the pins. The manufacturers state that ends and sides produced in this way can be thrown in a pile together, and that any pair picked out at random will be found to fit, because all are made precisely alike. The specimens which have been submitted for our examination, and which we are assured represent the work as it comes from the machine, indicate a very clean and neatly-fitting joint. The machine is not what would ordinarily be termed complicated, and is of a character to be easily run by an ordinary mechanic. It will doubtless fill a long-felt want among woodworkers, and will be especially desirable in establishments making boxes, where strong and durable cases for goods are required.

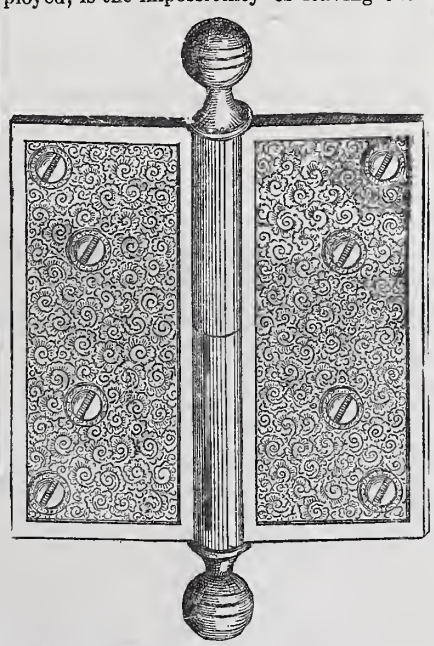
SASH AND WINDOW FURNITURE.

The Morris Sash Lock Manufacturing Co., of Cincinnati, Ohio, make a number of novelties in the way of sash and window furniture, two of which are shown in Figs. 6 and 8 of our illustrations. The former represents a self-locking shutter bar, the essential parts of which are clearly shown in the engravings. It is very simple, quite ornamental, and withal effective. By its self-locking action it is operated as easily with one hand as the old style. It secures the inside shutter so effectually as to render it impossible to be opened from the outside or blown open by the wind. Fig. 8 represents a combined flush sash lift and lock, which



Novelties.—Fig. 8.—Combined Flush Sash Lift and Lock.

presents some advantages in its construction over others. The usual projecting catches and hooks, so annoying to housekeepers, are avoided; one combined action unhooks and raises the window. How this is effected is clearly shown by the engraving. The pressure of the fingers in the opening provided for them releases the catch. This being operated by a spring, closes automatically when the window is shut down. A sash lock of this kind upon the bottom sash, used in combination with a lock provided for the meeting rail of sash made by this same company and their "ventilating hook," makes a most desirable window trimming. The "ventilating hook" to which we have referred is an attachment fastened at the side of the middle upright of the upper sash. It consists of two prongs, between which the bolt of the sash lock fastens, the same as into the plate on the lower rail of the upper sash, thus making it possible to fasten the lower sash and leave the upper one open, as may be desired. One of the great objections that housekeepers have to windows hung with weights, especially where blinds are not employed, is the impossibility of leaving them

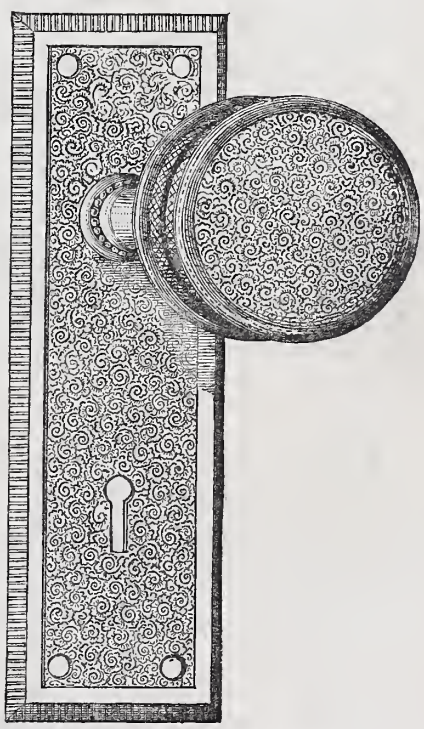


Novelties.—Fig. 7.—Bronze Door Hinge.—Damascene Pattern.

down from the top in hot weather without running the risk of intrusion from sneak thieves. By the fittings above described all this is obviated effectually and at very small expense.

J. B. SHANNON & SONS,

of No. 1009 Market street, Philadelphia, have sent us a new edition of their catalogue of art metal-work for fine dwellings, furniture decoration and specialties in builders' hardware. The catalogue has been greatly enlarged, and is gotten up in a manner to be of special service to the contracting builder and all who are buying hardware supplies. A number of novelties are contained in this catalogue which deserve passing notice, among which may be mentioned hand-made locks for dwellings and furniture of a superior character; a line of bronze-metal door locks, in the Eastlake style, with escutcheons and other trimmings to match; a ventilating and self-



Novelties.—Fig. 9.—Bronze Knob and Plate. Damascene Pattern.

locking sash-fastening and improved form of door bumper; wicket frames for bank desks; feed cut-offs for stables; house numbers and a full line of door-bell trimmings. This catalogue should be in the hands of every enterprising builder.

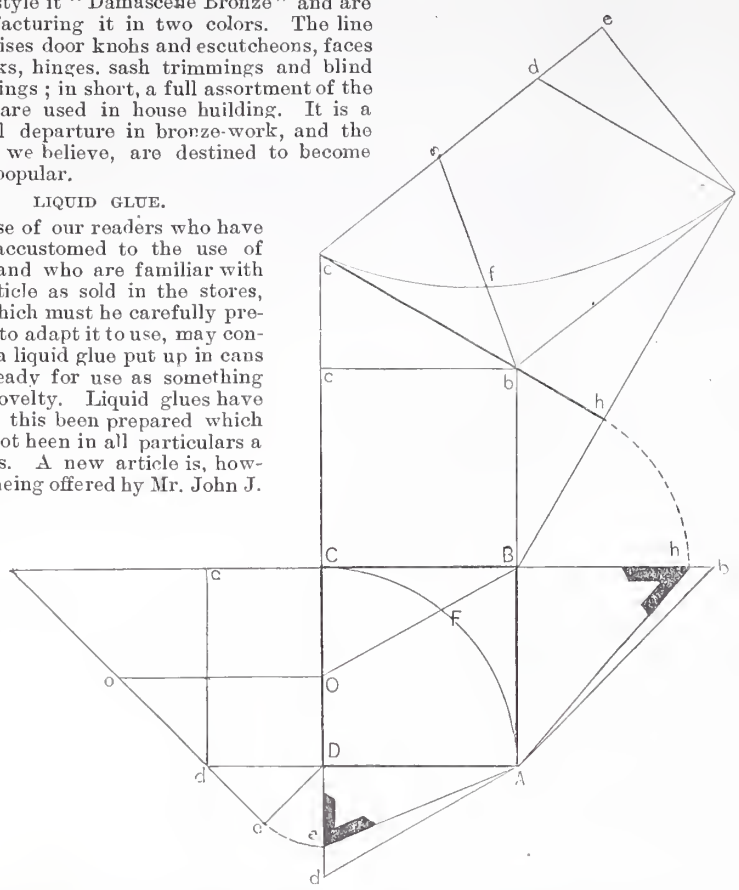
NEW PATTERNS IN BRONZE HARDWARE.

The Russell & Erwin Mfg. Co. have recently completed and are now putting upon the market a new line of bronze hardware, two specimens of which are illustrated in Figs. 7 and 9 of our engravings. The notable feature in this line of work is the character of the design. While much beautiful work has been produced by this company in the past, we think there is no

design or style of ornamentation which they have yet brought out that is as beautiful as the present one, or as likely to be as enduring in popular estimation. The company style it "Damascene Bronze" and are manufacturing it in two colors. The line comprises door knobs and escutcheons, faces of locks, hinges, sash trimmings and blind fastenings; in short, a full assortment of the hardware used in house building. It is a radical departure in bronze-work, and the goods, we believe, are destined to become quite popular.

LIQUID GLUE.

Those of our readers who have been accustomed to the use of glue, and who are familiar with the article as sold in the stores, and which must be carefully prepared to adapt it to use, may consider a liquid glue put up in cans and ready for use as something of a novelty. Liquid glues have before this been prepared which have not been in all particulars a success. A new article is, however, being offered by Mr. John J. Tower, No. 96 Chambers street, of this city, which, so far as we have had the opportunity of examining it, seems free from some of the objections to which its predecessors were open. One of the tests of good glue is that of taking it between the hands, when in its liquid form, and repeatedly drawing the hands apart and noting the stringy condition that the material manifests. Subjecting this liquid glue to the same test, it seems to possess very desirable qualities. We have not had the opportunity of putting this article to the test of time, but from what we have seen of it we think we risk nothing in commending it to the attention of our readers.



Wreath-pieces which Pass from one Rake to another of Different Inclination over Ground Plans which are Quarter Circles.—Fig. 1.—General Method of Obtaining Lines by which to Lay Off the Pattern.

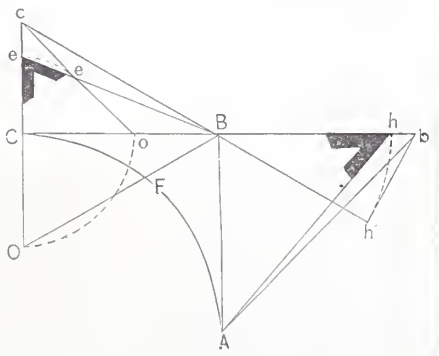


Fig. 2.—Practical Method of Accomplishing the Same Result.

Transparent Waste Pipes.—A well-known writer on sanitary science, says: "If, by some magic spell, all the drain tubes and pipes in a large city could be transformed from tubes of metal into tubes of glass, so that in every house the decomposition they cover could be made manifest to the eye, the wonder of the simplest-minded would be, not that we had disease in our houses, but that at any moment we were free from the self-inflicted curse of diseases of the most fatal nature in their worst and most mortal types and consequences. From the upper closet, through the whole of the soil into the chief drain; from the pipe of every sink into the main drain; from the main drain at its commencement through all its courses to the outlet trap; from the earth all around the main drainage pipe; from the exit of the main drainage pipe in the trap to the termination of the trap itself in the sewer or cesspool; in all these parts there would be seen such a line of decomposing, disease-producing material as would make every one, I think, for once declare that sanitary reform is not quite such a fanaticism as it is commonly accredited to be."

Practical Stair Building.—XVI.

WREATH-PIECES WHICH PASS FROM ONE RAKE TO ANOTHER OF DIFFERENT INCLINATION OVER GROUND PLANS THAT ARE QUARTER CIRCLES.

We have now reached the consideration of the third class of wreath pieces as described in our eighth article, which was published in the April number of the present volume. We shall next give attention to the methods of obtaining the patterns of wreath-pieces which pass from one rake to another of different inclination, or, to express it in other words, wreath-pieces having within their length two different pitches, or having their tangents of different lengths. We use these several forms of expression in describing the problems for the reason that the great difference between hooks on the subject of stair building is, in many cases, more in the terms employed in describing the methods pursued and the results reached than in any other essential particular. All expositions of the art of stair building are essentially one in principle, provided they be correct, although they may differ in the language employed and other minor particulars.

Referring to Fig. 1 of the illustrations, let it be required to produce an elevated curve line over A C, with its tangents over A B and B C of different inclination and therefore of different lengths. Complete the square A D C B. Draw the triangle A *b* B, showing the rake of the tangent over A B. Draw the triangle A *d* D, showing the proposed rake of the tangent over B C. Draw the rectangle D *d c* C equal in hight to D *d* of the triangle last described. Draw the rectangle C *c b* B equal in hight to B *b* of the first triangle. Draw the triangle *c c b* showing the rake of the tangent *b c* over B C. Draw the triangle *c c* D with the same rake as A *b*. Extend the rake line *c b* indefinitely in the direction of *h*. From B draw a line at right angles to *c h* extended, cutting it in the point *h* and extending in the direction of A indefinitely. From B as center, with B *h* as radius, draw the arc *h h*. From the termination of this arc draw a line to A, as shown by *h* A on the indefinite line B *h* A, already drawn. Make *h* A equal to *h* A just drawn. Connect A thus established with the point *b* in the line *c h*, and complete the parallelogram A *d c b*. Draw O o parallel with B *c c*, making it in length equal to the hight of B *b*. Connect the points O and B of the elevated parallelogram A *b c d*. Take the distance *c* o equal to *c* o of the triangle at the left of the diagram, and connect the point o *b*. On this line set off the distance *b f* equal to B F of the central figure. Then A *b c b* are elevated tangents, having their proper angle at *b*. With these tangents to serve as guides at each end, draw a curved line through *f*, as shown by A *f c*. This line, then, will be the elevated curved line corresponding to the plan A C, under the conditions named in the statement of the proposition.

The bevel at *h* represents the solid angle at the tangent line *c b*. To measure the solid angle at *c d*, produce *c d* indefinitely in the direction of E. Draw D *e* at right angles with *c e*, thus determining the point *e*. From D as center, with D *e* as radius, describe the arc *e e*. Draw *e* A. Then D *e* A is the angle desired.

The correctness of this diagram, which may be somewhat puzzling to the beginner, may be readily demonstrated as follows: Square up the elevated parallelogram, A *b c d*, by drawing the lines *d e* and A *e*. Fold up the figure upon the heavy lines B C, D C and *c h*; then A in the elevation will lap over and hit A in the ground plan, and the curved line A *f c*, with its tangents A *b* and *c b*, will take their proper places over corresponding lines in the plan. If the bevels at *h* and *e* be folded up against the elevated plane, they also will be found correct.

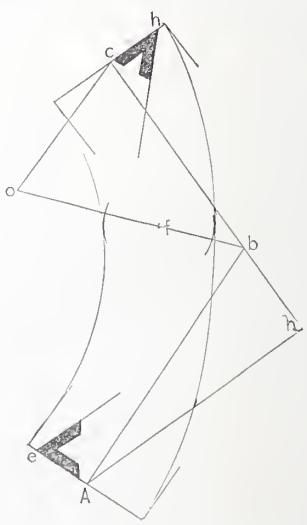


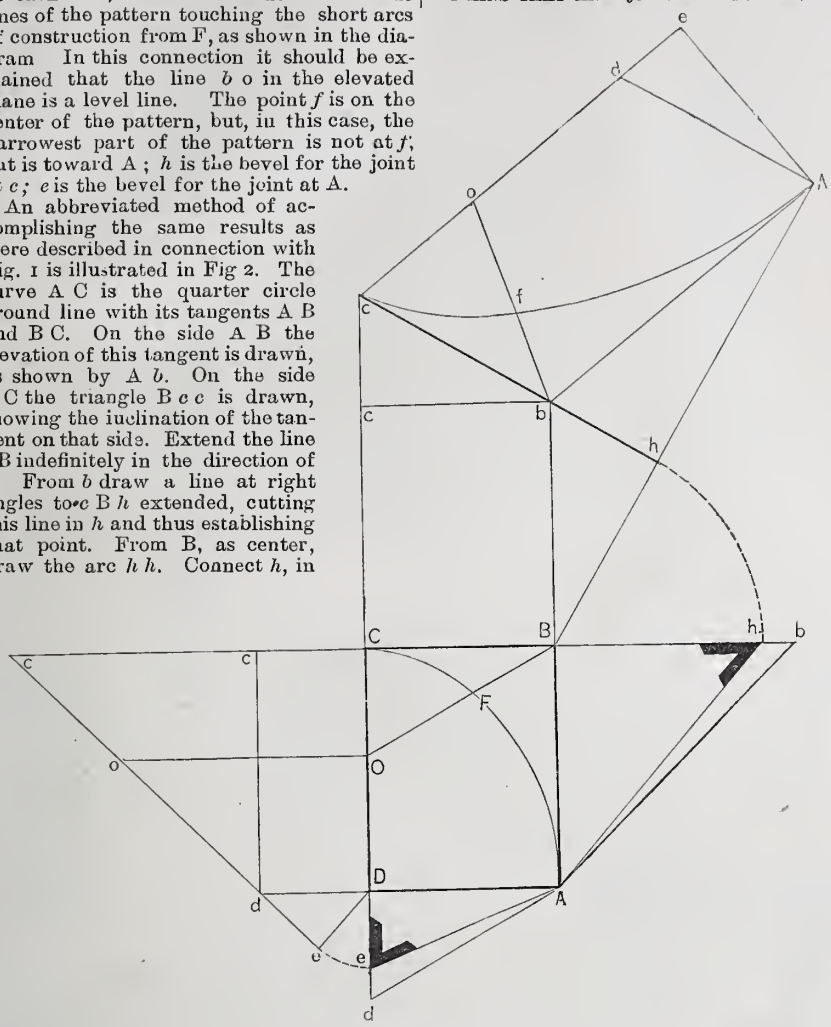
Fig. 3.—Laying Out the Pattern.

The face pattern of a wreath-piece of the character named in the statement of the proposition, may be drawn as follows from the diagram which has been prepared: Referring to Fig. 3, draw the line *c b h* equal to the line represented by corresponding letters in Fig. 1. At right angles to this line, from the point *h*, draw *h* A equal to *h* A of the original figure. Connect the points A and *b*; then A *b* and *b c* are the tangent lines of the pattern. Draw *c* o parallel with A *b*, making the distance *c* o equal to *c* o in Fig. 1. Connect o *b* and take the distance *b f* equal to B F of Fig. 1. From *f* as center draw two short arcs, as shown in the engraving, measuring about one-sixth more than the width of the rail. At A and *c* make the pattern about

one quarter wider than the rail. Then, with short parallel lines to serve as girders at each end, draw the inside and outside lines of the pattern touching the short arcs of construction from F, as shown in the diagram In this connection it should be explained that the line *b* o in the elevated plane is a level line. The point *f* is on the center of the pattern, but, in this case, the narrowest part of the pattern is not at *f*, but is toward A ; *h* is the bevel for the joint at *c*; *c* is the bevel for the joint at A.

An abbreviated method of accomplishing the same results as were described in connection with Fig. 1 is illustrated in Fig 2. The curve A C is the quarter circle ground line with its tangents A B and B C. On the side A B the elevation of this tangent is drawn, as shown by A *b*. On the side B C the triangle B *c c* is drawn, showing the inclination of the tangent on that side. Extend the line *c* B indefinitely in the direction of *h*. From *b* draw a line at right angles to *c* B *h* extended, cutting this line in *h* and thus establishing that point. From B, as center, draw the arc *h h*. Connect *h*, in

WREATH-PIECES PASS FROM ONE RAKE TO ANOTHER OF DIFFERENT INCLINATION OVER PLANS THAT ARE QUARTER ELLIPSES.



Wreath-pieces Passing from one Rake to another of Different Inclination over Ground Plans which are Quarter Ellipses.—Fig. 4.—General Method of Laying Out the Lines by which to Describe the Pattern.

the line B *b*, with the point A. From the point draw c o, giving it the same pitch as A *b*, or, expressed otherwise, draw it at right angles to A *b*. From C draw C *c* perpendicular to *c* o. From C as center, with C *e* as radius, describe the arc *e e*. From the point *e* thus established draw E B. Extend c C indefinitely in the direction of O. From C as center, with radius C o, describe the arc *o* O. thus establishing the point O. Connect O and B. From this diagram the pattern is laid off, as shown in Fig. 3, as follows: Draw the line c *b h*, making c *b* equal to c B, and B *h* equal to *b h*. At

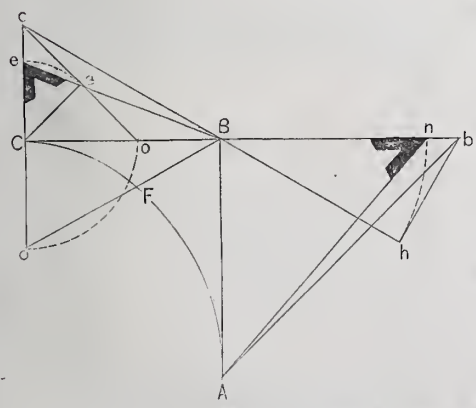


Fig. 5.—Shorter Method of Accomplishing the same Result.

right angles to c *h*, draw *h* A equal to the bevel line *h* A. Connect A and *b*. Draw c o parallel with A *b* and equal in length to the pitch line C O. Draw o *b*, and make *b f* equal to B F. From this point proceed as already described in connection with the pattern.

The next case are those problems in which Figs. 4, 5 and 6 of the diagrams represent a case of this kind, Fig. 4 showing the long method of obtaining the necessary lines for laying out the pattern, and Fig. 5 showing the abbreviated methods. The two problems are so nearly alike that, as in former cases, we think it hardly necessary to go through the demonstration in full. Corresponding letters in the two sets of diagrams refer to corresponding parts.

NEW PUBLICATIONS.

PRACTICAL LESSONS IN ARCHITECTURAL DRAWING, OR HOW TO MAKE THE WORKING DRAWINGS AND WRITE THE SPECIFICATIONS FOR BUILDINGS. By William B. Tuthill, Architect. Published by William T. Comstock. Price, $2.50.

This is probably the most important work to which we have ever drawn our readers' attention. By means of some 44 pages of text, together with 33 full-page plates and 33 woodcuts, the various methods of constructing buildings are clearly shown, and the manner of representing the same in drawings explained. The work embraces scale drawings of plans, elevations, sections and details of frame buildings, brick buildings and stone buildings, with full descriptions, and a specification showing the various forms of writing the same for different kinds of buildings. The arrangement of the book is such as to adapt it to the wants of both builders and architects. It contains within its covers a greater fund of knowledge than many of the practicing architects of the day possessed when they first entered the profession. Its usefulness to those who desire to engage in architecture can therefore be appreciated. The first chapter describes the tools and instruments used in drafting, with some incidental remarks concerning the use of color in drawings for indicating various materials. The second chapter describes and illustrates a small frame cottage. Details of construction of various parts are shown, as well as a full set of drawings, as they would be termed by the architect or builder. Following this is a similar description of a frame house, in the illustration of which 11 full-page plates are employed. This, in turn, is succeeded by the description and drawings of a brick building, after which comes a similar chapter devoted to a stone building, the illustrations representing a church. The next to the last chapter of the work is devoted to the specification. It is not intended to present to the student a form which he is to copy, but so to direct him that he may be able to write a specification adapted to work on which he may be engaged. The closing chapter is entitled "Color," and shows the application of color in working drawings. This book is designed to meet a want often experienced by our readers, and we have no doubt it will have a large sale.

AN IMPROVED SLIDE RULE. To accompany "Lessons in Carpentry by the Slide Rule." Price, $1.50.

It may be remembered by our readers that in our May issue of the current volume we noticed a book by Mr. Robert Riddell on the slide rule. Since receiving the volume referred to, we have been furnished with one of the new slide rules, made especially to accompany the work. This rule differs in some respects from any heretofore made. It is single, 12 inches long, and has one feather edge, for convenience in using upon the drawing table. The slide is of metal and is very finely divided, or perhaps we should say very accurately divided, excelling, in this respect, any rule of the kind which we have examined. The importance of this point can hardly be overestimated, since, without extreme accuracy in the

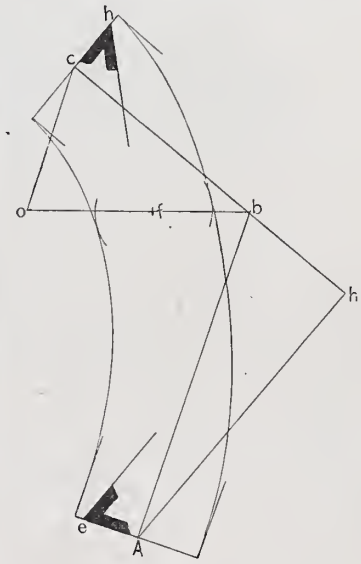


Fig. 6.—Drawing the Shape of the Pattern.

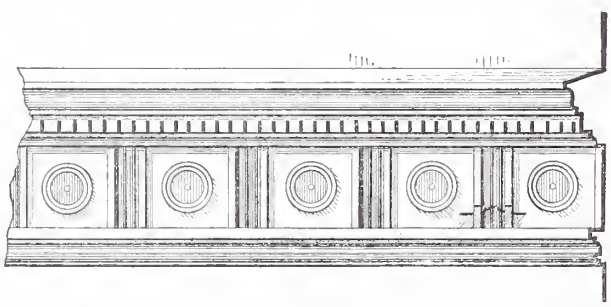
divisions, a slide rule is little better than a multiplication table with half the figures transposed or missing. Every purchaser of the book entitled "Lessons in Carpentry by the Slide Rule," will require one of these instruments, While in general we doubt the utility of the slide rule in the solution of practical, every-day problems, the greater perfection to which the instrument itself is brought, the less objection we have to it. Mr. Riddell has done much in this direction and is entitled to full credit for the results attained. His book (price, $1.50), accompanied by this instrument, constitutes the best exposition of the subject now available to our readers.

HAND-BOOK OF USEFUL TABLES FOR THE LUMBERMAN, FARMER AND MECHANIC. Revised Edition. Finch & Apgar. Price, 25 cents.

This little work, with which many of our readers are familiar, has recently been revised, and some of the errors to which we called attention in previous editions have been corrected. The work now, so far as we have had opportunity to examine it, is correct. It will be found useful by a very large class of our readers.

Miscellaneous Details.

The constant request that is made for details of odd parts of buildings adapted to use by carpenters and builders, has induced us to prepare a series of plates of this kind. In our last number we presented some details of this character, which have been greatly appreciated, and we now add still further to the list, and shall continue the subject in other numbers of the paper, so far as our readers may be served by such publication. In this connection we would remind our subscribers that if they desire special subjects treated in the general manner here set forth, we shall be pleased to hear from them. Of the engravings now presented, Fig. 1 represents a belt course, simple of construction and adapted for use in a great many places. Fig 2 shows a neat form of cornice bracket. Figs. 3 and 4 represent some finials which will be found useful in various connections. Two designs for balusters are shown in Figs. 5 and 6. What might be called a study in terminals is presented by means of Figs. 7, 8 and 9, the first representing a drop, and the latter two the finish for the tops of posts. A very neat design for a panel is shown in Fig. 10, while Fig. 11 presents a balustrade suitable for use around a porch. Fig. 12 is a frieze in which open work is introduced, the black lines representing wrought iron and giving to the design a neat and light appearance. A simple conformation of moldings, adapted to use as a capital, is shown in Fig. 13. A porch hood in all its parts, including the steps over which it is designed to be placed, is shown in Fig. 14. The style of all the work here presented is characteristic and in keeping with present architectural fashions. The scale is indicated in connection with the cuts.



Miscellaneous Details.—Fig. 1.—Design for a Belt Course and Frieze.—Scale, 1 Inch to the Foot.

Chimneys and Fire Places.

The following paper, from the pen of Mr. Arthur Jennings, will, we think, be found of interest and value to our readers :

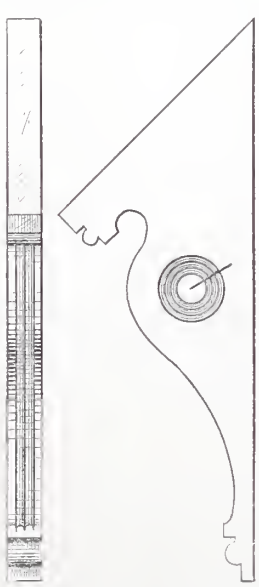
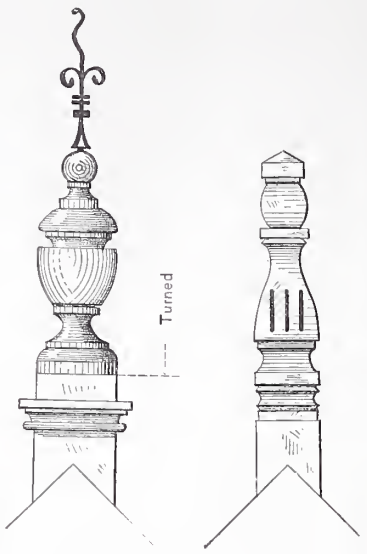


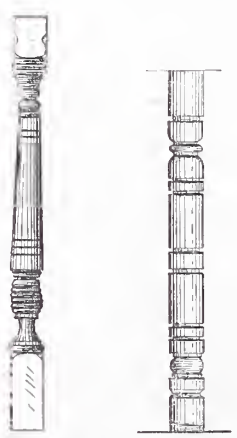
Fig. 2.—Design for a Cornice Bracket.—Scale, 1 Inch to the Foot.

Chimneys are constructed essentially for the purpose of carrying off the smoke from burning fuel, and the fact of all dwelling houses and most buildings being provided with a chimney of some sort warrants considerable attention being given to the subject.



Figs. 3 and 4.—Finials. — Scale, 1 Inch to the Foot.

It was not before the end of the eleventh century that chimneys may be said to have been known in England. Previous to that time the smoke arising from the fire was allowed to escape through a hole formed in the roof for the purpose, or the fire was covered by a kind of hood in a manner something after the present style, with the difference that the smoke was allowed to escape through a funnel brought immediately through the wall instead of being carried up, as at present, to beyond the hight of the building. Since then, however, the chimney has much developed.



Figs. 5 and 6.—Balusters.—Scale, 1 Inch to the Foot.

At the present day chimneys are usually constructed in a manner of which an example is shown in Figs. 1, 2 and 3, the different flues being brought together, forming what is called a "stack." This consists of the fire plate bounded by the "jambs" A and by the "chimney back" B; a hearth of stone or other incombustible material, laid level with the floor boards, and a grate or stove is set between the jambs to contain the fuel. Above the stove is the front "breast" C of the chimney, which is carried by a rough arch turned on in iron "chimney bar" D. The walls at the side of the breast and above the jambs are "gathered" in so as to lead to and bring the smoke to the "flue" E. The flues are carried up until the hight of the building is reached, and usually project some few feet above the roof, terminating in a "chimney pot," F, or a cap of some sort.

In order that a chimney may properly fulfill its functions of carrying off the smoke, consideration must be given to the particular circumstances under which it is to be built, for the form, deposition and even construction will be more or less dissimilar in different cases. This, however, is not attended to as it should be. Modern builders seem to imagine, in many cases, that so long as a chimney is provided which does not interfere with the elevation and is built in the stereotyped manner, all the trouble is over.

As a matter of fact, however, the form and position of chimneys need much consideration and careful thought, for not only must it properly carry off the smoke—and this is by no means a small matter to insure—but the fire-place must be in such a position as shall be best calculated to diffuse the heat over the apartment. And again, the chimneys must be brought together as far as may be, both on account of economy and that they may afford mutual support; while the stacks should be so placed as to prove, if possible, objects of ornament instead of otherwise.

Figs. 7, 8 and 9.—A Study in Terminals.—Scale, 1 Inch to the Foot.

To properly design a chimney, it is necessary to first understand the action by which the smoke is carried off. In order to do this we must take into consideration the primary effect of heat when applied to air. We know that air, on being heated, becomes rarefied, the particles of which it is constituted getting further apart, and the result is that it becomes lighter than the cooler air around it and rises, or tends to rise. This is the fundamental principle upon which the action of the chimney depends. The construction of the flue is such as to inclose a column of air communicating with the outer atmosphere. On a fire being kindled beneath this inclosed column, the air immediately above it becomes heated, and thence

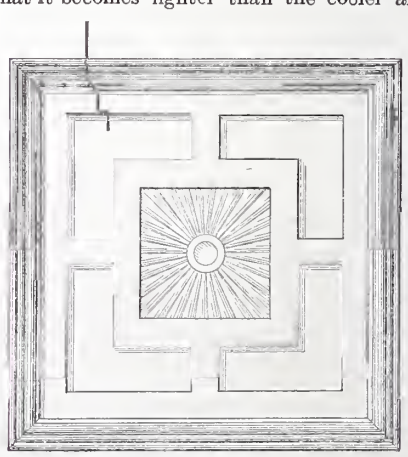


Fig. 10.—Design for a Panel.—Scale, 1 Inch to the Foot.

rarefied and lighter, the result being that the heavy air is pushed up the chimney by the hotter, and therefore lighter, air below it, and an ascending current is produced. Now, as soon as the fire is lighted, heat and smoke are simultaneously emitted by the burning fuel; the heat acts in the manner described, and produces an upward current, and the smoke is carried with it. Thus, then, the whole efficiency of the chimney depends upon this upward current of air, and hence we may come to the conclusion that the primary, and, indeed, the main thing to be aimed at is to give such a construction to our chimney as shall be best calculated to aid its upward progress.

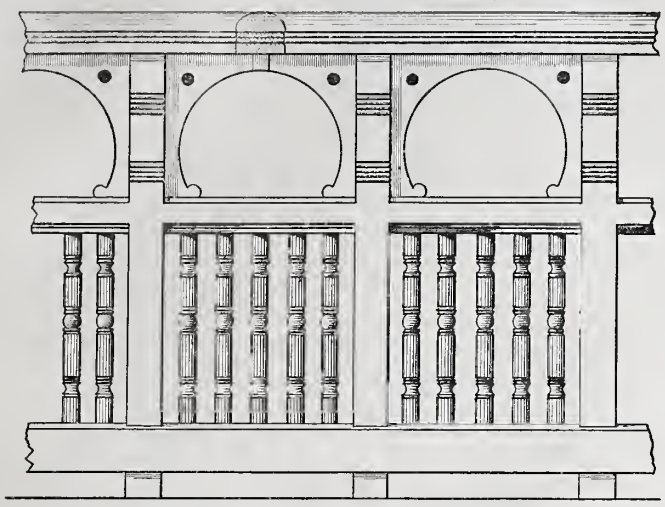


Fig. 11.—*Design for Balustrade.—Scale,* 1 *Inch to the Foot.*

The first thing which will affect the upward draft or current is the difference of temperature inside and outside; for, supposing that the outside is always somewhat colder, the current may lose its impetus by the cool air acting upon it from the outside and depriving it of its heat. To prevent this the outside walls or back (B, Fig. 3) in an external chimney should always be at least 9 inches in thickness. The draft, which is always in proportion to the perpendicular hight of the flue, will always be stronger the straighter the flue is carried up, because there will be less friction, and the cooling effects of the longer passage will be saved. It is, however, necessary to curve the flue slightly in order to prevent the rain from entering, and the curve should be at least sufficient to prevent daylight being seen when looking up the flue from the fire-place.

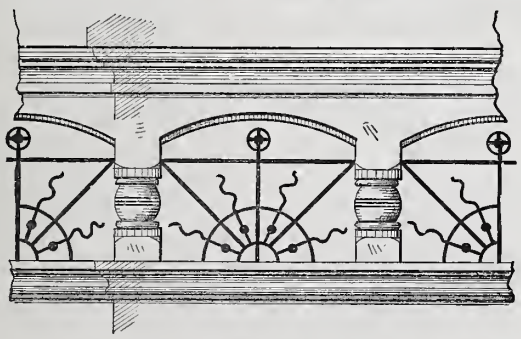


Fig. 12.—*An Open Frieze.—Scale,* 1 *Inch to the Foot.*

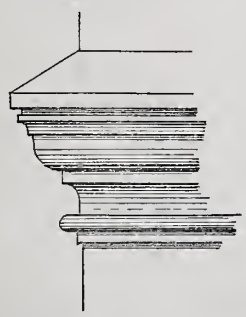


Fig. 13.—*A Profile of a Capital.—Scale,* 1 *Inch to the Foot.*

It is necessary, in order to obtain a proper upward current, that sufficient air be admitted to the room to supply the fire. But often the only means of entrance for the air is by the closed window and door, and even in these, every cranny and crack is often carefully covered, so as to exclude the least possibility of a draft. It cannot be a matter for surprise if in such a case the chimney is smoky, and although we cannot altogether expect people to sit with the window or door open, so as to feed the fire, yet, if they are determined to so exclude all air which enters in the ordinary way, they must, at least, find some other means which will not annoy them of admitting it. To do so, an opening communicating with the outer air may be made in the wall beneath the fire, which will then obtain its supply independently of the doors and windows, and without giving rise to any drafts. If the fire-place is on the ground floor, and there are cellars beneath, an opening may be made so that the supply of air may come from the basement.

Many chimneys fail in their action from not being sufficiently high, and the old expedient of putting on "tall-boys" (that is, long chimney pots) to increase the hight often effects a cure. But the most fruitful source of smoky chimneys arises from the chimney's opening being too large. The old shift, which is so often resorted to, of placing a newspaper in front of the opening to make the fire burn brighter, simply has the effect of reducing the size of the opening. The greater part of the air in this case passes through the fire, and, becoming heated, at once rises, carrying the smoke with it. When the opening of the fire-place is too large, the air does not become sufficiently heated to gain the necessary force, and the consequence is that the householders are bored with the most disagreeable of all the detestable results of bad building—a smoky chimney.

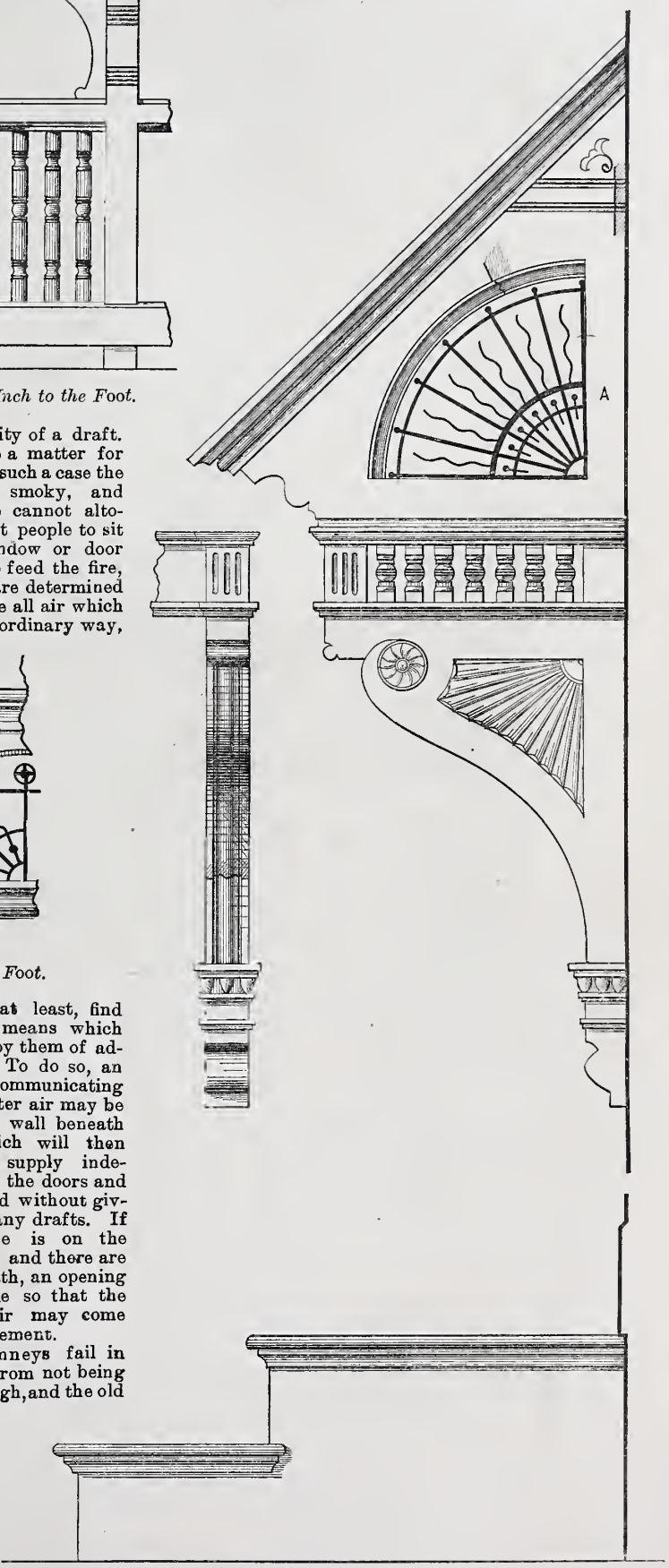
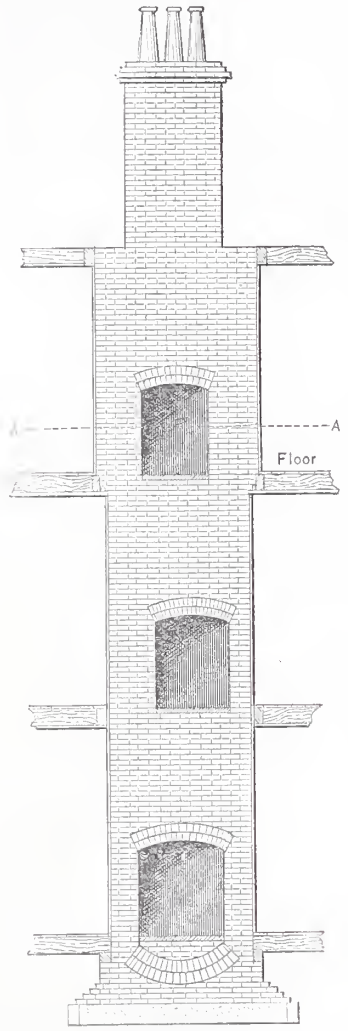


Fig. 14.—*Porch Hood with Wrought-Iron Grill at A.—Scale,* 1 *Inch to the Foot.*

Chimneys will sometimes smoke in consequence of a building or wall being near to the outlet, which gives rise to complex eddies and currents, causing a downward blow of air. In such cases it will be noticed that it is only when the wiud is in a certain quarter that the chimney smokes. This is on account of the wind on the outside striking against the obstructing wall or building, and, recoiling, giving rise to the downward draft. To cure a chimney in such a case, carry it up, if possible, beyond the obstacle; but if this cannot be done, a "cowl" will effect the object. A cowl is a kind of a valve, forming a cover for the chimney, with holes in the side by which the smoke can escape, constructed to revolve in such a manner that the outlets may always be presented in the opposite direction to that from which the wind is blowing.



Chimneys and Fire-Places.—Fig. 1.—*Elevation of a Chimney Stack.*

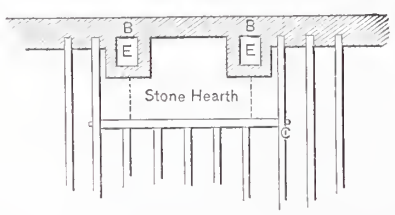
It will be seen, on referring to the illustration, that the fire-places on the different floors are built over one another, and that the flues are all brought together so as to form what is called, as before mentioned, a "stack." This process is both convenient and economical, as it tends to preserve an equal temperature in the flues. The width of the fire-place on the bottom floor need only be sufficient for the fire-place opening and the jambs on either side, but on the floors above it needs to be wider so as to contain the flues from the fire-places below. The extra widths are formed and are carried on corbels (that is, bricks laid overhanging in steps). The corbels are concealed between the floor and ceiling, and sometimes with the additional aid of the cornice. As it generally happens that the principal rooms which require the largest fire-places are in the lower part of the building, this corbelling out does not become sufficiently extensive to be inconvenient or unsafe. If, however, it should happen that the width of the fire-places have to be kept the same all the way up, and the stacks are of a great hight, the jambs on the lower floors must be wider to carry those above, or some other means must be taken to insure safety.

All chimney stacks should be built on footings and concrete in the same manner as a wall, and an inverted arch may be turned between the jambs below the fire-place to distribute the weight. The mouth of the flue should always be over the center of the fire, and the flue should be carried up as straight as may be consistent with the curves required to keep out the weather. They should always be taken up vertically for some little distance before commencing to bend, as otherwise the smoke is liable to strike the brickwork before it has attained any considerable force, and is driven back into the room. All curves, where necessary, should be well rounded off, sharp angles which afford lodges for the soot being carefully avoided. The rounding off is termed "gathering," and needs to be carefully done by a good workman, as no definite rules can be laid down for the position of the bricks in each case beyond those general ones already mentioned.

The size of the flues should be for most fires 9 by 14 inches, for small fire-places 9 by 9 inches and for large kitchen chimneys 14 by 14 inches. The last size is rarely, if ever, exceeded in ordinary dwelling-house chimneys. In deciding the direction of the flue, as to whether it should be turned to the left or the right, regard must be given to the point at which the greater part of the air is admitted into the apartment, and the flue should be turned in the direction which a current of air would take from this point of entry to the fire-place.

The flues are separated by partitions of brick, called "widths," which, being only 4½ inches or half a brick in thickness, need to be carefully set, without leaving any spaces through which the smoke might find its way from one flue into another. Each fire-place should have a separate flue to itself, and the whole should be carried up at least 2 or 3 feet above the hight of the roof. Sometimes the smoke from one flue will pass down the flue adjoining. This can generally be obviated by raising the one slightly above the other.

Over each fire-place a rough arch is turned on a "chimney bar" of iron, which is ½ to ¾ inch thick and about 3 inches wide, and rests with a bearing of about 4½ inches on each side. The ends are usually split, and turned up and down into the brickwork; but as this necessitates cutting the bricks, it is better to turn it in one direction only, either up or down, according to which is the more convenient for the mortar joint. The stack is contracted, when it reaches to top ceiling, to just a sufficient width to contain the flues with the half-brick widths, and is then carried up above the roof, terminating in a chimney-pot, or a cap of some kind, which is often ornamental. Tho interiors of the flues undergo a process termed "pargeting," which consists of a plastering with a mixture of cow-dung and mortar.



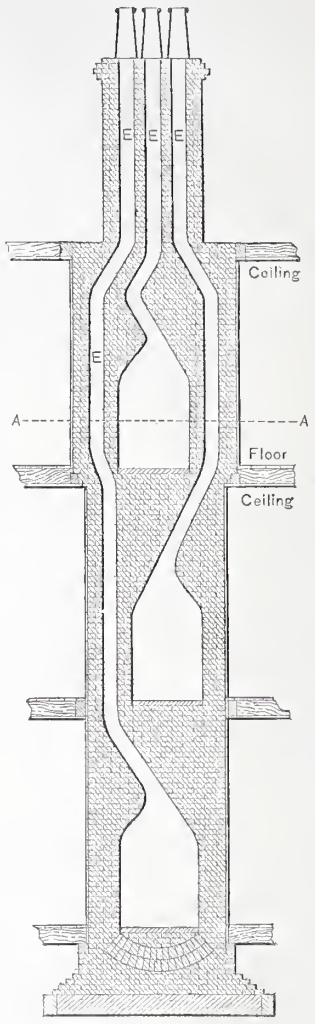
Chimneys and Fire-Places.—Fig. 2.—*Horizontal Section on Line A A.*

The object of this is to round off the gathering so that there may be no lodgments for soot.

Fig. 1 is an elevation of the stack; Fig. 2 a plan taken at the line A A; and Fig. 3 a sectional elevation, showing the flues.

The Fall Exhibitions.

A MACHINE which attracted great attention at the Institute Exhibition at Boston was the wood-turning lathe exhibited by Messrs. Lock & Wood. By it oval work can be turned or work with any numbar of angles and without the use of patterns or forms. The machine has the advantage of being quite simple in its parts and of a character to be readily understood and easily operated by mechanics of average ability. The wood to be cut is given two motions, one rotary and the other horizontal. In the horizontal motion the cutter is operated at the same rate of speed in all kinds of work. The number of motions to each revolution of the lathe corresponds to the number of angles imparted to the finished work. The speed of the rotary motion decreases as the number of angles increases. This much of a description will be sufficient to give our readers an idea of how the machine operates. Cutters can be made in an endless variety of designs, and by a simple arrangement of the machine one cutter is made to produce several different patterns. The angles produced are quite sharp, adapting the work for use in various places. Balusters, chair and table legs, buttons, ornaments for furniture, &c., are a few of the uses to which the machine may be put. The principles upon which the machine is constructed do not limit it to woodwork, but it may be adapted to work in brass, as well as other metals.



Chimneys and Fire-Places.—Fig. 3.—*Vertical Section Through Stack.*

OF LATE we have received a number of inquiries concerning portable buildings, either for use at the seashore in this country, for transportation to the Far West and South, or for export. While a number of companies at different times have been engaged in this industry, for the most part business has ceased in this line, from what cause we are unable to say. At the fall exhibition of the American Institute, New York, however, Mr. J. Milner Peck, of Flushing, Long Island, showed in a practical way what he was prepared to do in supplying the demand which we have noted above. A model of a portable house large enough to exhibit the method of construction, and the manner of marking the parts and setting up the building after it reaches its destination, was exhibited. We cannot indicate the leading features of construction without diagrams. The frame seemed to possess a sufficient degree of stability for general use,

and the parts were put together in such a way as to adapt them to use where only common labor is to be obtained.

At the Chicago Exposition, recently closed, a number of exhibits contained items of special interest to persons in the building line. Messrs. Benjamin, Fisher & Mallory, of Chicago, exhibited a number of woodworking machines, among which may be mentioned a double endless bed surfacer, an improved resawing machine, an improved siding machine, some exhaust fans and an automatic saw sharpener. Mr. W. B. Baker exhibited an improved crank wrench and bit brace, which had some features about it to commend it to the attention of mechanics generally. This tool may be used in several different ways. First, as a wrench, a clamp and a hand vise; then, by an attachment, it becomes a bit brace; with the use of a bench clamp it can be employed as a bench vise. Messrs. Durkee & Doe, of Chicago, exhibited a new chuck, the patent for which is pending. Other interesting features were shown which we have not space to enumerate.

In our last number we mentioned some practical tests of building materials made upon the large testing machine employed at the Watertown Arsenal. The managers of the Massachusetts Charitable Mechanic Asssociation Fair testified in a handsome manner to their appreciation of the practical value of the device. The testimonial is in the form of a medal of honor to the inventor, Mr. Albert H. Emery, civil engineer, of New York. The medal is a very elaborate piece of work. It consists of a shield of gold raised above a circle of white enamel, within which is a field of deep blue, with the words "Medal of Honor." Upon the circle is a laurel wreath of gold with raised arm, the special emblem of the association, between two laurel branches, while below, on a scroll of emerald green, are the words, "Be just, and fear not." The other inscriptions upon the circular band and the shield are the name of the association and the date of the award. The medal is said to have cost cost $500. Its principal value, however, is derived, not from the material or artistic design, but from the sources through which it was awarded. It was provided by the Fair Association, but was awarded by the American Academy of Arts and Sciences for that "exhibit most conducive to human welfare," which was the highest requirement that any exhibit could be called upon to sustain. The machine to which this award applies is a wonderful piece of ingenious mechanism, and has been in use for nearly three years in crushing and breaking large specimens with loads up to 800,000 pounds, the shock of which is received on a scale. It appears wholly uninjured, and still shows the strain on a single horsehair.

A very conspicuous exhibit at the fair of the Massachusetts Charitable Mechanic Association was a sheet-metal pavilion, located on the stage in the main hall, and erected by Messrs. S. D. Hicks & Son, the well-known coppersmiths and galvanized iron cornice manufacturers, of Boston. The building is an anomaly in architecture, but serves to illustrate the capabilities of sheet metal for purposes of construction and decoration. It is handsomely painted, which adds much to its attractiveness to the general visitor, but conceals many of those features which engineers and mechanics would delight in examining. Specimens of the iron framework which forms the skeleton of the structure are shown within the pavilion, as well as some of the corrugations which form conspicuous features of the design. Much ingenuity was displayed in the construction of this building in concealing joints, and in selecting those forms of joints best adapted to the places where they occur. In point of cost this exhibit of sheet-metal work is second only to some of the displays made at the Centennial Exhibition, while for the purpose in view it probably excels in appropriateness anything that has ever before been done. The utility of sheet-metal work for architectural purposes is too great to be ignored, and year by year its proper place among building materials is becoming better defined. Some of the more enthusiastic manufacturers of galvanized iron work, a few years since, were disposed to believe sheet metal a legitimate competitor with brick and stone in building construction, and hence whole fronts were covered with sheet iron in a way to bring contempt upon the industry, besides producing buildings which are eyesores to all who have any true artistic perceptions. Manufacturers have learned a lesson from these early endeavors, and of late confine their work to those parts of buildings to which sheet metal is well adapted. So radical has been the change in this respect that we regard the industry at the present time as upon a better basis and enjoying a greater degree of genuine prosperity than ever before.

At the Atlanta Exposition a passenger car built by the Jackson & Sharp Company, of Wilmington, Del., is exhibited, which in some of its features is of interest to our readers. As a specimen of fine workmanship in wood finish, it is unusually good. The interior of the car is entirely of mahogany; not a vestige of any other wood is to be seen. While mahogany is coming into general use, it is commonly employed for trimmings only, but in this case it is used entirely for the inside finish. The woodwork is handsomely carved and engraved, representing vines and flowers, and the decorations on the panels above the line of the windows are very chaste and attractive, combining a harmony of detail and an elegance of finish that shows to a decided advantage on all sides. The head-lining is most exquisitely done, and is in perfect keeping with the high order of the rest of the work. The car is fitted up in costly and luxurious style. The glass is all of the very best, and that of the doors and ventilators is handsomely engraved. It is lighted by three double-light chandeliers. The attractive basket racks are of a new design, and the seats are easy and comfortable. The upholstering is rich and elegant.

The Manufacturers' Mutual Insurance Co. exhibited, at the fair of the Massachusetts Charitable Mechanic Association, several working-sized models illustrating various features of the slow-burning construction recommended by this company. Instead of iron doors, which are commonly considered the best protection against fire between communicating apartments, this company advises wooden doors thoroughly protected by tin or sheet iron. The argument against iron doors is their liability to warp and give way in the time of need, while that in favor of wooden construction is that a wooden door will hold its place, filling the opening completely, and, being protected by the tin, will resist the fire sufficiently long for all practical purposes. Several doors were shown which had been taken from factories in which fires had occurred. They were placarded with the number of hours that they had resisted the flames. Portions of the tin covering were removed showing how the wood was charred beneath, and yet enough of its strength remained to keep the door in place and enable it to resist the attack of the flames. An automatic device for closing doors communicating between different apartments was also exhibited. The doors were hung upon an inclined track in such a manner that, if not held back by means of a catch, they would be driven forward by gravity and close the opening. By means of suitable cranks and connections, the catch holding back the door is released automatically as soon as the two pieces of metal, connected by an easily fusible solder, are parted. The effect of this is to close the doors instantly whenever the heat in a building from fire is sufficient to part the two pieces of metals named. The device is very simple, and from casual inspection would seem to be well adapted to the purposes for which it is intended.

One of the most unique structures erected within the limits of the fair of the Massachusetts Charitable Mechanic Association was that erected by Messrs. R. H. White & Co., a prominent dry goods house of Boston. It occupied a conspicuous position near the principal entrance to the building, and, in character of design as well as color effects, attracted marked attention. The designers were Messrs. Peabody & Stearns, the well-known Boston architects. The building may be described as a half-timber construction, with features identifying it with various styles of architecture. In some parts it might be likened to the Early English, while in others it would be connected with the French or Italian Renaissance. The structure was replete with pretty conceits, among which may be mentioned delicate stucco work in panels, belts and frieze. Some rough casts of panels in the upper part were plentifully besprinkled with bits of colored glass. The whole construction was sparkling and lively, and in connection with the goods within, constituted the most pretentious exhibit of the department in which it was placed.

NOTES AND COMMENTS.

In the November number we mentioned the burning of the Fourth avenue car stables, and the lessons which the city of New York had the opportunity of learning from that disaster. From the fact that a new building to take the place of the old one is being erected largely of wood and without any adequate provisions against fire, it would seem that so far as the corporation owning the building is concerned, the lessons have been of no avail whatever. The rapidity with which the old building succumbed to the flames was one of the striking features of that disastrous and memorable conflagration, and was justly attributed to the vast amount of woodwork used in its construction and the lack of proper precautions against the spread of the fire. The bricks had not cooled before the work of rebuilding was begun on the same site, and now that the new building has reached the second story, its skeleton form reveals the danger to which it is open should a fire again break out. The floor girders are of wood, and even the supporting columns holding up these beams are of the same material. The whole building presents a large and monotonous area of woodwork that can offer no resistance to the flames. The erection of this building is in defiance of the law which governs such matters in this city, but the Fire Commissioners seem powerless in the matter.

The Clark University, at Atlanta, Ga., has what is called an industrial department, in which there are several courses for technical instruction. Among these may be mentioned a School of Carpentry, in which lessons are given in drawing to scale, making plans and specifications, as well as in the use of tools. Each student is provided with a bench and the tools necessary. A School of Machinery is also maintained. The industrial progress of the South is something, at the present time, in which the nation at large is interested, and the effort that is thus being made in its educational institutes for conducting its business enterprises in the future is a commendable sign of its progress.

In the June number of *Carpentry and Building* we gave some particulars concerning the introduction of French flats and apartment houses in New York City, stating that the first house of this description was erected in 1869. A correspondent calls our attention to an error in date, and has kindly furnished us with information from which we are now able to lay before our readers the following: An apartment house at Nos. 256 and 258 West 37th street was built in the year 1852, and was the first French flat that was built in this city, if not in the United States. The name, "French flat," was not distinctively applied to this building. The apartments were known then and are still known as the "model houses." Mr. Richard K. Haight, a retired fur dealer, and a philanthropist who was endeavoring to solve the problem of cheap houses for the working classes, was the author of this venture. This gentleman had visited Paris and was struck with the idea of apartment houses, as there carried out, and after returning to New York began an experiment in a practical way. The house was built by

day work under the immediate supervision of Mr. Haight. The building was divided into suites of about three rooms, and were intended for what is called in this city light housekeeping for small families. The plumbing was set into a closet which ventilated through a shaft leading to the roof, thus embodying some of the ideas which engage the plumbers of the present day. The house is, at the present time, in good condition, thus vouching for the class of work employed and the materials used at the time it was built.

The direction of public taste in the matter of furniture and decoration is a subject which many designers and manufacturers are carefully considering. That it is away from the styles which have reigned supreme for a few years past all are prepared to admit, but authorities differ as to the direction in which fashion is tending. Eastlake is no longer popular. The so-called Queen Anne style is said to be dead and laid upon the shelf. What is to follow is a matter of some concern to those who cater to fashion. The public is capricious and will always be swayed by fashion. Fashion has decreed a change in household furnishings. What is it going to be? The *American Furniture Gazette* is of the opinion that the present direction of public taste is plainly toward French art. The public has tired of the straight lines, the sharp angles and the formal decoration derived from English models, and is turning again to the more graceful, if less serviceable, productions of the French. The change so far is manifested principally in ornamental details. The strong lines and solid, serviceable construction which have come to us from England are retained, but they are refined, and, to many tastes, rendered more pleasing by the graceful and flowing ornamental lines of which the French make such frequent use. From this the journal mentioned proceeds to describe some features which have already been introduced, and concludes by saying that the general tendency is in the direction of catholicity and more pleasing variety than has heretofore prevailed, rather than toward the adoption of any one school to the exclusion of all others.

Harmony in color is an expression very often heard. It is freely employed by art students and art critics, and conveys a meaning to the initiated which those on the outside very generally fail to understand. We have a dim perception that some combinations of color please the eye, while others give positive pain. Finally we come to understand that the former are what are known as color harmonies, but how to tell what constitutes a harmony or how to set about producing a harmony in color is something still beyond our reach. In the decorations of a room, and even in so commonplace a matter as painting the exterior of a house, we recognize that color harmonies are important considerations. When we set about obtaining them, however, upon our own ideas we find the task a difficult one. A little experimenting shows that we have no sure guide in such matters, except imitating what some master in the art has done before us. We therefore become the pupils of an artist. The question then arises, How does the artist know what contrasts will be pleasing? What is the secret of his ability to discriminate? This question is variously answered. It is said perhaps that the artist has a genius for color, or that he knows instinctively what is good without even so much as exercising his reflective powers. Such answers are hardly satisfactory, for they seem to imply that unless one is born knowing all about color he can never learn anything concerning it. It seems probable, however, if one is sufficiently endowed with the color sense to be pleased or distressed by color effects, that he possesses a faculty capable of cultivation. Hence, the conclusion is justifiable that some means exist for remedying our deficiencies and for adding to an insufficient knowledge of colors. We are at least warranted in looking for such a remedy. As the result, we find that the researches of modern science have come to the assistance of those who are not born artists. While it may still be impossible to express in mathematical terms all the laws of color, enough of the fundamental principles underlying color effects have been formulated to be of material assistance to all who feel the need of such help. Rules for color treatment are contained in various modern works on chromatics, so worded as to be readily understood, and which are in all respects adapted to the needs of students of decorative art who do not possess the happy instinct of color.

One of the largest brickyards along the Hudson River is situated near Kingston Point, Kingston. Eighteen million bricks were made at this yard during last season. It has a river frontage of 900 feet and is provided with kiln sheds 1100 feet in length. It has 8 pits and about 1000 feet of shafting. The machinery is of the most approved pattern. The clay bank is practically inexhaustable, and is brought near at hand from time to time by favoring land slides. One hundred and twenty men are employed and a proportionate number of horses. Nearly 3000 cords of wood constitute the average stock of that material kept on hand.

STRAY CHIPS.

A new county court house is proposed at Saginaw City, Michigan, to cost between $80,000 and $160,000.

Five hundred dwelling-houses have been erected in St. Joseph, Mo., this year. It is reported that houses to rent are still extremely scarce.

The Methodist Episcopal Church proposes to establish a university at Chattanooga, Tenn., conditioned that the city will provide the ground.

A number of architects in Chicago were busy, during the month of November, in drawing competition plans for the new Board of Trade Building.

A model country schoolhouse, quite artistic in appearance, has been built near Trenton, Ohio, at a cost of about $4000. The plans were prepared by S. Lappin, of New Philadelphia.

Valley City, Dak., is not behind other enterprising towns in the amount of building accomplished during the past season. The total value of new buildings erected is reported at $215,800.

Miss Margaret Hicks is said to be the first lady who has adopted the profession of architecture. She was graduated recently from the course of architecture at Cornell University.

New building enterprises of importance have ceased to be numerous in Chicago of late. During the first week in November only 78 permits were issued, the aggregate cost being $230,000.

In St. Paul, Minn., during the past season, 47 business rooms have been built. Several of the store buildings are five stories high, and the balance are four stories, with few exceptions.

P. Richardson, of Crete, Neb., has recently finished plans for a dwelling-house to be erected for William H. Mann, of that place. He has also completed the design for a public-school building to be erected at Chester, Neb.

At Hornellsville, N. Y., a 3-story brick block of stores, 57 x 83 feet in plan, is being erected at a cost of $10,000. John Cullen is the contractor and Elias Ayars the architect. Several other improvements are now in progress in the same place.

There is some talk of locating at St. Louis, Mo., extensive repair and construction works for the Wagner Sleeping and Palace Car Company. Mr. A. W. Soper, late manager of the Iron Mountain Railroad, has recently transferred his connection to the Wagner Company.

The St. Louis Gymnastic Society has selected a lot 112 x 150, at the southeast corner of Walnut and Eleventh streets, on which they propose to erect a new hall. The lease on their present quarters is soon to expire, and they think they can build more advantageously than to renew their lease on the terms offered.

At Greenville, Ohio, during the past season, a bank building on the corner of Broadway and the public square, costing $15,000, has been completed. Besides this, a business block and several fine residences have been built. Among the latter may be mentioned those of Mr. A. F. Knop, Judge D. L. Meeker and Mr. O. H. Smith.

The Central Lunatic Asylum at Anchorage, Ky., has been recently extended by the addition of a ward costing $17,000. The new building is two stories high, with a basement. This institution, as at present arranged, is considered one of the best in the country. Mr. M. S. Wilson, of Louisville, was the architect in charge.

The contract for the iron door and window frames and the iron wainscot for the new custom house at St. Louis, Mo., has been awarded to Messrs. Bartlett, Hayward & Co., of Baltimore, for $69,995. They have been much delayed in executing their work by the freight blockade on Eastern roads, which for a time interrupted the delivery of their material.

At Indianapolis, during the past season, business has been sufficiently brisk to keep mechanics generally employed. Wages, however, have ruled lower than in other cities of the West. Building operations for the most part have been confined to small dwellings. A steel rolling mill, costing some $60,000, and a large car shop have been the two principal enterprises completed.

The building season in Cincinnati, just closing, has been, in the main, a busy and profitable one, both to architects and contractors. The strikes of the early part of the season, and the general advance in building materials, no doubt kept back many improvements, but, on the whole, mechanics have had nothing to complain of. Work has been plenty and wages good.

A correspondent at Ann Arbor, Mich., sends us a diagram representing the new library building now in progress of erection for the State University. This improvement is under the charge of Messrs. Van Brunt & Howe, architects, of Boston, Mass. The contractor is James Appleyard. The building is expected to cost upward of $85,000, and is of brick, trimmed with stone.

The new Atlantic Flouring Mill at St. Louis, Mo., Mr. George Bain, president, is to be the largest flouring mill in the world. Heretofore Minneapolis has been noted for its enormous mills, one of which is said to produce 3500 barrels of flour daily. Mr. Bain proposes to surpass this by nearly 50 per cent. with his new Atlantic Mill. Its capacity will be 5000 barrels a day. The old Atlantic Mill was destroyed by lightning last summer.

The enterprising town of New Philadelphia, Ohio, has done its allotted share of building during the past season. A fine residence for Mr. William Wills has been built on a handsome elevation overlooking the Tuscarawas River. The plans were prepared by Mr. S. Lappin, architect, and the house cost about $8000. A hotel, 47 x 80 feet in size, three stories high, costing $15,000, has been built by E. Schmidt. Mr. Lappin was architect of this improvement also.

Mr. George Elwell, of Bloomsburg, Pa., has finished a fine three-story brick building on Main street, of that place, which is to be used for a book-binding and newspaper publishing establishment. William H. Carter, of Bloomsburg, prepared the plans, and Charles King was the builder Among the projected improvements in Bloomsburg is an addition to Dr. Turner's Sanitarium, the cost of which will be about $12,000. Mr. Carter is also the architect of these improvements.

The new building now in progress of erection for the Cornell University, at Ithaca, N. Y., is to be used as a laboratory for the Department of Chemistry and Phy-

sics. It will be built of Medina red sandstone, with gray Ohio sandstone trimming. In style of architecture it may be described as Romanistic. The length of the building is 136 feet, and the width 64 feet. The estimated cost is $60,000. Prof. Charles Babcock, of the University, is the architect. In the construction of this building, special attention is being given to the matter of heating and ventilation.

A VERY LARGE business block is projected in Minneapolis. Messrs. Keyes & Pardie are the architects. The building will include 15 stores, 12 of which will be four stories high, and three, five stories high. It will have a frontage of 630 feet on Nicollet avenue and Fifth and Sixth streets. The front is to be of Ohio stone. Three and one-half millions of bricks are estimated to be required for the back and fire walls and 600 perch of stone for the foundation. The building will be pushed as rapidly as the weather will permit, and it is expected that it will be ready for occupancy within one year from date.

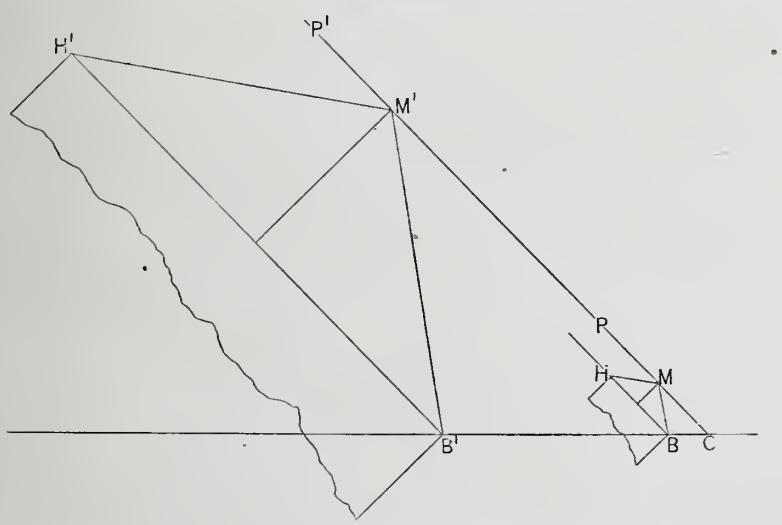
THE BUILDING TRADE at Mainstee, Mich., a town located in a lumbering and manufacturing district, received an impetus during the past season from the development of the salt industry. Several extensive salt works have been erected. A number of fine residences have also been put up, those of Mr. Lewis Sands and Mr. S. Babcock being among the number. A public hall has also been erected at a cost of about $40,000, by Mr. R. G. Peters. The contractors for this improvement were Messrs. Tellbridge, Long & Moble. A number of brick stores have been put up, and in all respects the season has been a prosperous one for mechanics.

THE BUILDING BOOM of the past season extended to the hyperborean region of Duluth. Among the enterprises put on foot may be mentioned an elevator, with a capacity of 1,000,000 bushels. A schoolhouse costing $24,500, not including the steam heating apparatus, has been built under the superintendence of J. A. Olds, the plans being prepared by L. S. Buffington, architect. The same architect prepared the plans for a $10,000 residence in the Queen Anne style, to be built for Col. C. H. Graves. Mr. J. A. Olds has prepared the plans and superintended the erection of several business blocks, and a residence for F. J. Olmstead.

BUILDING MATTERS have been remarkably brisk at Minneapolis, Minn., during the past season. A table has been prepared showing the number of storerooms which have been fitted up and the frontage which they occupy, from which we learn that over 100 rooms have been added for business purposes, occupying a frontage of over 2600 feet. The unusual rainfall of the past season in the region of Minneapolis has presented difficulties to contractors which have been beyond their previous experience. At last advices there was great danger, on account of the loss of time for the past month through a succession of rainy days, that a number of the prominent business offices would not be inclosed this fall.

AT THE TIME of President Garfield's confinement to the White House, various newspaper paragraphs appeared concerning the sanitary condition of that building as a place of residence. After the President's removal the building was thoroughly refitted under the charge of Col. Waring, one of the most prominent sanitary engineers of the country. New apparatus was put into the building, and at last it has been pronounced in a healthful condition for occupancy. In this connection it may be of interest to our readers to know that some of the sanitary appliances offered at the Myers Sanitary Depot, 94 Beekman street, this city, were employed. This is considered by the manufacturers an important testimonial concerning the favor in which their goods are held.

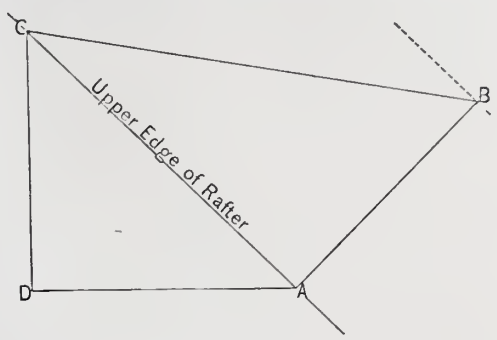
TWO OF THE MOST prominent buildings erected in Cincinnati during the present season were the new apartment houses belonging to the Anderson estate. One of these, called the "Ortiz," is located on the southeast corner of Fourth and Sycamore streets. The other, called the "Alta," is located on the southwest corner of the same streets. The former has a frontage of about 100 feet on Sycamore street and 140 feet on Fourth street, and is 7 stories in hight. The main entrance is in the center of the Fourth street front. Fire-proof stairways lead to the top of the house. A passenger and freight elevator are also provided. Unusual precautions against fire have been taken, besides which fire escapes have been provided. The first floor is occupied by stores and a restaurant for the tenants and public in general. The upper floors are occupied as apartments or flats. Five of these are situated on each floor and are so arranged that every room is well lighted and ventilated. Light and air are carried to the inner rooms by two central courts. Each flat is arranged for housekeeping if desired. Bathrooms and water-closets are ventilated in a thorough manner by means of several vent flues, in the bottom of which gas jets are kept burning, thus causing a constant upward draft. The interior finish of the rooms is in chestnut, executed in a plain and substantial style. The extreme top story is devoted to janitors' and servants' rooms. The exterior finish is Zanesville pressed brick, with Ohio freestone trimmings. Molded brick and fancy brick panels constitute the decorations. Although the lines of the plan are ncessarily straight and plain, the architect, Mr. Samuel Haneford, has succeeded in breaking up the front in a pleasing manner by means of orioles, &c., giving to the whole a picturesque appearance, and it is one of the marked architectural successes of the city. The companion building, above mentioned, at the time our information was obtained, was not sufficiently far advanced to admit of a detailed description. In its general features, however, it will resemble the "Ortiz," which we have here described.



W. B.'s Response.—Fig. 1.—Backing a Hip Rafter.—Illustrating the Extension of Lines.

CORRESPONDENCE.

We took occasion last month to call our readers' attention to the series of competitions which were announced in our advertising columns, and which are repeated in this issue. The scheme proposed is one to which considerable thought has been given, and has been devised in the hope of reaching something that will be popular and of practical service to our readers. We trust it will meet a hearty response.



W. B.'s Response.—Fig. 2.—The Cut for a Cripple Rafter.

Our correspondence department remains crowded, as usual. This is a very favorable sign and one that we consider quite encouraging; nevertheless, it has its disadvantages. The Editor is considerally embarrassed at times in making selections, and frequently is compelled to put aside some things in which our readers are specially interested, to make room for other features in the paper. A correspondent suggests that more pages be added in order to accommodate all the letters that reach us, and that an increase in the subscription price be made to meet the additional expense thus incurred. We are much obliged to him for the suggestion offered, but do not deem the course practicable at the present time. With the limited space at our command we shall continue to do the best we can at giving all a fair hearing. We shall always keep in mind that the general interests of our readers are of greater importance than the individual communications. We would not, by this assertion, deter any from writing to us whenever they are inclined, but, on the contrary, would encourage frequent letters in order that we may have a large variety from which to select, and that we may learn in what our readers are particularly interested.

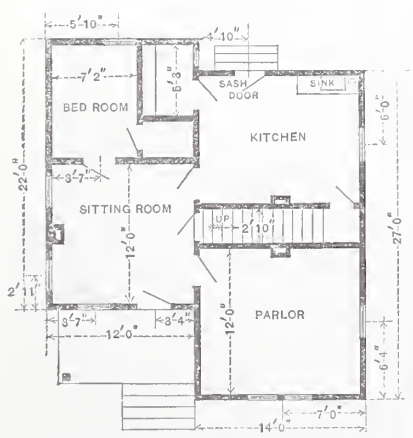
We commence in this number the publication of some of the letters which have reached us concerning our stair-building series. We have not space, however, to present enough to fairly indicate the discussion which has commenced.

Backing a Hip Rafter.

From W. B., *Springfield, Mass.*—I did not think I should have to take up the shingle again on the hip question, but as that correspondent who always excuses himself for being late calls on me to forego my noontime nap to clear up certain things, I will try to accommodate him. If our late friend is as much in the dark as he professes to be, the duller intellects among your readers must be in a deplorable condition of darkness. Though I enjoy my noontime nap, I cannot sleep after having been made acquainted with such a state of affairs. In the first place, your correspondent says he cannot see how W. B. arrived at the conclusion that he had asserted that backing a corner post could not be done as outlined in "Some Problems in Framing." As I am always ready to give reasons for my conclusions, I will make no exception in his case. If he will turn to his communication, page 38, current volume, second column, commencing at the last half of the twelfth line from the bottom, he will read, "Further, it cannot be obtained in the way there

described." If that is not an assertion that it cannot be done in that way, I would like to have him construct a sentence that would make the assertion more emphatic. I should wish to preserve it as a literary curiosity. He would probably be driven to the expedient of writing in large letters, in imitation of the individual who wrote a "loud" letter to his deaf grandmother. Secondly, he says with regard to putting roofs on without common rafters in them, "There is nothing funny about that." In this we are agreed. He ought to have known better than to have looked to the roof for the fun of the thing It only becomes funny when one attempts to follow the directions given in the letter before referred to, which, commencing with the last line of the column named, reads: "Set off the distance from B to C and B to A equal to the distance between B and the first common rafter each way"—and this in a roof in which there are no common rafters. Again, he says with reference to what W. B. meant by saying, "I simply meant to give the run and rise of the post," that it is not clear to him. I will do my best to bring this matter to his comprehension. The horizontal plane over which the hip rafter stands is called a run. The perpendicular hight to which it is raised is, in the language of the shop, by the craft generally called the rise. This is true of New York, as I happen to know, where your correspondent resides, as well as other sections of the country. If his reference to the common rafters was not to get this position, will he please state what it was for? Further, he says "W. B. makes a poor defense as to the short lines. The question is not the possibility, but the practicability." This is at least a strong insinuation, if not a positive assertion, that an extension of the lines for the purpose of setting a bevel is impracticable. I will now show him that it is not only possible, but eminently practicable to obtain the bevels in this way.

Cheap Frame House.—Fig. 1.—Front Elevation and Sections of House.—Designed by Elias Ayars, Hornellsville, N. Y., and Erected at a Cost of $700.—Scale, ⅛ Inch to the Foot. *(See description on next page.)*

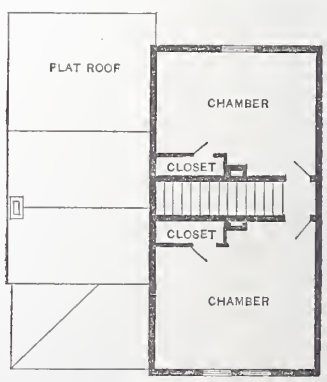


Cheap Frame House.—Fig. 2.—First Floor Plan.—Scale, 1-16 Inch to the Foot.

The statement made by me in a former letter, and which your correspondent probably had in mind when he wrote, was that a line carried up the side of the rafter from the face of the plate at its junction with the foot of the rafter, and parallel with the upper edge of the rafter, would show the amount necessary to be taken off in backing. If we construct a cross section of the rafter, using the lines already described, we will produce the angle required for setting the bevel. Now, it is evident that the same angle will be obtained by using any other distance in the horizontal line, provided the same distance in turn is employed upon the line drawn parallel with the edge of the rafter. This is illustrated in Fig. 1 of my sketches, which, in the small diagram at the right, is essentially the same as Fig. 2 of the cuts in my former letter. (See page 118 of last year's volume.) By this figure it is plain that the angle H' M' B' is the same as H M B.

Your correspondent may say that it was getting the cut of cripple rafters, instead of backing hip rafters, that he meant was impracticable. To anticipate this, I have prepared Fig. 2, in which E C represents the upper edge of the rafter and C D the plumb line. At any convenient distance on C A, square out to the line C E, thus obtaining the point A. Square across C E from A, a distance equal to D A, establishing the point B. Connect B and C; then the angle B C A will be the angle for setting the bevel in this diagram. D A and A B represent the thickness of the rafter, although the actual length of the lines employed may be several times that amount. In other words, they are simply representative lines rather than actual lines, but they are so placed with respect to each other as to produce the angles sought. The angles are unaffected by length of lines merely. Hence it is that lines of any convenient length may be employed for the purposes named, provided, always, that their relative positions are correctly maintained.

Your correspondent may ask the question how I would apply this principle to the diagram on page 177 of last year's volume, to which he has referred. In answer, I would say that the upper and lower edges of the hip rafter may be taken as the two parallel lines, P' B' and H' B' in Fig. 1. For a cripple rafter in the same diagram the distance between any two points may be taken as the representatives of the thickness of the rafter, as shown by Fig. 2. Your correspondent may object that it would require too much mental effort to have anticipated what has here been explained from the statement of principles contained in my former letter. To the man who has been in the habit of following the standards without asking the reasons, this may be true, but it should not be the case with mechanics who have a reason for the faith that is in them.

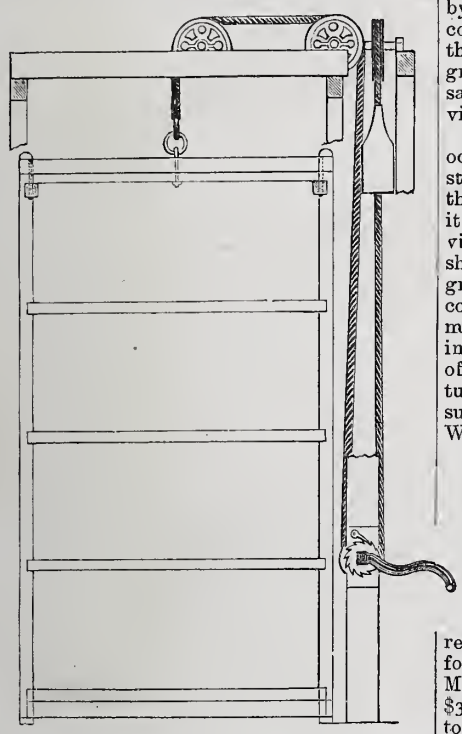


Cheap Frame House.—Fig. 3.—Second Story Plan.—Scale, 1 16 Inch to the Foot.

This whole controversy has confirmed me in the opinion, expressed in a former letter, that there are a great many different ways of placing lines for obtaining required results, and that every workman feels assured that his own plan is the best, what-

ever it may be. I do not claim that this plan is best under all circumstances, but it has its advantages, particularly in enabling the workman to make the lines and attain his bevels directly from the timber, without first making a drawing.

Again, he says, "As W. B. has never yet said anything about the bevels for cutting purlins against the hip rafter, I suppose it is reasonable to conclude that he never uses them." This conclusion, in my mind, is about as logical as the conclusion of the farmer who asked a civil engineer, who was surveying a railroad through his farm, to explain to him how he could run his lines, obtain his levels, &c., though a hill, not being able to see the other side. When the engineer had explained the way, the farmer said: "In them calculations you don't have to carry one for every ten, do you?" "Why, certainly," replied the engineer. "But I thought you didn't," said the other, "because you didn't say you did." Does



Dumb Waiter.—Fig. 1.—Elevation.—Scale, ½ Inch to the Foot.

your correspondent really think W. B. could not get the bevels for a purlin because he has not said so? If he thinks so I will give him a practical demonstration if I can. When he has a roof with purlins, if he will send the plans to me and the timber he wishes to use for the purlin, I will frame it and send it back to him. It is possible, as this is the first time he has referred to purlins, that your correspondent has just heard of them.

The rule published by Peter Nicholson, revised by Tredgold and endorsed by T. M., is in every way correct, as I know by actual experience of a number of years. While this arrangement of lines commends itself to one class of minds, another arrangement will be made clear to another class. The old Daball arithmetic of my youth was entirely correct, and I have heard many old persons say that it was the best book for the purpose that ever was published. More progressive minds in succeeding generations, however, have produced books upon the same subject, founded, of course, upon the same unchangeable principles, but differing in the manner of presenting them, which have completely supplanted the old book in the minds of the people.

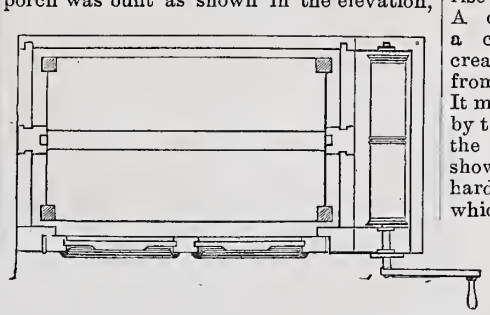
One class of minds prefers the old road that was scientifically laid out and which has the endorsement of generations of travelers, while another class prefers to head directly for the goal by cutting across lots, without regard to the old road.

I know that it is a standard thing when the absence of the grindstone has been explained by the assertion that the cow has eaten it, to set up a great chorus of "I told you so." It is so easy to see a thing after it has been pointed out, that the "I told you so" family is a very large one; but the chorus has not been as large as I expected. The echo, however, has repeated itself sufficiently to make up for the lack of original sound. I am acquainted with all of the arguments of those who believe in the cow theory, having read Mr. McKnowitalls standard work on the "Relation of Cows to Grindstones." On page 997 the author says that cows have evinced such a strong desire for grindstones that they have been known, in cases where these were not attainable, to eat common dairy salt. Further on, as opposing the argument that they could not have eaten the grindstones because they had no teeth on one of their jaws, he says this is a strong argument in favor of the theory. In former ages they ground their teeth off by eating grindstones, and this peculiarity has been transmitted to their offspring. This latter view is supported by Darwin, who advocates the development theory, and the former one by the dairyman's daughter, who, to test the correctness of the statement, gave one of the cows, which she knew had never eaten a grindstone, some salt. As the cow ate the salt, she too indorses the theory, being convinced by a practical demonstration.

I am willing to admit upon all ordinary occasions where the absence of the grindstone is noticed that the cow ate it, but there have been instances where I thought it better to set up the theory that an individual whose moral structure rested upon a shaky foundation had an ax to grind. I am greatly obliged for the attention of your correspondent T. M. for affording me so many opportunities for getting my initials into *Carpentry and Building*. I hope he is fond of oysters, and that I may have the opportunity of measuring my capacity for consuming them with him, all at the expense of W. B.

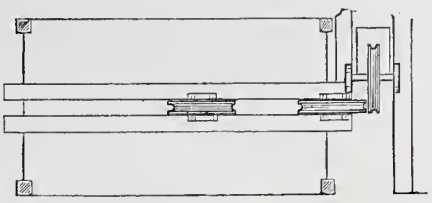
Cheap Frame House.

From ELIAS AYARS, *Hornellsville, N. Y.*—I inclose you the plans, elevation and section of a cheap dwelling-house, which has recently been built in this city. I consider the arrangement convenient, and presume it will be of interest to your readers. The house was contracted and built for $700, the following being a detail estimate: Masons' material and work, $208; lumber, $360; tinning, $60; carpenters' work, $72; total, $700. A general idea of the construction employed may be made from the following specification. The outside finish was done of first quality weather-boarding, 6 inches wide, and lapped 1 inch. A weather table of 6 inches and corner board of 4 inches were provided. The front windows were finished as shown in the elevation, and those in the other walls of the house were made plain, with a drip rabbeted above the frames. The porch was built as shown in the elevation,



Dumb Waiter.—Fig. 2.—Horizontal Section near Bottom.

and was ceiled overhead with matched lumber. The roof was covered with shingles laid on lath, 2 by 1¼ inches in size. The porch was covered with tin. The gutters on the main roof were formed in the roof and provided with suitable leader pipes. The roof over the bedroom was also covered with tin. Rosined paper was used on the outside under the weather boarding. The joists and studding of the building were placed 16 inches between centers. Double studs were used at the doors and windows. The flooring was of good quality, 1 inch thick and blind nailed. The kitchen pantry and bedroom were finished with 4-inch casings, plain, with square edge. The kitchen and pantry were wainscoted 3 feet high, and the former was provided with a sink. The sitting-room and parlor were furnished with a square face casing, 4½ inches wide, with a face molding 2 inches wide. Finish in the second story was plain; closets were provided with strips and hooks. The contract also included a cistern, to hold 12 barrels, made of pine, finished with iron hoops, and placed in the cellar. A pitcher-mouth pump connecting with it was placed in the sink. A driven



Dumb Waiter.—Fig. 3.—Horizontal Section at Top.

well, furnished with a pump, was also included. The outside kitchen door was made 1½ inches thick, with sash in the upper part. The doors of the other opening were four panels, finished with flush molding on both sides. The glass of the windows was first quality double thick American. In painting, the kitchen and pantry were grained in imitation of oak. The other rooms were finished with three-coat plain work. The outside finish was three-coat, the blinds being painted green. The masonwork, including stonework, chimneys and plastering, was done in a workmanlike manner and in keeping with the other parts.

Improved Dumb Waiter.

From J. B. SHANNON & SONS, *Philadelphia, Pa.*—The subject of dumb waiters has at different times been discussed in your columns, and as being of interest to your readers we desire to call attention to a construction of dumb waiter which has been found serviceable by many builders in this community, and the fixtures for which we keep for sale, ready for use. The following description of the apparatus we think will be sufficient for the purpose: A sliding cupboard is attached to one end of a rope, which is carried up and over a pulley, as shown in Fig. 1. Thence it is carried down and twice around a cylinder or windlass, then up again over a pulley, and is finally attached to a balance weight. The balance weight should be 10 per cent. heavier than the sliding cupboard. The rope passing around the cylinder, having the sliding cupboard attached at one end and the balance weight at the other, is caused to adhere to it, so that on turning the crank the cupboard will rise and the weight descend, or *vice versa*. A cylinder 4 inches in diameter and a crank 10 inches long give an increase in lifting power, by which a load from 50 to 75 pounds can be raised with ease. It may be held in place whenever required by the ratchet and pall shown at the back of the crank. The grooved guide posts, as shown in section, Fig. 2, require a piece of hard wood with a tongue to fit in the groove, which is to be screwed on at the top and bottom of the cupboard. By this plan of guiding a noiseless waiter can be put up, even though the sliding cupboard be much smaller than the openings through which it runs. Waiters of this description are suitable for use in dwellings, restaurants and hospitals. The control of its motion and the increase of power obtained by the use of the crank are its principal advantages over the ordinary balance waiter, and, as before remarked, make but little increased cost.

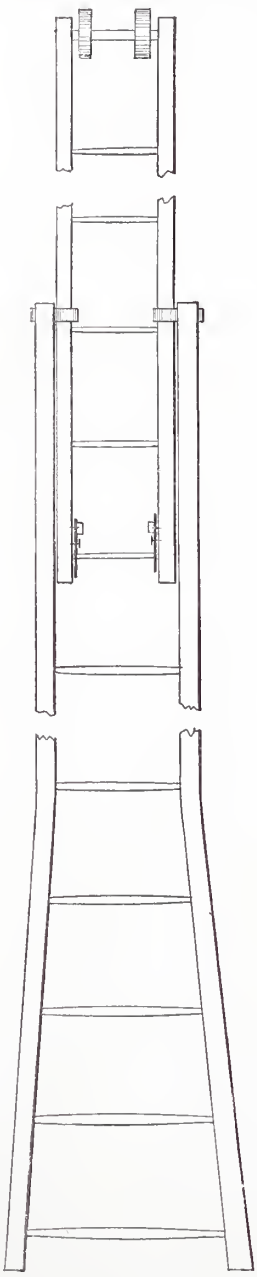
A Correction.

From C. R. P., *Pittston, Pa.*—In my description of the diagram illustrating hopper bevels, published in the November number of *Carpentry and Building*, a few words have been omitted which make the demonstration somewhat difficult to be understood. As printed, reading at about the middle of the second paragraph, it is as follows: "Then with B as a center, describe

the semicircle shown by the dotted lines from *b* to E." It should read as follows: "Then with B for a center, describe the arc shown by the dotted line A to E. Then with A for an axis, describe the arc shown by the dotted line from *b* to E." In another place it reads, "bevel joint of the fire-board." It should read, "bevel of the joint on the face of the board."

Construction of Ladders.

From J. B. T., *Fond du Lac, Wis.*—In a recent number of the paper a correspondent inquires concerning the construction of ladders. In response to his request, I send herewith drawing and details of an extension ladder, which may be of interest to him and others of your readers. In making the lower ladder, I have about five rounds of one length commencing at the top; the next lower I make ⅛ inch longer; tho following one ¼ inch longer, and the one after that ⅜ inch longer, increasing regularly ⅛ inch each round until the bottom is reached. This feature of construction serves as a brace in the ladder, and is no objection in

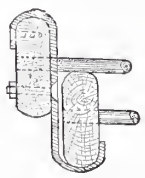


Construction of Ladders.—Fig. 1.—Elevation of Extension Ladder.

the use of the article, because enough straight part is provided at the top to keep the upper ladder in place. I place two rollers at the top as large as will go through the irons at center coupling. The dimensions for a 32-foot ladder I make as follows: The lower part, 3¾ x 1½-inch sides and 18 feet long; the rounds ¾ inch in diameter at ends, swelled to 1⅛ inches in diameter in centers, and the length 18 or 20 inches for the regular ones at the top. The top ladder should be narrow enough to go inside of the other, and at the lower ends the frame should be 3½ inches, and at the upper ends 2⅜ inches, being 1¼ inches thick throughout. Fig. 1 of the engravings shows a general elevation of the ladder constructed as I have described. Fig. 2 shows a section through the coupling at the center. Fig. 3 shows a detail indicating how the coupling hook is to be attached. These coupling hooks may be made of tough wood, but they cost so little made in iron that it is better to have them cast after a pattern is made.

Are the Stair Building Articles Practical?

From CARPENTER, *Indianapolis, Ind*—I have never seen anything published in *Carpentry and Building* from this place, and yet I know there are a large number of subscribers in this vicinity. I like the paper, and I am doing everything I can in the way of increasing its circulation. With all this said, I think that there are some things in it that ought not to be there; for example, "Practical Stair Building." If there is anythiug practical in the lessons so far given I fail to find it. In these articles I think there are too many lines used. In my practice I use only half the lines that the author of the papers in question is employing. What I call practical would be a few lines, and those so arranged that any ordinary man could understand them. What is the use of publishing things that are not practical? For my part, I hope in the future all foolish things will be rejected. I am not



Construction of Ladders.—Fig. 2.—Section Through Center Coupling.

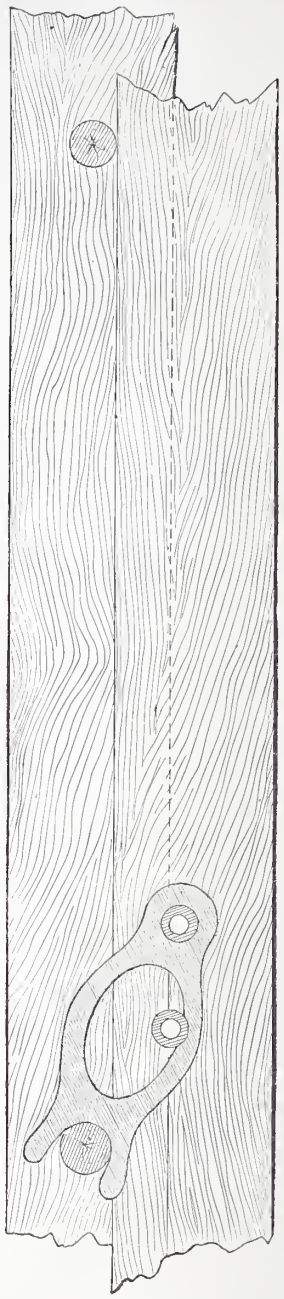
trying to tell the Editor how to conduct his paper. I like it well enough to do all I can to increase its circulation, but I hope that, if the author of the stairbuilding articles has many more practical lessons, he will keep them to himself.

The Present Position of Carpenters.

From A. A. F., *Cleveland, Ohio.*—I most heartily indorse every word your correspondent E. H. C. says in the November number of the paper. It seems to me he has hit the nail square on the head at every stroke. His remarks remind me of the story of the darkey who took the contract of sawing a cord of wood for 50 cents. He afterward sublet the job to another for 75 cents. When asked where his profits came in he replied that it was worth 25 cents to be boss. It seems that a great many carpenters are willing to pay something for being boss. A few weeks ago a building was to be let in this city. The bids generally ran at about $1900. One, however, was at $1200. The architect said that he had the low bidder bound by an article to build that house before he had time to gasp. He thought, however, he would gasp several times before he got through with it. What chance has a mechanic to get good wages on that house? The ill effect does not end there. The next man who wants to build will say "that house was built for so much; mine ought not to cost any more, as it is the same size." Accordingly the market is lowered. During the past season a very large proportion of carpenters have worked at wages ranging from $2 to $2.25 per day, while masons and plasterers have received $4. It is a shame that such a state of things should exist, yet the blame rests upon our own shoulders.

What killed the apprentice system as it existed 25 or 30 years ago? It was simply apprentices leaving their masters and taking work upon their own account, with an experience of only six months or a year. This went on until master builders would not take apprentices upon any considerations whatever.

I also agree with what Mr. Robert Riddel says with regard to what mechanics read. I have made some efforts among mechanics in the way of getting subscriptions for *Carpentry and Building* and in selling books, and I find that it is very hard to persuade workmen in general to pay out money for useful reading. Scarcely one mechanic in a hundred cares to pay anything for the sake



Construction of Ladders.—Fig. 3.—Detail of Coupling Hooks, about one-third full size.

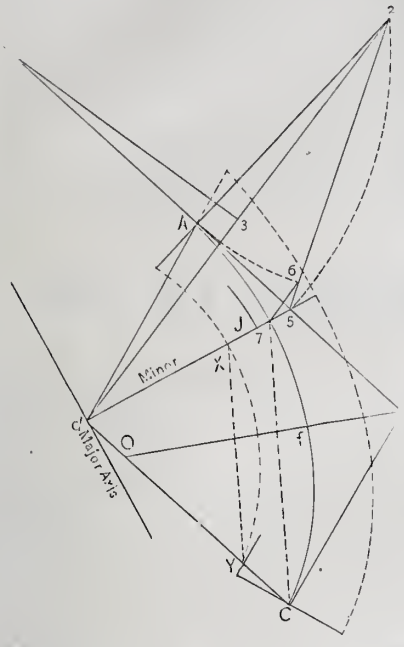
of learning drawing, an art which I claim is one of the most valuable acquisitions within the reach of mechanics. It is far better in many cases than the money it costs put out at interest even at 100 per cent.

Length of Rafters.

From D. M. W., *Caledonia, Mich.*—I wish to acknowledge, through the columns of *Carpentry and Building*, that I have been hasty in forwarding a rule for calculating the length of rafters. I am much obliged to the correspondents who have criticised it and have shown wherein it was in error. The rule was originally given to me when I was building a barn 40 feet wide. I attempted to prove it by the old rule of extracting the square root, using the dimensions I then employed, and found it was only 3-100 of an inch too short. I assumed that it would work in all cases. In this connection I may be excused for remarking that the rule of J. E. W., of Royalton, Wis., will not work in all cases either. It seems, however, that his rule is nearer correct in many cases than the one I presented.

Hand-Railing Problems.

From W. H. C., *Orillia, Ont.*—I desire to offer a friendly criticism on the stair-building article published in the September number of *Carpentry and Building*, so far as it relates to wreath-pieces which have a continuous rake over ground plans which are quarter ellipses. The statement is made that the case under this head is so nearly



Hand-Railing Problems.—Fig. 1.—Diagram Accompanying Letter from W. H. C.

identical with the quarter-circle case, previously discussed, that a demonstration is not necessary. So far as tangents and general construction are concerned, the cases are undoubtedly sufficiently similar to prevent misconception, but if the student takes in hand to put in the curves of the face mold by string or trammel, and is not familiar with cylindrical sections, he will be altogether at sea as to the position of axes and their limits. Now, as geometricians are aware, the minor axis of an ellipse resulting from the oblique section of a cylinder, is always equal to the diameter or right section of the cylinder. If the cylinder be vertical, the minor axis will be horizontal, so that it becomes a simple affair in determining the position of the minor axis in connection with hand-railing wreaths having circular plans, but when we come to compound plans, we at once part company with the simplicity connected with the cylindrical problems, except in two cases. One of these is when the seat of the cylindrical pitch is coincident with the minor axis of plan. The other is when the seat is coincident with the major axis. In the last case the minor axes of both plan and section are equal. In the first case, if the oblique cut equals the major axis of the plan, the curve will be a circle, and if the oblique section exceeds the major axis of the plan, the said major axis becomes the length of the axes and their limits. From this fact it has been found more expedient to find the curves by the use of ordinates. I present a diagram of the parallelogram connected with the case in question, the parts being drawn of the same size, and lettered to correspond with the diagram printed in connection with the article alluded to. The additional lines necessary, with the figures for determining minor axes, are also presented.

On *b* A square A 2, making it equal to *b* A, and connect *d* 2. Bisect *d* 2 in the point 3, and from this point draw 3 4 at right angles to *d* 2. Produce 3 4 until it intersects with *b* A, prolonged as shown at 4. From 4 as center, with 4 2 as radius, describe an arc intersecting *b* A in the point 5. Connect 5 and *d*, which is the direction of the minor axis. Make 2 6 equal to 2 A, and draw 6 7 parallel to *d* 2, cutting the minor axis in the point 7, which will be the limit of the axis. Now, *d* 7 is more than the minor axis on the plan to the extent of J 7; therefore the width of mold at 7 will not be normal, or, in other words, it will not be equal to the width of the rail. To get the width of the rail, connect *c* and 7, and draw Y X parallel to *c* 7. then 7 X is half of the width required. If B *o* in the plan is not vertical to the plan, the curve *b a* in the elevation will not be in position for a normal width of mold at *f*. In this example it will be found to lie parallel to *b o* nearer to *c*. As I have no need to intrude too much upon the valuable space of *Carpentry and Building*, I have omitted in the drawing to show how the limit of the major axis is obtained. It can be carried out by extending from 4 the line *b* 4 and from 4 as center, continue the arc 2 5 to cut the said extension, then join the intersection with 2. The major axis will pass through this intersection. The limit of the major axis is obtained by taking 2 as center, and cutting the line joining the intersection and 2; then a line drawn from said cutting parallel with *d* 2, intersecting the major axis, gives its limit.

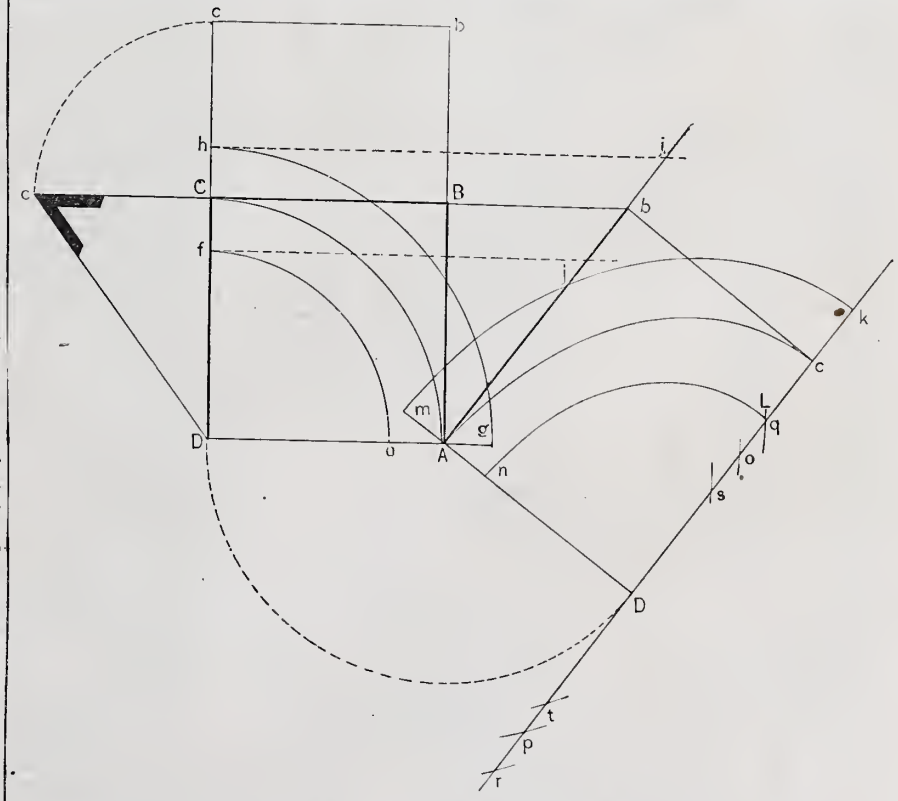
From R. H. H., *Picton, Ont.*—Correspondence and criticism have been invited on the stair-building articles. For some reason there appears to be very little forthcoming. Is it that the initiated are too jealous of their craft to care to enlighten the uninformed, while others are afraid to venture in the field, or is it that the subject is so perfectly expounded as to admit no amendment? Some one has said that "Fools rush in where angels fear to tread," so I will run the risk of exemplifying the truth of the quotation by offering my little criticism. The use of the same letter several times in one diagram is apt to mislead and puzzle beginners, and perhaps those who are not beginners. A few errors have crept into the text on this account. In the July number, the last column of page 125, and twentieth line from the bottom, it should read, "Draw *h* A equal to *h* A," not H A. The second line below this should be "A *o* equal to A *o*," not A O.

Many will find it difficult to draw the curved center line of wreath-pieces and the curved side of face patterns by eye, as the lessons direct, and accordingly I offer the accompanying modification of Fig. 1 in the number for May as an easy and correct method of accomplishing the desired result. Referring to the accompanying sketch, *e f* and *g h* are the inside and outside of rail on ground plan. Draw *h i* and *f j*, parallel to C B, cutting A *b*, produced in the points *i* and *j*. Then *j i* will be the width of the mold at the end C. Lay off *c k* and *c* L, equal to *b i* and *b j*. From D lay off D *m* and D *n*, equal to D *g* and D *o*, respectively. Then from *m*, with radius equal to D *k*, describe short arcs, cutting the line D *k*, produced, in the points *q* and *r*. From *n*, with radius equal to D *l*, describe arcs, cutting it in the points *s* and *t*. From A, with radius equal to D *c*, describe arcs, cutting it in the points o and *p*. Then the points *o*, *p*, *q*, *r*, *s* and *t* are the foci of the ellipses forming the center, outer and inner lines of the mold, respectively. Place pins in these points, and, with a string and pencil, describe the curves by the usual plan of drawing an ellipse, the method of drawing which has been described in former numbers of *Carpentry and Building*. To turn up the diagram, score upon the heavy lines. Fig. 5 of the article referred to can be modified in exactly the same manner.

Note.—Some of our readers may notice that this correspondent uses the same letter in different parts of his diagram. Whether he has done this inadvertently, or because the diagram he is oriticising made use of this plan, we do not know. The latter supposition, however, will not account for all the duplications. Since this question has been raised, we will say, in explanation of our course, that we have thought it better to have the same letter in different portions of the diagram represent the same part, than to have letters used arbitrarily upon no system. Those who have folded the diagrams, as has been suggested from time to time, have probably noticed that the several parts indicated by one letter have joined, thus showing their relationship.

Cellar Floor in Soft Ground.

From J. O., *Kingston, Ont.*—Would you or some of your readers be kind enough to give me some information that will help me out of a difficulty that I am in. My house is built on the bed of a creek. In consequence the cellar is wet and damp, and I may say unhealthy, on account of the soft, spongy surface of which it is composed. Now, I want to put a floor in it, or treat it in some way to make it useful, which it is not at present. The house being double, I tried a cement floor in one part, but it has only been in a few years, and is all sagged into holes from the under-current of water. In laying it, I



Hand-Railing Problems.—Fig. 2.—Diagram Accompanying Letter from R. H. H.

first put in large stones, then broken stone, and covered the whole with coal clinkers, on which I laid the cement in the usual way. In spite of this it has given out in the manner I have described. Can you suggest any plan to make a floor that will last? I also wish to build a cistern in the cellar, but as there is so much water running in, it would be impossible to get a foundation for one of stone. How would a wooden one answer if built on piles? In getting a foundation for the house I had to go 5 feet below the cellar bottom.

Answer.—The first suggestion that comes to mind is to use wood for the work our correspondent wishes to do. Pine, when placed under water and not allowed to get dry, is apparently as durable as stone. Piles driven to support a bridge across the Danube River 2000 years ago, were uncovered within 10 or 20 years, and the pine wood was sound and bright. From what our correspondent writes, we suppose the bottom of his cellar is constantly wet, so that wood bedded in the earth would never be dry. This being the case, he can lay pine scantling in the soil and a pine floor on top, making sure that there is no space between the bottom of the boards and the earth. This floor he can use for a foundation, and give it a good solid coating of coal tar. Upon this he can lay a concrete floor, which we think will last. The cistern may be framed of wood, and planked inside the frame. It can be made tight by bricking up with bricks laid in coal tar or in cement. The frame and plank will hold the cistern in place, and the brick will make it water tight. We should not use any iron if we could help it in parts where there would be any strain, for it would be likely to rust out. The pine will last, as we have said, if only kept wet and excluded from the air. The coating of coal tar on the floor should be carried well up on to the walls of the cellar, and the floor timbers might be anchored to the walls to prevent any considerable movement of the floor.

Another plan is applicable in this case. Level up the floor with sand, and bed pine or chestnut scantling in it level with the surface. Run a line of coal tar along the side and bed the first floor board in it and nail fast. Then run another line of pitch, and bed and nail the board. In this way each board will be bedded in pitch, and each of the seams filled with it. When the floor is done, it can be covered with pitch and gravel like a roof, or a plain coat of pitch may be given, and a cement floor laid above. Either of these floors will be tight, even though there should be some settlement. In either case the pitch will protect the wood as long as the house is likely to last.

Prices of Building Materials in New York, November 20, 1881.

Blinds.—OUTSIDE.

Per lineal, up to 2.10 wide....$ .... @ 0.24
Per lineal, up to 3.1 wide..... .... @ 0.26
Per lineal, up to 3.4 wide..... .... @ 0.28
Per lineal, paiut'd and trim'd 0.45 @ 0.55

INSIDE.

Per lineal, 4 folds, Pine..... .... @ .53
Per lineal, 4 folds, ash or chstuut..... .... @ .78
Per lin'l, 4 folds, cherry or butternut..... .... @ .96
Per liueal, 4 folds, bl'k wal't. .... @ 1.06

Bricks—(Afloat.)

Pale..... ₱ M. $4.25 @ 4.75
Jersey..... ..... " 0.50 @ 7 00
Long Island..... " 7 75 @ 8.00
Up-River..... " 7.25 @ 7.75
Havers'aw Bay, 2ds... " 7.75 @ 8.25
Havers'aw Bay, 1sts. . " 8 25 @ 8.50
Croton—Brown ..... " 11 00 @ ....
Croton—Dark..... ..... " 13 00 @ ....
Croton—Red..... . " 13.00 @ ....
Philadelphia Fronts .. " .... @ 29.00
Trenton " .. " .... @ 29.00
Baltimore.. .... " ... @ 39.00

Yard prices 50c. ₱ M higher, or, with delivery added, $1.50 per M for Hard, $2.00 for Crotons and $6.00 per M for front Brick.

FIRE BRICK. (yard prices).

Red Welsh.....$35 00 @ ....
Scotch..... 30.00 @ ....
Engli h..... ... ... 30.00 @ 32.00
Silica (English)..... 35.00 @ ....
Silica (Welsh)..... 50.00 @ ....
Stourbridge..... 50.00 @ ....
American, No. 1..... ..... @ 40.00
" " 2 .... @ 30.00

Afloat, 500 ₱ M less

Cement.—(Cargo rate.)

Rosendale, ₱ bbl..... $1.25 @ ....
Portland Saylor's Americau, ₱ bbl..... ..... 2.25 @ ....
Portland (imported) ₱ bbl.. 2.70 @ 3.00
Roman..... " .. 2.75 @ 3.00
Keene's coarse..... " .. 6.00 @ ....
Keene's fine..... " .. .... @ 10 50

Add 25 cts. to above rates for yard prices.

Doors.

RAISED PANELS, TWO SIDES.

2.0 x 6.0.....1¾ in. $1.04 ....
2.6 x 6.6..... 1¾ in. 1.38 ....
2.6 x 6.8..... 1¾ in. 1.44 ....
2.8 x 6 8..... 1¾ in. 1.50 ....
2.10 x 6.·0..... 1¾ in. 1.61 ....
3.0 x 7.0..... 1¾ in 1.86 ....

MOULDED.

Size.	1¼ in.	1½ in.	1¾. In
2.0 x 6.0.....	.....$1.79	....	....
2.6 x 6.6.....	... 2.03	2.59	....
2.6 x 6.8.....	2 07	2.62	....
2.6 x 6.10....	..... 2 11	2.68	....
2.6 x 7.0.....	..... 2 27	2.71	...
2.8 x 6 8.....	2.16	2.75	3.84
2.8 x 7 0.....	2.35	2.83	3.99
2.10 x 6 10.....	2.28	2.92	4.09
3.0 x 7.0.....	..... 2.54	3.09	4.37
2.6 x 7.6.....	2.47	3 c2	....
2.8 x 7.6	2 59	3.16	4.43
2.10 x 7 6.....	2.72	3 30	4.66
3.0 x 7.6.....	....	3 45	4.85
2.6 x 8 0.....	2.59	3.16	....
2.8 x 8.0.....	....	3.31	....
2.10 x 8.0.....	....	3.47	5 14
3 0 x 8.0.....	....	3.62	5.42

2nd quality 15 cts. less.

Drain and Sewer Pipe.

Discount 50 to 55 per cent. according to quality and size of order.

Pipe, per foot.	Bends & Elbows, Each.	Branches—Siug.	Branches—D'bl. & V.	Traps, Each.
2 in..$ .13	$ .40	$ .48	$ ...	$1.00
3 " .. .16	.50	.61	...	1.25
4 " .. .20	.65	.75	1.30	1.75
5 " .. .25	.85	.90	1.55	2.50
6 " .. .30	1.15	1.05	1.80	3.50
7 " .. .35	1.50	1.20	2.05	5.00
8 " .. .45	2.00	1.45	2.45	6.00
" .. .55	2.50	1.70	2.85	7.00
10 " .. .70	3.00	2.00	3.30	8.00
12 " .. .80	3.75	2.52	4.24	10.00
15 " .. 1.25	5.00	House Branches pr. lin. ft. 15x6 $1.75 18x6 2.50		Sewer Branches pr. lin. ft., 15 in. $2.25 18 " 3.00
" .. 1.60	7.50			

Longer than 1 ft., charged as pipe.

Glass.—(American.)

Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x15....	$8.25	$7 50	$7.00	$6.50
11x14—15x24 ...	9.25	8.50	8.00	7.25
16x24—20x28....	10.75	9.75	8.75	7.75
15x34—24x30 ...	12.25	10.75	9 00	8.50
26x28—24x36 ...	13.00	11.50	9.75	9.00
26x36—26x44...	14.50	13.25	10.75	9.50
26x46—30x50...	15.00	14.00	11.25	6.50
30x52—30x54....	16.00	14 50	12.00	....
30x56—34x56...	17.25	15.50	13.50	....
34x58—34x60....	18.25	17.25	15.00	....
36x60—40x60....	20.75	18.75	17.25	....

DOUBLE.

6x 8—10x15....$12.75	$11.75	$10.75	$10.00
11x14—15x24....	14.50	13.25	12.50	11.25
16x24—20x28....	17.25	15.75	14.00	....
15x34—24x30....	19.75	17.25	14.50	....
26x28—24x36....	21.00	18.50	15.75	...
26x36—26x44....	23.25	21 25	17.25	...
26x46—30x50....	24.00	22.50	18.00	...
30x52—30x54....	25.75	23.25	19.25	...
30x56—34x56....	27.75	25.00	21.75	...
34x58—34x60....	29.25	27.75	24.00	....
36x60—40x60....	33.25	30.00	27.75	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 60 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: Single, 60 & 20%; Double, 70%.

French

WINDOW, PICTURE AND CAR GLASS.
Prices current per box of 50 feet.

SINGLE.

Sizes.	1st.	2d.	3d.	4th.
6x 8—10x13	$6.50	$5.75	$5.50	$5.25
11x14—16x24....	7.25	6.75	6.25	6.00
18x22—20x30....	9.25	8 50	7.75	7.25
15x36—24x30....	10.25	9.25	8.25	....
26x28—24x36....	11.00	10.00	9.00	....
26x36—26x44....	11.75	10.75	9.50	....
26x46—30x50....	13.25	12.50	10.50	...
30x52—30x54....	14 00	13.00	11.25	....
30x56—34x56....	15.00	13 75	12 50	....
34x58—34x60....	15.50	15 00	13 25	..
36x60—40x60....	17.50	16.00	15.00	. ..

DOUBLE.

6x 8—10x15....	$8.25	$7.75	$7.50	$7.00
11x14—16x24....	10.00	9.25	8.75	8.25
18x22—20x30....	12.75	11 75	10 75	....
15x36—24x30....	14.25	13.00	11.25	....
26x28—24x36....	15 25	13.75	12.50	....
26x36—26x44....	16.25	14 75	13 00	....
26x46—30x50....	17.50	16 75	14.25	....
30x52—30x54....	18.50	17.25	14.75	....
30x56—34x56....	19.50	18.25	16 25	....
34x58x34x60....	20 50	19 50	18.00	....
36x60—40x60....	23 00	21 00	20.00	....

Sizes above—$10 per box extra for every five inches.

An additional 10 per cent. will be charged for all glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches' bracket.

Discounts: 50 & 5 %.

GREENHOUSE, SKYLIGHT AND FLOOR GLASS
Per square foot, net cash.

⅛ Fluted plate, case 10c; cut to size				16c.
3-16 Fluted plate	"	13c.	"	" 18c.
¼ Fluted plate	"	16c.	"	" 20c.
¼ Rough plate	"	16c.	"	" 20c.
⅜ Rough plate	"	21c.	"	" 27c.
½ Rough plate	"	28c.	"	" 33c.
¾ Rough plate	"	45c.	"	" 55c.
1 Rough plate	"	55c.	"	" 65c.

Hair.

Cattle.....₱ bushel, $15.00 @ ....
Goat..... " 18.00 @ ....

Lath.

Cargo rate..... ₱ M $2.00 @ ....

Lime.

Glen's Falls. cr Keenan's commou, cargo rate ₱ bbl..... @ 1.10
Glen's Falls, or Keenan's finishing Jointa..... 1.25 @....
Rockland. common..... 1.20 @....
Rockland. finishing..... 1.35 @....

Add 25c. to above figures for yard rates.

Lumber.—(Yard prices.)

Prices firm, with upward tendency.

Pine, very choice and ex.. dry. ₱ M. ft. thick.....$70.00 @ $75.00
Pine. clear..... 60.00 @ 65.00
Piue. selects..... 50.00 @ 55.00
Pine, pickings..... ... ... 40.00 @ 45.50
Pine. selected. box..... 22.00 @ 25.00
Pine. common box..... 18 00 @ 22.00
Pine. common box, 5½..... 16.00 @ 17.50
Pine 1¼x10. 13 ft., matched. each..... .42 @ .45
Pine, 1¼x10. 13 ft.. culis.... ... @ .30
Pine. 1x10, 12 ft., good matched. each..... .30 @ .32
Pine. 1x10. 13 ft., common. matched. each..... ..... .25 @ .28
Pine. 1x4½. clear. match'd, each..... .22 @ .24
Pine. 1x4½, merchantable, matched, each..... ... @ .18
Pine, 1¼x4½, cl'r, match'd, each..... .35 @ .38
Pine, 1¼x4½, merchantable. matched. each..... .30 @ .32
Spruce. 1x9, 13 ft., rough. . .20 @ .21
Spruce. 1x9, 13 ft. matched, each..... .23 @ .25
Spruce, 1¼x9, 13 ft., rough. .23 @ .25
Spruce. 1¼x9, 13 ft., matched, each..... ..... .28 30
Spruce. 2x9, 12 ft., rough.. .37 @ .39
Spruce, 2x9, 13 ft., match'd, each..... .43 @ .46
Spruce, 2x4, 13 ft.... ..... .15 @ .16
Spruce timber, flat, ₱ M ft 20.00 @ .....
Spruce timber, square, ₱ M ft..... ..... @ 22.50
Hemlock, 1x10, 13 ft., each. .16 @ .18
Hemlock, 2½x4, 13 ft.,each. .16 @ .17
Hemlock, 3x4, 13 ft., each.. .19 @ .20
Hemlock, 4x6, 12 ft., each.. .40 @ .44
Ash, good, ₱ M ft..... 45.00 @ 55.00
Oak..... ..... 45.00 @ 55.00
Oak, quartered . .. . 70.00 @ 90.00
Maple, commou..... 25.00 @ 35.00
Maple, good to 2 in..... 40.00 @ 45.00
Maple good thick..... 45.00 @ 55.00
Maple white..... 55.00 @ 65.00
Chestnut..... 40.00 @ 60.00
Bl'k walnut counters, ₱ ft. .18 @ .20
Black walnut, selected and seasoned, ₱ ft..... .12½ @ .15
Bl'k walnut, good to choice 105.00 @ 125.00
Black Walnut 2d..... 85.00 @ 95.00
Black walnut, 5/4..... 90.00 @ 100.00
Cherry, wide, ₱ M ft..... 100.00 @ 110.00
Cherry, ordinary..... 85.00 @ 95.00
Whitewood, or Poplar ⅝ in. 35.00 @ 40.00
Whitewood, or Poplar ⅝ panels..... 45.00 @ 60.00
Whitewood, or Poplar 1 to 1½ inch..... 45.00 @ 55.00
Whitewood or Poplar. 2 in. and upward..... 50.00 @ 55.00
Shingles, extra sawed pine, 18 in., ... 5.00 @ ....
Shingles, clear sawed pine, 18 in., 2 md..... 4.00 @ ....
Shingles, cypress, 7x24..... 15.00 @ 18.00
Shingles, cypress, 6x20..... 12.00 @ 14.00
Shingles, Cedar, 6x24, No. 1 — @ 22.00
Shingles, Cedar, 6x14, A's.. — @ 16.00
Shingles, Cedar, 6x20, No. 1 — @ 12.50
Shingles, Cedar, 6x20, A's.. — @ 10.00
Shingles. Cedar Easteru. — @ 3.50
Shingles, Hemlock..... — @ 3.75
Shingles, Pine..... ..... 4.00 @ 5.00
Shingles, Spruce..... — @ 3.50
Shingles, Redwood (California), ordinary, per bunch. — @ .85
Shingles Redwood (California) 6x16 cut,.... ..... — @ 1.85
Yellow pine dressed flooring, wide, ₱ M ft..... 37.00 @ 40.00
Narrow ditto..... 40.00 @ 45.00
Yellow pine timber..... 35.00 @ 50.00
Locust posts, 8 ft., ₱ in.... .18 @ .20
Locust posts, 10 ft.,..... .24 @ .25
Locust posts, 12 ft..... .25 @ .30
Chestnut posts, ₱ ft... .... .03 @ .3½
Mahogany, ¼ in. ₱ ft..... .05 @ .07
Mahogany, ⅜ in. ₱ ft..... .10 @ .12
Mahogany, ½ in. ₱ ft..... .10 @ .16
Mahogany, ⅝ in. ₱ ft..... .12 @ .16
Mahogany, ¾ in. ₱ ft..... 14 @ .16
Mahogauy 1 in. ₱ ft..... .18 @ .22
Rosewood, ¼ in. ₱ ft..... .11 @ .15
Rosewood, ¼ in. ₱ ft..... .16 @ .20
Rosewood, ⅜ in. ₱ ft..... .24 @ .28
Rosewood, ½ in. ₱ ft..... .40 @ .45
Rosewood, 1 in. ₱ ft..... .60 @ .75
Satiu wood, ½ in. ₱ ft..... .30 @ .40
Satin wood, 1 in. ₱ ft..... .40 @ .55
White holley ¼-inch..... .10 @ .12
White holley ⅜-inch..... .15 @ .18
Cedar (Cubau and Mexican) ₱ ft..... .10 @ .14
Cedar (Florida) Less than 1 inch..... .16 @ .24
1 inch and over ..... .25 @ .30
Redwood (California)..... 1 to 2 in., dry, per M ..... @ 60.00
3 in. aud over, per M ..... @ 60.00

Moldings.

50c. to 60c. per inch per 100 feet, according to quality.

Paper.

Rope, waterproof building, ₱ lb. 16c @ 17c
Rosin Sized Sheating, ₱ lb. 4c @ 5c
Dry Sheating ₱ lb..... 3c @ 3½c
Tarred Felt. ₱ lb..... .... @ 3c

Plaster.

Calcined City.....Millrate..$1 25 @ ....

Sash.

GLAZED.

Dimensions of windows.	12 Lights. 1¼pl.	1½c.	8 L's. 1½c.	4 Lights. 1¼c.	1½c.
2.1x3.6.....	$1.04	1.10	....	....	....
2.4x4.10....	1.13	1.21	....	1.32	....
2.7x4.6.....	1.36	1.44	....	1.67	1.77
2.7x4.10....	1.52	1.58	....	1.75	1.86
2.7x5.2.....	....	1.96	....	2.03	2.15
2.7x5.6.....	....	....	2.13	2.22	2.35
2.7x5.10....	....	....	....	2.23	2.32	2.49
2.10x4.6....	1.52	1.63	1.73	....	....	....
2.10x5.2....	1.72	1.82	1.97	2.19	2.24	2.39
2.10x5.6....	1.83	1.93	2.12	2.33	2.36	2.52
2.10x5.10...	2.14	2.26	2.45	2.40	....	2.73

c. means counted checked—plowed and bored for weights.

Hot bed sash, glazed.....$2.42

HEAD LIGHT.
Two or three Lights, Glazed.

Size.	1¼	1½	Size.	1¼	1½
2.6x1.0 ..	46	54	2.10x1.0..	54	62
2.6x1.6...	58	62	2.10x1.6..	69	75
2.8x1.0...	54	58	3.0x1.0...	58	69
2.8x1.6...	62	69	3.0x1.6...	76	85

Slate.

By car load, delivered in New York.

Purple roofing slate, ₱ sq're. $5.50 @ $6.00
Green slate..... 6.00 @ 6.50
Red slate..... 11 00 @ ....
Black slate, Pennsylvania... 4.50 @ 5.00
Tiles, 1¼ in. rubbed, ₱ sq. ft. @ .30
₱ sup. ft.
Steps and platforms, 1½ in. thick; Risers, 1 inch thick, prices uominal....
" " 2 " .....
Red tile and borders.....
Coping, 1½ " .....
" 2 " .....
Lineal ft.
Wiudow sills, 4x7.....
" 3x7..... .....
Window caps, 4x10, plain.....
" 4x8, " .....
" 3x10, " .....
" 3x8, " .....

Stair Material.

BALUSTERS.

	1½ in.	1¾ in.	2 in.	2½ in
Black Walnut.				
Fancy Turned	9c	12c	14c	20c
Neck Turned.....	10c	13c	15c	21c
Fluted or Octagon	15c	18c	20c	25c

OCTAGON PANELLED NEWELS.

Panels Veneered with French Walnut.
8-inch Newels, with Cap..... $8 30
9 " " " 9.20
10 " " " 9.75

SOLID NEWELS, WITH CAPS.

	5 in.	6 in.	7 in.	8 in.
Black Walnut.				
Fancy Turned....	$2.20	$2 80	$3.75	$5 00
Octagon.....	2.60	3.20	4.15	5.40

STAIR RAIL.

Worked out and finished ready to put up. Easemeuts and cylinders counted double. Price per foot Newels and Balusters not included).

	3 in.	3½ in.	4 in.	4½ in
Black Walnut.				
Molded.....	44c	48½c	55c	61c
Toad Back..... ...		58c	63c	72c

STAIR RAIL, UNFINISHED.
Price per foot.

	3 in.	3½ in.	4 in.	4½ in
Black Walnut.				
Molded.....	12½c	15c	17½c	20c
Toad Back..... ...		10c	13½c	21c

Stone.

Cargo rates. delivered at New York.

Amherst Blue.....$1.00
Amherst freestone, in rough, ₱ C ft...1.00
Bay of Fundy, Wood Point, brown..... 0.80 @ 1.00
Bay of Fundy, Mary's Point, brown..... ... .$0.80 @ 1.00
Bay of F'dy, Mary's Pt., olive. 0.80 @ 1.00
Berlin Blue..... .... @ 1.00
Berlin freestone. in rough... .... @ 1.00
Berea freestone, in rough ... 0.85 @ .90
Browu stone, Portland, Ct... 1.25 @ 1.50
Brown stone, Belleville, N. J. 1.00 @ 1.50
Corsehill (Scotch) Red Sandstone..... @ 1.00
Granite rough..... .50 @ 1.00
Dorchester, N. B., stone, rough.....₱ foot. .... @ 1.00

BLUE STONE

Rubbed hearth, 10 ft. or under..... 25c
Rubbed hearth, 20 ft. or under..... 35c
Rubbed hearth, 30 ft. or under..... 45c
Rubbed hearth, 40 ft. or under..... 50c
Rubbed sills..... 30c
Sawed & Planed..... 40c
Sills and lintels..... .... @ 18c
Sills and lintels, fine quarry cut sills..... .... @ 35c
Coping, 11 to 18 in. wide..... 20c @ 24c
Coping, 20 to 28 in. wide..... 38c @ 6 c
Coping, 30 to 36 in. wide..... 65c @ 80c
Steps, 8 in.... .... @ 60c
Steps, 7 in..... .... @ 55c
Steps, 6 in..... .... @ 35c
Steps, door. per in. wide..... .... @ 3c
Platforms, promiscuous, 4 in... .... @ 32c
Wyoming Valley, promiscuous, per cubic ft..... 1 30 @ 1.35

Vault Lights.—Nominal.

Platform, sq ft..... ....$3.50
Step and risers, sq. ft..... 3.50
Floor light, sq. ft..... 2.50
Roof light, sq. ft..... 2.50
Platform, 2d quality, sq. ft..... 2.00

COVERS.

Diameter.	Round.	Hexagon.
14 inch.....	$3.00.....	$0.00
16 "	3.75.....	4.00
18 "	5.50.....	6.00
20 "	8.00.....	8.50
24 "	14.00.....	15.00
26 "	16.00.....	17.00
30 "	3.50.....	25.00
63 "	1.00.....	33.00