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# CARPENTRY AND BUILDING.

## VOL. XI.—1889.

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# INDEX.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



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## NOTES AND COMMENTS.

THE PRESENT NUMBER commences A new volume of *Carpentry and Building*. Ten years of its history are rolled into the past, and it now enters upon its second decade. Its success from the beginning has been unexampled among architectural and building papers, and the reason for this is quite apparent. It has ever striven to be serviceable to those who are anxious to secure the best ideas in building and who need assistance in the various parts of house construction. With success thus established, its policy for the future will be the same as it has been in the past, but with greater resources and larger experience we hope to make the paper still more serviceable. In this number it will be noticed that we have given special prominence to our Correspondence Department. The large variety of subjects presented in that portion of the paper, ranging from house designs to mathematical problems, and from the discussion of topics of special interest to the apprentice boy up to those which command the attention of the experienced mechanic, reveals the mental grasp of the readers of this journal and the wide range of their observations. The development of our Correspondence Department has been a marked feature of the paper, and the character of the matter which we are now publishing, compared with that which appeared in our columns in the early years of the enterprise, is a measure of the growth of the paper and also of the general advancement of its readers.

THERE ARE MANY mechanics among our readers, including men in middle life as well as those who are younger, who would be glad of the opportunity to attend a school in which is taught drawing and other branches of direct application to their business. The fact that they have passed the age which is usually devoted to school would make no difference in their desire to increase their store of knowledge and acquire technical skill, if only the chance to go to school was presented. The reason they have not gone to such a school in the past, or are not attending it at present, is that such schools, save in rare cases, do not exist. With all our boasted educational advantages it is seldom that the mechanic can find anything among them that is of direct advantage to him beyond the rudiments. Mathematics are taught in a way to give the theory, but nothing more. The average teacher of geometry, and we might safely include many authors of text-books in the charge, has no more idea of the application of principles he explains to roof framing, for example, than a saw-horse has of racing. With all that our common school system affords, our young men are poorly equipped for their trades, and many a regret is expressed by ambitious and enterprising persons that they could not secure in their schooling a better foundation for their practical work. Gradually this want is assuming definite shape, and in some cases we hear of those whose interests are most affected taking measures to bring about a change.

AN INSTANCE in point is the action of 30 carpenters in the city of Yonkers, N. Y. These carpenters petitioned the Board of Education of that city to afford them facilities for studying drawing during a portion of the winter evenings. The result of their effort should be an encouragement to other mechanics similarly situated. Their petition was promptly granted, and a teacher was appointed a short time since. Accommodations for the class were found in the High School Building, and the members of it are now at work with every indication of the very best results. The men who took the initiative in this movement set a good example for their fellows, and the school board that granted the petition also did a work which other boards might emulate to the advantage of the several communities to which they belong.

THE OLD-TIME readers of *Carpentry and Building* have not forgotten the series of competitions in house plans announced in November, 1881. The first competition was for floor plans of an eight-room house. From upward of 200 sets of plans submitted ten were published and voted upon by our readers, the prizes being awarded according to the popular ballot. The first prize set of plans was next made the basis of a competition, advertised in the spring of 1882, in elevations and details. The first prize elevations and details from the second competition was then made the subject of a third contest for specifications for material, workmanship and construction. The final competition in the series was for a detailed estimate of cost of building the eight-room house according to the first-prize floor plans, first-prize elevations and first-prize specifications. Our readers were thus provided with a full working description of an eight-room dwelling-house, the joint production of Henry S. Jaffrey, Chicago (floor plans), Edward S. Hammatt, Albany (elevation, perspective and details), B. C. Pond, Boston (specifications, and J. D. Sibley, Middletown, Conn. (estimate.)

THESE COMPETITIONS proved such a notable success that we have decided to continue the series, extending it to the question of heating the building. For this purpose, however, the work has been transferred from this journal to the columns of *The Metal Worker*, which, as many of our readers know, is issued from the same office. This paper which, by the way, is a weekly, published at $2 a year, is devoted to subjects which make this portion of the enterprise more appropriate for its columns. Its special topics are Heating and Ventilation, Roofing, Plumbing, Cornice Work, Tinwork, &c. In the issue of *The Metal Worker* for December 8 the announcement was made that three sets of prizes would be awarded for plans and descriptions of the best systems of heating the house above described by hot-air, furnace, steam and hot-water circulation. A special supplement was sent out with that issue, containing the floor plans and elevations of the house on a scale of half inch to the foot. To further facilitate the work of the contestants arrangements were made to send to applicants separate sets of plans printed on paper appropriate for the purpose, on which the pipe lines, &c., could be drawn in. At the close of the heating competition the first-prize plans, together with others, will be published in *The Metal Worker*, and the builder of this ideal house will then have an opportunity of choosing from the best heating plans of three systems. The unity in this series of competitions is its distinguishing feature. There has been a competition at each step in the construction of the house, and now after the house has been fully planned we proceed to gather opinions on the best means of heating it.

ON THE 21st of November the fifth annual convention of the Western Association of Architects assembled at Chicago. The convention was particularly notable because of the action that was taken with regard to consolidating the two architectural organizations of this country into one body. The American Institute architects were the first to favor the consolidation, and appointed a committee to forward the scheme. The proposition was heartily approved at the meeting of the Western Association, and they appointed a similar committee to confer with the eastern one and draw up a definite plan of joint organization. There is little doubt but that the scheme will reach a successful issue, a strong indication that may bring the action at the late convention regarding the employment of a clerk-of-works on important buildings and the formation of State defensive leagues, both of which questions were referred to the Consolidation Committee. No lengthy argument is needed to show the advantage of having one representative society of architects for the whole country. The only real opposition, if there be any at all, must arise from sectional jealousy or similar motives of narrow prejudice, but even this opposition is only conjectured, and in reality there appears to be a singular unanimity of sentiment in favor of the plan.

THE GROWTH of national organizations during the past few years has been quite remarkable, and in every instance the enlargement, and, if we may so term it, the nationalization, of trade associations has equally increased their strength and usefulness. The trades and professions interested in the building industry have made rapid progress in this direction. The National Association of Builders is in charge of energetic officers, who are doing everything in their power to build up its membership, and at the same time inaugurate and carry out reforms. The National Association of Master Plumbers is also a growing body, and it is safe to hope that in time they will do much to raise the standard of their trade, even though their efforts heretofore have not been such that the public could thoroughly appreciate. The architects of the country also through joint efforts can accomplish much that would be utterly impossible if attempted by individuals. The question above referred to, for instance, of the employment of clerk-of-works is one that can only be effectively acted upon by a large and influential association. That such an overseer is necessary, or at any rate desirable, where large and important buildings are being constructed, will not be questioned by those who are familiar with English building customs, and it would be often advantageous for us to borrow well-tried ideas from the older countries. But even though the employment of clerk-of-works be generally approved, it would be extremely difficult to introduce the practice, except through the medium of a national organization. It will be acknowledged that a consolidation of the two associations would strengthen their influence, and influence and membership are so closely connected that neither can be increased without similarly increasing the other. When the plan of union is perfected it will be submitted to both societies, the ballot to be taken by letter, and, if ratified by a two-thirds vote, the associations will consolidate under the name of the American Institute of Architects.

SECRETARY WM. H. SAYWARD, of the National Association of Builders, directs our attention to the effort that is being made to secure a more complete affiliation of builders throughout the country in the National Association. The organization, though established but a comparatively short time, already includes 24 of the largest cities, but it is their desire to add to this number all the cities in the country, so that the association may be thoroughty representative and the better fitted to accomplish the work it has undertaken. With this end in view a circular has been addressed to all the prominent builders in cities not represented in the association, inviting them to take part in the convention which is to be held in Philadelphia on the second Tuesday of February next. Wherever there are local exchanges or associations of builders in existence, it is preferred that they appoint a representation, but if this is not done an urgent request is made of any builders interested to send representatives. By way of impressing the need of a full attendance at the coming convention, the circular points out that there are many reforms of vital importance to all builders which can only be accomplished by concerted action, and unless an organization be thoroughly representative in its character it cannot hope to secure its objects satisfactorily. Already the National Association of Builders have been the means of establishing the "uniform contract" which was adopted by joint committee of them and the two National Associations of Architects, and is now in process of introduction throughout the country. They have also taken steps to reorganize the apprenticeship system, as well as frame rules and conditions for estimating work. Other matters now under consideration are the lien law, permanent arbitration with employees, uniformity of measurements and uniform size of brick. At the Philadelphia convention several other questions of general interest to builders will be brought up for consideration. We have thus fully referred to the past and prospective work of the National Association of Builders, for we believe that such a record is the strongest possible argument that can be presented in favor of the organization. We wish the association every success in the future, and can heartily second Mr. Sayward's appeal for a large gathering at Philadelphia next February.

NO DOUBT many of our readers would be very glad to secure a *souvenir* of *Carpentry and Building*, and for this reason we mention in this connection a miniature *fac-simile* of the October number of last year, which was prepared for advertising purposes, but which has proven to be such a gem as to be in large request as a keepsake or curiosity by those to whose attention it has been called. The little book measures 5 x 3¼ inches, and is a perfect reproduction, line for line, page for page, cover included, of the issue above mentioned. It is legible, and a person with ordinary eyesight can read every word that is presented. At the same time, many parts of it appear almost microscopic in size. Those of our readers who desire to secure this miniature, which, by the way, is regarded by experts as the finest thing of its kind ever produced, can obtain copies by remitting 10 cents each, in postage stamps. We will supply three copies to one address for 25 cents.

WE TRUST that none of our readers will forget that our Building Association Competitions are still open. Full particulars can be found in the advertising pages of the issue for December. The contest closes January 31st. For the benefit of those who have not seen the December number, we mention that the subjects are designs for $1000 and $2000 frame dwellings, specially adapted to the needs of those who build with the assistance of building and loan associations. Two prizes are offered in each—namely, $100 and $75 respectively. The prize designs and some of the other studies will be published in this journal during the current year.

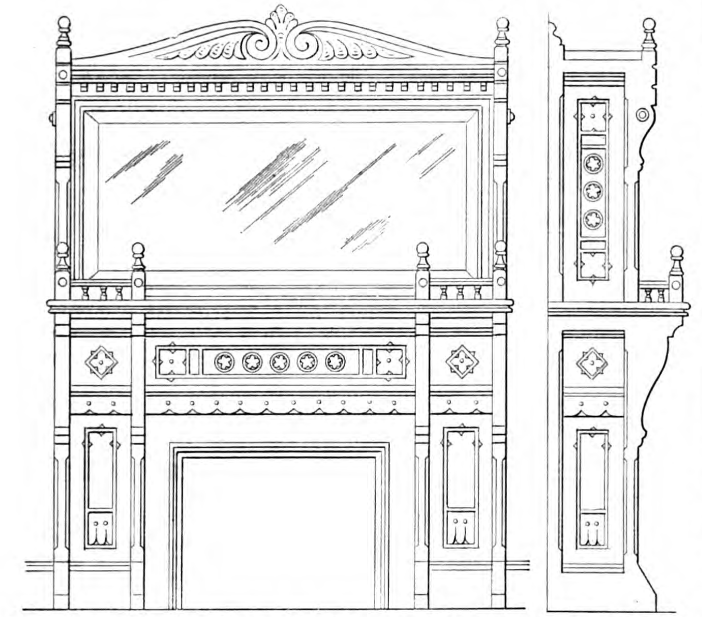
## THE PLATES.

In plates I and IV we present designs of two Dutch Renaissance chimney-pieces, taken from a little work by Franz Ewerbeck, and published under the title of "Die Renaissance in Belgien und Holland." The first of these chimney-pieces is from the "Salle d'Audience," on the first floor of the House of von Marten van Rossum, at Zalt Bommel. The inclosed space forming the front of the fireplace is faced with blue tiles having large panels of delft representing David and Solomon.

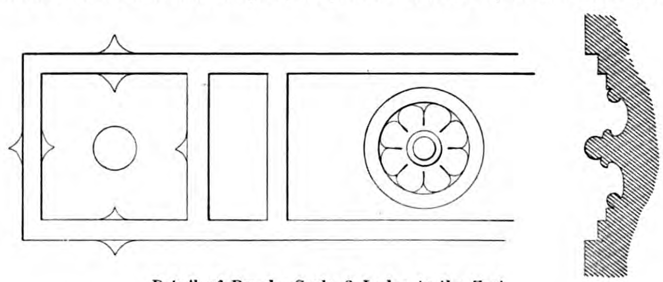
In plates II and III will be found a representation of the Loggia of Raphael at the Vatican, Rome, concerning which Vasari says, "it is impossible either to execute or imagine a more beautiful work." Julius II. began them after the designs of Bramante, and they were completed by Raphael during the pontificate of Leo X. The Loggia form a triple portico, of which the two lower stories are supported by pilasters, and the third by columns. The only part painted by Raphael is that which faces the city on the middle tier. The two other sides in continuation were added by Gregory XIII. and his successors, in order to complete the uniformity of the Court of San Damaso, which forms the entrance to the palace from the Gallery of Bernini. The Loggia of the lower story is covered with stuccoes and arabesque executed by Giovanni da Udine from the designs of Raphael, the restoration of which was completed about 20 years ago by Sig. Mantovani with ability and success. The vaults of the small domes, in which are figured the devices of Leo X., the Medicean tri-colored Prince of Wales's feather and the oxen yoke, are particularly varied and elegant for their decorations. The second story contains the celebrated frescoes, which have given the name of the "Loggia of Raphael." It is divided off into thirteen arcades, sustained by pilasters covered with stucco ornaments and arabesques by Giovanni da Udine from Raphael's designs. He is said to have derived the idea from the then recently discovered paintings beneath the Baths of Titus. Nothing can surpass the grace and elegance of these decorations — figures, flowers, animals, mythological subjects, and architectural ornaments are combined with the most delightful fancy, and, though seriously injured by the troops of Charles V. and by the restorations of Sebastiano del Piombo, they are full of interest. Each coved vault of the 13 arcades contains four subjects connected with some particular epoch of Scripture history, executed from the designs of Raphael by Giulio Romano, Pierino del Vaga, Pellegrino da Modena, Francesco Penni and Raffaelle del Colle. There are, therefore, 52 subjects in all, commencing with the Creation downward through the Old and New Testament subjects. The other two wings of this tier contain a series of frescoes in continuation of the Gospel history painted by Sicciolante da Sermoneta, Tempesta, Lorenzo Sabbatini, &c., and Signor Mantovani has also restored these. He likewise painted the third portion of the Loggia next the Pope's apartments, and his work furnishes one of the best examples of modern pictorial decoration to be seen in Rome. Some of the sculptured doors in the Loggia date from the time of Leo X., and are splendid specimens of carved woodwork. The top Loggia on which the Pinacotheca opens was painted in the pontificate of Clement VII., with maps and landscapes; that on the side which overlooks the city, and from which there is a fine view, was restored under Gregory XVI., the walls being covered with maps of European countries.

## Mantel Design.

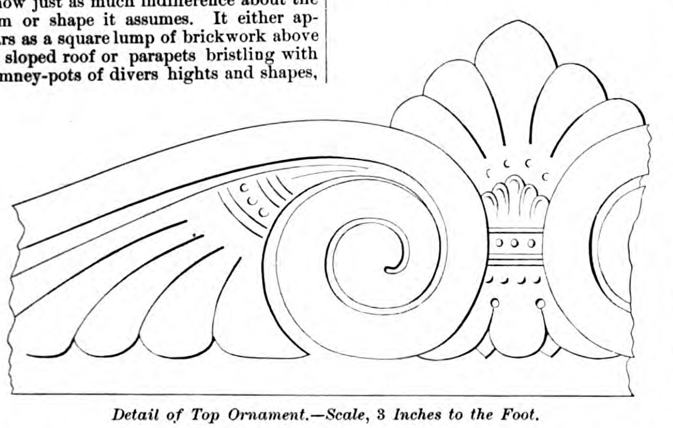
A plain, easily constructed and withal a neat appearing mantel, designed by H. P. Miller, of Philadelphia, is presented herewith. The front and side elevations show the construction of the design so thoroughly that little can be said in explanation. We present a detail of the carved scroll that surmounts the mirror finish, and also a detail of the panel occuring immediately under the shelf.



*Front and Side View of Mantel.—Scale, ½ Inch to the Foot.—Designed by H. P. Miller.*



*Detail of Panel.—Scale, 3 Inches to the Foot.*



*Detail of Top Ornament.—Scale, 3 Inches to the Foot.*

## Chimneys.

A writer in one of our English exchanges, discussing the chimney shaft from an architectural point of view, says:

The chimney is not a feature that has been favorably regarded among architects. We all know when its presence was deemed a decided eyesore, and all kinds of expedients were adopted to hide it or to try and make it look like something else. Happily for the advancement of common sense and truthful architecture, those days are past, with much also in dress that was artificial and restrained. There is now just as much indifference about the form or shape it assumes. It either appears as a square lump of brickwork above the sloped roof or parapets bristling with chimney-pots of divers hights and shapes, or is carefully arranged to appear at certain points, and to assume some definite architectural shape, as we find in buildings of Italian design. Express it we must, but how to do so pleasingly in every case is a problem. Two ways are open to the architect—the one is the artist's idea, based on picturesque effects, that the chimney should be allowed to come out anywhere so long as it groups with other objects. The other view is to make it conform to the architectural design by arranging that it should appear above the roof, where it will assist in the balance of the elevation, and in making it of certain proportions and form. The first of these methods is that of the Gothicist and follower of Queen Anne, or Old English; the latter the method in vogue among disciples of the more orderly schools of classical or Anglo-Italian architecture.

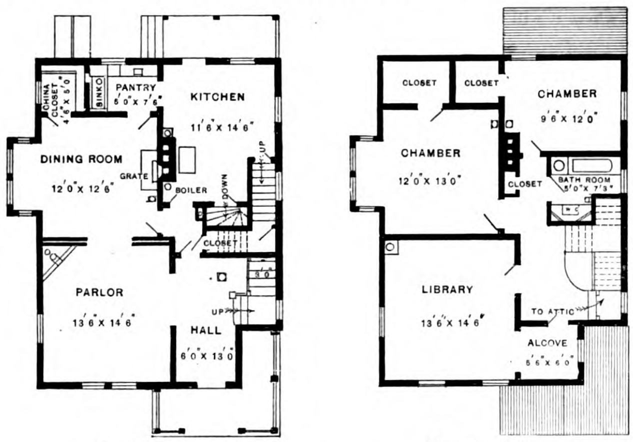
To the credit of the Gothicist it must be said that while making the chimney a picturesque feature, they gave it form and rendered it often during the Tudor period a highly pleasing object with the gables of their domestic buildings. The separate flues were expressed and united, and often a great variety of exterior ornamentation in cut and carved brickwork, and in molded caps and bases, was to be seen, as may be noticed at Hampton Court Palace, and in a score of the old mansions of the reigns of Elizabeth and James. The shafts are clustered, and in plan either squares arranged diagonally or octangular and circular. At Longleat and Wollaton are examples of the manner the Renaissance architects clothed them in classical garb and made them ornamental accessories. Directly the revival came all this was changed, and the houses of the early Georges betokened a desire to completely ignore the chimney. We have at last thrown off the mask of classic purism, and are free to build again as we like, yet there is little attempt made to study the chimney shaft, as at one time was the case. There is a want of invention in the arrangement of the plan; the grouping, among other features, is often bad; they start out of ridges in awkward proximity to the gable, or flank a gabled roof, making it appear all flat chimney on the side. We see shafts octagonal in plan clustered together, start abruptly out of the ridge and roof slopes as if it had pierced the roof unpreparedly; others show heavy bases that stand saddle-back fashion over the ridges; some are top-heavy with moldings, others unfinished at their summits. For square-built shafts the sides can be relieved by division into panels with cut-brick vertical piers between—a treatment resorted to by designers of the vernacular seventeenth century villas. We have at least common sense in this plain and unsophisticated chimney building; the shafts can be taken up to any desired hight, and the higher they are the more effective; they can be placed anywhere without being twisted or diverted from the original direction of the flues, and, being massively built, the evils of smoky chimneys are, to a large extent, avoided. This squarely built shaft allows of the ordinary pot or cowl without disfiguring the design, but the Italian shaft is spoiled at once by the addition. The physics of chimney construction are ill understood by the ordinary architect; or, if he does know the laws of gases and action of the column of warmed air, he inadvertently builds an outer flue wall that conducts the heat rapidly away, or a long thin shaft, which, operating in the same manner, sends back the smoke; or some huge space over the fireplace, in which all kinds of eddies are at work, that completely nullify the effect of the ascensional force of the warm smoke in the flue. So much has he to learn to make his art and his science agree!

## CORRESPONDENCE.

### An Eight-Room House.

*From* L. W., *Boston, Mass.*—I have studied, with considerable interest, the various house plans and the general information concerning them which have been published in your paper from time to time. Without a single exception the drawings have been finely executed, and some of them might well be selected for practical use. I inclose plans and elevations for an eight-room house, which has some features worthy the attention of *Carpentry and Building;* not on account of the exactness of the drawings, but because of the general arrangement, with a view to cheapness of construction, economy of heating, &c. The ideas presented have not only been gathered from *Carpentry and Building*, but from other sources as well, and will be adopted, I think, by mechanics and clerks who desire a cozy house for a small sum of money. The house was built about three years ago, in a suburb of Boston. The kitchen is arranged so as to be shut off from every other room in the house by two doors, thus confining the odors of cooking to that apartment. There is also a ventilator near the ceiling in the kitchen. Back stairs leading from the kitchen to main landing have a ventilating window in the stair passage. The head-room necessary for the stairs comes out of the bathroom to the hight of 3½ feet, and above that there is a closet for water-tank, &c. The house is heated with a furnace, and in the dining-room is also a "French grate" for use in the spring and fall before it is cold enough to necessitate starting the furnace or for use at any time it is desired to enjoy the cheer of an open fire.

*House Near Boston, Described by L. W.—Front Elevation.—Scale, ⅛ Inch to the Foot.*

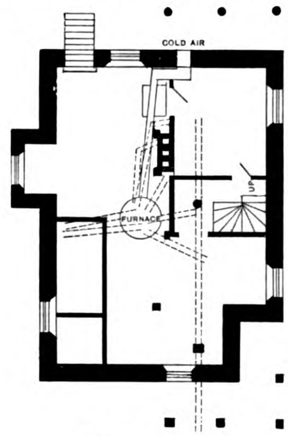



First Floor. Second Floor.

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

### Brick Buildings.

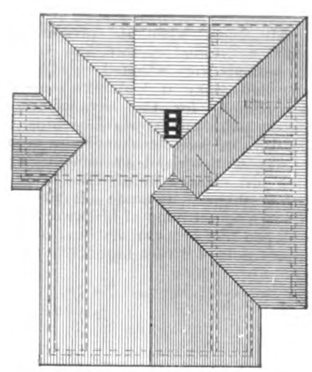
*From* J. E. A., *Waitsburg, W. T.*—I should like to see in the columns of *Carpentry and Building* the views of practical builders on the construction of brick buildings. What I desire particularly to learn is the usual and best methods of anchoring the timbering and the brick together; also, the construction of the foundations. I think a discussion of this subject would be of interest to many of the readers, especially as it is something, I believe, which has never received attention.




*Foundation Plan.*

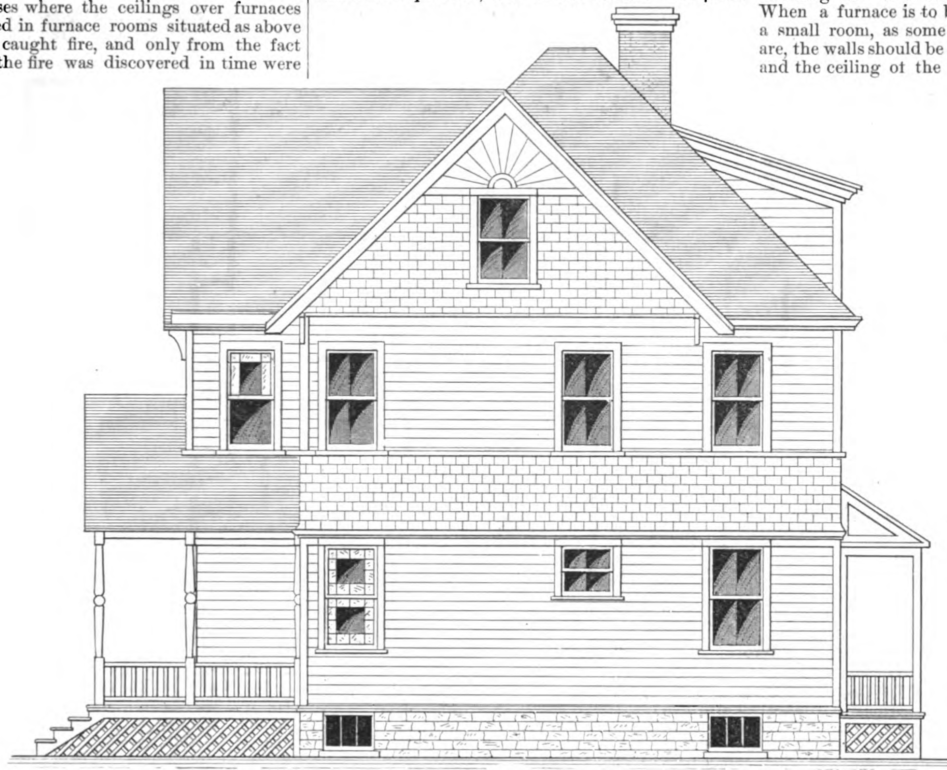
### The Furnace Room.

*From* S. B.—In some houses there is a room especially reserved for the furnace, and in many cases this room is made so small that it is difficult to place the furnace in position. When land is as expensive as it is in cities, and when the basement is to be occupied for kitchen, dining-room, and other uses, it is probable that the room left for the furnace must be, to say the least, rather limited. When the above combination of circumstances exists, it may be impossible to give the furnace a reasonable amount of room. For all of that, there is no reason why part or all of the surrounding walls, as well as the ceiling, should not be made fire-proof. The writer has noticed many such rooms where some of the walls were made by placing lath and plaster on wooden studding, and where it was necessary to bring the smoke-pipe from the furnace much nearer the wall that it should be. In case the basement is low, the top of the furnace is brought nearer the ceiling than it should be, and with the heat that escapes through the casing of the furnace, and that from the heating and smoke

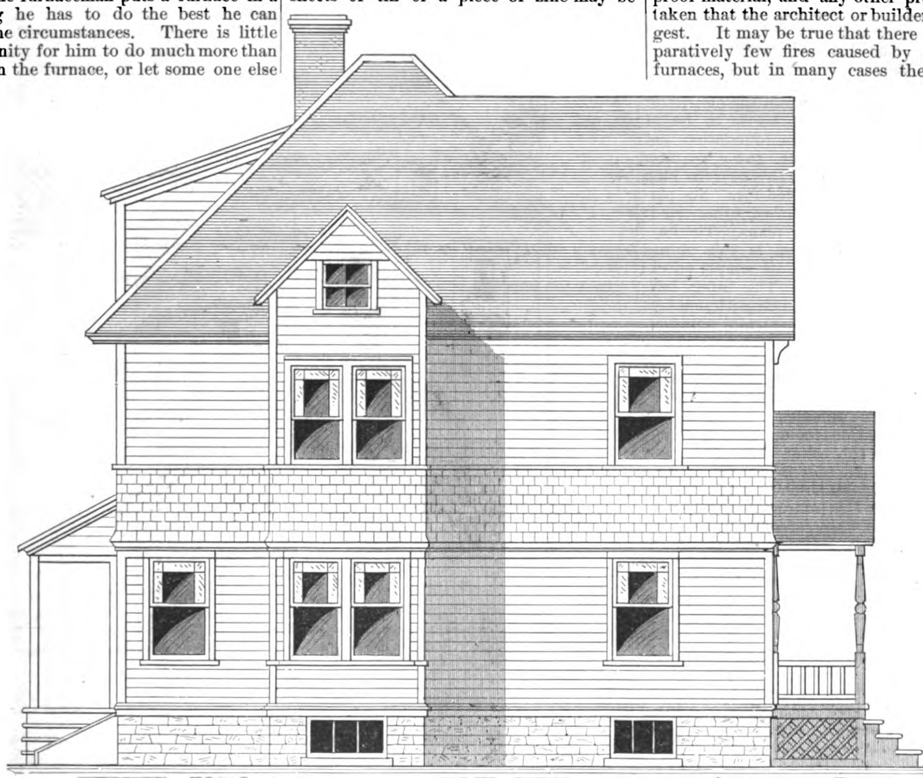


*Roof Plan.*

pipes, there is great danger that the lath may be set on fire. The writer has known of cases where the ceilings over furnaces located in furnace rooms situated as above have caught fire, and only from the fact that the fire was discovered in time were the buildings saved from destruction. When the furnaceman puts a furnace in a building he has to do the best he can under the circumstances. There is little opportunity for him to do much more than to put in the furnace, or let some one else do the job. It does not take many "furnace fires" to give heating furnaces a bad name, yet, if houses are not properly constructed or planned, how is the furnace-man to remedy the difficulty? A few sheets of tin or a piece of zinc may be nailed up over an exposed place just to avoid the appearance of evil or to clear one's conscience, but that is not making a fire-proof building out of a tinder-box. When a furnace is to be set in a small room, as some of them are, the walls should be of brick, and the ceiling of the furnace-room should be covered with some fire-proof material, and any other precautions taken that the architect or builder can suggest. It may be true that there are comparatively few fires caused by defective furnaces, but in many cases the number could be greatly reduced if the proper precautions were taken by the builder.



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

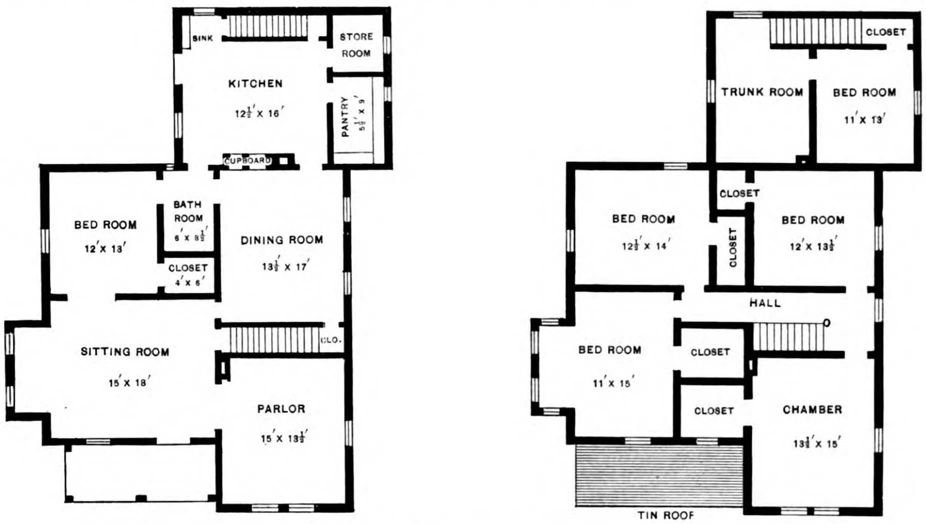


*Side Elevation (Left).—Scale, 1/8 Inch to the Foot.*

**A Dakota Farm House.**

*From* B. S. Hoxie, *Evansville, Wis.*—The requirements in drawing the plans for this house were, that there should be on the first floor a parlor, sitting-room, dining-room, bedroom, kitchen, bathroom, milk-room or pantry; on north side of kitchen, a cupboard between kitchen and dining-room, and perhaps a wood-shed attached to the kitchen. It must have an east front. The bedroom and sitting-room to be located on the east side, and a bay-window in sitting-room, and perhaps in parlor. On the second floor there must be five chambers with closet in each, besides the chamber over the kitchen. This must be reached by a separate flight of stairs, and no communication between this and the other chambers. The owner did not desire an open staircase, but preferred to go up between partitions. The lower rooms were to be $9\frac{1}{2}$ feet in the clear, and upper rooms $8\frac{1}{2}$. The house to be of wood and cost above the foundation not to exceed $2500. With these requirements the reader can see how near the plan comes to what was asked for. No perspective elevation was drawn, otherwise it would accompany these plans. The bay-window for sitting-room is two stories and finished with gable, or simply an extension of the rooms. The other bay-window has a projecting belt with brackets covered with cut or ornamental shingles, and the second story is shingled the same way, with deck of tin coming under the gable end of main roof. The front veranda is to be finished with storm-house entrance, to be removed in summer.

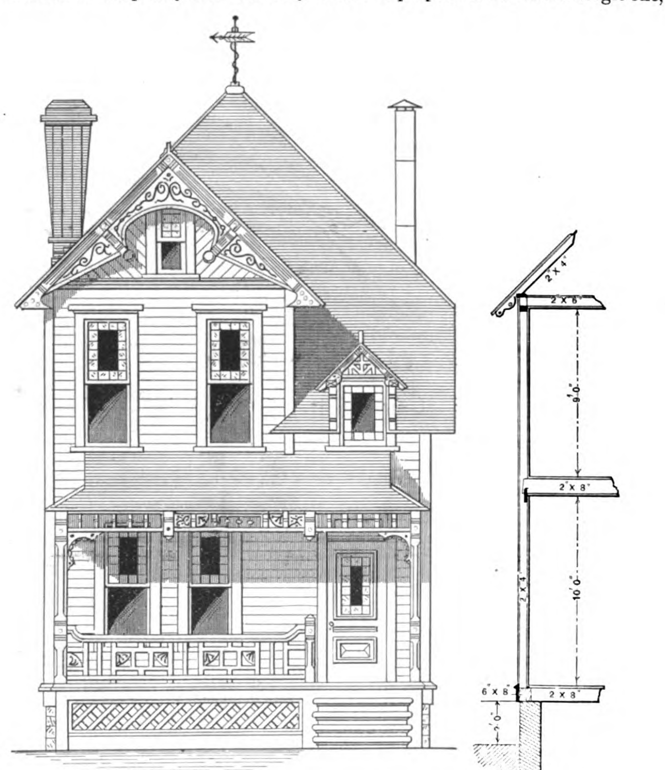
The specifications require both chimneys to extend into the cellar, so as to furnish an air duct, and also to accommodate a furnace should the owner wish at any subsequent time to put one into the house. It will be noticed, by reference to the plan, that sitting-room, bedroom and parlor can be warmed with one stove by opening the folding doors, and the chambers are also to be warmed by registers in the ceilings, unless stoves are used, for which provision is made by the arrangement of chimneys. The first floor is to be double, with tarred paper between. Outside of studding to be sheathed up with good, sound pine boards, and then covered with good building paper, well wrapped around corners and under frames before siding is laid. The studding on inside is to be covered with iron board paper, then furred the thickness of lath before lathing and plastering. The interior woodwork is to be of hard pine and butternut, with darker wood for angle and plinth blocks, finished with hard oil and polish for principal rooms, and others oil shellac and varnish. Kitchen and dining-room floors to be laid of 3-inch hardwood flooring. The work of all kinds is to be of the most substantial character, according to specifications.




*Floor Plans of a Dakota Farm House.—Described by B. S. Hoxie.—Scale,* 1-16 *Inch to the Foot.*

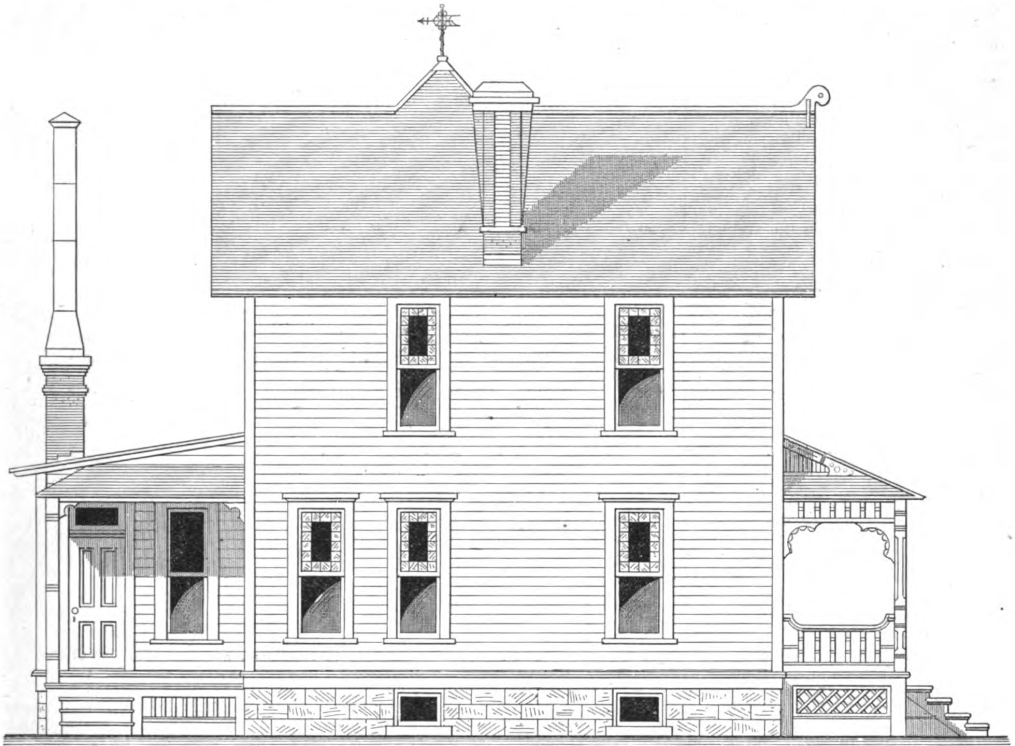
**A Cheap Six-Room House.**

*From* D. F. J., *Wichita, Kan.*—I have been a reader of *Carpentry and Building* for the past five years, and, noting your request to draftsmen for cheap houses, or houses of moderate cost, I take pleasure in forwarding you the inclosed plan of a six-room house, costing $1200 at Wichita prices of to-day. The house is to be plainly finished inside, and the lumber of the grades usually employed for their various purposes. The small glass in the upper sash and in the door are to be colored as the owner may desire. A double chimney between the parlor and sitting or dining-room would doubtless serve the purpose better than a single one, but the house was constructed here with a single shaft. There is to be a bank cellar




*A $1200 Six-Room House.—By D. F. J., Wichita, Kan.—Front Elevation and Section. Scale,* ⅛ *Inch to the Foot.*

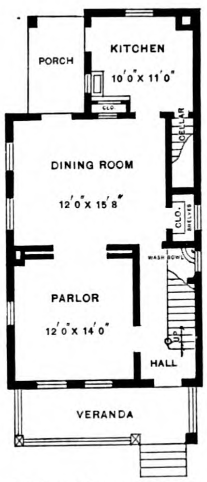
under the main part of the house 7 feet in the clear. The house to-day is supplied with a galvanized pipe carried up from the kitchen flue to clear the main roof, in order to insure draft. The same plan and design was built after here not long ago, and cost, with a few changes, $1292.



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

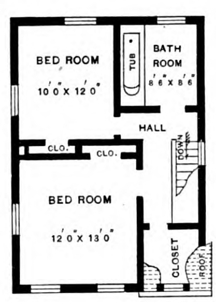
**Working from Plans.**

*From* M. P.—How many plans of houses that are to be heated with a furnace are so drawn that the person who is to put in the furnace has confidence in them? The location of the furnace may be shown, as also the pipes in the partitions and the registers, but when it comes to putting in




*Ground Floor Plan.—1-16 Inch Scale.*

the work it is found that a gas-pipe is in the way, or it may be discovered that the plumber has put a water or soil pipe in the place where the stack should go. The result is that the tinner has to hunt up such a location for his pipe as he can find. This condition of affairs may make necessary some extra cutting, and then the carpenter is greatly disgusted. Especially is this the case when a girder has to be cut into. Once upon a job that I know about the carpenter was so exasperated because he had to do some cutting, so as to allow of the placing of some partition pipes or stacks, that he said that if he was to build a house for himself he would put up a lot of poles, fasten the stacks to them, and then build the house about the pipes. It may be that in some localities the architects so construct their plans that it is not necessary to cut the woodwork for furnace pipes, but it is difficult to see just




*Chamber Floor Plan.—1-16 Inch Scale.*

how this could be done in all cases, for when the partitions are so arranged that it is necessary to take a pipe across, or at right angles to the joists, it is rather difficult to do so without some cutting. Providing the plans are properly drawn, a great deal of trouble could be avoided if each workman about a building would be careful to place his work just where the plans indicate, for if one mistake is made there is no knowing what the result will be, as was demonstrated once in my own experience. Everything appeared to go all right until the centerpieces about the gas pipes were put up, when it was noticed that the one in the back room was a foot from the center. Upon investigation it was found that the house was shorter than had been intended; either the person who laid out the house or the masons had made a mistake, but as all of the measuring had been done from the front of the house, the mistake had not been noticed until the centerpiece was put up.

**Hair in Brown Mortar.**

*From* W. H. H., *Stuttgart, Ark.*—In answer to "F. D.," of Dunmore, Pa., I would say I do not put any hair in my brown coat, as it floats down better and makes a much smoother piece of work without it, and is just as good, if not better. I have tried it both ways. I have also done what is called "greenwork." In this I follow up with the brown coat while the first coat is green, as the two coats will cement together better than drywork. The two coats will not separate when put on in this way. I have tried greenwork long enough to know it is the best, and I do not put any hair in the brown coat. I would rather have all the hair that some plasterers put in two coats put in the first coat. I use the brown coat very sandy, as the more sand in the mortar the harder will be the plastering. I am no plasterer, but I have the work done in this way, and would not have it done in any other way that I have tried.

**Weighting Windows.**

*From* J. S., *Center Bennington, Vt.*—Will some reader of *Carpentry and Building* kindly inform me with regard to the proper manner of weighting windows? Should the weights be of the same avoirdupois as the sash, or should the upper sash have heavier weights?

### Laying Down Polygons.

*From* L. W. T., *Upper Alton, Ill.*—I am under the impression that polygons in general are scarcely understood in the matter of their angles, sides, &c., by the average carpenter. As affording some little information on this point I inclose some drawings of hexagons which perhaps will be of interest to your readers. Fig. 1 is drawn with a square and dividers. Inasmuch as hexagons are figures of six equal sides, each side may be described as containing 60°. To draw such a figure easily and accurately with square and dividers proceed as follows: Divide any given line into three equal parts. Take one part in the dividers and radius, and, with one foot in the points X and A of Fig. 1, strike the two arcs shown below the horizontal line, intersecting as indicated. Draw the chords forming an equilateral triangle, each side of which will contain 60°. The hexagon is then made of six of these triangles wedged together, as shown in Fig. 3. Divide the triangles into two parts. The result is two triangles of 30° each. We can now apply the square, as shown, bringing it against the vertical line at the left. Take 10 inches on the blade and 5¾ on the tongue and strike the line A D (Fig. 1) extending it as shown. Inasmuch as A B is the length upon one side of the figure it is easy to establish D F. Reverse the square for the other side, as shown. Notice that the dotted lines are important, and should be put in at the start. Take B X¹ in the dividers and draw the quadrant containing 90°. The radius will then divide the arc into three parts, from X to U, each containing 30°. If a corner of the figure is desired to come against the horizontal line place it on the line O and use the same runs of square as before, laying out the figure as indicated at the right. Next look at the small cube that is drawn above Fig. 2. In this the 30° pitches run out right and left, and at once indicate how the work is managed. The quadrants are used to get the 30° divisions, but are not necessary after the square is employed. Any one side, of course, is equal to the other. Next we turn to Fig. 3. First run up the vertical lines on A and B, draw the diagonal lines through O extending to an intersection with the outside vertical lines, as shown. Draw the horizontal line through O, swing A B C on one side up to D, and then again to E, and finish the opposite side in the same way. The work can be done with the bevel when the point O is established, by paralleling the lines. I suggest to the reader to try it. The square in this figure shows how to cut the hexagon miter. In Fig. 2 the dividers have been freely used, and three hexagonal figures are built in together. Three of the central lines in each are shaded, making three cubes with their corners inclined 30° from a vertical line. This is the result of taking a 30° pitch from the vertical line. One of the sides of the diagram, Fig. 2, being on the horizontal, the sides 1 and 3 rise to a 60° pitch. I suggest that some one find out the runs on the square and give the figures. It is not hard to do, and will be good exercise. The small cube in this figure is an isometrical drawing as it is generally made, the 30° pitch run out on each side. In Figs. 1 and 2, one of the six sides is subdivided, giving the twelfth, or 30°, with the corner and the central line and its side pitches of 15°. It seems to me that what is here presented, taken with the diagrams, quadrants, and their divisions, also with squares and pitches shown, almost any one should be able to understand the underlying principles, especially is this the case if a little study is given to the subject, and a smooth board employed for containing the drawings.

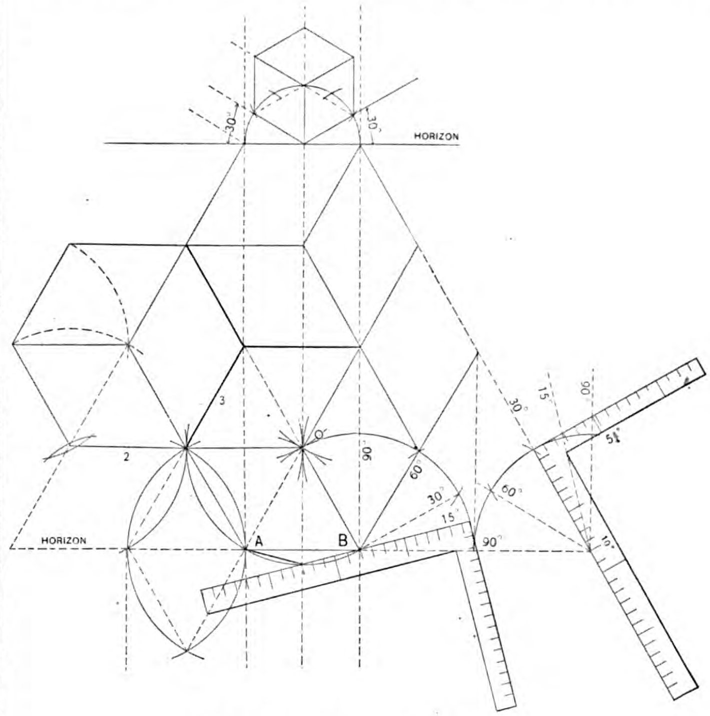
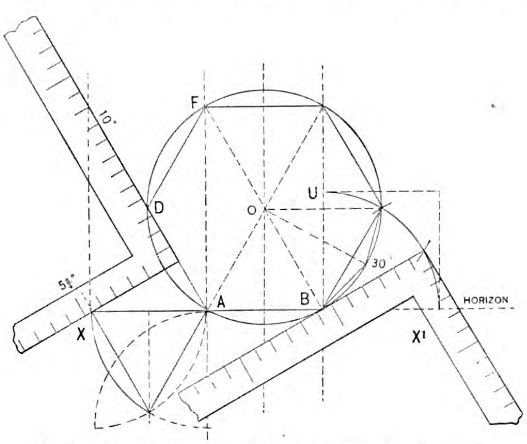



*Fig. 2 of Sketches Submitted by L. W. T.*

*Note.*—What our correspondent has presented above, and which is further illustrated by the diagrams shown herewith, is an interesting study in geometrical shapes. His use of the square, dividers and bevels shows that he is familiar with these tools, and that there has been much more perhaps in his mind than he has put upon paper in this connection. Our correspondent makes use of degrees as representing sides of a figure, while it is customary among mathematicians to use degrees in designations of angles. Some other peculiarities will also be noticed by our readers, which it is hardly necessary for us to point out in this connection. His suggestion of a little experimental study upon the part of those interested is certainly to the point.




*Laying Down Polygons.—Fig. 1 of Sketches by L. W. T.*

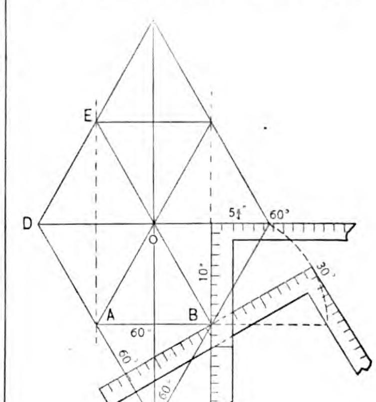
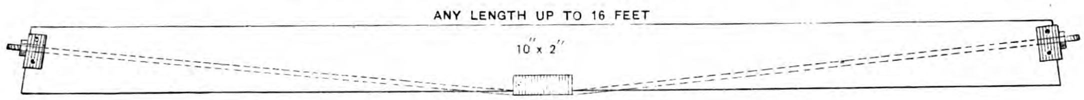



*Fig. 3 of Sketches by L. W. T.*

### Supporting a Ceiling.

*From* F. W. P., *Ellenwood, Kan.*—Referring to the article by "C. K. P.," of Madison, Ohio, on the subject of supporting a ceiling, it is to be noted that your correspondent does not state the thickness of the ceiling joists, nor yet the span of the ceiling, nor if there are partitions on top of it. I think if the span is under 18 feet, a truss, the same as shown in the inclosed sketch, will hold the ceiling up for any ordinary load. It would answer all the purposes of a dwelling-house. Referring to the engravings, Fig. 1, indicates the truss joist, being about 10 inches




*Supporting a Ceiling.—Fig. 1.—Suggestion of Truss Offered by F. W. P.*

deep; there is a ⅞-inch iron rod, tightened on both ends. An iron plate is used for the

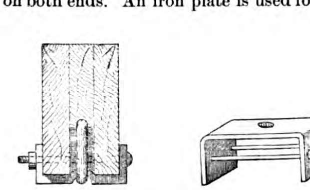


Fig. 2. Fig. 3.

*Details of Truss.*

end protection of the truss timber. Fig. 3 shows the shape of the iron on the end of the truss. Fig. 2 shows the joists combined to form the truss. The center joist is worked out to give the iron rod good form. A bearing or carrying plate is used in the center of the truss. The bolt through the joists is ⅜ inch in diameter.

### A Cheap and Substantial Floor.

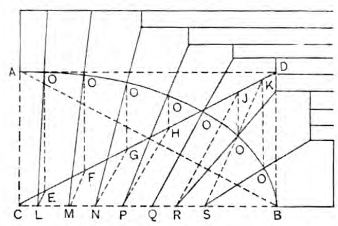
*From* J. C. S., *Decatur, Ill.*—I desire to ask the opinions of the readers of *Carpentry and Building* on a piece of work recently finished by me. It is the floor in the vestibule of a dwelling. I took black-walnut and ash and sawed the same into blocks 4 x 4 inches. I also prepared a suitable border for the same. The blocks were well finished before cutting, afterward they were dipped in boiling linseed oil to prevent shrinkage. I covered the floor with hot pitch to a depth of $\frac{3}{16}$ inch, and laid blocks in place with the border, and then rolled them down smooth. The result was a very solid and substantial floor at a very low cost, and one that presents a fair appearance. The cost was about 15 cents per square foot.

### A Convenient Tool Chest.

*From* R. G. M., *Atchison, Kan.*—In reply to the communication from "Jack Rafter," who writes from Monroe, Iowa, I would say that I am in about the same fix, having been watching the columns of the paper for almost two years without seeing anything that would be of assistance to me in the direction I am working. I think the best thing to do is to examine every tool chest you get, and in this way you will be sure to find something to suit. I shall try to build myself one this winter as follows: The place of the molding planes I will change to both ends of the chest, and between them the planes and other heavy tools can be arranged, as well as movable saw tills with cover for the chisels, bits and other smaller tools dependent upon the taste of the maker. Drawers are about the best thing, as they keep the tools in better shape, while moving the chest about. If tills are used they should be made to fit close, and fixed in such a way that they may be fastened in place. Now, brother chip, if you have any plans, please let us know, and between us, I think, we can get up a good tool chest.

### Simple Method of Finding Joint Lines Through the Circumference of an Ellipse.

*From* J. H. MONCKTON, *Brooklyn, N. Y.*—Mr. Maurice L'Ocagne points out in the "Annales des Ponts et Chaussées of France," the following simple method of finding the direction of joints as required in elliptic arches: From A, parallel to C B, draw A D; from B, parallel to C A, draw B D. Draw the diagonal lines C D and A B. Let each of the places marked



*Lines for the Joints in Segmental Arches.*

O around the elliptic curve be the designated points through which joints are required; then, parallel to A C, draw the lines O E, O F, O G, O H, O J and O K. At right angles to A B, draw E L, F M, G N, H P, O Q, J R and K S; then the joints sought lie along the lines L O, M O, N O, P O, Q O, R O and S O. At the joint Q O, the place of joint at O falls on the diagonal line C D, and, therefore, at this point the line of joint is simply at right angles to the diagonal line A B.

### Setting Furnaces in Brick.

[The following letters are from a recent issue of *The Metal Worker* and bear on questions of interest to our readers.]

*From* O. P., *Memphis, Tenn.*—"G. S." wishes information regarding the setting of furnaces in brick. I would say in reply that it is best to introduce the cold air directly into the base of the hot-air chamber, because it is distributed quicker and more equally by virtue of its being brought directly in contact with the hot castings of the furnace. In case cold air should be brought from the outside of the building and become partly warmed before reaching the base of the furnace, it would, very naturally, be retarded in its downward course, thereby causing a diminished supply of air into the rooms above. In regard to how far the inner walls of a brick-set furnace should be away from the castings, "G. S." will find that every first-class furnace is provided with covering bars and trench plates which will indicate the size of brick work. I would recommend that the inner wall be cemented on each side.

*From* N. S. K., *Canastota, N. Y.*—In reply to the letter of "G. S.," would say, always bring cold air in at the bottom of the furnace, as it insures a more perfect draft though the hot-air pipes. When the air is brought in over the top of the chamber it often becomes so hot that it will not pass down between the inner and outer walls, but backs up. In many instances I have seen hot air pouring out of the cold-air box, but never where it was introduced at the bottom. Build the inner wall 7 inches from the largest part of the castings. Make the cold-air box equal in cubic inches to the area of the hot-air pipes. The air is best when it comes from the register at 110° F. A large supply of warm air is better than a small supply of very hot air. Air is not "burnt" until it reaches a temperature of from 150° to 175°. Large pipes and a large cold-air box are always desirable, as they can be partially closed if necessary, while small pipes and small cold-air box, if insufficient for the purpose, cannot be increased in capacity. The only thing that can be done is to force the furnace to its greatest capacity, which is likely to result in a waste of fuel, "burnt" air, a hot cellar and a cold house. No definite rule can be given as to the size or length of pipes, as the construction of buildings differs in different localities to such an extent as to render it impossible to give a rule applicable in all cases. The location of the cold air box should be on the side of the building most exposed to the wind. The points of the compass do not so materially affect the result as many people imagine. I have been engaged in the business for 27 years, and the experience for that period justifies the above conclusions

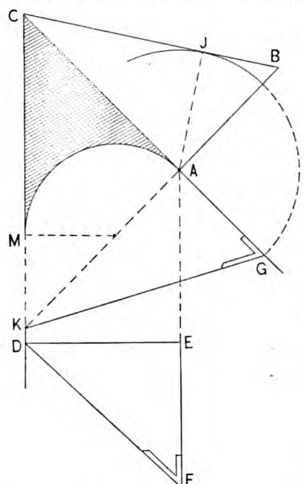
### Questions in Hand-Railing.

*From* C. H., *Siclo, Neb.*—In the February number of *Carpentry and Building*, page 34, there was given the *fac-simile* of a certain page in a book on stair-building and hand-railing, brought out by J. H. Monckton. I desire to ask one or two questions concerning the same. I am a constant reader of your valuable paper and have become greatly interested, although I have not presumed to ask many questions, I want to know the following for general information: First, How does it happen that the top and bottom bevels for squaring the ends of the wreath piece are got by lines running through the center of two banisters? Now, if there had been two banisters on each step, or if there had been any number of banisters distributed around the segment, which would be the ones from which to get the angles? In this case there happen to be three, but one of them is near two, or I might say is on the bottom tangent; therefore, no angle can be got from it. Second, Supposing, in a winding stair, instead of banisters there is paneled work, what then would be done?

*Answer.*—On receipt of the above letter we referred it for reply to James H, Monckton, the author of the book from which the plate above referred to was borrowed. We have the following answer for publication to which we refer our correspondent:

1. Those lines passing through the center of balusters on the plan are taken merely as a matter of convenience; thus, and in the manner shown, portions of the planes only are used for finding required bevels, or, rather, angles for squaring the wreath at the joints, serving that purpose as well as though the whole of the planes

were included. If your correspondent will examine the drawing published in *Carpentry and Building* of last February, he will see that the lines in question at plan Fig. 3 serve four different uses: First, at Fig. 2 to unfold the center line of wreath, giving its exact relation to the unfolded elevation; second, again at Fig. 2, to obtain the lengths of balusters; third, at Fig. 4, to draw the parallel pattern; fourth, used as convenient level lines on the plan Fig. 3, by which to find the angles for squaring the ends of the wreath-piece. In the diagram inclosed your correspondent will find a plan of angles, planes and curve similar to those based on his questions, but in which the whole of the planes connected with the plan are taken in finding the angles required to square the joints of the wreath-piece. Let A C M be the plan




*Questions in Hand-Railing.—Diagram Submitted by J. H. Monckton in Reply to C. H.*

tangents and M A the plan of curve. Draw A B at right angles to A C; let A B C be the angle required over plan tangent A C, and let M C be a level tangent. To find the angle for squaring the wreath over joint A: Prolong C A to G indefinitely; prolong C M to D indefinitely; prolong B A to K; on A as center with A J as radius describe the arc J G; connect G K; then the bevel at G will contain the angle sought. To find the angle for squaring the wreath-piece at the joint over M: From A draw A F parallel to C M; at any point above A and at right angles to A F draw E D; make E F equal A B; connect F D; then the bevel at F contains the angle required.

2. If there is to be panel-work instead of balusters, then develop the concave or convex face of the panel-work, together with its upper edge in its relation to the wreath, in the same way as the center line of wreath is unfolded. Or proceed as follows: Draw a line parallel to the place required for the top edge of the panel-work; then space the line A N, Fig. 2 of drawing in February number, in any number of equal parts, raising perpendiculars to the place fixed for the top edge; then set up these perpendicular hights from the equally divided and unfolded plan of either the concave or convex face of panel-work, and trace through the points found by these hights the unfolded edge and face of panel-work. It seems necessary to inform your correspondent that Plate No. 14, one plate out of 97 contained in the second edition of the book from which the extract in question was made, answers his most important queries, and, further, ten of the first plates treat the subject of hand-railing in an elementary character, using for the purpose simple shaped geometrical solids formed of paper in one piece, with all the angles and surfaces required in their relative positions, such as plan of curve and tangents, vertical planes; the cutting plane or plane of plank upon which the face-mold and its tangents are given. It will be seeen, too, that by the use of these solids the study of hand-railing is relieved from the abstruse method which unassisted plane surface drawing alone affords. Also the development of the center line of the different varieties of wreath-pieces is fully treated through two plates in an elementary way.

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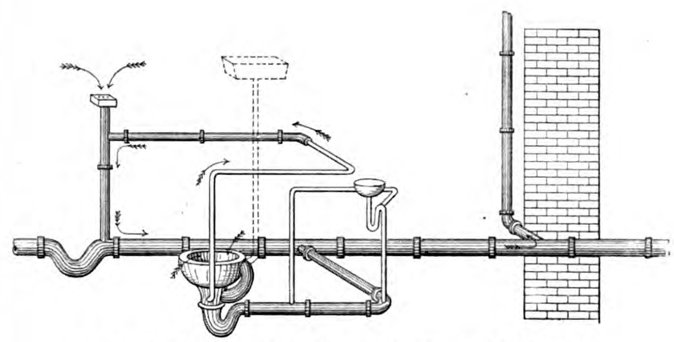
### A Question in Ventilation.

*From* A. W. G., *Philadelphia.*—I herewith send you two plans of a job of ventilation for your opinion as to which would be the proper plan to adopt. The drain-pipe is all on the outside of the building, which is a church. The water-closet and wash-basin are placed in a small room in the basement. The ventilation-pipe, 4-inch, of iron, runs up alongside of a tall chimney, and has a powerful draft. The job, Fig. 2, was done as directed by the inspector, and every time the closet is used it not only smells, but emits a horrid stench. The plumber says his plan, Fig. 1, would have carried all the smell off (see direction of arrows), while the inspector says Fig. 2 is the proper plan. Now, Mr. Editor, I would like you to decide which plan is correct, Fig. 1 or Fig. 2.



*A Question in Ventilation.—Fig. 1.—Plan Proposed by Plumber.*

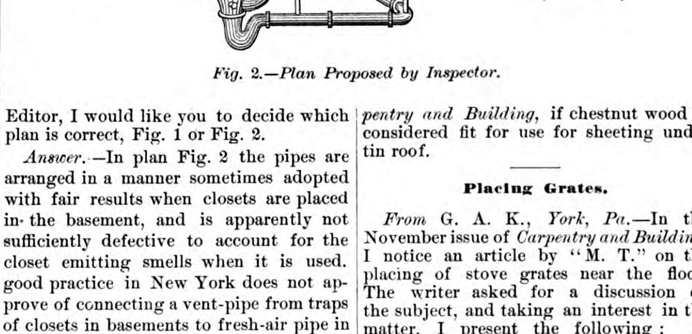



*Fig. 2.—Plan Proposed by Inspector.*

*Answer.*—In plan Fig. 2 the pipes are arranged in a manner sometimes adopted with fair results when closets are placed in the basement, and is apparently not sufficiently defective to account for the closet emitting smells when it is used. good practice in New York does not approve of connecting a vent-pipe from traps of closets in basements to fresh-air pipe in street, but advises a separate air-pipe to above roof, or a connection to verticel soil-pipe, even when this pipe is a long distance from basement closet. If there is not any defect in the closet itself either of these changes may be beneficial, as it might be remotely possibly that the flushing of the soil-pipe might be a momentary hindrance to the circulation of the air. It will be also well to ascertain for a certainty if the vent-pipe from closet trap to fresh-air pipe is open through, and that the closet trap forms a proper seal should there be no defect in the closet. In Fig. 1, by connecting the air-pipe to the closet in the manner shown, the latter is brought into direct communication with the soil-pipe, and the closet trap is without any vent or air pipe, which change would not be a remedy. In this plan it is assumed that the basin trap is vented as in Fig. 2 plan, and the pipe taken direct to soil-pipe instead of to pipe to fresh-air pipe—that is, that it is not proposed to take the vent-pipe from overflow of basin, which would be the same as venting the closet trap into the basin. We think, therefore, that Fig. 2 is the better plan.

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### Chestnut Lumber.

*From* B., *Johnstown, Pa.*—I desire to learn through the practical readers of *Carpentry and Building*, if chestnut wood is considered fit for use for sheeting under tin roof.

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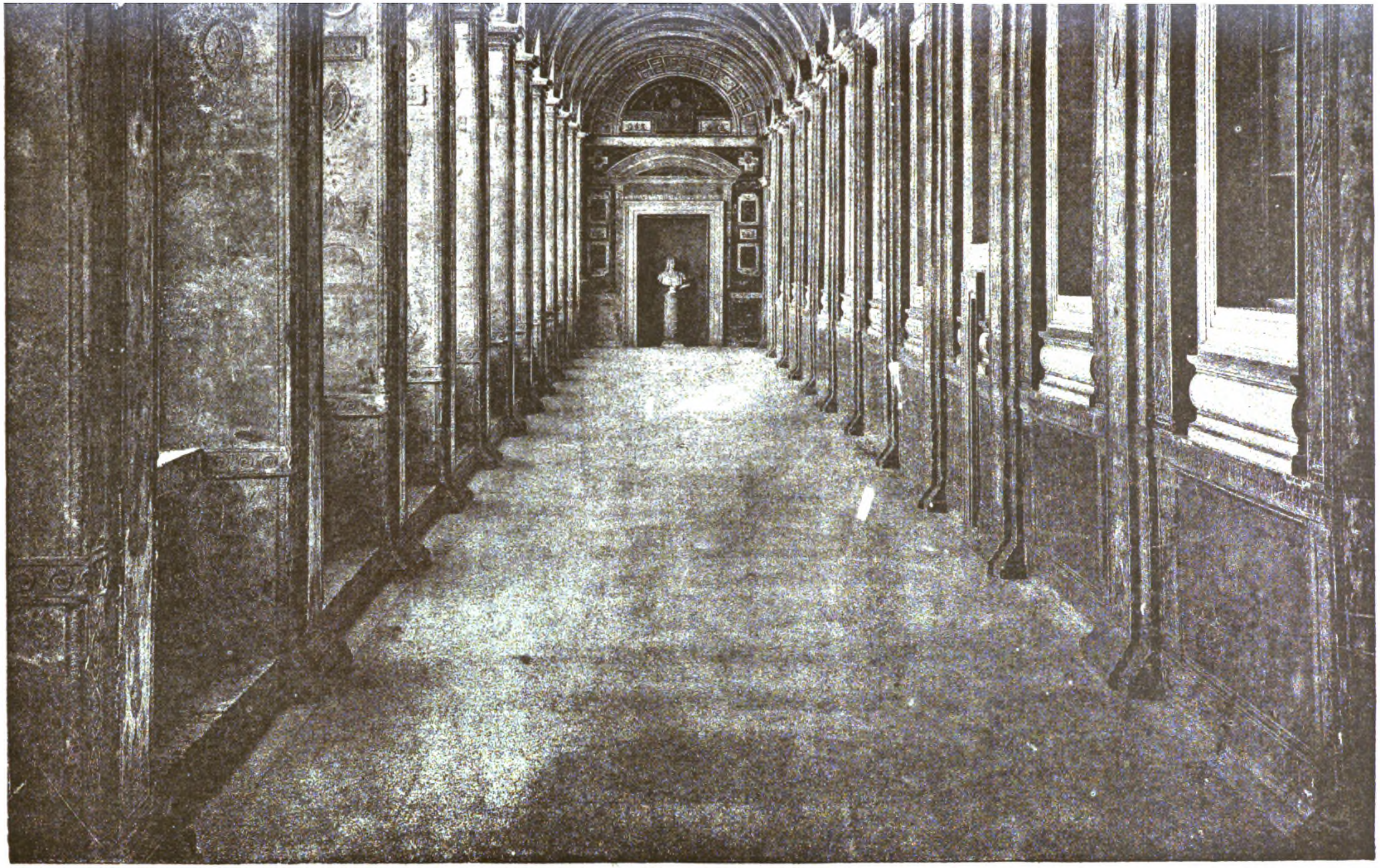
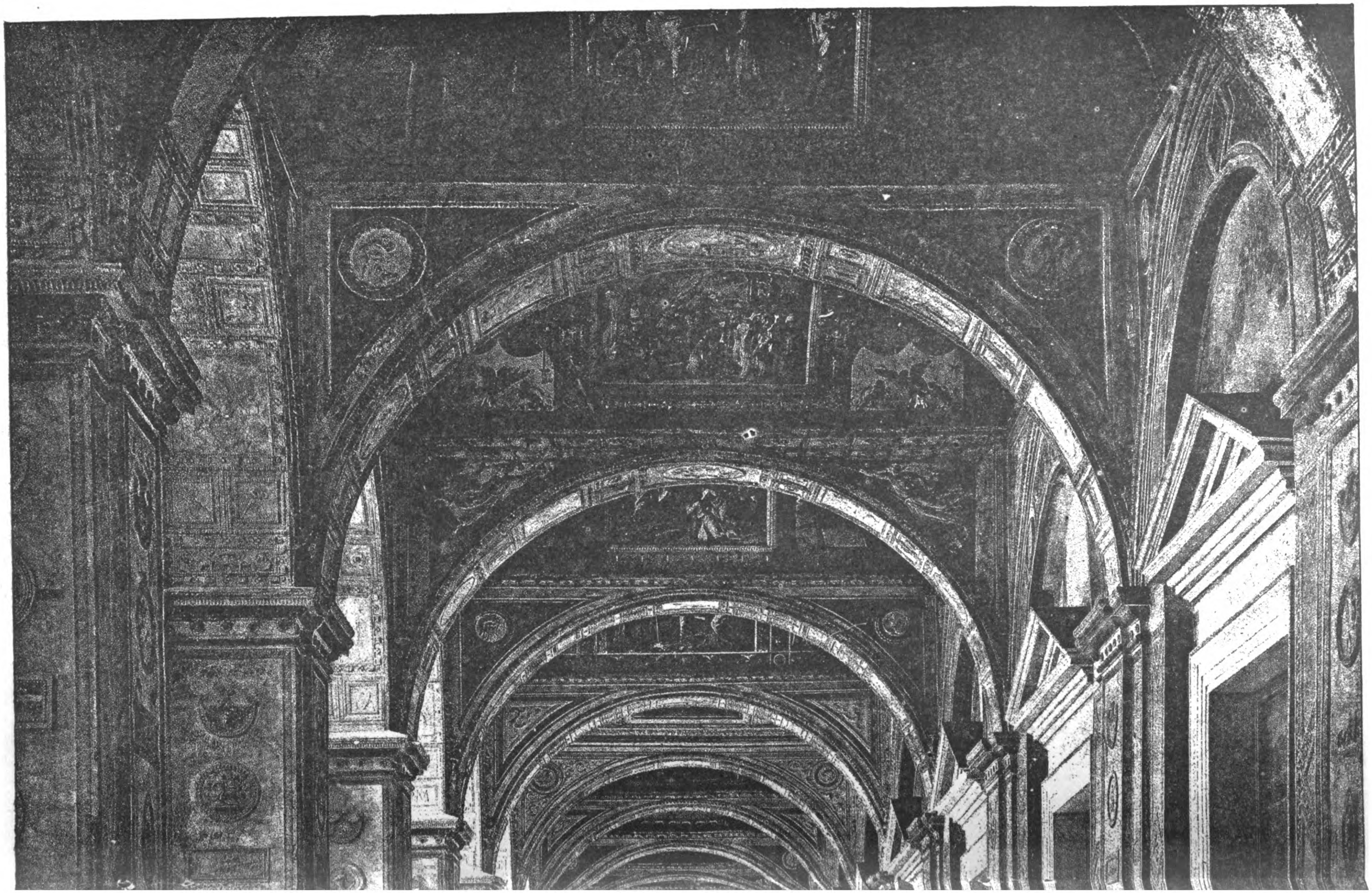
### Placing Grates.

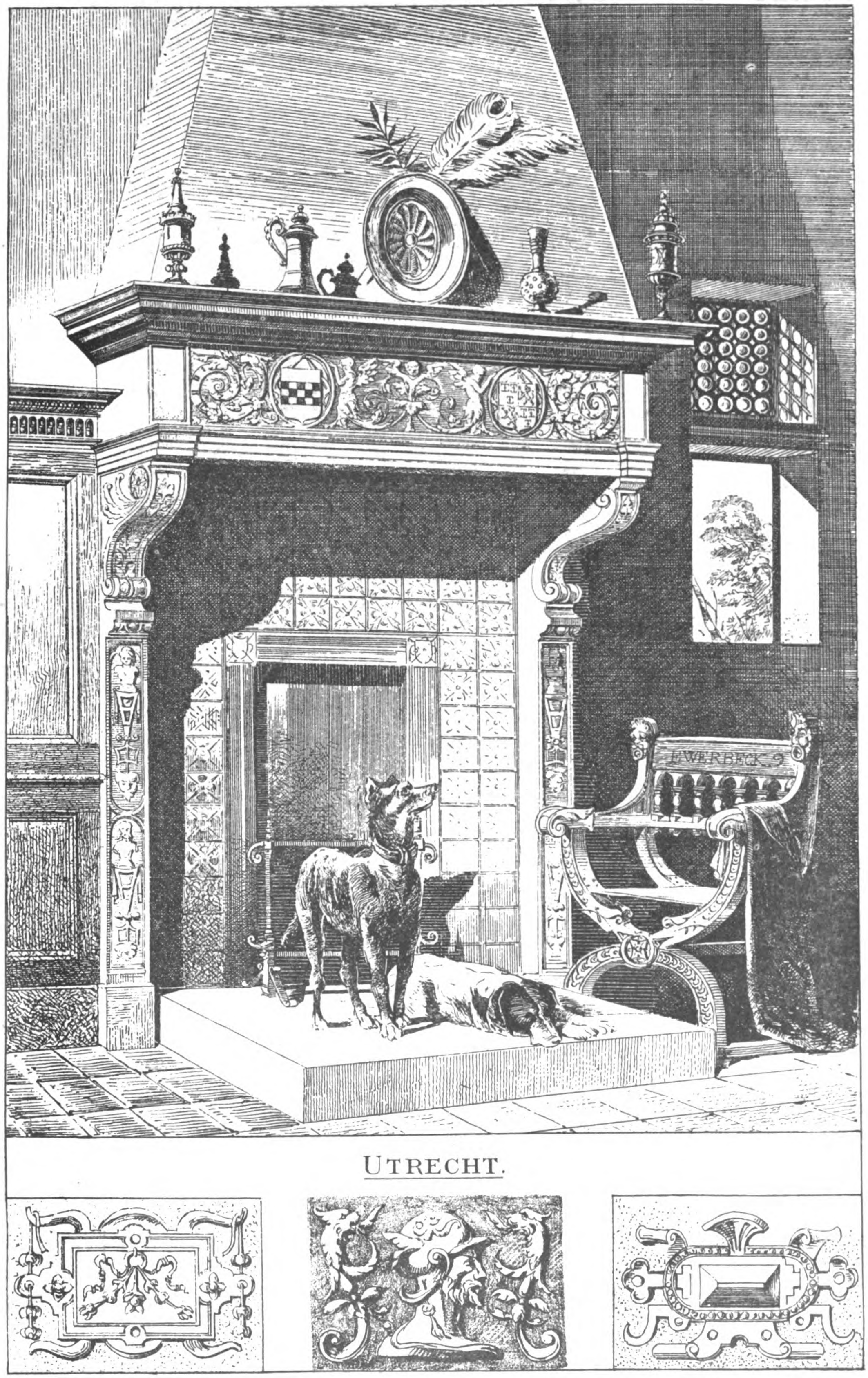
*From* G. A. K., *York, Pa.*—In the November issue of *Carpentry and Building*, I notice an article by "M. T." on the placing of stove grates near the floor. The writer asked for a discussion on the subject, and taking an interest in the matter, I present the following: In "M. T.'s" discussion of the subject in the issue referred to, he apparently forgot to

A DUTCH RENAISSANCE CHIMNEY PIECE, AT ZALT-BOMMEL.



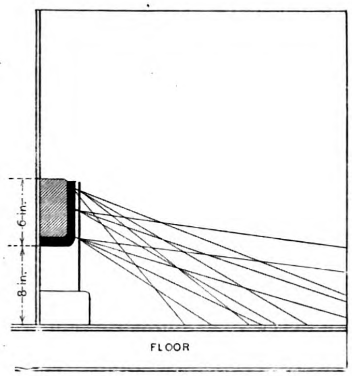
THE LOGGIA OF RAPHAEL, THE VATICAN, ROME.






A DUTCH RENAISSANCE CHIMNEY PIECE IN UTRECHT.

take into consideration the hight of the grate, and consequently the thickness of the fire. Generally speaking, the bottom of the grate is from 6 to 10 inches above the floor in open grate stoves, the hight of the grate varying in different makes, styles, &c., but suppose the average hight to be about 6 inches. Assuming 8

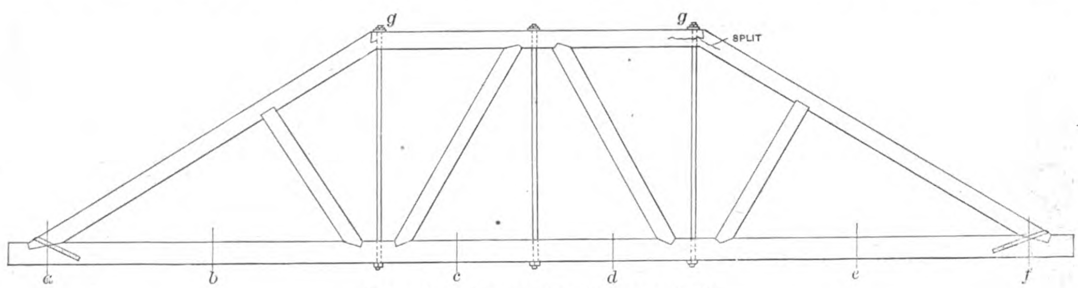



*Placing Grates.—Letter from G. A. K.*

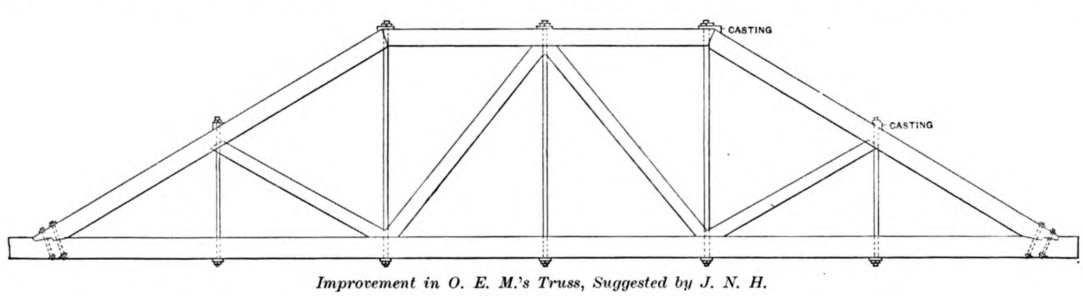
inches to be the average hight above the floor, and 6 inches the average hight of grate, or the thickness of fire, we would have the top lines of fire at least 14 inches above the floor. By referring to the diagram it will at once be apparent that an infinite number of rays will be thrown to the floor from every point in the whole front surface of the fire, and not from but one point, as shown in the figure submitted by "M. T." It would be essential to have the fire a certain distance above the floor, as represented in the engraving, in order that the heat rays may not strike the latter too obliquely. Just here we are confronted by another condition imposed by a law of radiation—viz., "the intensity of radiated heat is inversely as the square of the distance." Thus, if the intensity of a certain heat ray be represented by 81 at a distance of 2 feet, at three times the distance, or 6 feet, the intensity of the same would be only 9. This being the case, it is certain that any fire more than 24 inches above the floor would affect the latter but little, except in the immediate neighborhood of the stove. Summing up the whole matter, then, we believe we are justified in thinking that plan the best which would place the grate as near the floor as safety and convenience permit. It must be understood, however, that under almost all circumstances the effect upon a large floor area, by heat radiated from a stove or other hot body in the same room, amounts to but little, if anything.

### Roof Truss.

*From* J. N. H., *Cincinnati, Ohio.*—There are several features about the roof truss submitted by "O. E. M." in the October number of *Carpentry and Building* which I think are not of the best; further, I think the designer is far from the truth in his statement that the center rod should be the largest. With his arrangement of struts the only strain on the center rod is that produced by the weight of ceiling from C to D. This strain is transmitted from the center struts to the side rods, each of which has to bear half of the said strain, in addition to the weight of its own portion of the ceiling, plus a considerable weight of the roof which is transmitted through the struts. Your correspondent can readily see, therefore, that his side rods are strained in excess of the center one, and, indeed, I may say if the center rod is needed at all there is an equal necessity for rods at the half-panel points *b* and *c*. If your correspondent is partial to this form of truss I suggest that he bring the ends of his struts close up to the three rods to which they lead, for, as the strain is transmitted to rods and struts, and in turn also struts to rods, it is important that the points of transmission be brought as close together as practicable. I would also suggest that your correspondent divide his end panels equally by his side struts, as shown in the sketch which I inclose, and that he may square butt joints at the points *g g*, which are infinitely better than the form he uses. The latter has a decided tendency to split both chord and end posts, as indicated. The choice between forms of joints at *a* and *f* I believe to be simply a matter of preference. In the face of so many accidents caused by buildings collapsing, roofs falling in, floors giving way, &c., it behooves those upon whom the blame generally rests—namely, the designers of the structures, to look well to many small details of construction. These are too often overlooked entirely, or directed in a way to amount to no direction at all. Their real importance justifies the most careful consideration.




*Form of Roof Truss, Submitted by O. E. M.*




*Improvement in O. E. M.'s Truss, Suggested by J. N. H.*

*From* C. W. W., *Allentown, Pa.*—"O. E. M.," Richmond, Ind., submits in October number of *Carpentry, and Building* a roof truss for criticism in regard to the arrangement of struts and rods. This is very hard to do if there are not given more details of the other roof construction, as in one case the struts and rods may be right while in another case they may be altogether wrong. The whole structure, according to the cut in October number, is an unsightly affair, at least to my idea, resembling more a highway bridge than a roof truss, but as this is not a question of different tastes, only of construction, I will pick out some grave mistakes. As "O. E. M." seems very anxious to strengthen the end-struts and the strut-beam, I take it for granted that the roof is constructed, or shall be constructed in the manner as shown in the sketch below. In this case the first thing which strikes the eye is the arrangement of the diagonals in end-panels, for these members can be placed there either to support an extra load resting on the end-struts (such as purlins), or they are not needed at all. In the position shown in sketch of "O. E. M." there will scarcely be a purlin to support, and their power to strengthen the end-strut in that position, so near the end, is more or less doubtful, at least questionable, and the end-strut should always be made sufficiently strong to do without such help. This is one of the items I referred to above, which "O. E. M." should have given in placing his question, as then the answer could be given more satisfactorily and coming more to the point.

The old, old law that the center lines (neutral axis) of the members of a structure shall intersect each other in the axis of the top or bottom chord is not followed in "O. E. M.'s" sketch, as he has placed the ends of the diagonals so far from the panel points that they intersect far below the axis of the bottom chord or above the axis of the strut-beam. According to his sketch, the tie-beam will not only be subjected to tension by the struts and bending by the weight of the ceiling, but also to a bending moment from the diagonals, which moment increases with the distance of the foot ends from the panel points, and may be so great as to impair sometimes the strength of the whole structure to such an amount as to cause a break down. The same is the case with the top ends of struts in center panel. "O. E. M." says, further: The center rod, of course, is to be the largest. I confess I cannot see that we want in this structure the center rod at all. If the tie-beam in the end panels is strong enough to carry the weight of the ceiling without sagging it will also be sufficiently strong in the center panel, as the lengths of the panels are equal. It would be quite another thing if the truss has also, besides the ceiling, to support a floor, and the space under roof should be used as storage-room or for any other purpose. In this case the tie-beam would scarcely be sufficiently strong, and would have to be supported by rods in the end panels as well as in the center panel, as shown in my sketch, but these rods would always be lighter than the other two tie-rods, which take the place of the so-called queen-posts.

Another feature in sketch of "O. E. M." I do not like is the joint between end struts and strut-beam. The best rule is to bevel them together, according to the angle, and, in order to avoid sliding, to nail side straps to them and also place a cap plate of wrought iron over the joints, which may be used at the same time as washer for the nuts on queen-rods. Should the load on the trusses be very heavy that the ends of struts and beam might be telescoped into each other, it is good to place between them a flat piece of lead or zinc, but better is to use a box of cast iron with an inside center plate, against which the struts and strut-beam are pressing.

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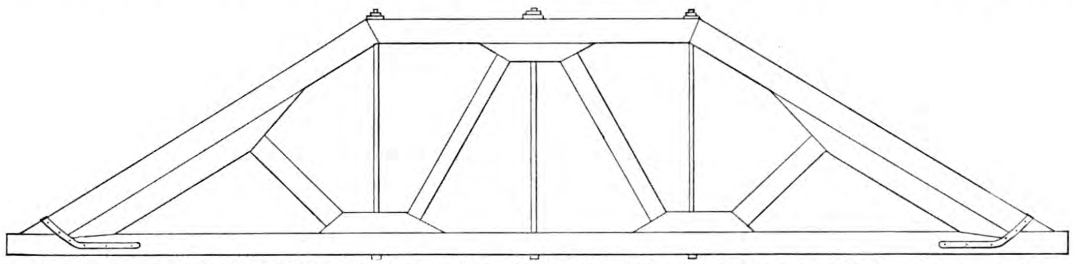
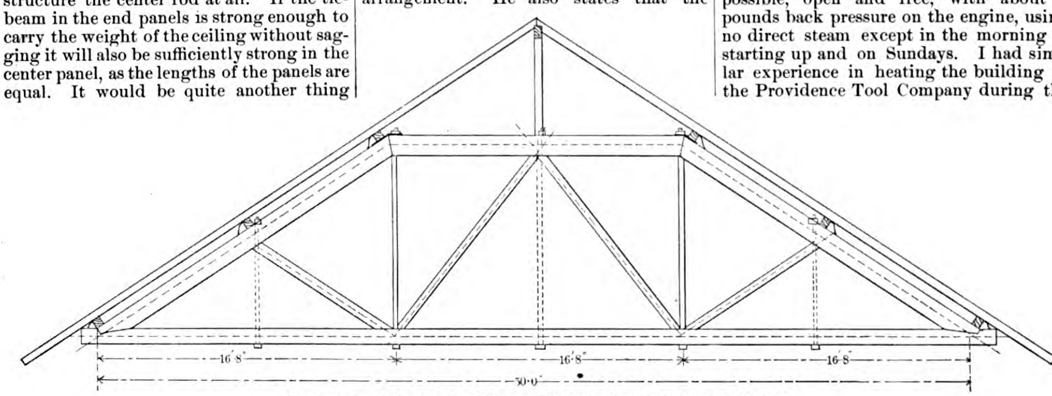
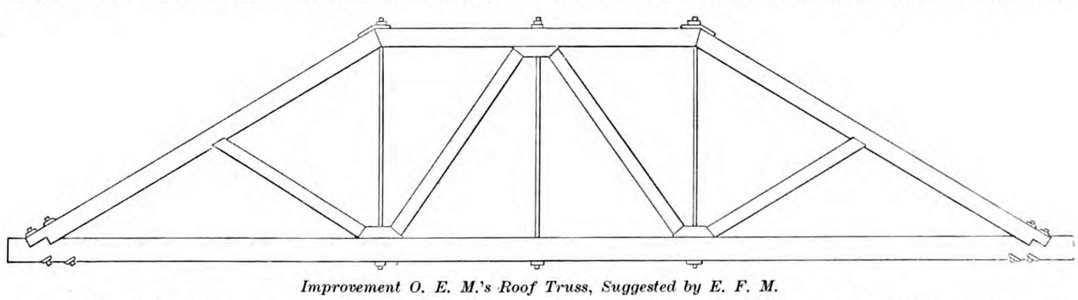
*From* E. F. M., *Moberly, Mo.*—In the October number you have a cut of a roof truss from "O. E. M," of Richmond, and as he asks the opinion of the arrangements of rods and struts, I have ventured to send what I consider an improvement in their arrangement. He also states that the center rod should be the largest, which is not the case, as it only keeps the truss from buckling up in the center. In the truss I send, you will observe I use a wooden shoe that is held in place by truss rod, and by the use of which cutting into the tie-beam is avoided. I would use iron plate where collar beam and truss rafters join, and for bearing under tie beam where the truss rods are. Where bolts go through the tie-beam, it would be better to use beveled washers than to cut into the timber, as I have shown.



*Improvement in O. E. M.'s Roof Truss, Shown in October Number, Submitted by C. E. W., Quincy, Mich.—Greater Strength Without Increased Cost.—(No Letter).*




*Improvement in O. E. M.'s Roof Truss, Suggested by C. W. W.*



*Improvement O. E. M.'s Roof Truss, Suggested by E. F. M.*

### Piling.

*From* F. A., *New York City.*—I have a question which I desire to ask the practical readers of *Carpentry and Building.* Where piles are used in the foundation work of a building where tide water comes in, are the tops of the piles cut off at the low or high water mark?

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### Heating Buildings by Exhaust Steam.

At a recent meeting of the New England Railway Club, John A. Coleman said:

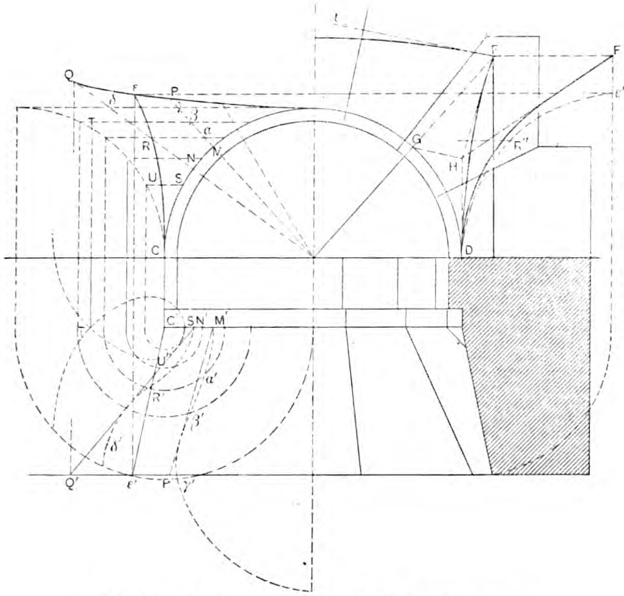
I have had a long experience in heating buildings by steam. When the matter of using exhaust steam was agitated, and most people were opposed to it, we took a number of mills, using then a 16-foot tubular boiler, and averaged a ton of coal a day. We heated the mill by using large pipes, having the circulation as straight as possible, open and free, with about 2 pounds back pressure on the engine, using no direct steam except in the morning in starting up and on Sundays. I had similar experience in heating the building of the Providence Tool Company during the war. The building was 70 feet wide by more than 200 feet long, the rooms with 15 foot studs, and large windows in an exposed situation, then heated by small pipes all around the walls, and using about a ton of coal a day for the boiler. In reconstructing we took out the small pipe, cut it up into coils, which we placed in the center of the building, using a 6-inch pipe as the main artery through the building, and a 2-inch socket-pipe for the condensed water, avoiding bends everywhere as much as possible. Result was that the building was overheated by using only exhaust steam, and about 2 pounds back pressure and no extra coal was used for the fires. My idea in heating is to use large pipes and carry a large body of steam to the point where you want to use it, and not strangle it on the way.

# MASONRY.

### Masonry and Stone Cutting.

(Continued from page 251, December.)

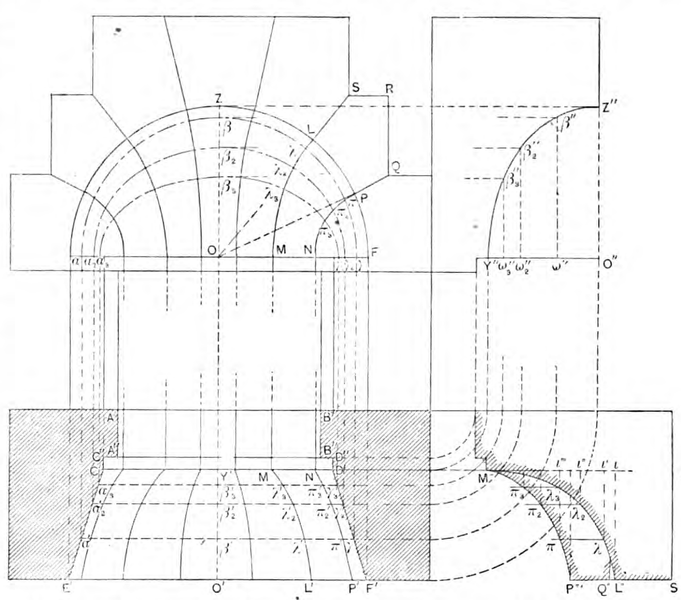
*Limiting Curve.*—Instead of verifying, after settling the directing curves, whether the surface of the vault will allow of the opening of the door, we can find beforehand a curve outside which all curves will allow of the opening of the door leaf. To do this we imagine the surface of revolution described by the door leaf, and we cut it by a series of planes radiating from the axis of the door. This gives us on plan Fig. 49 such lines of section as M′ $\alpha'$ $\beta'$ $\gamma'$, N′ R′ U′, S′ U′ T′, &c. Now a series of tangents, M′ P′, N′ Q′, on the wall side of these sections will form a surface which will contain the surface of revolution generated by the door leaf, and we have only to find the intersection of this surface with the faces of the wall and the jamb to have the lowest limits that the directing curves can attain without preventiug the opening of the door. It gives us as a limit to the upper curve the line Y E Q, and on the jamb the line projected in elevation in C U R E, but which we must turn down to show its real shape D R″ E′ Fig. 50. We complete the directing lines by selecting the point F high enough to produce the line F″ H outside the limiting curve and H below G, as G H is to be parallel to the tangent to the upper curve in the point F. We then delineate the guiding curve as in Fig. 47 of former lesson.



*Masonry.—Fig. 50.—Illustration of the Limiting Curve.*

*The Montpelier Black-vaulting* is a variety of the preceding one, being distinguished by having a straight line instead of the upper guiding curve.

*The Saint Antoine Black-vaulting* is named after a similar vault constructed at the back of the gate which led from the Bastille to the famous Revolutionary Faubourg of St. Antoine, in Paris. This vaulting is highly interesting as an example of the application of the surface of sails to stonework. We have seen it used in some doorways as a finish to increase their effect in elevation. In Fig. 51 we have a doorway which is covered between its reveals A′ A″ and B′ B″ by a traight arch; its rebate C′ C″ is also carried square above. Now, the space between the splayed jambs C′ E′ and D′ F′ is covered by a vaulting produced as follows: We draw, on the face of the wall, a semicircle which may be considered as an ellipsis, both axes of which are equal; in section we draw (Fig. 52) in a plane square to the face of the wall an ellipsis of which the half-axes Y″ O″ and Z″ O″ are equal to Y′ O′ (Fig. 51) distance of the rebate from the face of the wall, and O F the radius of the circle described above. The surface of the vaulting is then generated by the motion of a vertical ellipsis bound to remain parallel to the face of the wall, and to have the extremities of its major axis on the lines C′ E′, D′ F′ of the splayed jambs, and the extremities of its minor axis in contact with the ellipsis drawn on section (Fig. 52). This will give us sections of the vault the curves $\alpha\,\beta\,\lambda\,\pi\,\gamma$, $\alpha_2\beta_2\lambda_2\pi_2\gamma_2$, &c. (Fig. 51); and, as the sections are taken nearer to the plane of the door rebate, the ellipsis becomes flatter and flatter, until it is at last reduced to a straight line. The bed joints are made to radiate from the center of the semicircle drawn on the wall face; but below that semicircle they are continued by cylindrical surfaces, so as to avoid having sharp angles in the soffit of the straight arch.



*Figs. 51, 52 and 53.—Elevation Plan and Sections of Doorway, which is Covered Between its Reveals by a Straight Arch.*

To get the bed mold of such a voussoir we have only to develop the cylindrical joint. Its intersection with the soffit of the vault is easily drawn with the help of the generators of the vault. (See Figs. 51 and 53.)

*Operations for Cutting the Voussoirs.*—We cut out first a prism, the base of which is equal to the elevation of the voussoir, and the length of which is equal to the thickness of the wall. The bed-molds will allow drawing the outlines of both beds. We have there all the arrises belonging to the soffit of the voussoir. This soffit, which is neither a skew nor a developable surface, must be cut with the help of a series of templets $\gamma\pi$, $\gamma_2\pi_2$, $\gamma_3\pi_3$, &c., which will have to be placed against the stone on the points $l_1p_1$, $l_2p_2$, &c., given by the bed-molds. This is, of course, a long operation, owing to the generators being ellipses of variable diameters. On the other hand, the difficulty of forming in lath and plaster such a vault over a rectangular room is not great, and such a vault may be very elegant if decorated as a light vellum. In this vault every section parallel to the side of the room is an ellipsis, and it is found by algebraical calculation that the diagonal section through the opposite angles of the room give a parabola.

(To be continued.)

### The Masonry Class at the New York Trade Schools.

In the handsome and neatly finished lecture-room of the New York Trade Schools, on Wednesday afternoon, December 5, an important step was taken in combining practice and theory in technical education. Some 50 students, under Professor Ware, of the School of Architecture of Columbia College, assembled to hear the opening lectures in a course of instruction in practical plumbing and masonry at the above schools. At the conclusion of the lecture on plumbing, the students proceeded to the masonry department or shop, where Mr. Van Houten delivered the first lecture on masonry. The mixing of lime mortar was practically demonstrated and this was followed by making a quantity of concrete, which was placed in an excavation prepared for it, when it was rammed in a most practical manner. Cement mortar was next prepared and wheeled to another excavation beside which lay a quantity of large rocks; the different conditions of the faces of these rocks was pointed out by the lecturer, and several were then placed in position and properly bedded. The line of the imaginary building was determined above the excavation with the plumb-bob, and, the stone foundation having been completed, a brick wall was started. The time occupied in the delivery of this lecture was taken up in giving demonstrations, but the information given in the space of an hour was of such a kind that it would require many pages of explanation, and would not then make the effect on the mind that the practical work of this trade school does. The second lecture on masonry was delivered by Mr. Van Houten, Wednesday afternoon, December 12.

The lecture was begun by practically demonstrating how bricks absorb water, and the benefit attained by wetting bricks just before laying them. Two bricks were wetted and two taken dry, a cement joint was laid between the two former and then a similar joint between the latter. The bond between the wet bricks was perfect, as on lifttng th top brick the lower one adhered to the upper one through the cement joint, whereas, the dry bricks on being raised fell apart. The manner of using the trowel was then described, several students attempting to acquire the "knack." To get mortar on the trowel it was shown that it should be twisted or turned under the mortar, and that it would not do to, as it were, dig or drive the trowel into the mortar, as the mortar could not be then spread as regularly and easily on the bricks on which others were to be laid. It was pointed out, also, that the rough side of the brick should be the upper side, and that each brick should be rubbed down solid. The necessity of striking cross joints first and making bonds by headers was shown, as well as how to keep close joints, and that two headers were not as long as one stretcher in ordinary bricks, but that such was not the case when Philadelphia bricks were used. A sample piece of wall was then built by Mr. Van Houten, who described how a 12-inch wall, with some bricks, will measure 12¼ inches or more in width, and that in building piers -say 4 or 5 feet long, irregular dimensions, such as 4 feet 3 inches or 5 feet 2 inches, are sometimes called for by the architect's drawings, and when the piers are built and measured by the architect they are found to be 4 feet 1 inch or 5 feet, according to whatever the bricks will work out without breaking or cutting. The speaker considered a bricklayer was more justified in working to the proportions made by the bricks than in adhering to the dimensions exactly given on drawing, by following which such a pier would not be as substantial, on account of the numerous cut or broken bricks which would have to be used, as if all the bricks were whole. At the close of the lecture, the mortar boards being all full, and lines started on three walls, the students set to work laying bricks.

The following is a list of 30 questions about mortar for the brick-laying class in the New York Trade Schools, the questions having been printed in pamphlet form for the use of the students:

1. *How is mortar made?*—Mortar is made by mixing one part of slaked lime to two parts of clean, sharp sand.

2. *How is lime obtained?*—By calcining limestone.

3. *What is meant by calcining?*—Expelling the moisture and the carbonic acid gas from the limestone by the action of heat. Moisture and carbonic acid gas being component parts of limestone.

4. *What is carbonic acid gas?*—It is a gas existing almost everywhere. It is poisonous. It is found in the atmosphere; it is thrown off in large quantities by decaying vegetable matter, and is produced by our breath and from burning charcoal. It can be obtained from limestone by pouring sulphuric acid upon it.

5. *What happens when lime is exposed to the air?*—It becomes air slaked.

6. *What is meant by air slaked?*—The lime has absorbed the moisture and carbonic acid expelled from it when it was burned, and it is unfit for mortar because it is necessary that the carbonic acid gas should be absorbed after the mortar is used.

7. *What sort of sand is best for mortar?*—Clean, sharp sand.

8. *How can sand be tested?*—By rubbing it on the palm of the hand; it should scratch the skin but not soil it.

9. *Why is sea sand objectionable?*—It has had its angles worn off by friction, and it is impregnated with salt.

10. *What harm does the salt do?*—Salt absorbs water. Mortar in which salt enters is constantly becoming damp by absorbing moisture from the atmosphere.

11. *How much water does lime absorb in slaking?*—About one-quarter its weight.

12. *How much does lime expand when mixed with water?*—Two or three times.

13. *Will slaked lime keep without being mixed with water?*- Yes; slaked lime, so long as it is protected from the atmosphere, is benefited by being kept; any impurities existing in it become absorbed. The Roman building laws required it to be kept two years. In Italy the lime is always slaked when a building is commenced, and kept in pits covered with a layer of earth. When the slaked lime cracks the earth is scraped off and the lime is sprinkled and covered again. It is kept covered with earth to prevent the absorption of carbonic acid gas from the atmosphere.

14. *How should slaked lime and sand be mixed to make mortar?*—It should be mixed so thoroughly that each grain of sand is covered with a thin film of slaked lime, and a sufficient quantity of slaked lime added to make a paste-like mass.

15. *What should be particularly guarded against?*—That no lumps of unslaked lime, or masses of sand unmixed with the lime should be left; both are injurious to the mortar.

16. *Is there any advantage in keeping mortar after it is mixed?*—Rather the reverse, as it commences to harden. The only advantage is that the second working mixes the lime and sand as thoroughly as should have been done at first.

17. *Why is mortar more adhesive than slacked lime unmixed with sand?*—Slacked lime when dried in any quantity is friable. Slacked lime also shrinks considerably as it dries.

18. *What is cement?*—Cement is a species of lime which when made into mortar will harden under water.

19. *What is natural cement?*—Cement made from limestone containing about 20 per cent. of clay. Rosendale cement is a natural cement.

20. *What is artificial cement?*—Cement made from slaked lime mixed with clay. This mixture is molded into bricks, burned in a kiln at a low temperature to expel the carbonic acid gas and ground to a powder. Portland cement is an artificial cement made of chalk and clay.

21. *Is sand an advantage to cement?*—No; cement is not friable and does not shrink.

22. *How should cement be used?*—Cement should be mixed only as it is wanted. The sand and cement should be thoroughly mixed and then sufficient water added to make it into stiff paste. Water can be added while in the tub to prevent its hardening. It commences to harden immediately. When stiff it is unfit for use, even if worked over again.

23. *What is concrete?*—Concrete is a mixture of cement, sand and small broken stone, in the proportion of one of cement, to two of sand and three of broken stone. This should be thoroughly mixed, and when laid in a trench it should be rammed down, or dumped from a hight. It is better laid in layers not over 8 inches deep.

24. *What is grout?*—Liquid cement which is poured into a wall after it is built with mortar or cement or into a dry stone wall.

25. *What advantage is there in this process?*—It keeps the wall wet while the mortar is setting, and it enters into every crevice, uniting the mass more solidly together when it hardens.

26. *How is plaster obtained?*—From gypsum treated in the same manner as limestone.

27. *When hair is added to mortar for plastering, what precaution must be taken?*—The mortar must be cold, otherwise the hair will be burned and the plaster will be liable to fall.

28. *Why should brick always be wet before being used?*—Because a dry brick will absorb the water from the mortar and the cement, causing the lime mortar to become a powdery mass of lime and sand, and injuring the binding power of the cement.

29. *How do mortar and cement unite brick?*—By entering into the pores of the brick and forming a solid mass with the brick.

30. *What causes mortar, cement and plaster to harden?*—The absorption by them of the carbonic acid gas which was expelled when the limestone or gypsum, from which they are made, was burned.

To find the number of bricks in a wall, first ascertain the number of square feet of surface and then multiply by 7 for a 4-inch wall, by 14 for an 8-inch wall, by 21 for a 12-inch wall and by 28 for a 16-inch wall.

A bricklayer should be able to lay 1500 bricks in a day on a plain wall; on face work, on angles and around stone trimmings not more than half that number can be laid.

## Tank Construction and Support.

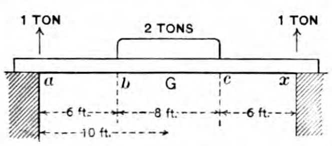
BY C. POWELL KARR.

"C. W.," of Memphis, Tenn., says: "I have to place a tank in a house which weighs 26 tons, and would like to know how to calculate the strength of the timber used to support it. Please give me a rule to calculate one joist and then what ten (joist) will hold. Work out an imaginary example for me in the paper, so I can see the figures and the operation; also the operation to ascertain the strength of a wooden column." To this I answer as follows:

A tank weighing 26 tons with its contents would be built of great length in relation to its hight and width. Ordinary house tanks in this city are about 14 feet feet long by 5 feet wide by 5 feet high, being made of spruce plank 1¾ inches thick and 4 inches wide, built on the flat in the same manner as an elevator bin is constructed. Such a tank would contain when full about 2000 gallons of water, and would weigh about 8 tons. A tank to weigh about 26 tons or more would, for example, be made, say, 20 feet long, 8 feet wide and 5 feet high. Suppose it to be placed upon the roof of a building 20 feet wide between the supporting walls. The roof beams are generally placed 20 inches c-c, but as the beams which are to hold this tank will be heavily loaded it would be advisable to space them the regulation distance of 16 inches c-c. Suppose the tank to be supported in such a manner as to have the joist run parallel to the length of the tank, then the joist to carry it will be in number $8 \times 12 = 96$ inches $- 16$ inches $= 80 \div 16 = 5$ in number, and each joist will have to support $\frac{26}{5}$ tons$=5.2$ tons, but as each joist runs under the tank for its entire length the load on each joist will be uniformly distributed.

Suppose the joist to be yellow pine and say 3 inches thick, what must the depth be to support this load? We have the rule deduced from approximate experimental data, the breadth, length between supports and load being given to find the depth: Rule—Multiply the center load by the length in feet (clear span) and divide the sum by the breadth in inches and the constant; the result will give the square of the depth in inches, or formulated for a center load it would read $d = \sqrt{\frac{\text{span} \times \text{load}}{b \times \text{constant}}}$. For Georgia pine the constant for the greatest center load within the elastic limit is 500 pounds, but only one-third of this should be taken as the average. If we consider the distributed load as being concentrated at the center, one-half of this whole load would produce at the center of the beam the same stress as the whole load uniformly distributed, hence in using this formula the load at center = one-half the whole load distributed, then $d = \sqrt{\frac{20 \text{ ft.} \times 5000}{3 \text{ in.} \times 166}}$ Span = 20 feet, $L$ = 10,000 pounds, center load = $\frac{10000}{2}$ = 5000 pounds, breadth = 3 in., constant = $\frac{500}{3}$ = 166, or $d = \sqrt{201 \text{ sq. in.}}$, nearly or practically 14 in.; therefore a beam 3 in. × 14 in. × 20 feet span will safely support 5 tons uniformly distributed. From this load, however, the entire weight of the beam should be deducted to obtain the net load supported, which in this case would be about 261 pounds. Technically it would require a beam about 14¼ in. in depth, but as beams of such a depth are not kept in stock, and as a tank of this kind is never kept quite full of water the 14-inch beam would practically be sufficient.

In many buildings in this city it is the custom to support tanks at the wall corners, so that two iron I beams may be placed from wall to wall, one side of the tank supported by the I beams and the other side resting upon one of the walls. Such tanks are uniformly circular in section, so as to make it possible to use short beams; the weight is concentrated on a small area, and where it can be done it is one of the best methods in use. Another method, however, is to support the tank on as many beams as its length will cover. If the beams were 16 inches c-c it would require 14 beams, the load on each beam would amount to 1.714 tons. If the tank were placed in the middle of the roof the stress on the beams supporting it would amount to about eight-tenths of what it would be if the load were concentrated at the center. The moment of rupture is to be obtained, and it can be best shown by means of the following diagram:




*Calculating the Strength of Floors.*

Let the load be 2 tons, covering 8 feet in length of a beam 20 feet between supports, the moment of rupture at $a$ or $x$ is $o$, the reaction at $x$ and $o$ is 1 ton each. At $b$ it is equal to the reaction at $a$ times $a\,b$. The general rule for the moment of rupture in horizontal beams supported at each end, no matter how irregularly the load or loads may be distributed, is: First find the center of gravity of the whole load $g$, and what portion of said load rests on each support, $a$ and $x$; thus whole span : whole load as either arm : portion at other arm; thus 20 : 2 :: 10 : $x$, $x$=1. This is obvious in this case, as the load is uniformly distributed equidistant from the center, and one-half the load therefore is sustained by each abutment. Consider the upward reactions thus found (viz., 1 ton each) of the two supports to be two forces acting vertically upward against the ends of the beam at $a$ and $x$, as denoted by the arrows. Let $b$ be any point whatever in the beam at which as a fulcrum the load's moment is required. Assume either of the upward end forces, say the 1 ton at $a$, to be acting at the outer end $a$ of a lever, $a\,b$ (6 feet long), of which $b$ is the fulcrum. Multiply this force, 1 ton at $a$, by this leverage, $a\,b$ (6 feet). Call the product 6 ($p$). Find the center of gravity of the part load between $a$ and $o$ if any—in this case there is no load between these points—then the moment at $b$ would be 6 × 1 or 6 ft. tons, or from Humber's work on strains we have:

$$m\,x = \frac{w\,z\,x}{l}\left(l - v - \frac{z}{2}\right)$$ in which $m\,x$ = the moment of rupture at any point, $x$; $w$ = distributed load per unit of length; $z$ = the length of the load; $l$ = length of clear span; $x$ = horizontal distance between left abutment and the point at which the moment is to be found; $v$ = distance from the load to the left support.

In the case above $b$ is the point at which the moment of rupture is wanted, $a\,b = x = 6$; and $a\,b = v = 6$; $z$ = 8 feet, $w = \frac{2}{8}$ tons = ¼ ton, $l$ = 20 feet. By substitution $m\,x = \frac{\frac{1}{4} \text{ ton} \times 8 \times 6}{20}\left(20 - 6 - \frac{8}{2}\right)$ = 6 ft. tons. If the whole load were concentrated at the center the $m\,x = \frac{w\,x}{2} = \frac{2 \times 10}{2}$ = 10 ft. tons. With the load distributed as outlined above the moment of rupture at the center would be obtained from the following formula: remembering that in this case $v$ and $z$ have the same values as before, but $x$ = 10, $m\,x = \frac{w\,x}{2}\left(2\,z + 2\,v - x - \frac{z\,(z + 2\,v)}{l}\right) - \frac{w v^2}{2}$, or

$$mx = \frac{\frac{1}{4} \times 10}{2}\left(2 \times 8 \times 2 \times 6 - 10 - \frac{8(8 + 2 \times 6)}{20}\right) - \frac{\frac{1}{4} \times 36}{2}$$ = 8 ft. tons; so the conclusion from this is, that with the load distributed as it is, a beam eight-tenths of the strength of a beam loaded at the center would be sufficient, then by the formula well known, calculate the beam required to sustain such a load concentrated at the center, observing the same proportions, a beam eight-tenths of the area found would be ample. Formulæ for safe loads for rectangular timber posts of best seasoned white pine are, for factor of safety of 5, as follows: Square bearing — safe load = $\frac{1120}{1 + \frac{L^2}{550d^2}}$; for pin and square bearing, safe load = $\frac{1120}{1 + \frac{L^2}{378d^2}}$; $L$ = length of post in inches, $d$ = width smallest side in inches. Shaler Smith's formula is for the breaking load of white or yellow pine: square the length in inches; square the breadth in inches; divide the first square by the second one; multiply the quotient by 0.004; to the product add 1; divide 5000 by the sum The various formulæ in use are to a large extent based upon data derived from experimental research. The strength of posts depends upon their degree of seasoning, one-eighth to one-sixth of its crushing load should be the calculated safe load in practice. In regard to beams to be loaded otherwise than uniformly, a good method is to find its moment of rupture at the point of the beam lying in the plane of the center of gravity of the load, and what the moment of the same load would be if concentrated at the center of the beam, establish the ratio between the two and apply that ratio to the beam calculated for the load at the center to obtain the sectional area of the beam required.

A CORRESPONDENT writing to one of our exchanges concerning the frequency with which men employed in shops are more or less injured by reason of cuts or bruises, cites the following instance as showing the curative qualities of a rag glued on a flesh wound: "A man was running a boring machine with 1¼ inch-auger attached; by some means the sleeve of his shirt caught in the auger, bringing his wrist in contact with the bit, tearing the flesh among the muscles in a frightful manner. He was conducted to my department (the pattern shop), and I washed the wound in warm water, and glued around it a cloth, which, when dry, shrunk into a rounded shape, holding the wound tight and firm. Once or twice a week, for three or four weeks, I dressed the wound afresh, and it was well. The man never lost an hour's time in consequence. The truth of this statement hundreds can testify to. I use, of course, the best quality of glue."

### Books for Architects.

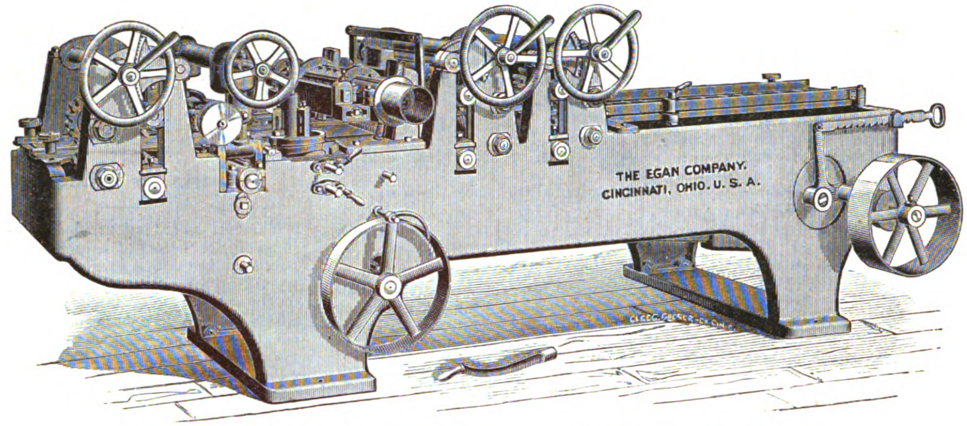
The editor of this journal is frequently in receipt of letters of inquiry from correspondents in various sections of the country asking for a list of books suitable for use by students of architecture, and which would be found valuable, if not essential, for their library. A really satisfactory answer to such an inquiry is attended with many difficulties owing to the absence of specific information as to existing conditions in individual cases and the large number of publications treating upon this important topic. Knowing the progress a student has already made in the direction in which he is seeking knowledge, it is a comparatively easy matter to suggest books which may be of assistance to him. Considering the question in a broad and liberal manner, we cannot do better perhaps in this connection than to direct the attention of our friends in the trade to a list of books which, in the opinion of the readers of one of the leading architectural journals of this country, are valuable acquisitions to the library of the student of architecture. Some months ago the *American Architect and Building News* invited its readers to vote upon the 20 books which, in their opinion, architects can least afford to do without. The result is presented herewith, the books being given in the order to which they are entitled by the number of votes each received. We also append the prices:

I. Ferguson, James, "The History of Architecture in all Countries." 2 vols.......$7.50
II. Gwilt, Joseph. "An Encyclopædia of Architecture." 1 vol. ................$17.50
III. "The American Architect and Building News" (weekly)..... ............$10, $7, $6
IV. Viollet-le-Duc, E. "Dictionnaire raisonne de l' Architecture Francaise, du XI au XVI Siecle." 10 vols.
V. Smith, Colonel. "Notes on Building Construction." 3 vols................ ......$13
VI. Trautwine, J. C. "Civil Engineer's Pocket-Book." 1 vol......................$5
VII. Clark, T. M. "Building Superintendence." 1 vol...............................$3
VIII. Violet le Duc, E. "Discourses on Architecture." 2 vols..........................$15
IX. James, Owen, "The Grammar of Ornament." 1 vol.................. .........$25
X. Rosengarten, A., "Hand-Book of Architectural Styles." 1 vol...................$4
XI. Kidder, F. E., "Architects' and Builders' Pocket-Book." 1 vol., 1885 ............$3.50
XII. Webster, Noah, "An Unabridged Dictionary of the English Language."....$12.50
XIII. Ruskin, John, "The Stones of Venice." 3 vols..................... ..........$4.50
XIV. Gilmore, J. Q. A, "Practical Treatise on Limes, Hydralic Cements and Mortars." 1 vol...................... ....... ......$4
XV. Ware, W. R., "Modern Perspective." 1 vol. Plates in portfolio ................$5
XVI. Baldwin, W. J., "Steam Heating for Buildings." 1 vol.......................$2.50
XVII. "The Builder." London: 1843 to 1886. Per year ...............................$6.33
XVIII. Haswell, C. H, "Engineers' and Mechanics' Pocket-Book."...................$4
XIX. Billings, J. S., "Ventilation and Heating." 1 vol........ . ............ ...$3
XX. Ruskin, John, "The Seven Lamps of Architecture."........................$1.75
XXI. Parker, J. H., "Concise Glossary of Architecture." 1 vol............. . .....$3

# NOVELTIES.

### Fast-Feed Flooring Machine.

The Egan Company, of Nos. 221 to 241 West Front Street, Cincinnati, Ohio, have just brought out and are introducing to the trade, a new improved fast-feed flooring machine, a general view of which is presented in Fig. 1 of the engravings. This machine, the makers state, has been designed especially for fast work, and the parts are so arranged that adjustment is rapid and convenient. The frame is well made, being curved and heavily ribbed on the inside, which gives it great rigidity. The cutting cylinders employed are constructed of the best quality steel. These are slotted on all four sides, and each side is provided with a knife. The journals are long, of large diameter and revolve in self-oiling boxes, lined with the best material for the purpose. The feed consists of six 7-inch feed rolls, all heavily geared by the new system adopted by the makers of the machine. All the rolls are driven by internal and external gearing, without expansion links, each upper feed roll being made to lift parallel, which gives an even pressure across the surface of the board. The pressure bars are of improved design, and so arranged as to adjust in and out, on each side of the cutting cylinder, giving, it is claimed, all the advantages of an inside molder, and enabling the operator to do very smooth work. The matcher spindles run in long connected bearings, and the matcher hangers have separate adjusting screw and locking device to allow for width of stock to be cut, and also for the purpose of insuring equal wear on the bed. For the purpose of holding the stock firmly in place while matching is being done, adjustable hold-down brackets are provided. The bed-plate is so constructed that when necessary it may be removed for truing up. When it is desired to examine or sharpen the knives the independent beader and pressure bar for the lower cylinder may be swung to one side by simply taking out a single pin. The company manufacture two sizes of this machine which work 9 and 14 inches wide respectively and on either three or four sides.




*Novelties.—Fig. 1.—Fast-Feed Flooring Machine.—The Egan Company, Cincinnati, Ohio.*

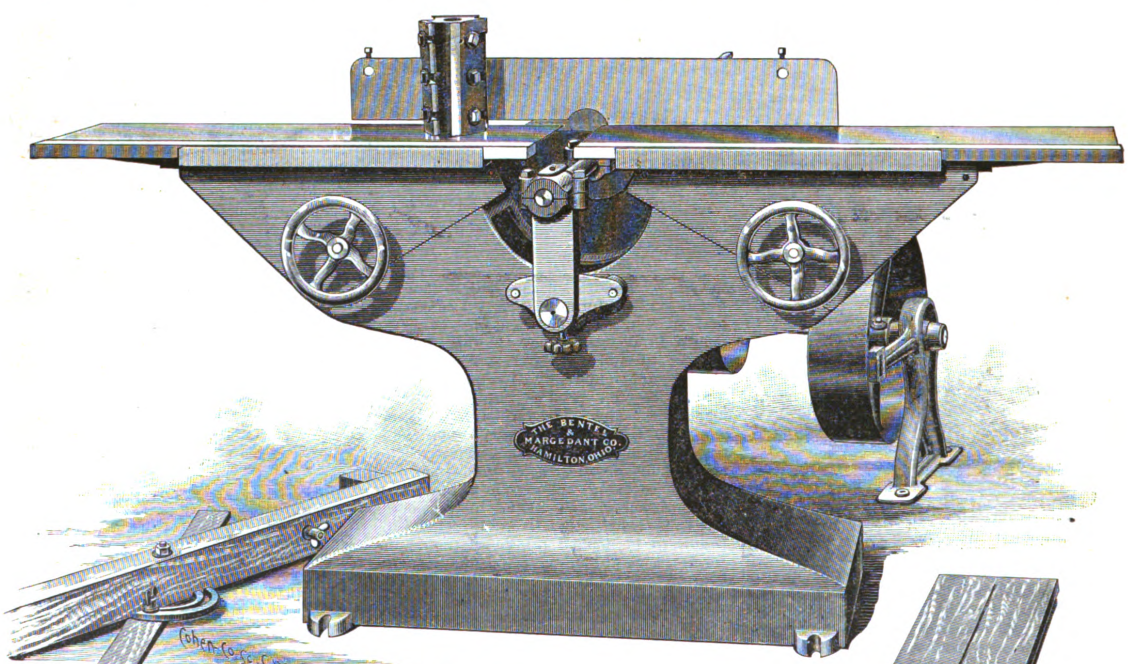
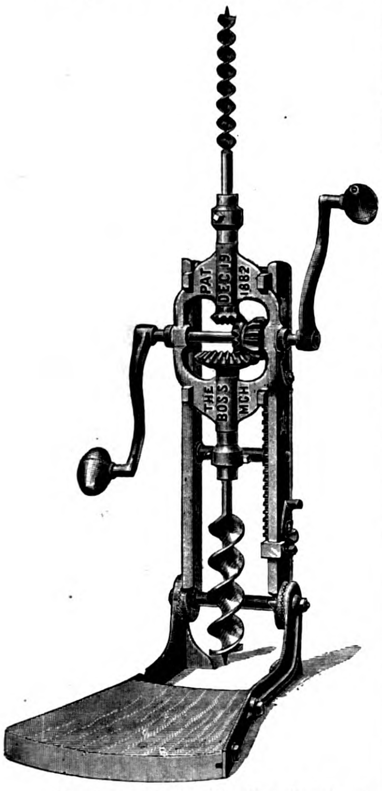



*Fig. 2.—Economy Universal Wood-Worker, Built by Bental & Margedant Company, Hamilton, Ohio.*

### Economy Universal Wood Worker.

The Bentel & Margedant Company, of Hamilton, Ohio, are offering the trade a new Universal wood-worker, a general view of which is shown in Fig. 2 of the accompanying engravings. The machine is substantially built in all its parts, the frame being cast solid with its heavy base. The two tables are provided with angular supports, and are alike in adjustment and general arrangement. A solid cast bracket rests with planed ways on strong V-slides mounted on the inclined tops of the frame. The table tops move in slides on top of the brackets, and, it is stated, may be set to any distance from the mandrel. The brackets are adjustable to and from the cutterheads by raising and lowering in an oblique direction. The table tops are each 36 inches long and 12½ inches wide, including the recess in front, 3 inches wide, for receiving the gaining frame. The adjusting hand wheels are in front, where they are within convenient reach of the person operating the machine. The fence and bevel rest are adjustable in and out, and can be set to any bevel. The mandrel is 1½ inches in diameter, and is provided with a removable outside bearing which, it is claimed, affords a firm and rigid support for the mandrel at high speed. The journal box is 5 inches long, and the support consists of a heavy projecting shaft and two dowel pins, all of which are slightly tapered toward the end. The holes of the bearing are also more or less tapered, the




*Novelties.—Fig. 3.—The Boss Two-Speed Boring Machine, Open.*

construction being such as to give a full bearing on the whole length of shaft and dowel pins and an accurate fit. When so desired, a boring and routing table, similar to that employed on the company's solid and double Universal wood-worker, is provided. With the machine above described is furnished a 9-inch patent triangular shear-knife cutterhead, a view of one of which is shown on top of the machine illustrated herewith. The countersink is furnished with tight and loose pulleys of the company's patent differential pattern, the loose one being smaller than the tight one. The tight pulley has a face of 5¼ inches and a diameter of 10 inches. The weight of the machine is about 1100 pounds.

### The Boss Two-Speed Boring Machine.

This machine, which is represented in Figs. 3 and 4, is put on the market by J. H. Osborne & Co., Union City, Ind. Its special feature is indicated in its name, and consists in the fact that it can be run at two different speeds, a comparatively slow speed for large augers and a speed

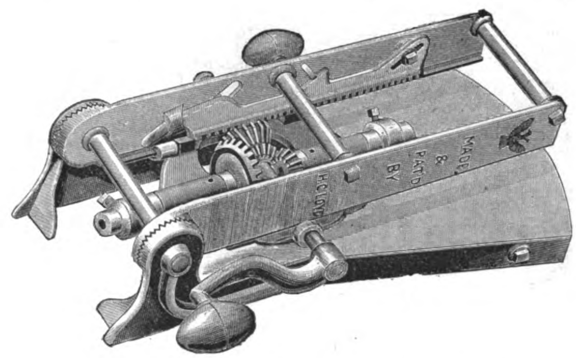



*Fig. 4.—The Boss Two-Speed Boring Machine, Folded.*

two and a half times as great for small augers. The manner in which this is accomplished is indicated in Fig. 3, which shows clearly the mechanism of the machine. Two augers may, if desired, be kept in the machine, to use either of which it is only necessary to point it downward by first raising the gear frame out of the main frame, inverting and replacing it, keeping the cog gearing on the right-hand side of the machine. It will be observed that the machine will bore at any angle, and that it may be folded up compactly, as shown in Fig. 4. The advantage that results from having a different speed suited to the size of the auger bit used will be appreciated, and it is placed on the market by the manufacturers in confidence that it will be found to meet the wants of the trade. The quality of the workmanship is also alluded to, and various improvements which have been incorporated in the machine. The point is also made that there are no springs or shifting gear to get out of order.

### The Perfect Radiator Valve.

A radiator valve designed to overcome the common objections of leaky stems, by which carpets and ceilings are often damaged and other considerable injury occasioned, has just been put upon the market by Curtis & Co., 140 Centre street, New York. In Fig. 5 a general view of the Perfect radiator valve is shown, while its internal construction is illustrated in Fig. 6. The special feature of this valve is that it is made without stuffing box, packing or ground joints, the metal diaphragm shown in Fig. 6 taking the place of those and preventing the leakage of water. The diaphragm is made of phosphor-bronze, which, as is well known, is a very strong and durable alloy. By the use of this diaphragm and by means of the lever-arm arrangement, a slight movement is sufficient to open the valve. The valve shuts off with a pressure behind it, making it absolutely tight at the seat. It is stated that a test of two years has established the reliability of this device, and has proven the fact that it will not leak. The manufacturers further state that the valves open and close easily. The Perfect radiator valve is made in ten different styles, of ¾, 1, 1¼, and 1½ inch size.

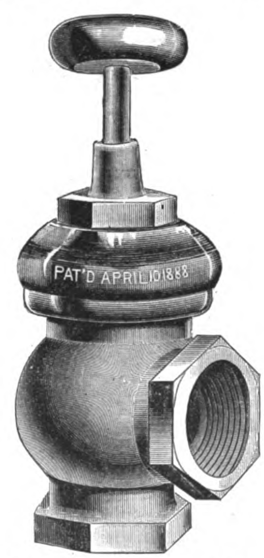



*Fig. 5.—General View of Valve.*

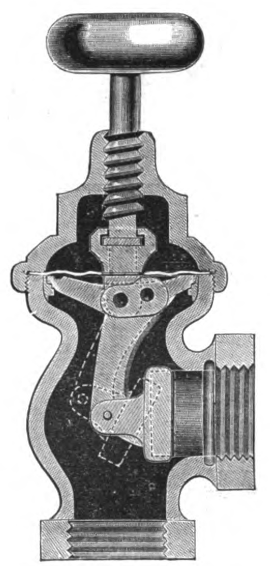
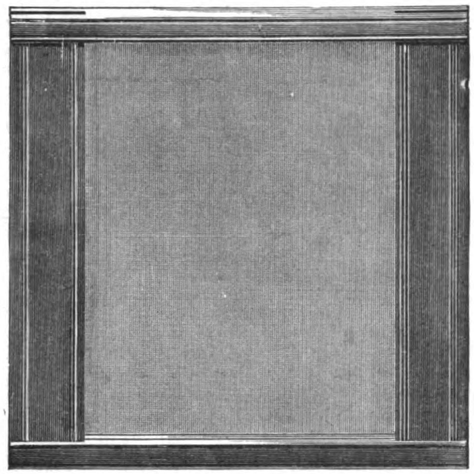


*Fig. 6.—Sectional View.*

THE "PERFECT" RADIATOR VALVE.

### The Bonanza Adjustable Window Screen.

This screen, manufactured by A. J. Phillips & Sons, Fenton, Mich., is represented in Fig. 7 of the illustrations. As will be inferred from the cut, this frame has two movable wings 3½ inches wide, one on each side of the frame, by which means it is adjusted to windows of different widths. The proper movement of these wings is controlled by slides top and bottom, which are covered by the caps the whole length of the frame, the slides being thus entirely concealed, making a plain and unbroken front and back. Both the wings and the frame are beaded on both sides. The screens are made of bass wood, well finished and dipped in oil, thus showing the grain of the wood. The Cortland wire cloth of standard mesh and quality is used. The manufacturers advise us that their object is to produce a well made article at a lower price than they can offer their hard wood line of screens. Three sizes of these screens are made as follows: No. 10, 20 inches high, and No. 11, 24 inches high, both of which adjust from 24 to 30 inches in width, and No. 12, 24 inches high, which adjusts from 30 to 36 inches in width.



*Novelties.—Fig. 7.—The Bonanza Adjustable Window Screen.*

### Wrought-Iron Pipes in Plumbing.

The accompanying sketch, Fig. 8, is a sample of wrought-iron pipe for plumbing purposes which is being sent to the Government of the Argentine Republic for approval, by the Durham House Drainage Company. From this it appears that the question of the strength and quality of soil and other pipes to be used in plumbing and sanitary engineering is at present under general discussion. One of the difficulties in the use of wrought-iron threaded pipe is the taking of correct measurements by the mechanic, and it is doubtful if this can be overcome, except by the more general use of such pipe, by which mechanics will be educated into the proper way of ascertaining the measurements. While this want of knowledge exists, the expense of cutting threads on large pipes, 3-inch, 4-inch and 6-inch pipes, by hand deters the average plumber from using wrought-iron pipe. One of two events will have to take place before wrought-iron pipe is in general use—viz., either the mechanic will have to be capable of taking correct dimensions, so that all threads on pipes may be cut by power and not by hand, or the introduction of a joint which will dispense with the necessity of cutting threads on large pipes, and equally strong. The manner in which the threads are now cut on pipes for plumbing purposes is more exact, and it is done with more care than is generally used in threading pipes for steam pressures. Fig. 9 shows an improvement in fittings for house purposes. The thread is cut right to the bottom so that the pipes may abut for a certainty against the shoulder in fitting in a solid manner leaving no space. Fig. 10 shows the recess which has been used up to the present time. As to the strength of wrought-iron pipe, when comparing it to cast-iron pipe, there is no question as to its superiority, and the durability of wrought iron in soil pipes, it may be said, is also proved. Some wrought-iron pipes have now been in use nearly ten years, and there is yet no sign of failure on account of corrosion or rust. When either of the obstacles above referred to are removed wrought-iron pipe will probably become as much in general use in plumbing as the cast-iron pipe of the present day.

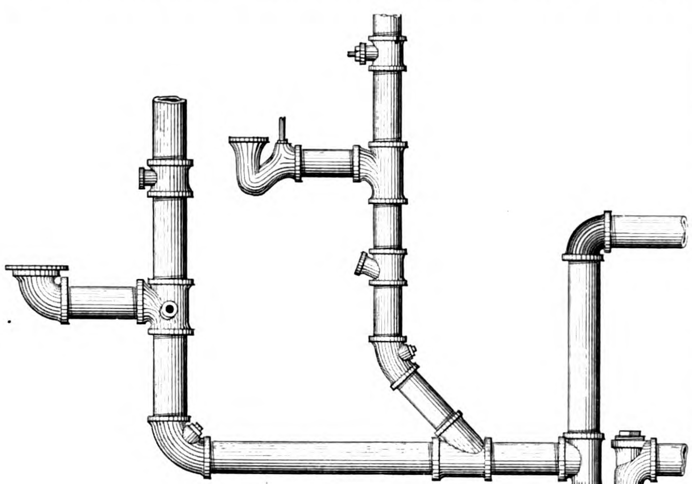


*Fig. 8.—Sample of Piping to be Sent to the Government of the Argentine Republic, Buenos Ayres, South America, by the Durham House Drainage Co., New York.*

*Fig. 9.—Improved Fitting with Thread Full to Inside.*

*Fig. 10.—Old Style of Fitting with Recess at Inside End of Thread.*

### North's Sash Fastener.

This article is manufactured by North Bros. Mfg. Company, Philadelphia, Pa., under patents August 7, 1887, and March 13, 1888. The appearance of Nos. 40, 41, 60 and 61 is shown in the accompanying illustration, from which it may be inferred its construction is especially simple. It will be seen that the bolt is operated by a lever of sufficient length to be powerful in its action and rendering it easy to draw the sashes firmly into postion. The end of the bolt which engages with the keeper on the upper sash is made of such a form as to cause it to take hold when the upper sash is slightly below its proper level and to simultaneously raise and draw it close to the other sash, where it is firmly held when the lever is down, as shown in the cut. The manufacturers call attention to the fact that the fastener is very strong and practicably unbreakable at the locking point; that it contains neither rivets nor screws to work loose or break; that no part of it projects from the front of the sash to interfere with blinds and screens; that it is easily attached; that it presents a neat appearance, contrasting in this respect favorably with other sash fasteners on the market; and that it has received the approval of architects and builders. It is made in a variety of patterns, of iron and solid bronze.

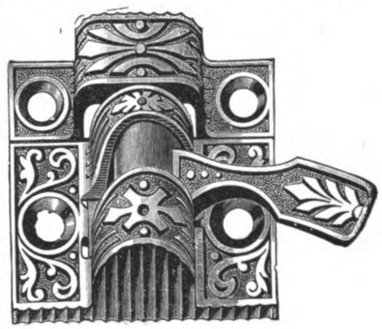
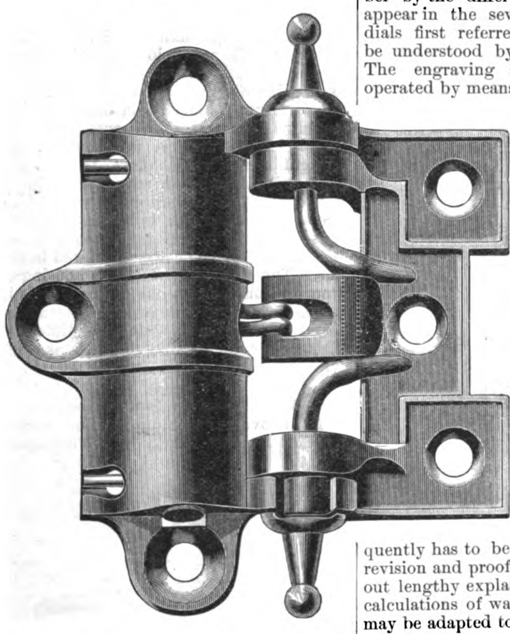


*Fig. 11.—North's Sash Fastener.*

### New Idea Spring Hinge.

The accompanying illustration represents full size the New Idea Spring Hinge, which is put on the market by the Stover Mfg. Company, Freeport, Ill. It indicates satisfactorily the construction and special features of the hinge, in which, it will be observed, are some new features. The manufacturers lay special stress upon the fact that the hinge holds the door strongest at the closing point; that the spring is covered, protecting it from the weather;

that there is an exceptionally light amount of strain upon the spring while in actual use. Enlarging upon one of these feat-



*Novelties.—Fig. 12.—The New Idea Spring Hinge.*

ures, the company explain that the spring has three to four times more resistance at the closing point than others on the market, and that the resistance gradually decreases in opening the door. The hinge is also referred to as subject to less than one-half the actual working strain of any other. The illustration given represents the No. 1 hinge, a No. 2 being also made larger and stronger, 4 x 4 inches, which is intended for use on large doors.

### Wages Calculator.

The Willis Mfg. Company, of No. 157 Broadway, New York, have introduced to the trade a device for readily computing

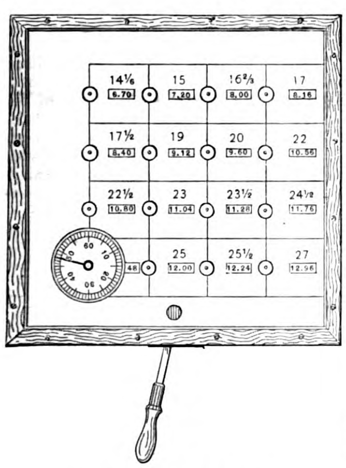



*Fig. 13.—Wages Calculator.*

the wages of workmen, a view of which is shown in the accompanying cut. It consists of a series of paper dials, on which are printed the amounts for different numbers of hours at different rates, so connected by internal mechanism that when an auxiliary dial of hours is turned to any required number the amount of that number by the different rates per hour will appear in the several openings over the dials first referred to. This will at once be understood by reference to the cut. The engraving shows the mechanism operated by means of a handle with a peculiar crank connection. The device is also manufactured operated by a center button. The sample before us has on one side rates $14\frac{1}{16}$, 15, $16\frac{2}{3}$, 17, $17\frac{1}{2}$, 19, 20, 22, $22\frac{1}{2}$, 23, $23\frac{1}{2}$, $24\frac{1}{2}$, 25, $25\frac{1}{2}$ and 27 cents per hour. The opposite side of the device is provided with a corresponding number of rates, rendering the calculator susceptible of use in an establishment with the widest range of wage prices The advantage to the bookkeeper or time-clerk in having something of this kind for use in figuring, something which frequently has to be done with no time for revision and proof, will be manifest without lengthy explanation. In addition to calculations of wages the same mechanism may be adapted to various other uses.

### Gaskill's Patent Water Lifter or Motor.

In Fig. 14 of the engravings is shown a general view of an engine designed for pumping water from cisterns into supply tanks for bathrooms, kitchens, &c., where cistern water is preferred to the public supply. This motor is provided with two cylinders, one being of the nature of a hydraulic engine and the other a pump—both supplied with air-chambers. The inside cylinders are of bronze, as well as all the working parts, and every lifter is thoroughly tested before leaving the company's works. The water from the street mains is brought to the engine, and, after having there performed its work, may be used, the manufacturers state, for irrigating lawns or other purposes that do not require it to be raised to any considerable hight. The pump takes the water by suction from the house cistern and delivers it into an attic tank, and, by placing the lifter between the street mains and inside water openings, it may be made to do service each time water is taken from the pipes. It is stated that in the same manner water taken from windmill tanks may be made to pass through the lifter placed in the house, and do the pumping of all cistern water before being distributed to other points. In order to avoid waste of water, the makers, the Goulds Mfg. Company, of Seneca Falls, N. Y., suggest the desirability of having a valve in the supply pipe of the power cylinder, to be operated by a float in the tank, so that as soon as the tank is filled the engine will be stopped, and again started when the water in the tank is drawn down far enough for the float to operate the valve. The company make two sizes of this motor, No. 1 having a capacity of about 300 gallons per hour, and No. 2 a capacity of about 100 gallons per hour. In the directions for placing the apparatus the statement is made that the lifter may be put in the cellar or in the kitchen, as drip pan and brackets for the latter position are provided. The city water or supply is connected to the ½-inch opening in the base of the air chamber of the engine end of the lifter, the ½-inch hole beneath being the exhaust or waste, which can be run into the sewer, or a bibb cock can be placed in this pipe and the house supply drawn from it. This machine has been fully tested, and is said to be giving very satisfactory results wherever employed.

### The Victor Radiator.

Among the new forms of radiators for steam and hot water recently put on the market is the Victor radiator, offered to the trade by the Kelly & O'Hara Mfg. Co., 160 Broadway, New York, the radiator being the joint invention of Mr. Patrick J. Kelly and Mr. Thomas W. O'Hara. A general view of the double-loop radiator is shown in Fig. 15, while a sectional view of one of the loops is presented in Fig. 16, the latter illustrating by arrows the course of the steam. The radiator is constructed in sections, each consisting of one or more inverted U shaped tubes and a hollow base, the interior of the latter being divided into compartments, corresponding and connecting with the ends of the tubes. Each loop is

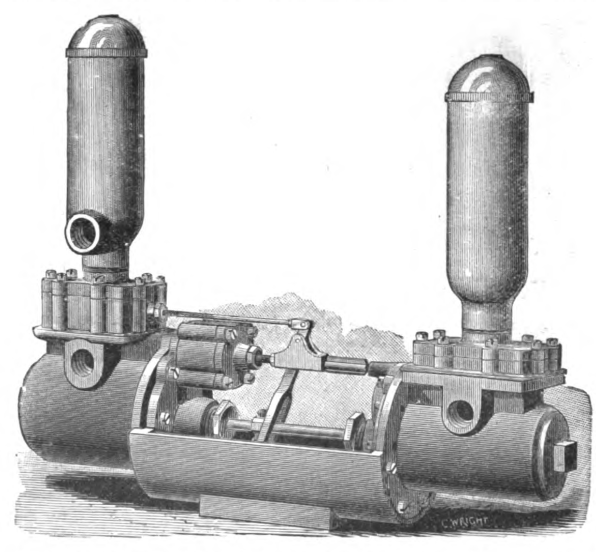
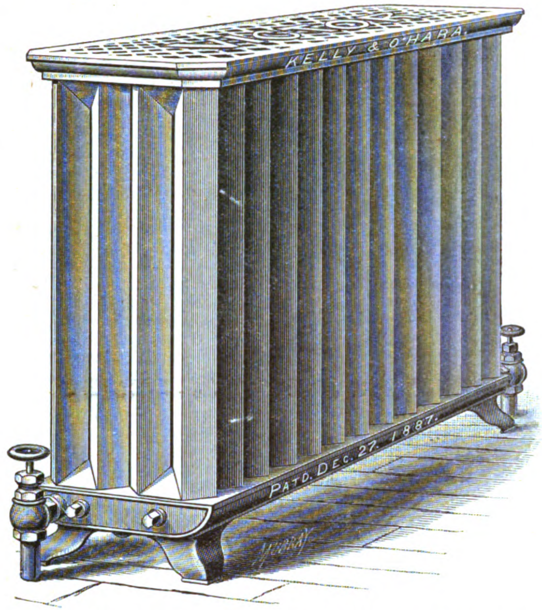



*Fig. 14.—Gaskill's Water Lifter or Motor.—Goulds Mfg. Co., Seneca Falls, N. Y.*

cast in one piece, and the loops, we understand, are capable of being so joined together that either steam or hot water




*Novelties.—Fig. 15.—General View of the Victor Radiator.*

may be circulated through them in a direct and continuous current. The steam, as shown, passes up one channel, down the middle, across the bottom, up the right-hand side and finally down again on the outside, and passes through the next section through the opening shown at the lower right-hand corner. In the next section the direction of the current is

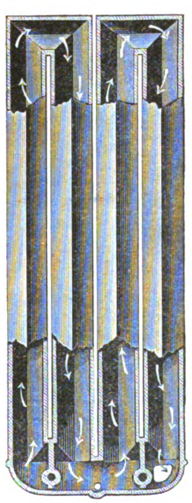


*Fig. 16.—Sectional View of Loop.*

exactly the reverse, and the steam passes on to the third section from the opposite lower corner, the connections between the loops being at alternate corners. By referring to Fig. 15 it will be seen that the flow and return pipes are connected at diagonally opposite corners of the radiator. The claims made for this apparatus are that it secures a continuous and perfect circulation of the heating agent. Provision is made for collecting and carrying off the water of condensation by channels through the base, by which means it is prevented from flowing or obstructing the course of the steam through the tubes. The radiator illustrated consists of unornamented tubes, 2 inches square, set diamond-wise in direct rows. The sections, or loops, are connected together at the bottom by long bolts extending the entire length of the radi ator. The ends of these bolts are shown in Fig. 15, while the sockets through which they pass are indicated on the broken view, Fig. 16. According to the circular issued by the Kelly & O'Hara Mfg. Co., the Victor radiator is made in one row of loops 6 inches wide, and in two rows of loops 12 inches wide. The one-row radiators are from 24 to 42 inches high, and contain from 2 to 20 loops, the extreme heating surface being from $4\frac{3}{8}$ to 85 square feet. The two-row radiators have from 4 to 40 loops, are from 24 to 42 inches high, and contain from $9\frac{1}{8}$ to 170 square feet of heating surface.

### Gwinner's Patent Common Sense Caster.

We illustrate herewith a new caster which is being manufactured and placed on the market by Gwinner, Dowrey & Co., of Hamilton, Ohio. The Reading Hardware Company, 73 Wabash avenue, Chicago, are agents for the sale of this caster west of Buffalo. As will be seen from the cut, this is a two-wheeled caster. It is intended for use on all kinds of furniture, from the smallest center table to the heaviest book cases, &c. Only two screws are required to hold it in place. The caster above the axle consists of three pieces, which are held together without screws or washers, but are so loose as to be capable of rotating and oscillating as the furniture is moved over uneven floors, on extra thicknesses of carpet, &c. The weight of the furniture is thrown on the upright stem, which plays in a socket back of the axle, thereby preventing a direct thrust downward which would bind the stem and cause it to rotate with difficulty. The extent of oscillation is shown in that part of the caster exhibited in the cut. The play allowed in the housing or frame would permit one of the wheels in a No. 7 caster to pass over an obstruction about $\frac{1}{2}$ inch high without difficulty. This caster, of all sizes to No. 7, is made with either iron or lignum-vitæ wheels.

### The Practical Saw Jointer.

The above article is put on the market by Danforth & Pike, 114 Washington

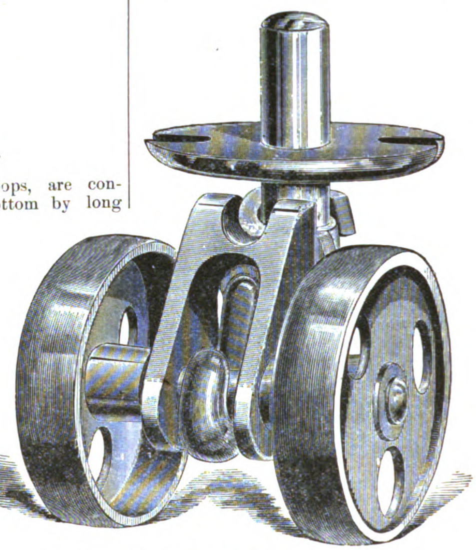


*Fig. 17.—Gwinner's Patent Common-Sense Caster.*

street, Boston, Mass. It is used on the saw as shown in the accompanying illustration (Fig. 18). The file in the slot is adjustable so that the full width of the file may be utilized on one side, then the file reversed and used in the same way until it is all worn out. This tool is referred as making a great saving in time, and to insuring accuracy in jointing the teeth

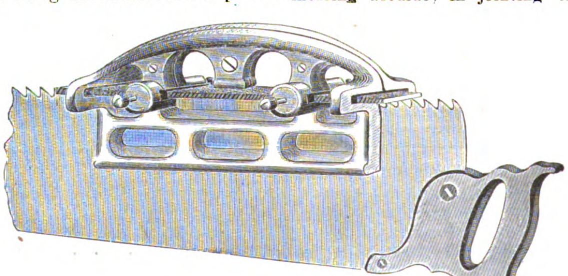
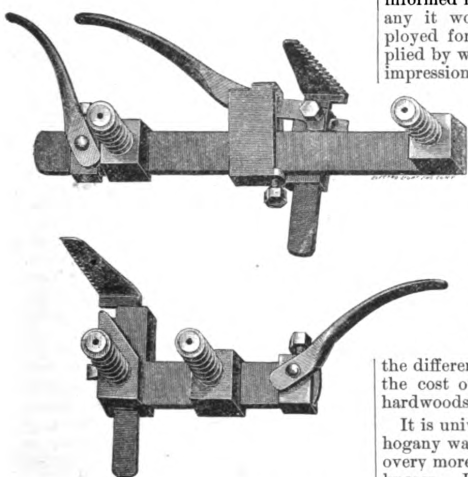


*Fig. 18.—The Practical Saw Jointer.*

to an equal length. The ease and facility with which it can be used, as well as its simplicity and effectiveness, are alluded to.

### The Davis Bench Dog and Clamp.

We show on this page engravings of a new form of bench dog and clamp brought out by F. N. Gove, 16 Exchange Place, N. Y. It is of simple and substantial construction, and will be found useful in a variety of ways. Fig. 20 represents the device in position on a bench, holding a board, while Fig. 19 shows rear



*Novelties.—Fig. 19.—Clamping Mechanism of the Davis Bench Dog and Clamp.*

views of the clamping mechanism. It will, no doubt, be readily understood that the two grooved projections on each dog, which resemble screws, one of them being movable laterally, are slipped into two adjoining holes in the side of the bench at approximately the desired distance apart. Pushing down the end levers then brings into operation a cam on each of their ends, which acts on the movable projection, causing the dog to firmly grip the bench. The clamp adjustment is easily and quickly made, the clamp, as shown in the upper of the two cuts, marked Fig. 19, having a lateral travel of several inches. It also is firmly clamped by pressing down a lever. This, by means of a toggle action, causes the serrated clamp proper to slightly move both forward and downward sufficient to securely hold the board. The set screw shown at the bottom is for the purpose of taking up wear on the bar along which the clamp fixture is moved. The serrated clamps are capable of being set at different hights, set screws holding them in place.

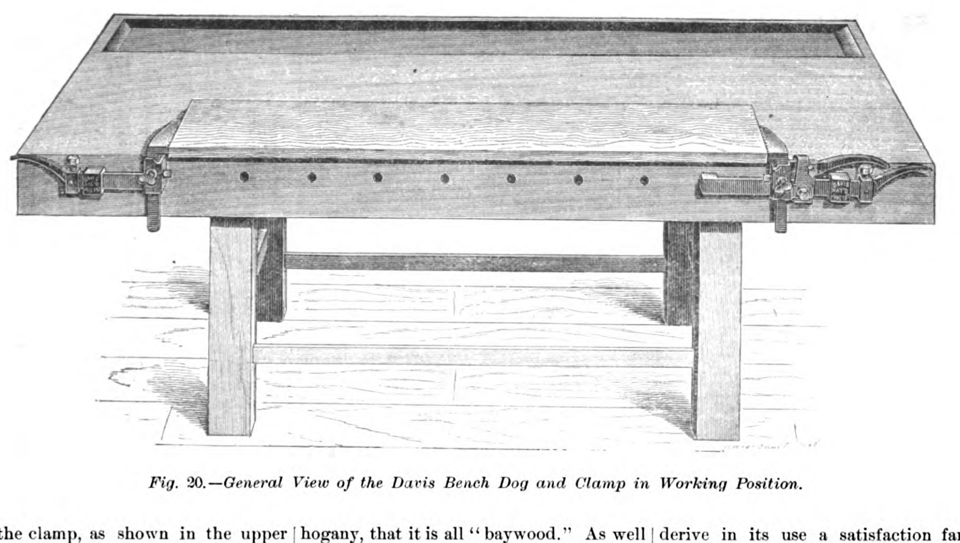


*Fig. 20.—General View of the Davis Bench Dog and Clamp in Working Position.*

### A Few Facts About Mahogany.

It appears to be the general impression among those at present engaged in the lumber trade that if the public was better informed regarding the merits of mahogany it would be more extensively employed for purposes which are now supplied by woods of other description. The impression also prevails that mahogany is an expensive wood and can only be employed by those possessing deep pockets, but such is not the case. The facilities for procuring mahonany in its native country and the devices for reducing it into lumber have so improved, that its cost to-day compares favorably with some of the domestic hardwoods, notably cherry. The cost of working mahogany is certainly not greater than any of the domestic woods, and computing for any given work the difference in price of the raw material, the cost of mahogany over the domestic hardwoods will be found to be small.

It is universally acknowledged that mahogany warps less, stands better and is in overy more reliable than any other wood known. It is also a wood that grows more beautiful with age, other woods getting dull and deteriorating in appearance. Mahogany has been called the "king of woods," and it imparts to an interior a tone and richness that is conceded by all. Will not, therefore, the intrinsic value of a private residence or a public building finished in mahogany warrant the use of this wood at a greater difference in cost than we have here set forth ?

Inasmuch as there appears to be a vast deal of misinformation regarding mahogany, we are led to place before our readers a few facts. One is sometimes met with the assertion that there is no mahogany, that it is all "baywood." As well might one argue that there is now no black walnut from the fact that it is no longer supplied but to a small extent from Ohio and Indiana, but largely from the Indian Territory. Thirty years ago mahogany was commercially designated as "St. Domingo," from the Island of St. Domingo, and "baywood" or "bay mahogany," from the vicinity of the Bay of Honduras in Central America. The Central American wood was rightly condemned as being too soft, of light weight, straight grained and characterless; in later years it has practically ceased coming to this market, but one cargo having arrived at the port of New York, now the largest mahoghany market in the work, in six years. St. Domino mahoghany likewise exists, we may say, in name only. The original growth of the Island of St. Domingo has long since been utilized, and the importation of small lots at exceedingly long intervals are only of the small and stunted growth, crooked, stained and defective. Individual logs of good size and quality are only now and then to be secured. The markets of the world are now, therefore, principally supplied from Mexico. The island of Cuba furnishes considerable quantities of a smaller size, more especially valuable for small work, which is hard and of good texture, but the great bulk of the mahogany used in later years is supplied from the forests of Mexico. This great area of country, however, produces not only our largest and most beautiful grades of mahogany, but also some of the softer and less desirable grades, somewhat resembling the baywood or Honduras mahogany of olden times, though still better.

This we regard as an important fact to be noted by architects and others interested in the use of mahogany, for here arises the difference of opinion on our Mexican mahogany of the present day, some claiming it is soft and unlike genuine mahogany, and others that it is hard and beautiful in texture. It is both, as we have explained. Let the architect or householder specify "Frontera Mexican mahogany, or similar," and if the specifications are followed the result will be all that can be desired. Frontera is the shipping point for the better grades of Mexican mahogany.

In the erection of buildings of all classes there is in general a steady advance toward improvement. In recommending the use of mahogany we believe the simple statement of facts is sufficient to warrant its adoption, and architect and client will derive in its use a satisfaction far outweighing the small advance in cost.

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AN EXCHANGE gives a plan for deadening floors. Fill the empty parts between the joiner works with liquid lime thickened with chloride of zinc. This will prevent noise, fire, vermin, and the house will be rendered healthy. Workmen using this preparation should wear guarded spectacles and wash their hands well.

# TRADE NOTES.

EIGHT HOURS A DAY'S WORK is claimed not to be so much a matter for legislation as it is of careful selection of tools with which the work is to be done. This is the statement made to carpenters by the Stanley Rule and Level Company, and they try to back up the statement by abundant illustrations in their advertisement on another page in this issue.

THE LUFKIN RULE COMPANY, of Cleveland, Ohio, are distributing among their friends in the trade a large circular containing a number of illustrations of their leading manufactures, among which is included the Perfection glass board. The cuts are all numbered and will be furnished to such customers of the concern as desire any of them for use in connection with catalogues or other advertising matter.

ARTHUR S. JENNINGS, whom many of our readers know on account of his articles on architectural and building topics, has recently become editor of the paper called *House Building and Decorating*, published in Philadelphia. Mr. Jennings brings to his new position broad experience and many qualifications which should render him eminently successful.

KELLOGG, JOHNSON & BLISS, 108 and 110 Randolph street, Chicago, have issued an illustrated price list of wood-worker's tools in the shape of a handsome volume of 154 pages, bound in stiff paper covers, and presenting a bewildering variety of illustrations of tools used by carpenters, cabinet makers, carvers, bridge builders, ship carpenters, lumbermen, &c. Large as the list of contents is, the firm say that it falls far short of what they carry in stock, as they make a specialty of tools. Full directions how to order are printed in the preface. An excellent feature of the book is an alphabetical index giving the names of all the tools mentioned and the pages on which they are to be found described. The last 15 pages are devoted to a full line of special net-cash prices, in which the several sizes of each article are quoted separately. The book is an extremely valuable publication for mechanics, who will find in it many tools not frequently brought to their notice, but whose value to them will at once be recognized. The firm have printed a limited edition of the work, and therefore prefer to confine its distribution to the Northwest, including Michigan and Indiana, that portion of the country being their natural territory.

THE HENRY MARTIN BRICK MACHINE MFG. COMPANY, Lancaster, Pa., whose advertisement appears on another page, inform us that they have just closed a very prosperous season. There has been a large increase in sales over last year of their brick machinery, and orders have come from all parts of the world, even from so remote a portion as Africa. They keep up with the latest improvements and have the best facilities for filling orders.

E. W. FISHER, of No. 18 Broadway, New York, has recently issued an interesting circular devoted to an exposition of the merits of Stettin Portland Cement, which has been in use in this country for a little more than three years. The claim is made that this cement is always uniform, is finely ground, of good color and well calculated to give entire satisfaction. It has been recently tested by the Dock Department of New York, and its tensile strength, both neat and gauged, with two parts standard sand, at the end of seven days was found to be high. Last year, it is stated, between 10,000 and 15,000 barrels of this cement were used in St. Augustine, Fla., in the construction of some large hotels and in the restoration of the old Spanish Cathedral.

GOODELL & WATERS, of 3101 Chestnut street, Philadelphia, Pa., are pushing the Amesbury Band-Saw Filer, which is adapted to file saws up to 2 inches wide and teeth up to 5/8 inch from point to point. It can be worked either by hand or power, and is intended to set on an ordinary bench, with the saw suspended overhead.

THE HENRY MARTIN BRICK MACHINE COMPANY, of Lancaster, Pa., in their advertisement which appears in another part of this issue, illustrate their brick machine, which they claim to be the strongest, best and latest improved machine in the market. Over 1000 are said to be in use. Those of our readers who are interested will want catalogues, which can be had on application.

THE GURNEY HOT-WATER HEATER COMPANY, Boston, Mass., in their advertisement on another page of this issue, announce a change in the location of their New York agency, to 88 John street, corner of Gold. Mr. M. H. Johnson still continues to be their selling agent for New York.

THE S. A. WOODS MACHINE COMPANY, 91 Liberty street, New York, with offices at Boston and Chicago, announce in their card in this issue that they have recently issued a new illustrated catalogue of their well-known wood-working machines, which they are prepared to send to all applicants free of charge.

THE GOULDS MFG. COMPANY, of Seneca Falls, N. Y., with New York office at 60 Barclay street, in their card appearing in another part of this issue, make the statement that they desire to place their new No. 20 illustrated catalogue and price list in the hands of all responsible dealers in hardware, agricultural implements, stoves and tin, plumbing supplies in the United States who have not already been supplied with a copy. Their catalogue is described as a complete treatise on pumps, engines and hydraulic machinery, illustrating their adaptation to manual, animal, wind, water, steam, oil, gas and electric power.

THE GAGE TOOL COMPANY, of Vineland, N. J., are making use of a rather humorous return card upon the envelopes used in conducting their correspondence. The face of the envelope contains a perspective and sectional view of their new self-setting plane, accompanied by directions to the Postmaster, which read as follows: "Shove me back in one day to Vineland, N. J., if not delivered."

THE PULLMAN SASH BALANCE COMPANY, Rochester, N. Y., present in another part of this issue the ordinary form of their balance, and point out that it takes up very little room in frames and entirely obviates the necessity of weights. They also mention that it is as easily applied to old as it is to new frames and obviates the necessity of pockets in the frames.

J. J. SPILKER, 45 Central avenue, Cincinnati, Ohio, presents in this issue a cut of the Spilker Adjustable Joint Cutter, of which, he states, over 2000 are at present in use by manufacturers of frames, cabinet-work, furniture, &c., including planing mills. An illustrated price list and catalogue is offered to all applicants.

THE SPRINGFIELD IRON WORKS, Springfield, Mass., solicit correspondence with the trade with reference to ornamental and building iron, iron and steel structural work, bridges, fire escapes, &c.

A NEW LINE of screw-drivers, one variety of which is illustrated in their card in another part of this issue, is being introduced to the trade by J. H. Sternbergh & Son, of Reading, Pa. The screw-drivers are neat in appearance, strong in their parts and well adapted for the purposes for which they are intended. The ratchet variety is automatic in action and possesses such features as are likely to be appreciated by all who employ it.

IN ANOTHER PART of this issue, James G. Wilson, 907 Broadway, New York, directs attention to Venetian blinds, wood mantels and other goods of which he makes a specialty. The reputation of the Wilson blinds is already well-known to many of our readers.

WE HAVE RECEIVED of Mr. E. W. Fisher, of No. 18 Broadway, New York City, a circular relating to Francestown Soapstone, which is intended for use as a hard finish for plastering, being in effect a substitute for the plaster of paris or sand finish commonly employed. The statement is made that this material will not chip—crack; that it is impervious to moisture, gases and stains; that it can be washed without injury to either surface or color, and that on account of its non-absorbent qualities it can be decorated without the customary sizing. It is put up in barrels of 300 pounds each, and when mixed and applied according to directions, we are informed, will cover 100 square yards. Mr. Fisher states that the material is specially adapted for the walls of institutions, and that it has been so used in the Johns Hopkins Hospital in Baltimore. We understand that it has also been specified for the walls of Christ's Hospital, now in course of erection in Jersey City.

THE CINCINNATI CORRUGATING COMPANY, of No. 147 Eggleston avenue, Cincinnati, Ohio, request all roofers to correspond with them before placing orders for plain or corrugated iron and steel roofing, siding, ceiling, arches, lath, &c. They make a specialty of these goods, and are prepared to furnish estimates promptly.

THE CANTON IRON ROOFING COMPANY, of Canton, Ohio, have been reorganized, and will hereafter be known as the Canton Steel Roofing Company. The new concern will give attention to all kinds of iron and steel roofing, siding and ceiling, and request the trade to write for catalogue and price lists.

IN ANOTHER PART of this issue Charles A. Strelinger & Co., Detroit, Mich., wish their customers and friends a Happy New Year, and make a pleasing allusion to Oliver Twist in their desire for still more friends and patrons. Their No. 12 catalogue, to which special reference is made, is something in which all of our readers will feel an interest.

THE AMERICAN TOOL COMPANY, of Canton, Ohio, are calling the attention of carpenters and builders to the advantages possessed by their saw sets, which are offered at very reasonable prices. The makers state that samples of the tool will be forwarded by mail on receipt of price.

A NEW ESTABLISHMENT in the roofing business is the Kanneberg Roofing Company, of Canton, Ohio, who make a specialty of steel roofing, siding, ceiling, &c. They are at present engaged in the preparation of a catalogue, which is expected to be ready for distribution about January 15.

THE BOARD OF EDUCATION of Yonkers, N. Y., have recently appointed Mr. James H. Monckton, of Brooklyn, teacher of the classes of architectural drawing as applied to pecarntry and joining, established a short time ago in that place. Mr. Monckton is well qualified, by reason of long experience, to assume the office to which he has been appointed, and we have no doubt that the arrangement will prove mutually advantageous. He has also for a long time past had charge of the mechanical class, which includes all mechanics except machinists, at the General Society of Mechanics and Tradesmen, on East Sixteenth street, New York City.

# NEW PUBLICATIONS.

FIRST LESSONS IN WOOD WORKING. By Alfred G. Compton. Illustrated. 188 pages. Stiff boards. Published by Ivison, Blakeman & Co. Price 50 cents.

In the preparation of this work it has been the aim of the author to so present the matter as to assist teachers of elementary classes in manual training. The subjects treated include: Cross-cutting, splitting, whittling, or paring with a knife Splitting, cross-cutting or hewing with axe or hatchet. Fibers or grain of wood explained and illustrated. Strength of wood tested by the aid of a small testing machine. Sawing across the grain of wood with a cross-cut saw. Sawing lengthwise, or with the grain of wood, using a rip-saw. Sawing with a back saw or tenon saw. Use of bench hook. driving a nail. Manner of using a hammer in driving nails and drawing nails. Use of fore-plane, jack-plane and smoothing-plane. Sharpening plane-bitts. Adjusting cap of plane-bitts. Use of gauge. For measuring purposes a 2-foot folding rule, metric and the English on opposite sides. Planing to thickness and planing end wood Metric measure. Working drawings, sketches, sections, shading to indicate sections, broken lines. Isometrical drawing. Making a nailed box. Marking with a trying square. Use of brace and bitts—boring. Use and care of oil-stone. Grinding chisels and plane-bitts. Treatment of warped or winding surfaces. Use of two strips of wood prepared with straight and parallel edges to detect winding surfaces To prevent or modify by construction the effects of shrinkage in wood. Glue-pot. Preparation and use of glue. Use of a bevel. Dovetailing. Use of mallet. Making a box with its sides and ends dovetailed together. How to use hand screws. Fitting hinges. Use of brad-awl and screw-driver. Making mortises and tenons. Chamfering. The use of the plow. Making a battened door. Making a single-panel door. The panel set in the plow-grooved frame, the frame mortised and tenoned together. Finishing with sand paper and shellac. The author says that the series of lessons in woodworking presented is intended principally for use in schools in which handwork is pursued as a part of general training. The order of sequence is designed to lead the pupil from one tool to another of larger capabilities and from one operation to another requiring a higher degree of skill. The work being designed for young pupils, it is not intended to go over much ground, nor to impart great skill, but simply to open the way, reserving for another volume a more extended course. With the exercises in the use of tools have been interwoven observations on the properties of the materials used and elementary principles of mechanical drawing, with the idea that the three studies thus blended together would lend help and stimulus to each other, and thus be pursued with more zest than if taught separately. The details of every operation are plainly stated, and their completeness, together with the cautions and hints to the pupil could only come, it would seem, from a skilled and experienced mechanic. The knowledge and practice brought to the pupils by the aid of "First Lessons" may give "manual training," but if this same course of training were given our apprentices, it would be regarded as most excellent mechanical training; and when introduced in its completeness to the boys of the public schools as part of a necessary education, would certainly lay the foundations of a future race of mechanics much superior to those of the present.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



VOLUME XI. NEW YORK, FEBRUARY, 1889. NUMBER 2

## NOTES AND COMMENTS.

THE SEASON is rapidly approaching when building operations will be actively resumed in various sections of the country, and architects and builders alike are interested in the outlook for the year in their respective lines of business. The field is being carefully surveyed with a view to ascertaining the improvement likely to be experienced as compared with the year just closed, and preparations made in accordance with the results reached. Considering the reports of several of the leading cities of the country the opinion seems to be warranted that building operations the present year will show a gratifying increase as compared with the work accomplished during 1888, and that the improvement will consist more in the erection of small dwellings in cities and towns of moderate size than in the construction of magnificent business blocks in the larger cities. Various causes conspire to this opinion, principal among them being the fact that a large proportion of the manufacturing expansion is likely to be made in the smaller cities and towns where the inducements are greater than in the larger cities where real estate is high and taxes in proportion. Those engaged in the various lines of trade which are allied to that of building are making preparations for a season of increased activity, and all the present indications seem to point to a sharp demand for building material of all descriptions.

THE TERRIBLE STORM which visited different parts of the country about the middle of the second week in January caused the destruction of numerous buildings and the loss of many lives. One of the severest disasters, so far as buildings are concerned, and also so far as loss of life and limb is concerned, occurred at Pittsburgh, in which several structures in the business center were demolished. It is, perhaps, premature to assign any reason for the destruction of these buildings, and the escape of others similarly exposed, until all the facts have been carefully considered and a formal verdict rendered. Up to this writing this has not been done. We may be excused for asserting, however, that, at first blush, bad workmanship would seem to be the primary cause. The Pittsburgh papers, in referring to the disaster, are free to charge the blame to the practice, which they say has been increasing of late years, of erecting high brick walls during the winter season when the mortar cannot set unless artificially dried—in other words, in frosty weather. This general subject has much interest for our readers, and has been variously discussed all over the world the last few years. It seems to be pretty generally conceded that brickwork can be safely erected in the winter season provided the lime be of the best quality, and is used fresh, so that the heat generated in the slacking may prevent the freezing, but perhaps it was done otherwise in the case in point. We shall await the verdict of the coroner with interest.

PRESENT INDICATIONS seem to warrant the belief that the year 1889 is likely to witness an increasing degree of activity in the building trades in this city and vicinity. Although the growth has been rapid during the past few years there is still plenty of room for dwellings and business blocks in the upper portions of Manhattan Island, and plans for new and handsome structures are already under way. Among the new work which is now contemplated, the Cathedral of St. John the Divine excites a deep interest on the part of arthitects and builders. The plans for the *World* building on Park Row have been accepted. Two fire-proof structures are to be put up in Wall street, the Union Trust Company will build at 78, 80 and 82 Broadway, while St. Luke's Congregation and Trinity Church Corporation will expend several hundreds of thousands of dollars in extending facilities for worship. Taking the situation as a whole, it is confidently expected that both in volume and quality building operations will show a greater degree of activity than for some years past.

WHEN THE Queen Anne style of architecture started its popular career a few years ago, the taste of the people was quiet and sensible, and numberless cottages and houses were built in which the picturesque features of this notable style were wrought out with pleasing effect. But Americans are nothing, if not progressive, and in the might of material knowledge they soon reached the conclusion that the architects of Queen Anne's reign, though well advanced for their day and generation, needed to have their ideas elaborated a bit and brought into conformity with the principle of modern art, which is to make the biggest show for the least money. So it has come about that cathedral windows built up of broken bottles and remnants of the blue glass craze temper the bright sunshine that floods the 3 by 4 stairway landing or serve as a gorgeous framing for the cottage door. But if a thousand dollar mansion is rich in bottle glass translucencies, it must, to have everything in keeping, be provided with a *porte-cochère*, even though the owner return home afoot at the blowing of a factory whistle. Furthermore, no reasonable chimney will do, but it must be half the breadth of the house, exposed without, and carried up, far up above the hight of adequate efficiency. If the thickness for economy's sake be but 4 inches, it is no matter, so long as the broad expanse of red brickwork is there to claim our outdoor admiration.

THIS SAME HOUSE if built in the latest fashion, a nineteenth century Queen Anne style, must have nailed to the outside walls queer, wooden sunflowers and other absurdities, conventionalized out of all likeness to anything in heaven or earth. And, finally, when the house is all built the painter is called upon to color it into the semblance of a washed-out Italian sunset. We are treated to a light sky blue piazza, a misty pink clapboarding, and the whole crowned with a shingle roof of the color of the sun seen dimly through a cloud, while here and there around the fringes are streaks of pale yellow and faint green. Such houses with their unreasonable features of construction and silly decorative gewgaws outrage every canon of true art, and are the veriest traversty of the picturesque style of the last century. Let us hope that absurdity in this particular expression has reached its climax, and that hereafter dwellings will be planned simpler and in better taste. The revival of the old colonial architecture will aid in correcting the evil, but we fear that even this primitive American style will be altered and debased as it becomes increasingly popular. "Let well enough alone," is advice that can often be followed to advantage in the arts; and while we may sometimes modify a style with good effect, its exaggeration is always foolish and absurd.

IN A RECENT ISSUE we invited our readers in general to write us what they thought of the paper. We have received a large number of responses, and take this occasion to thank our correspondents for their courtesy in this regard. Those who have not yet written us are still invited to send their opinions forward. We have asked for such favors in the past, and some of our readers may think that it is gratuitous to again appeal to them for their views, but the success of *Carpentry and Building* is largely due to the fact that the Editor thus seeks the opinions of his readers from time to time and always strives to meet their expressed wishes. He has ever been willing to take them into his counsel and to act upon their advice and suggestions. Without such assistance in the future he will be unable to manage the paper as satisfactorily as in the past. Accordingly, the question cited is proposed now, and very possibly it may be repeated in the future for the same reason. The Editor will be glad to have those write who have suggestions to make and criticisms to offer, and such letters will be just as welcome as those which come from readers who are well satisfied and have the willingness to say that they are pleased with the paper.

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THE PLAN of grouping the separate, narrow and crooked flues of which chimneys, as at present constructed, are composed, is meeting with considerable adverse criticism among architects and builders, and various methods are offered as substitutes. One which seems to commend itself to more than passing attention is to build the chimney with one large flue running from the cellar to the highest available point, with branches from each floor extending upward and connecting with the main flue. In this manner an upward draft would be at all times maintained with little, if any danger, of counter currents. So far as the simple principle of ventilation is concerned, it is urged that the building of one large main flue, into which all branches are carried direct from each floor or apartment, is the only true and safe method by which present evils can be overcome, and the lungs be spared from the poisonous gases they are now forced to inhale, the fact being well established that no gases are more poisonous than those of sulphureted hydrogen or coal gas when permeating a dwelling.

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A SHORT TIME ago the Commissioners of the Commonwealth of Massachusetts advertised for designs for a new extension to the State House at Boston, imposing conditions which, in the opinion of many of the leading architects of that city and vicinity, were faulty and not calculated to secure the best architects as competitors. A protest against the form of competition was drawn up and signed by a number of the principal men engaged in the profession, and the matter was taken up by architects in other parts of the country. At the annual convention of the Missouri Association of Architects, held in St. Louis on the 8th and 9th of January, a resolution introduced by Mr. Charles E. Illsley sustaining the protest of the Boston architects in the matter referred to, ennunciating with emphasis the principle that tax-payers have a right to the services of the best architects in the country for the design and superintendence of public buildings, and that the best architects in the country have equally a right to such work without the imposition of conditions which experience has proven to be unnecessary, unjust and alike prejudicial to the public interests and to the advancement of architecture in this country, was unanimously adopted.

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THE QUESTION of technical education is one which is attracting a great deal of attention just at the present time, both in this country and abroad. One of its most enthusiastic supporters is Sir Lyon Playfair, a member of the British Parliament and a man well versed in science. According to his views, the public schools should train the faculties of the working classes by introducing a more extended teaching of drawing, by the use of tools, by popular scientific lectures and by more practical lessons in arithmetic. In London, at the Finsbury School, instruction is given in evening classes to young men actually engaged during the day in trades or manufactures, and science and art are applied to the explanation of their own special industries. Thousands of young working men in London give up their evenings to acquire this knowledge, and the large and busy manufacturing towns throughout Great Britain one after the other are establishing local technical schools. Weaving and dyeing, bricklaying, tailoring, watchmaking and many other industries are thus being taught, so that the workman may be the master of whole of his trade and not merely of some one small division of it. Technical schools now teach workmen, foremen and managers the scientific principles lying at the base of all industries. The results are visible on all sides. While Coventry and Spitalfields were losing their silk industries, Crefeld, in Germany, spent over $1,000,000 on its lower schools and nearly $250,000 on a special weaving school, doubled its population, quadrupled its trade, and now sends to England the silks which were once such a profitable branch of employment for its own weavers. France has schools for apprentices, Germany for foremen, Munich has spent $1,000,000, Berlin $2,250,000 on great polytechnic institutions, and the United States is rapidly establishing them throughout the country.

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THE THIRD Annual Convention of the National Association of Builders will be held in Philadelphia on the 12th, 13th and 14th of this month. The programme which has been issued is a varied and interesting one, and a general discussion of the topics likely to come before the meeting cannot fail to result in profit to all who attend. The first day will be devoted to the transaction of general business incident to the real work of the convention. The morning session of the second day will be occupied with a consideration of the reports of a number of important committees, while the afternoon session and that of the following morning will be taken up by the addresses of several well-known gentlemen, who will speak upon topics with which they are thoroughly familiar and which possesses more than passing interest for every carpenter and builder in the land. The importance of the convention will be apparent to every intelligent member of the building profession when we state that the subjects to be considered include, among others, "Uniform Contracts," "Rules and Conditions for Estimating Work," "Permanent Arbitration," "Apprenticeship System," "Uniformity of Measurements," and "Lien Law." Among the gentlemen who will address the meeting may be mentioned James John, of Chicago; Samuel J. Cresswell, of Philadelphia; John J. Tucker, of New York; William H. Sayward, of Boston; O. P. Hatfield, of New York, and Colonel Richard T. Auchmuty, founder of the Mechanical Trade Schools of New York. The closing session of the convention will be devoted to routine business.

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OUR BUILDING ASSOCIATION COMPETITIONS close just as we go to press. A large number of entries have been made, and the studies are in the hands of the judges. We hope to be in a position to announce results next month, although the large amount of work involved will make this somewhat difficult.

## THE PLATES.

In Plate V we present a perspective view of the new structure occupied by the New York *Times*, a description of the architecture of which we publish elsewhere. We are indebted to the *Record and Guide*, of this city, for the engraving.

In plates VI and VII we present a general view of a part of the Exposition Buildings at Paris, the work upon which is being rapidly pushed to completion. The view represents the structure as it appeared some few weeks since, and clearly indicates the character—wrought-iron construction. An inspection of the plate will give the reader some conception of the magnitude of the building, especially if he considers the perspective and notes the distance between the two domes. The celebrated Eiffel Tower is located at a point to the right of what is shown on the plate. This structure is to be carried to a hight of 1000 feet.

Plate VIII shows side elevation and floor plan of an Episcopal Church sent us by a correspondent at Winchester, N. H., a description of which, with front elevation, &c., is given on page 33.

### A Six-Thousand-Dollar Cottage.

The frame cottage presented in this issue by means of elevations, floor plans and details, was designed by Lawrence B. Valk & Son, architects, Tribune Building, New York. It is estimated to cost about $6000, a general summary of the figures being presented below :

MASON WORK.

| | |
|---|---|
| Excavation, 180 cubic yards, at 25 cents | $45 |
| Fifty-three perch of 16-inch stone wall | 212 |
| Concrete footings | 50 |
| Brick walls and chimneys, about 10,500 bricks, at $12 | 160 |
| Area door sill, steps and paving | 36 |
| Iron gratings | 10 |
| Kitchen fireplace | 18 |
| Hearth | 30 |
| Cellar concrete | 23 |
| Plastering, 825 yards, at 30 cents | 247 |
| Sundries—Plaster, cornice and centerpiece | 100 |
| Total | $931 |

CARPENTER WORK.

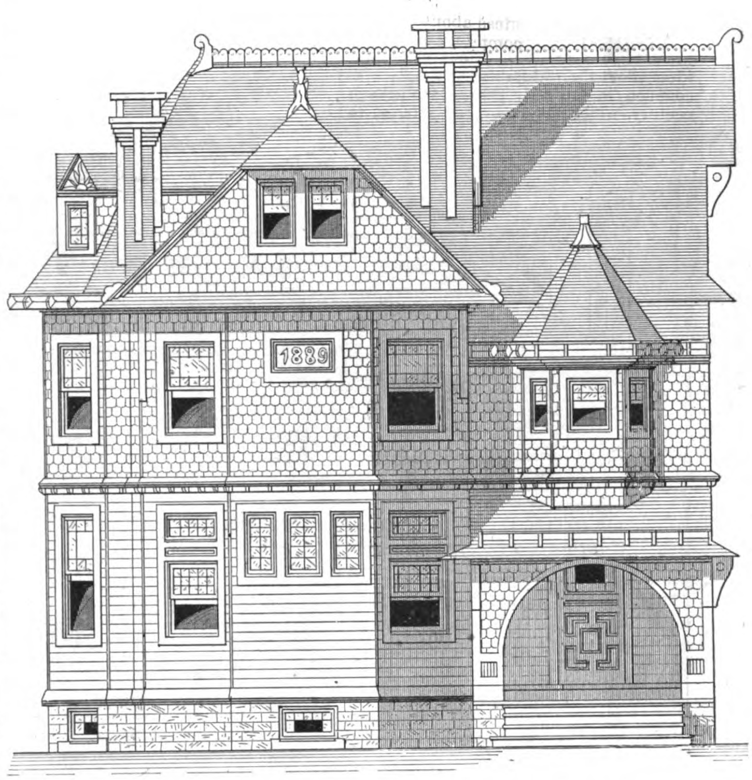
| | |
|---|---|
| Timber and framing, 7000 feet | $450 |
| Bridging | 25 |
| Partitions | 50 |
| Outside boarding | 125 |
| Shingles, roof and lath | 230 |
| Side wall weather boarding | 280 |
| Decorated shingles, gables | 200 |
| Side wall pine shingles | 130 |
| Eaves and linings all round | 120 |
| Gutters and leaders | 114 |
| Outside trim water table, cornice, &c. | 210 |
| Terra-cotta cresting and finish | 42 |
| Floors, porch, &c | 275 |
| Front porch, ceiling, rail and steps | 78 |
| Main staircase | 275 |
| Attic and cellar stairs | 180 |
| Inside base and trim | 198 |
| Pantries and fittings | 145 |
| Window frames and sash | 406 |
| Doors and hardware | 380 |
| Tubs, seats and closets | 95 |
| Refrigerator, coal bin and S. W. C. partition | 70 |
| Total | $4,078 |

SUMMARY.

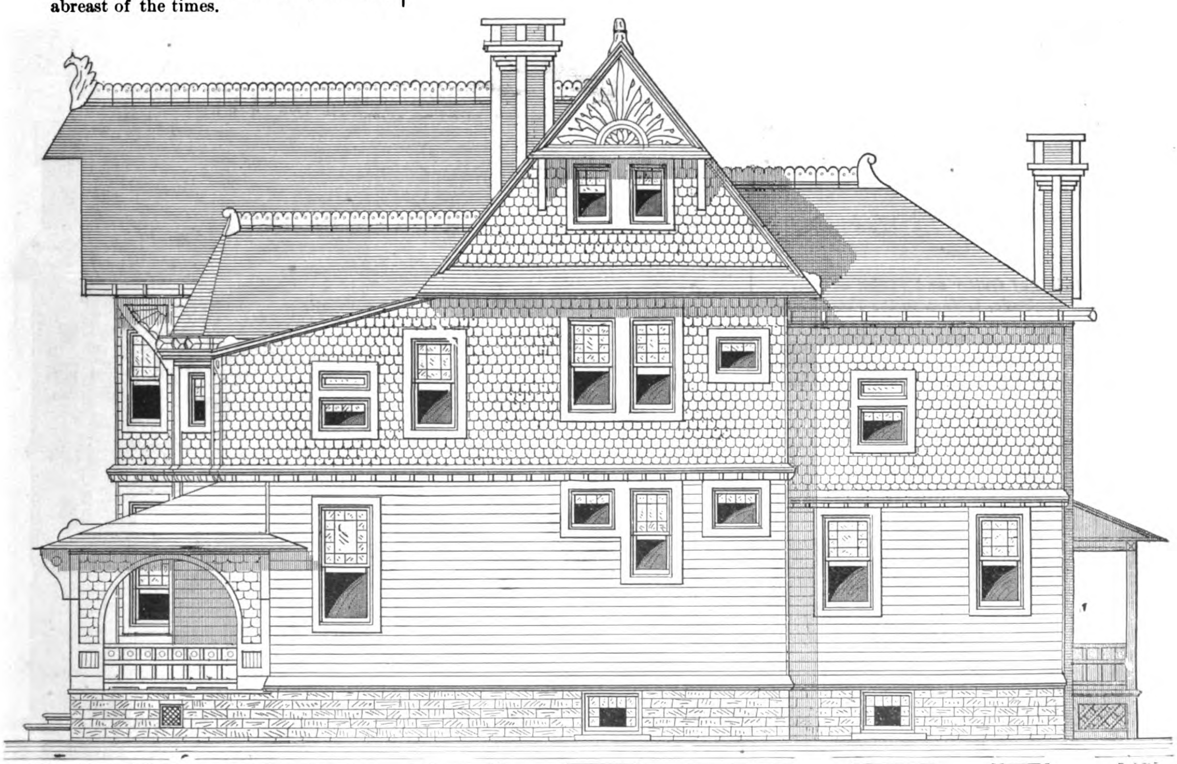
| | |
|---|---|
| Mason's work | $931 |
| Carpenter's work | 4,078 |
| Painting | 325 |
| Plumbing | 350 |
| Heating by one furnace | 280 |
| Architect's fees for plans | 125 |
| Total | $6,089 |

The foundation walls are composed of stone 16 inches thick, supported by an 8-inch hard brick underpinning above the grade line. The cellar extends under the middle of the house and kitchen wing, with an entrance to the rear by an area-way provided with stone steps. The cellar has a large coal bin 7 x 8 feet, and is also provided with refrigerator and shelf. The servants' water-closet also occurs in the basement. The furnace by which the house is heated is shown located in the foundation plan, and the connections are also indicated. The beams are 2 x 8-inches. The framing is done by what is indicated as the "old method." It is covered with diagonal boarding, and outside of this asbestos felt is used. The first story is covered with clear pine 5-inch weather boards. The second story employs round and square end shingles laid in alternate courses. The gables are finished in the same general manner. The roof is covered with Cyprus shingles. An ornamental cresting and finial of terra-cotta is also employed. The inside finish is calculated to be of pine, filled, then rubbed and hard oil finished. The studding is 3 x 4 inches. The floors are of white pine, $1\frac{1}{8}$ inches thick. The kitchen is provided with all modern improvements, and the pantries fitted with drawers and shelves. The glass in the windows is clear American, with a little stained material in the entrance door and the inside sash doors. The architects inform us that everything about the house is intended to be first-class, and that no attempt has been made to make it cheap. The estimate, which is given elsewhere in this issue, we are informed, is made up of prices and figures supplied by a reliable builder, and includes labor. A dwelling of this style and character requires plumbing and a means to heat it, and accordingly these items are included.

The issue of the *Manufacturer and Inventor* for December 15, published by Feilden & Co., of London, contains a special literary supplement, illustrated, which is devoted to reviews of new books, catalogues, cards and periodicals of interest to those engaged in various lines. It is an enterprising journal and its managers spare no effort to keep it fully abreast of the times.




*House Designed by Lawrence B. Valk & Son, Costing $6000.—Front Elevation. Scale, 1/8 Inch to the Foot.*

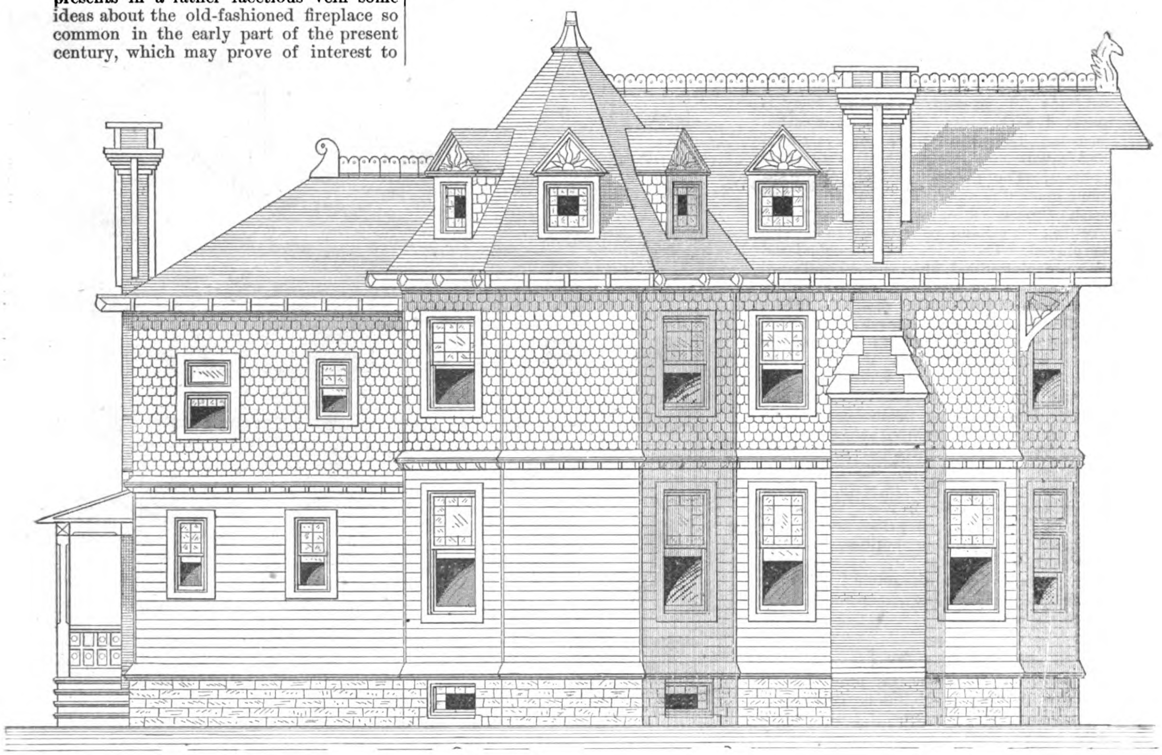


*Side Elevation.—Right.—Scale, 1/8 Inch to the Foot.*

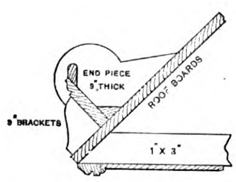
## The Fireplace of our Forefathers.

A clever writer for the Chicago *Ledger* presents in a rather facetious vein some ideas about the old-fashioned fireplace so common in the early part of the present century, which may prove of interest to our readers. He expresses himself in the following language:

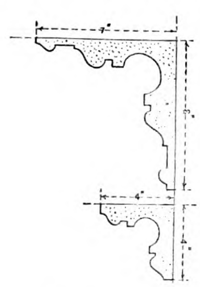
There is something about an old-fashioned fireplace that takes a body by the hand without waiting for an introduction. It don't keep a man standing out in the hall till his nails turn blue, and he sighs a regret that he didn't bring his ear-muffs along; but before he can tell how it is done, it has made him feel right at home, and is communing with him like an old friend with whom he hopes never to part again. It puts him in the best chair and is on the way to the cellar for cider before he can get his hat off. And as he sits there rubbing his hands with an ecstatic sort of feeling, to which no word in our language can give full expression, he feels like giving



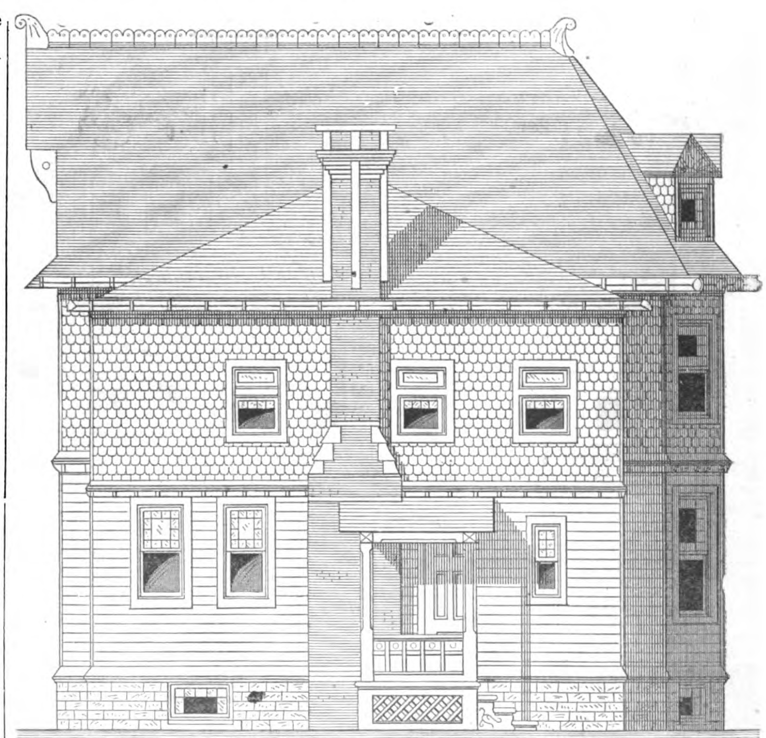
*Side Elevation.—Left.—Scale, 1/8 Inch to the Foot.*




*Detail of Gutter and Finish at Eaves. Scale, 3/4 Inch to the Foot.*

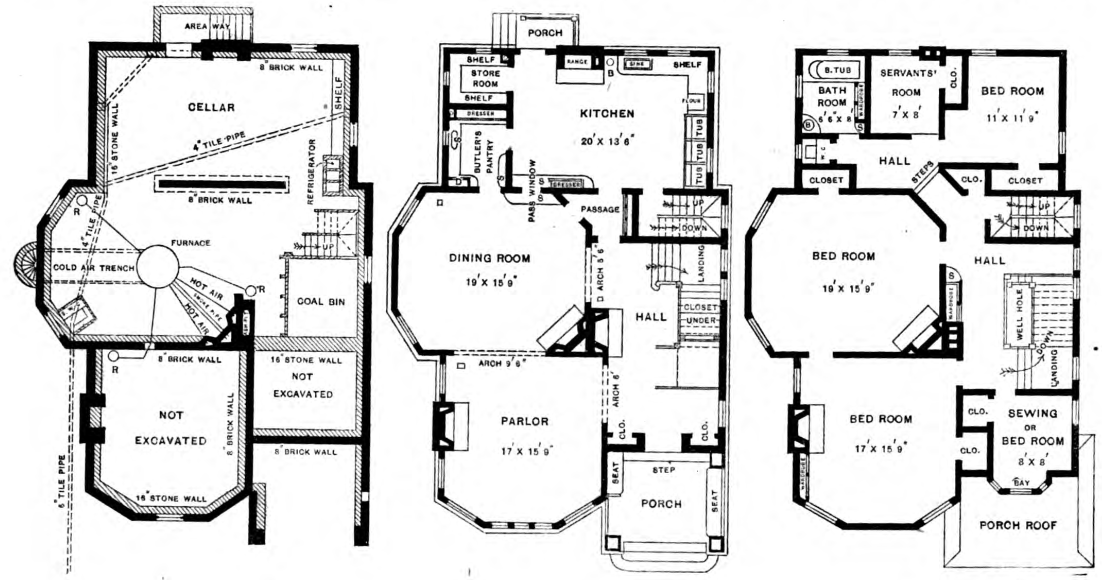


*Plaster Cornice for First and Second Floors. Scale, 1 1/4 Inch to the Foot.*



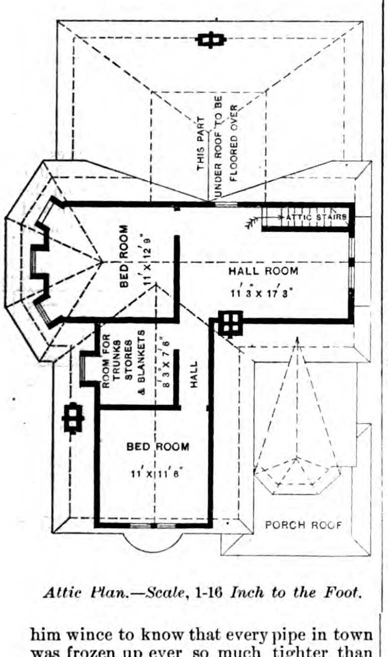
*Rear Elevation.—Scale, 1/8 Inch to the Foot.*

the bulk of his property to the poor before he has been there two minutes. It warms him up with a glow that makes him feel benevolent from his teeth to his toe-nails; quickens up his blood till he almost feels his hair grow, and takes away the fear of death or gives a fascination to fire, which amounts to about the same thing. It matters not to him how cold it is outside—in fact, the colder the better, for the more cheer it gives to the vault of flame before him, and at that moment it wouldn't make him wince to know that every pipe in town was frozen up ever so much tighter than the times, unless he was a plumber; but, bless your soul, a plumber never gets time to go near a fire, except to melt his solder, if he happens to get started on a job before cold weather sets in. The old-fashioned fireplace, with its wide jams to take in logs bigger than a half-grown boy; its high mantel, with a dish of apples on one end and a pitcher of cider on the other, and a panful of nuts in the middle, while a fire, like a dream of love, roars and crackles and sputters and pops just back of the glowing hearth, on which stands the Dutch oven, throwing out a suggestion of a mince pie that seems the very quintessence of toothsome cookery every time the lid is raised, to say nothing of the smell of joy to famine that comes from the mammoth cauldron swinging on the crane, and just fairly begging of you to drop in some time when you are hungry. Is there anything in cast iron that can throw out rapture like this? Will nickel-plated trimmings do it, or bring heaven down the chimney equal to it? Can a dark, bleak hole in the floor—no matter how it may try to scorch and smother you—crowd your home with sunshine on a cloudy day, and make you feel as rich as a pork packer, when you may in reality be swamped in debt up to your eyebrows? Can a gridiron stack of steam-pipe in one corner of the room fill your home with the

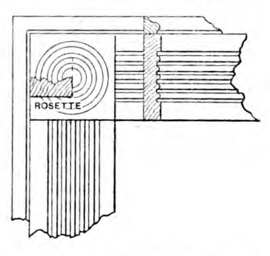



Foundation Plan. First-Floor Plan. Second-Floor Plan.

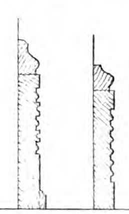
*Floor Plans.—Scale, 1-16 Inch to the Foot.*



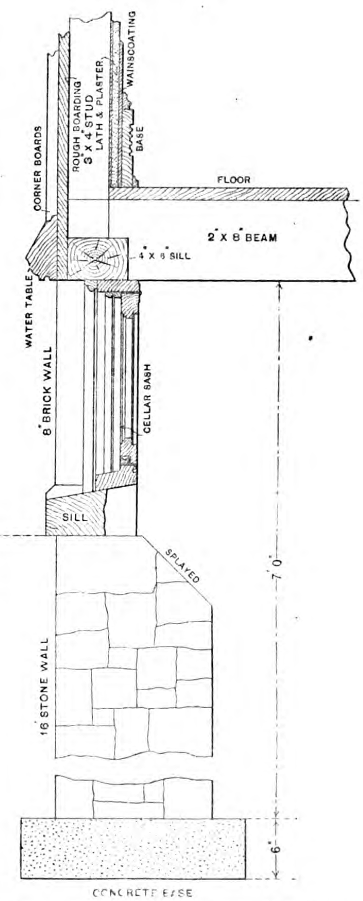

*Attic Plan.—Scale, 1-16 Inch to the Foot.*




*Detail of Door and Window Trim.—Scale, 1¼ Inch to the Foot.*

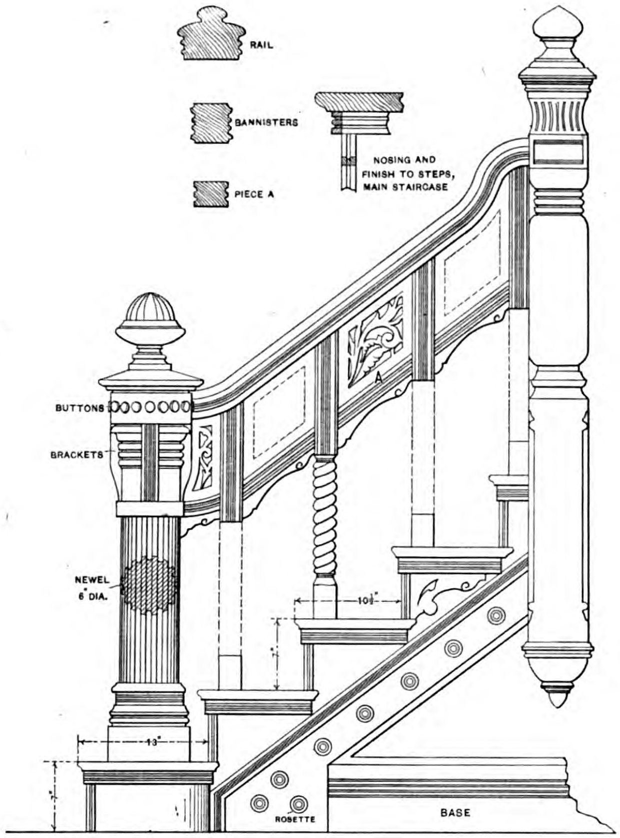


*Base Boards.—Scale, 1¼ Inch to the Foot.*



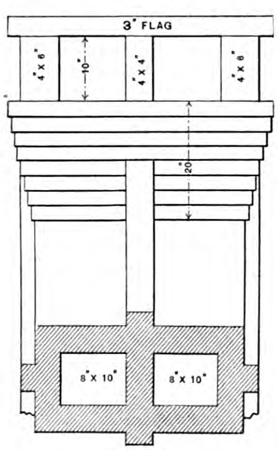

*Section through Basement.—Scale, ¾ Inch to the Foot.*

joyous music of childhood? Can it renew your youth and make sweet cider taste like gin 100 years old? Can it carry you back




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

to the good old days when you could get a barrel of flour for $3, and wear your wedding suit 30 years for genteel use? Can any of these things take the rheumatism out of a man's legs, and make him feel

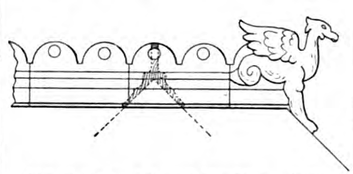



*Detail of Chimney Top.—Scale, ½ Inch to the Foot.*

like dancing a hornpipe even on Sunday? Can they bring back his hair, restore failing eyesight, or put teeth in his mouth equal to any emergency? Can they quicken up his imagination, and make him tell yarns about the good old times when he shouldered a saw-log and made himself bow-legged for life, and other stories of similar import, that no one under 40 will believe? Indeed they cannot, and nothing short of an old-fashioned fireplace on a cold day can do it.

## A Good Cement.

A very adhesive cement, and one particularly useful for fastening the brass mountings on glass lamps, as it is unaffected by petroleum, says one of our readers, may be prepared by boiling 3

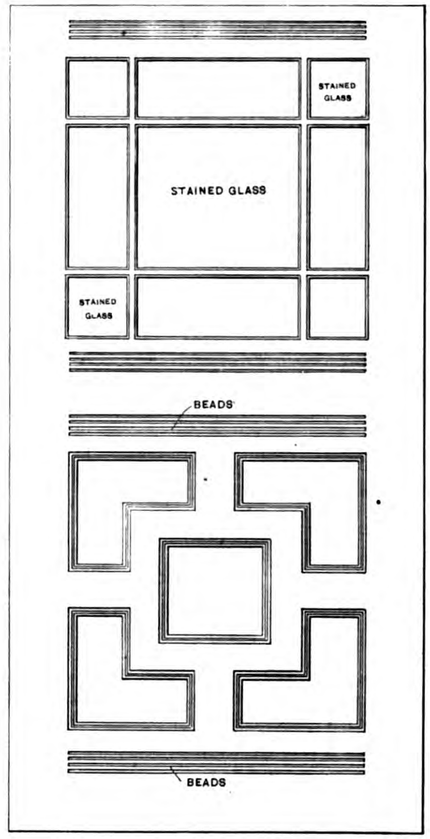


*Detail of Finial and Cresting.—Scale, ¾ Inch to the Foot.*

parts of rosin with 1 part of caustic soda and 5 parts of water, thus making a kind of soap, which is mixed with one-half its weight of plaster-of-paris. Zinc white, white lead or precipitated chalk may be used instead of the plaster, but when they are used the cement will be longer in hardening.

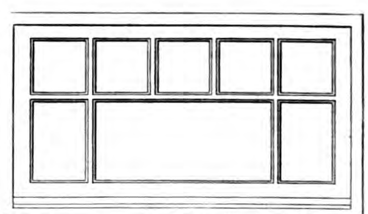
## Imitation Frost Crystals.

A very pretty winter ornament for a parlor table or to set on the showcase in the store, says a correspondent, can be prepared as follows: Dissolve 456 grains




*Elevation and Detail of Entrance Door. Scale, ¾ Inch to the Foot.*

of nitrate of lead in 6 fluid ounces of water. If the solution is turbid, filter through paper. Place the solution on the table where it is intended to remain and drop into it 200 grains of sal-ammoniac in



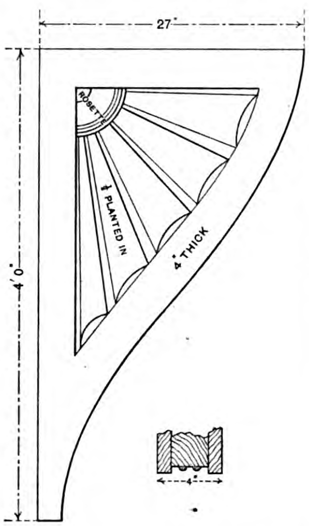
*Elevation of Basement Sash.—Scale, ¾ Inch to the Foot.*

long fibrous crystals. Small crystals of chloride of lead form and ascend through the denser liquid, presenting the appearance of an ascending snow storm. When the lead is all precipitated the crystals of chloride of lead begin to descend as a genuine miniature snow storm, forming grotesque masses resembling a winter's landscape. If the vessel containing the crystals is not disturbed it often preserves its beauty for a week or two.

## Gothic Pinnacles.

A. W. PUGIN.

I have little doubt that pinnacles are considered by the majority of persons as mere ornamental excrescences, introduced solely

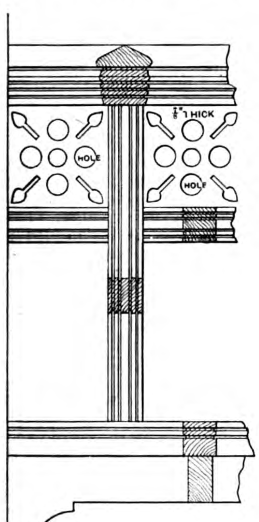


*Detail of Bracket on Octagon Front.—Scale, ¾ Inch to the Foot.*

for picturesque effect. The very reverse of this is the case, and I shall be able to show you that their introduction is war-

*Section of Inside Doors.*

ranted by the soundest principles of construction and design. They should be regarded as answering a double intention,

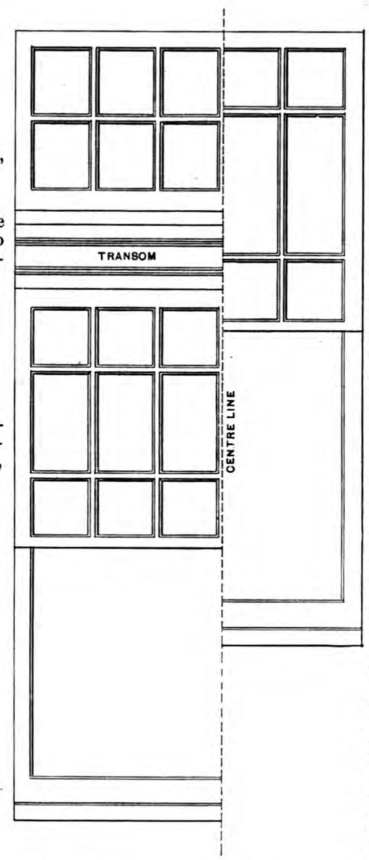



*Detail of Porch Railing.—Scale, 1½ Inch to the Foot.*

both mystical and natural. Their mystical intention is, like other vertical lines and terminations in Christian architecture, to represent an emblem of the Resurrection. Their natural intention is that of an upper weathering to throw off rain. This most useful covering for this purpose is of the spiral form: only let such a form be decorated with a finial and crockets, and we have at once a perfect pinnacle. Now the square piers, of which these floriated tops form the terminations, are all erected to answer a useful purpose when they arise from the tops of wall-buttresses.

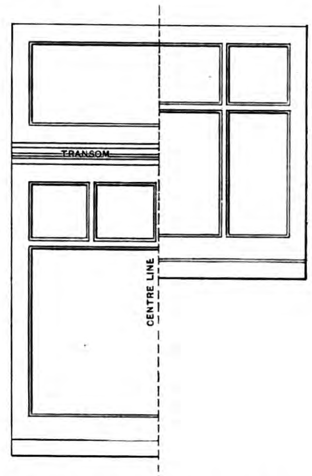
## The Oldest Architectural Drawing.

Those who are engaged, day by day, in making drawings of buildings and in working drawings prepared by others, must be interested in every item of history which relates to the draftsman's art, or shows through what stages the present degree of perfection has been reached. W. Burges describes what he characterizes as the Oldest Architectural Drawing. It is a plan of the monastery of St. Gall, which is now preserved in the library of that establishment. It was first published




*Detail of Window Sash.—Scale, ¾ Inch to the Foot.*

by Keller, at Zurich, in 1844, and republished two-fifths the real size in the "Archæological Journal," p. 87, Vol. V, with a most excellent notice by Professor Willis. The plan, which is drawn in thin red lines upon a large sheet of parchment, with inscriptions all over it, showing the uses of the different parts of the building, was sent, as one of the said inscriptions inform us, for the use of the Abbot Gospertus (who began to rebuild the church and monastery in 829), by some anonymous friend, who is supposed with some reason to have been Eginhard, the son in-law of Charlemagne, who held the office of prefect of the royal buildings. However this may be, the plan presents us with a very complete monastery, with its great church and accompanying buildings. The red line not only serves to mark the external and party walls, but also to indicate the furniture, such as benches, tables, stoves, &c., requisite to each building. The plan, as Professor Willis very properly remarks, is not done to scale,




*Detail of Window Sash.—Scale, ¾ Inch to the Foot.*

but certain figured measurements enable us to form some idea of the size of the buildings. The church would appear to have been a most noble structure, with two apses and three paradises or semicircular walks. The western one was further enriched with two circular towers. The winding stairs of these latter are shown as gradually winding round from the circumference to the center, like a section of a snail-shell. It is doubtful whether a common winding staircase is thus represented, or whether it was really an inclined plane, which went from the circumference to the center, and so on to an upper chamber, where there was an altar, in the one case dedicated to St. Michael, and the other to St. Gabriel; there would, supposing the latter supposition to be correct, be room to hang the bells in the space between the newel and circumference in the upper part of the tower.

The ornamental finial at the top is shown on plan as finishing the newel. The arches of the cloisters and the crosses of the altars are shown in elevation on their respective places on the plans, a mode which still obtains in Turkey at the present day, even among the distinguished native architects who have the honor of working for His Imperial Majesty the Sultan, so little have things changed in the East. Another peculiarity in this St. Gall plan is, that sundry squares are drawn in the middle of courtyards and of buildings. These, as Professor Willis suggests, might be either indications of the classic atrium with its uncovered impluvium, or a sort of upper lantern rising above the roof and giving light by means of clerestory windows. Both these explanations are very feasible, and both probably were intended in the original. Lastly, Eginhard, or whoever was the architect, wrote certain explanations in Latin verses on various parts of the drawing. Fancy that most matter-of-fact production, a modern plan, ornamented with metrical directions to the builder.

## Hints on Workshop Drawing.—II.

In a previous paper some account was given of those appliances which are not generally known, and which are especially adapted to use in the constructions of drawings in the workshop. The necessity for a broad knowledge of certain subjects was also referred to. It may be stated that a knowledge of the elementary rules of perspective should always be had by workshop draftsmen. He is frequently called upon to make rough sketches to illustrate the construction of a piece of work, and such sketches are by far more intelligible if they are drawn in perspective rather than in plan and in elevation. In view of the fact that an average member of the public is unacquainted with plans and elevations, the carpenter or builder who is likely to be called upon to submit sketches of proposed alterations, &c., to his customers should certainly be in a position to make perspective sketches quickly and with a reasonable degree of accuracy, while a foreman would find that in explaining the details of construction to his men perspective sketches would much assist him. Within the scope of this paper the subject of perspective cannot be entered upon, and the reader is referred to one of the many published manuals treating of the subject. A few general hints, however, may prove useful.

One of the best means of obtaining a practical knowledge of perspective is to draw from models. By this is meant simple objects, such as a table, a chair, a bench, &c. Let the operator take such an

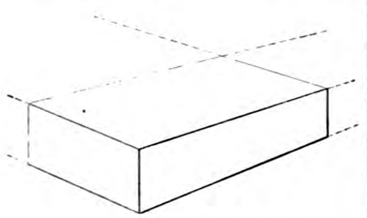


*Fig. 1.—Elementary Principles of Perspective.*

object and endeavor to reduce to paper an outline just as it appears to his eye. For example, take an ordinary brick and place it on a table in such a position that both its sides and its top may be seen and then proceed to sketch it. In doing so bear in mind these important rules: 1. That the vertical lines in the object will be represented by vertical lines on the paper. 2. That the parallel lines receding from the eye will be drawn to approach one another. 3. That all such parallel lines would, if produced, meet at the same points. By referring to Fig. 1 the reader will be able to more easily appreciate these rules and to apply them to other objects. The dotted lines show how the corners of the brick converge to common centers. Having represented the brick on paper in a satisfactory manner, proceed to delineate other figures in the same manner; it will be found that the geometric solids, such as the cube, cone cylinder, pyramid, prism, &c., are well suited to practice from at the commencement. More elaborate figures may be afterward undertaken.

From what has been said it will be clear that although both perspective and ordinary plans and elevations have their especial advantages, yet both are to some extent objectionable. While the former conveys the best idea of the form of the object represented, it is entirely useless to work from, for the reason that no measurements can be taken from it. What is wanted, then, is a system of delineation which will give a more accurate impression of the form of the ordinary plan and elevation, and yet which may be used to take measurements from. Such a system is that known as "isometric drawing," which was suggested many years ago by Professor Farish, of Cambridge, England, and by him termed "isometric perspective." The system is easily learned, and is so exceedingly useful it is surprising that it is not more generally used. The term "isometric" means equal measures, and to

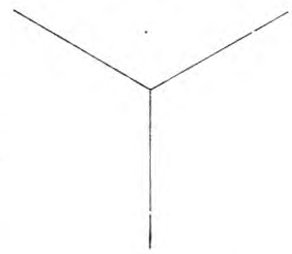


*Fig. 2.—Construction Lines in Isometric Perspective.*

some extent indicates the principles upon which the system is based. Instead of projecting the object into two separate planes, and calling them respectively "plan" and "elevation," the whole figure is projected on to a single plane, which is so inclined as to produce upon that plane equal measures of equal parts of the object represented. To make this intelligible, let us suppose that a solid block, which has all its corners mutually at right angles, is held against the paper in such a manner that the edges are inclined equally to it. The projection of these edges upon the plane as represented by the paper will be three lines inclined to one another at equal angles, as shown in Fig. 2. Now, upon these lines are constructed the figure which is to be represented in isometric projection, and it will be clear, upon a little consideration, that parallel lines upon the solid which is inclined to the plane of the projection previously mentioned will be represented by parallel lines upon paper. To take an example, let us suppose that it is desired to indicate upon paper a solid block measuring 1 x 2 x $2\frac{1}{2}$ inches. Proceed as follows: First, set out the three construction lines, as shown in Fig. 2. On the upright line set out the

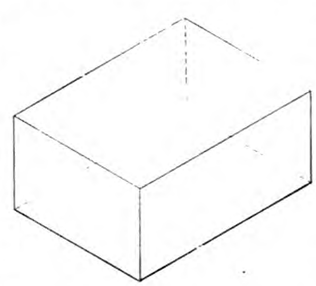


*Fig. 3.—Isometric View of a Rectangular Block.*

hight of the solid—namely, 1 inch—and on the lines to the left and right set off respectively 2 inches and $2\frac{1}{2}$ inches; complete the figure by drawing parallel lines, representing those corners which are hidden by dotted lines, as shown in the illustration, Fig. 3. The construction thus far, and, in fact, in nearly the whole system, will be done by means of the 30° triangle, as indicated by dotted lines in Fig. 4.

*(To be continued.)*

## The Times Building.

In our issue for July of last year we gave an account of the peculiar methods resorted to in putting up the new *Times* building, this city, while still allowing the old structure to be used. In connection therewith a view of the building showing the method of working at night was given. Since then the exterior has been completed, and at present the work of interior finish is being pushed rapidly forward. In one of our plates this month we present a view of the finished structure, being a cut prepared by the *Record and Guide*, of this city, a few weeks since. The treatment of this building architecturally reflects great credit upon the designer, Mr. George B. Post, of this city. The windows are carried through several stories, affording upon all floors an abundance of light on all.

The piers of the lower four stories on the north front and of the lower five on the Park Row front are united by round arches, three on the narrower and three on the longer front. The two lower stories are of granite, but this is used as a matter of practical necessity, and the difference of material, which gives little contrast of color between the pale gray of the basement and the buff limestone of which the superstructure is composed, is rather slurred than emphasized in treatment. Achitecturally the first five stories are the basement

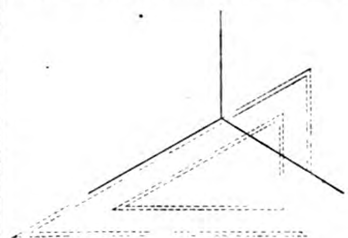


*Fig. 4.—Use of Triangle in Isometric Drawing.*

of the building, the bays formed by the piers and the large arches extending through four stories on the north front. The fifth consists of three pairs of arches coupled over each of the large openings below. On the Park Row front this arrangement is repeated in the narrow bay at the north end, while the three wider bays are continued through the fifth story.

The central division of the building includes six stories, and extends from the basement just described to the main cornice above the twelfth story, a continuous and emphatic belt, and the only horizontal line running through above the fifth story, where a molded string course marks the summit of the substructure. This second division is again subdivided into a lower group of four stories and an upper of two. The lower group is on the north front composed of three bays, of which the piers, unbroken and alligned over those below, are connected by round arches. On the longer fronts these openings are doubled over the arches below, the base of each central pier coming directly over the crown of the lower arch. The openings of the upper group running through two stories are doubled on the north front, and on the west front are arranged by threes. A tall two-storied gabled dormer of two-arched openings culminates the north front at its center, and three similar dormers are ranged along the longer front. These two stories include a parapet story and a roof story. On each side of the central dormer on the north front a pair of small lintelled openings, with a shaft between, pierces the parapet, and over each in the roof is a small gabled dormer.

The plate published elsewhere gives a clear conception of the architectural effect

## What Do You Know About Architecture?

Some time ago we called attention to the technical examinations that are conducted in England with reference to the building business, and offered some of the questions to our younger readers, with the idea of affording the basis of self-examination in an attempt to answer the question of what they really know about the building business. We propose at this time to submit the questions that were used in a similar examination on the occasion of the examination of candidates for the associateship of the Institute of Architects. The papers were used in March last, and are likely to be of service to our readers in the same general sense as those heretofore presented.

### HISTORY OF ARCHITECTURE.

*Questions for all Candidates.*

1. In what way does Gothic differ from Renaissance?

2. Give the difference between the style you have chosen and that immediately preceding or following it.

3. Give the characteristics of the early Renaissance, say, from the middle of the fifteenth century.

4. Describe some of the differences between the development of Gothic architecture in England and Italy.

5. Describe some of the buildings erected in the period selected by you, and name any architects who flourished at that period.

6. What do you consider the leading characteristics of early English work?

7. Explain the meaning of, and illustrate by sketches, "dekastyle," "peripteral," "dipteral," "hypostyle," "transverse rib," "diagonal rib" and "tierceron"; also the difference between stellar and fan groining, both in appearance and construction.

*Questions for Candidates who have selected the Classical or the Renaissance Styles.*

8. Describe a rectangular Roman temple of any order you please, and contrast it with a Greek temple having a portico of the same number of columns and of the same order.

9. Describe a circular Roman temple of the Corinthian order.

10. Describe a Roman basilica.

11. Describe the peculiarities of Greek Doric, and show the distinction between it and the Roman Doric.

12. Describe a house of any time between 1550 to 1650.

13. Describe the method of construction of a paneled elliptical barrel vault of the Renaissance, and contrast it with the best Gothic method of vaulting, and show the difference of the ornaments.

*Questions for Candidates who have selected the Twelfth, Thirteenth, Fourteenth or the first half of the Fifteenth Century.*

14. Describe a cathedral or large church erected in the period you have selected.

15. Describe the modifications made in the nave piers, and sketch the difference between the moldings of the vaulting ribs and those of the period immediately preceding it.

16. Describe one building erected during the period selected, and give a plan and other sketches of it.

17. Give the dates between which the different recognized diversities of Gothic occurred, and name any buildings you know erected in each period.

[Maximum of Marks: 100.]

### MOLDINGS, FEATURES AND ORNAMENTS.

1. Sketch an entablature of the Greek Doric, and name the parts.

2. Sketch an entablature of the Roman Doric, and explain the difference between this and the Greek Doric.

3. Sketch a Greek Ionic doorway, and explain the difference between it and a Greek Doric one.

4. Sketch a piece of Greek honeysuckle ornament, and a piece of the Roman acanthus scroll.

5. Sketch an early Renaissance capital, and explain its difference from a Corinthian capital.

6. Sketch a thirteenth century Gothic foliated capital, and some Gothic moldings enriched by ornament of a similar period.

7. Sketch an external doorway, and describe its difference from one in the style immediately preceding or succeeding the style you have chosen.

8. * Sketch a window and name its parts.

9. * Sketch the bay of a vault and name the parts.

10. * Sketch the plan of a pier or shaft in a large church, and give the section of the base moldings.

11. Sketch an antifixa or acroterium, a crocket and a cusp, and describe the purposes for which they were used.

12. Sketch a pediment or gable, and describe the methods used for its enrichment by the Greeks, Romans and Mediævals.

[Maximum of Marks: 100.]

### SANITARY, SCIENCE, STRENGH OF MATERIALS, SHORING, &C.

1. The drawing † marked A is the basement plan of a house: lay down the lines and sizes of drains and system of drainage you would recommend, and give marginal sketches of details and explanatory notes. [Assume the sewer to be deep enough to allow a sufficient fall.] *** Every candidate *must* answer Question No. 1.

2. What fall would you specify as being sufficient for a house drain?

3. What test would you apply in order ascertain whether a drain is properly jointed?

4. What description of water-closet apparatus is suitable—*a*. For a servants' closet in the basement of a first-class house? *b*. For the general closets in the basement of a first-class house? *c*. For an infirmary ward?

5. Name some of the principal causes of damp basements, and their respective remedies

6. How many cubic feet of space per patient would you provide for in designing the wards of a general hospital, assuming good means of ventilation to be provided?

7. What are the forces acting in natural ventilation?

8. Describe the different ways in which water stored in cisterns in houses may become polluted.

9. What kind of water is injuriouly affected by storage in lead cisterns?

10. Sketch a good form of rainwater filter.

11. What quantity of water, per square yard, would an inch of rainfall give?

12. Give the proportion in depth to breadth of a fir girder, so as to obtain the greatest strength with the least material.

13. Give the proportion of top and bottom flanges in wrought-iron and cast-iron girders, in order to obtain the greatest strength.

14. What will be the breaking weight on the center of a wrought-iron girder, 20 feet span, 15 inches deep, and bottom flange 10 inches wide and 1 inch thick, according to the following formula?

$$W = C\frac{a\,d}{L}$$

$W$ = breaking weight in tons.
$L$ = length in feet.
$d$ = depth in inches.
$a$ = area of bottom flange.
$C$ (the constant) = 6.

15. Sketch in detail the section of a wrought-iron riveted girder, 12 inches wide, 20 inches deep, bottom flanges 1 inch thick. What is the safe central load for this girder with a span of 15 feet?

16. Describe the circumstances in connection with any dangerous structure that has come under your own observation; also the method used to sustain the same both temporarily and permanently.

17. In order to excavate for a basement under a building having foundations of insufficient depth it is necessary to underpin the walls (which are 40 feet high and 2 feet thick) to a depth of 9 feet. Describe the method of doing this, and the precautions to be taken.

18. Sketch shores you would adopt to stop the lateral movement outward of the blank side wall of a house, 40 feet long: (*a*) 30 feet high, three stories; (*b*) 60 feet high, six stories. Give the distance apart of the shores, and figure the scantlings of the timbers. [N. B.—There is supposed to be no other building within 40 feet.]

[Maximum of Marks: 100.]

### THE PLANS, SECTION AND ELEVATION OF A BUILDING.

*Subject: A Country Parsonage.*

*Drawings Required.*—Ground and first-floor plans. Elevation and section. (These to $\frac{1}{8}$ inch to 1 foot scale.) Such details of constructional and artistic character to a larger scale as there may be time for.

*Further Particulars.—Site.*—The building to stand in its own grounds. The points of the compass to be given. *Size.*—To be a two-story building, with an attic and cellars.

*Accommodation.—Ground Floor.*—Dining-room, study and parish-room (each about 250 square feet in area), and drawing-room, about 320 feet in area. A vestibule, hall and staircase. The kitchen, scullery, water-closet, store-room and stairs to basement cellars to be in an attached one-story building, except so far as the cellars may extend under it.

*First Floor.*—Four bedrooms, one dressing, a bathroom and water-closet, with well-lighted landing and stairs. On this floor indicate the extent of the attics—two servants' rooms and a boxroom only required, with stairs to the same. The parish-room to be accessible from without, so as to avoid passing through the private part of the house.

[Maximum of Marks: 200.]

### MATERIALS, CONSTRUCTION, &C.

A. *The nature and properties of Building Materials, including their decay, preservation, quality and strength, and their application in building.*

1. Name the various building stones of the locality with which you are acquainted, their characteristics, and the positions for which they are adapted.

2. Describe in what position and under what circumstances hollow walls are desirable. State their disadvantages. Describe some other methods to exclude moisture.

3. What are the objections to granite, limestone and concrete for domestic building? How do you overcome them?

4. What objections are there to artificial drying of new work, and what precautions should be taken?

5. Describe the various forms of timber roofs and their construction?

6. Describe the precautions to be taken in making concrete and forming foundations.

7. Give the characteristics of Portland cement and the precautions to be taken in its use.

8. What are the advantages and disadvantages in the use of the following tim-

* Set to enable the candidate to illustrate the style he has chosen.
† A copy was provided for each candidate.

ber—namely, white, red and yellow deal, pitch pine and English oak?

9. What are you to avoid in the selection of stone, brick and timber?

10. State what you know of the application of cast iron and wrought iron to building purposes.

B. *The principles of Construction as applied in practice to foundations, walls, arches, vaults, roofs, floors and partitions.*

11 Describe lewis hole and bolt, foxtail wedging, calking (in timber), tusk tenon, bridle joint, dovetail having dovetail notch, gibs and keys, lead plugs, dragon piece, out of winding, hollow rolls, bottlenose drips, burning in.

12. Give elevation of a chancel arch, 18 feet span; also an aisle arch to organ chamber, with buttress and foundations, to be drawn to a scale half an inch to a foot.

13. Give the names of different kinds of vaulting, and descriptive sketches of the same.

14. Give section through the roof of a public hall, 30 feet span, with scantlings.

15. Give section through school bell-turret (timber), 20 feet from ridge, with scantlings.

16. State some of the effects of wind-pressure and any special precautions which should be taken against it.

17. Describe and give section of some system of fireproof flooring.

18. Sketch all the forms of stone walling with which you are acquainted, showing coursing.

19. Draw to ½-inch scale one turn of circular stone newel staircase, 5 feet internal dimension—plan and section, with one step in perspective.

20. Sketch section through a lead flat—lead gutter at back of the parapet, and to a sloping roof and cesspool with outlet pipe to rainwater head.

[Mamimum of Marks, 100.]

SPECIFICATIONS, &C.—PROFESSIONAL PRACTICE.

1. Write detailed specification of "Slater and Tiler" and "Carpenter" for the building designed on Wednesday.

2. Describe the method of making an approximate estimate for the building designed on Wednesday, and give such estimate.

[Maximum of Marks, 75.]

1. Give an account of the proceedings of an architect from the time when he receives his first instructions from his client up to and including the receipt of tenders for the execution of the works.

2. Describe the connection between contract drawings and specification, and state how these are to be understood in their relations to one another.

3. Under what circumstances may the builder depart from the contract drawings and specification?

4. State the duties and powers of the architect during the construction of a building contracted for.

[Maximum of Marks, 25.]

## The Chicago Auditorium.

Some interesting particulars concerning the great building now being erected in Chicago by private enterprise were embodied in the report of the president of the corporation, read at a recent meeting of the stockholders. The following extracts are taken from this report, as they convey a great deal of information relative to this huge undertaking not previously made public. Ground was broken and the work of tearing down buildings was begun in January, 1887. The construction has been vigorously prosecuted from that time, the only delay occurring from difficulty in procuring granite, which necessitated the association taking possession of the quarries, the result of which was satisfactory. From the date of completion of the granite-work, comprising the two stories of the sub-structure, all contracts have been thus far satisfactorily and promptly carried forward, the company having been exceptionally fortunate in the selection of all the contractors, especially so of the architects, who have faced most difficult and unprecedented problems

This enterprise, like all large projects, has been a matter of growth and development from its inception, both in magnitude and cost. It was originally contemplated by the projectors that a great public hall and hotel should be built on a site not including the corner of Wabash avenue and Congress street and the north lot of the Michigan avenue frontage, which were not then obtainable. From that the building has grown to cover the entire site now occupied—710 feet frontage, or an area of 1⅔ acres. Strictly fire-proof construction of the most approved kind was always contemplated, and it prevails throughout the entire structure, so that under no circumstances can the building sustain more than slight superficial injury from fire. It comprises five principal features—the auditorium, with its grand organ and stage: the hotel, the business front on Wabash avenue, containing seven stores and nine floors of rooms; the little auditorium, or rehearsal hall, and the public observatory. To which might be added the *café* on the main floor on Congress street. The main building will be ten stories high, or 145 feet, the auditorium proper reaching the seventh story. The tower will be 17 stories high, or 240 feet. The tower has eight floors (including the top) above the roof of the main building. The top will be an observatory from which can be viewed the city and surroundings, with the lake harbor, and from which the west shore of Michigan can be seen. The seventeenth floor will be occupied by the United States Signal Service Bureau; the sixteenth by the architects of the building; the fifteenth is required for tanks, &c., for the elevators. The tower above the main building is a building in itself, being 71 x 41 feet in area, each floor containing nine rooms, and it is, therefore, a thing of utility and value as well as being the monumental feature of the building, emphasizing the auditorium within by surmounting the grand entrance.

The foundations under the building have been carefully and scientifically considered. Every square yard of the ground was first tested by heavy water-tanks, then horizontal timbers of varying lengths, 1 foot square, were laid permanently below the water-line, covering which is a heavy bed of concrete, in which from one to four layers of 67-pound steel rails are imbedded. These, if placed in line, would reach 10 miles in length. Where the rails were insufficient in strength steel T-beams were substituted for them. Upon these rails and beams the piers were constructed. The tower rests on a solid foundation, 100 x 67 feet, thus distributing the weight over a large surface. The auditorium will contain 5000 seats, including 42 boxes. This capacity can be largely increased for conventions by utilizing the stage space. The hotel will occupy the entire Michigan avenue and Congress street fronts and 40 feet of the Wabash avenue front, and will contain nearly 400 rooms. The main dining-room will be on the 10th floor of the east front, 175 feet long, overlooking the lake. There will be 12 elevators in all. The cost of the iron in the building is nearly $350,000, no portion of which will be visible. The number of bricks in the building is 15,000,000.

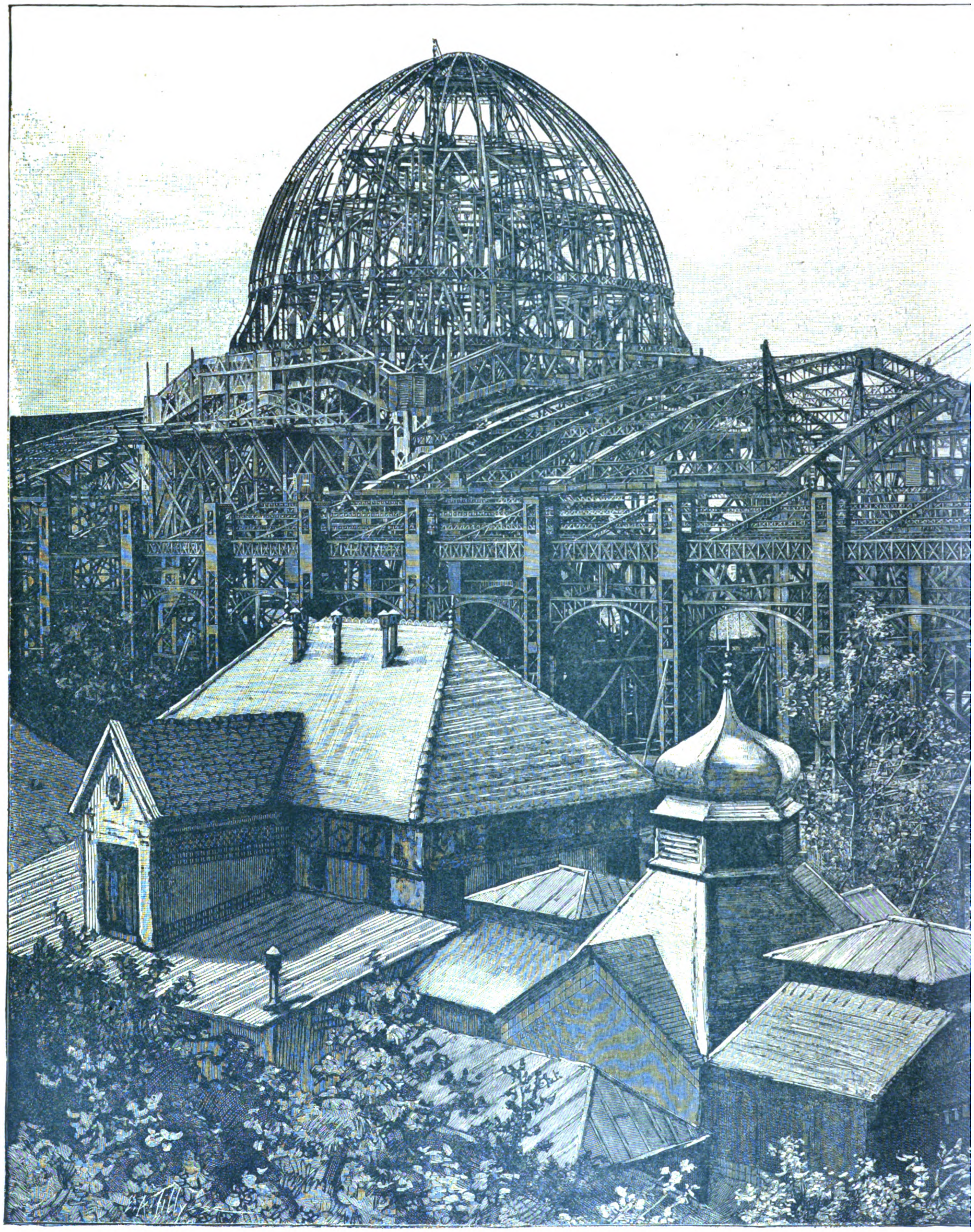
The number of electric lights in the auditorium proper is 4000; in the hotel and balance of the building 4600, making 8600 in all. The electric current is generated by 11 dynamos and 9 engines; there will be 11 boilers, having a capacity of 1800 horse-power, and 21 pumping engines to supply water for the elevators and other purposes, with a total hourly capacity of 400,000 gallons. There are two distinct heating and lighting plants for the hotel and balance of building. The tower weighs 30,000,000 pounds, or 15,000 tons. There are over 25 miles of gas and water pipes. The hotel rooms will be finished of hardwood throughout; mosaic floors will be laid in the vestibule and lobby of the auditorium and hotel. The grand stairways will be marble, with bronze sides.

A grand organ, costing about $50,000, has been contracted for, which is being built probably at a loss to the contractor, the contract for which calls for the most complete and grandest instrument ever constructed, and which the board believes will do much for musical education in Chicago and add largely to the earnings of the auditorium—more than ordinary interest on its cost. It was also determined to adopt the most approved and modern stage, with appointments similar to one at Buda-Pesth, Hungary, for which purpose Architect Adler was sent to Europe, and Mr. Bairstow, chief stage carpenter for McVickar's Theater for many years, was employed, and accompanied him abroad. This will cost much more than the ordinary stage, but will be unequaled on either continent in its effects and operating economies.

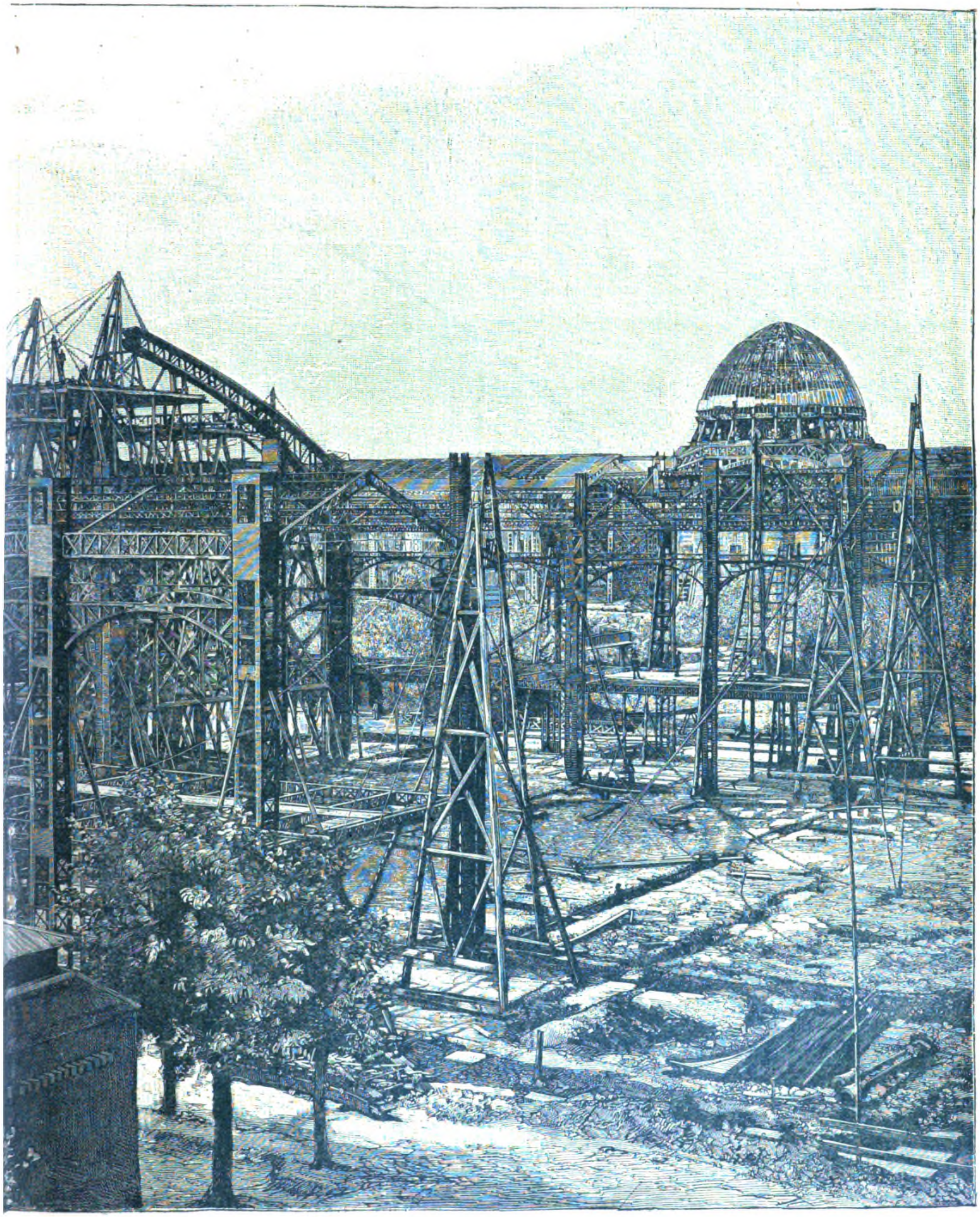
The purposes of the building are so varied, and its construction so complicated and demanding so many unknown quantities, that it has always been, and is now, impossible to estimate definitely the entire cost. It will aggregate over $2,250,000. The stage and appointments, the decorative finish of the auditorium and grand dining-room, the undetermined fuel problem as to the use of oil, fuel gas, or coal, the two former of which would demand an extra outlay; the ventilating and cooling construction, details to be settled in negotiating the hotel lease, and other things, are necessarily unknown quantities, and are unusual in ordinary buildings; so that the uncertainty in the cost of all structures is exceptionally illustrated in this vast project. It is believed that the actual value represented in the building when completed will be considerably greater than if it had been an ordinary building, because of the keen competition of among contractors for identification with the project. This consideration has saved nearly $250,000. If built by National, State or municipal government a building inferior to this would have cost over $3,000,000.

The roof is now being constructed on the Wabash avenue front, and the balance of the building will be roofed very shortly. The Wabash avenue front, including the small hall, will be occupied and earning income from May 1 next; the seven floors of the tower, including the observatory, about two months later; the hotel and auditorium during the fall of 1889. The report closes with the following striking paragraph: "In conclusion, I would congratulate you, on behalf of your board of directors, that you are approaching the completion of an edifice for quasi-public uses, constructed on a scale of magnitude unequaled in any enteprise based on private capital, one which represents complicated architectural problems without precedent, combining as it does so many distinct features within the walls of one structure, and in which a liberal policy has prevailed throughout. You are creating a city, as it were, containing, when entirely complete, between 10,000 and 12,000 souls."

THE NEW "TIMES" BUILDING, NEW YORK.



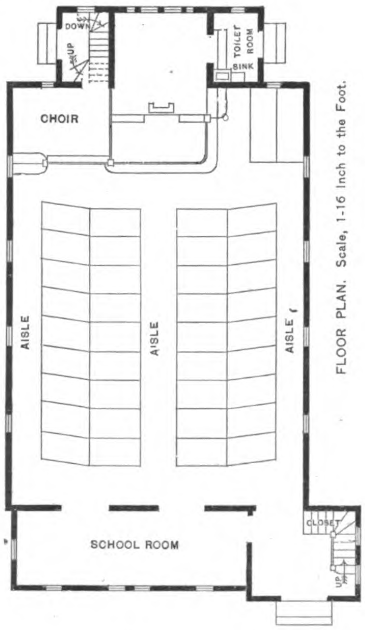
THE UNIVERSAL EXPOSITION, PARIS, 1889. PROGRESS OF THE



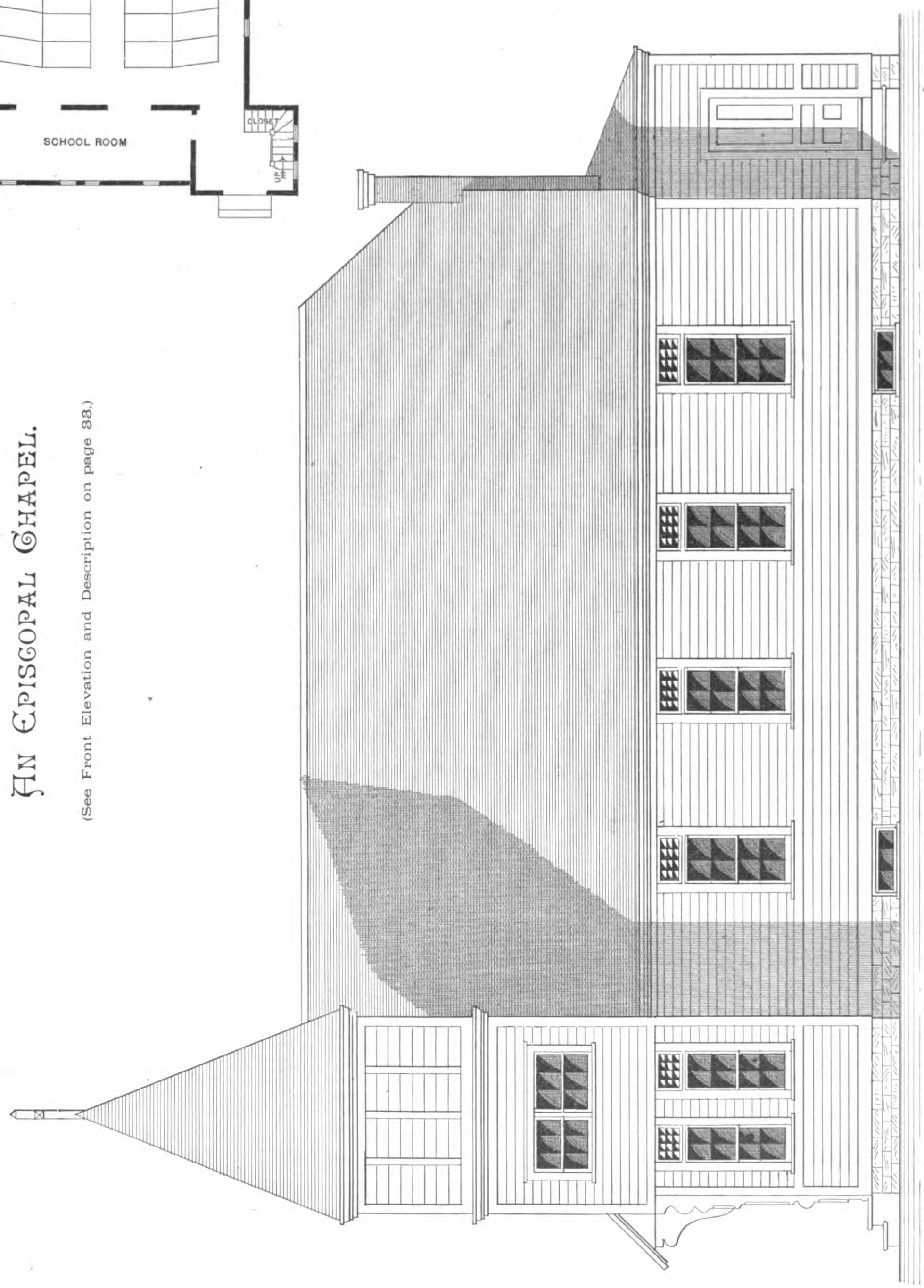
: BUILDINGS AT A RECENT DATE. ENGRAVED FROM A PHOTOGRAPH.

# AN EPISCOPAL CHAPEL.

(See Front Elevation and Description on page 33.)




FLOOR PLAN. Scale, 1-16 Inch to the Foot.

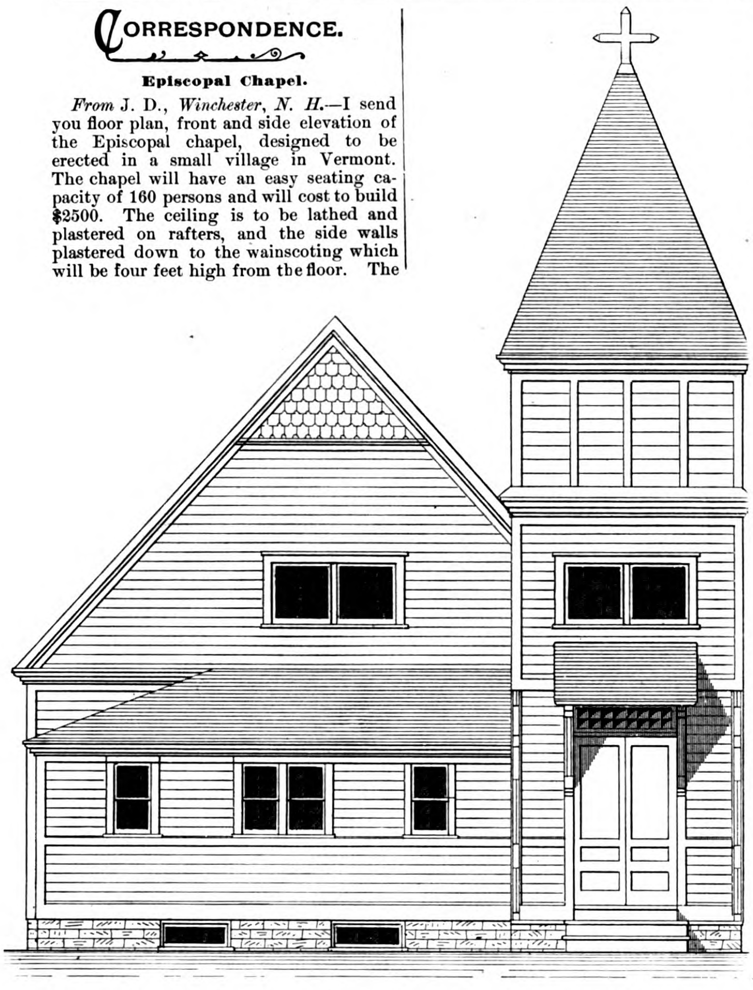


SIDE ELEVATION. Scale, 1-8 Inch to the Foot.

# CORRESPONDENCE.

### Episcopal Chapel.

*From* J. D., *Winchester, N. H.*—I send you floor plan, front and side elevation of the Episcopal chapel, designed to be erected in a small village in Vermont. The chapel will have an easy seating capacity of 160 persons and will cost to build $2500. The ceiling is to be lathed and plastered on rafters, and the side walls plastered down to the wainscoting which will be four feet high from the floor. The

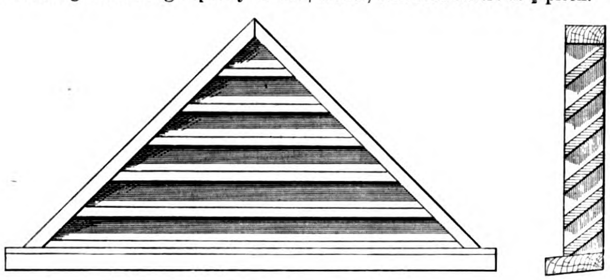


*Episcopal Chapel.—From Drawing by J. D.—Front Elevation.—Scale, 1/8 Inch to the Foot.*

interior finish is to be of white wood including seats and pulpit. There will be a good room in the second story of the tower which will be available for use for various purposes, such as committee meetings, &c. The schoolroom is provided with folding doors, communicating with the main room and can be thrown open, thus increasing the seating capacity of the chapel to 200 when necessary. A small amount of stained glass is used at the top of each window in the main room and in the front gable is a stained glass window (small lights); also another of the same size in the rear.

### Slat Ventilator.

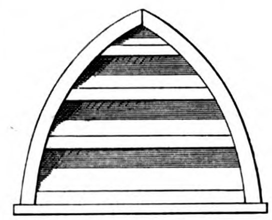
*From* OLD HICKORY, *Indianapolis, Ind.*—I have had occasion to make a number of ventilators within the past year, and brief reference to them may not be without interest to some of the readers of the paper. The sides were made on different pitches as $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and $\frac{3}{4}$ and one between $\frac{1}{4}$ and $\frac{1}{3}$ pitch. The slats in all of them stood at 45°. The sill in some of them was $\frac{1}{2}$ inch in 6 inches, and 2 inches in 12 inches, and still others at $\frac{1}{2}$ pitch. I have had a great deal of trouble in getting the different cuts, and would like to inquire of some of the readers if they can give me a method for obtaining the cuts. I desire first the cut across the side of the jamb, to fit on a given pitch of sill; second, a cut across the side of slat; third, the cut across the edge of slat when beveled at 45° or when edge is left square, the slats to fit a given pitch of jamb or let the slats stand on any given pitch. I also desire to learn how to get the cuts on side and edge of slats to fit a Gothic head or a half-circle head.



*Slat Ventilators.—Fig. 1.—Elevation and Section of Triangular Ventilator.*

### Ventilating a Bee Hive.

*From* CHEMIST.—The study of ventilation is one of great interest, and many are the forms of apparatus that have been invented for the purpose. As nature is the best as well as the earliest teacher, much can be learned from some of the lower animals. Probably there is no public building where the inmates are crowded as closely together as are the bees in a hive, and as these creatures require fresh air as much as we do, the manner in which the ventilating is accomplished must be of interest to those who make the subject of ventilation a study. A bee-hive is air-tight,



*ig. 2.—Another Form of Ventilator.*

excepting the small hole at the bottom which serves an an entrance to the hive, and the existence of a system of ventilation can be determined by suspending a small piece of paper attached to a thread in front of the opening. The two currents of air necessary to ventilate the hive are established by the fanning motion of the bees' wings. According to the state of the hive, or the heat of the weather, from 10 to 20 of the worker bees station themselves in files just within the entrance of the hive, one file having their heads toward the entrance and another in the opposite direction. By uniting their two wings of each side by the marginal hooks with which they are provided they vibrate them with great rapidity. The two sets of ventilators standing with their heads opposite to each other thus produce a com-

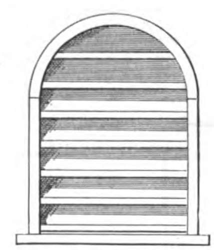
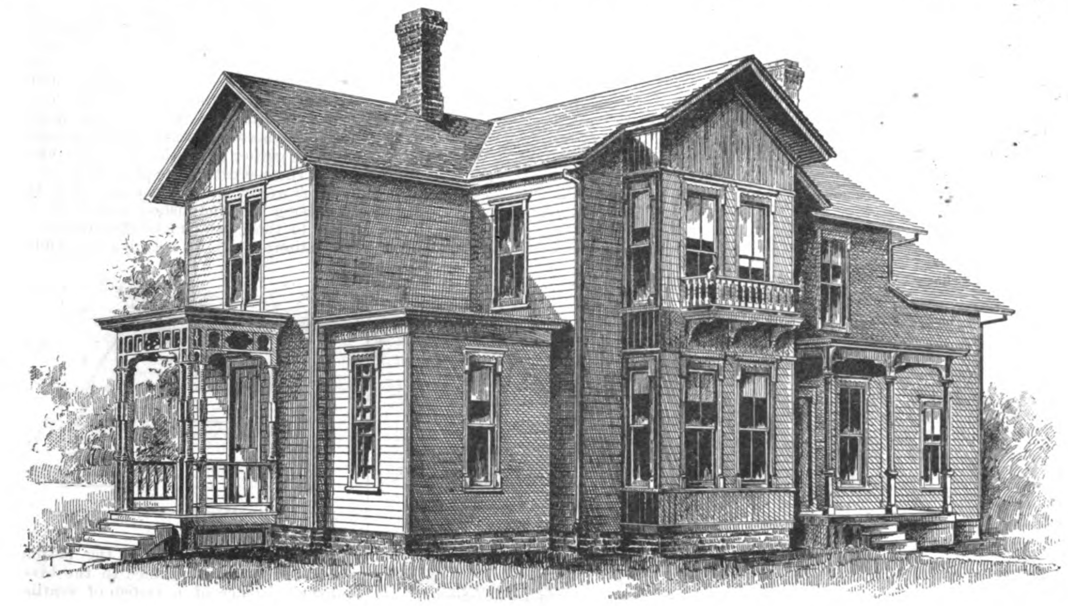


*Fig. 3.—Arched Ventilator.*

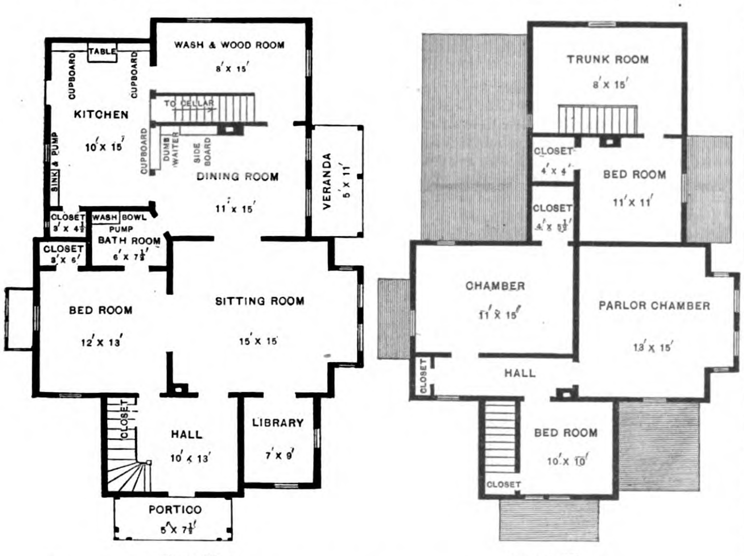
plete circulation of the air of the hive and keep down the temperature to the point necessary for the manufacture of honey. This form of mechanical ventilation, as it might be called, is kept up night and day during the summer. The gangs of ventilators are on duty for about half an hour and then are relieved by others. It would, perhaps, be more interesting if the bees were to construct ventilating pipes about the hive, as they could do by means of pipes made of wax, similar to the cells in which the honey is stored, instead of resorting to such a simple method of ventilation.

### A Question in Ventilation.

*From* W. F. S., *New York.*—The "Job of Ventilation," the diagrams of which, as sent by your Philadelphia correspondent, "A. W. G.," appeared in your January issue, might be very considerably improved, in my opinion. Fig. 1 shows what appears to me to be a very faulty piece of work. The closet is, as I take it, a "wash-out" of some pattern, and the diagram would show that the pipe taken from the bowl is more of a "local" vent than a trap vent—that is, it ventilates the bowl instead of the half S trap, which has no vent whatever. The wash-basin is in as bad a condition, for the pipe intended to vent the trap is carried down into the soil-pipe about 3 feet from where the water-closet trap discharges into the aforesaid soil-pipe. Considering that the wash-basin is discharged into the same pipe, about 5 or 6 feet further on, it would be interesting to know what advantage there is to be gained by such an arrangement, and where the air is to come from to relieve the basin-trap when the closet and the basin are being discharged at the same time. Fig. 2 is a decidedly better plan, but it has some defects, also, in so far that the air-pipe intended to vent the water-closet trap appears to be located about 2½ feet away from the trap. It would be a decided improvement, if, instead of venting the traps through the fresh-air inlet, the ventilating-pipe were carried to the vertical 4-inch vent-pipe, which is carried up alongside the chimney and which appears, according to "A. W. G.'s" letter, to be erroneously described in Fig. 2—as a "4-inch iron soil-pipe 70 feet." This, as I understand your correspondent, is only a "vent" pipe, all of the plumbing in the building being contained in the basement. It may not be out of place also to draw attention to the direction of the Y branch at foot of the vertical line, which should be set so as to discharge toward the running-trap on the main drain, instead of from it. Even as an air-duct the air entering from the inlet-pipe would have a more direct ascent than at present. I would add, as a matter of opinion, that dependence on the fresh-air inlet for basement trap-ventilation will, in nine out of ten cases, fail of yielding "fair results," owing to the tendency to have the opening of the inlet closed by dirt, snow, &c.



*Residence Designed by B. S. Hoxie, Evansville, Wis.—Engraved from Photograph.*




First Floor. Second Floor.

*Floor Plans.—Scale, 1 16 Inch to the Foot.*

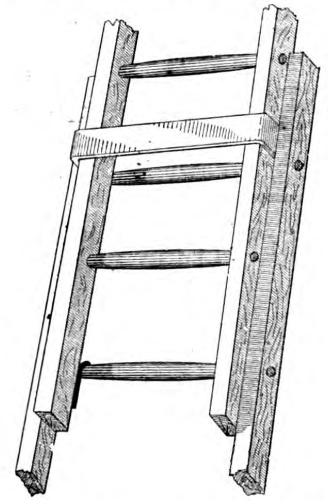
### A $2000 Dwelling.

*From* B. S. Hoxie, *Evansville, Wis.*—This house was built at a cost of $2000. The plans and elevation show the arrangement of rooms which, with nothing extravagant in style or finish, are very convenient and designed for every-day use. The frontage is to the east and north, the house being on a corner lot, with lawn terraced to sidewalk so that foundation shows 20 inches above grade line. Great precaution was taken to have the house warm in winter and cold in summer, and there are two thicknesses of paper besides sheathing-boards and siding. All windows are hung with weights and pulleys, storm windows being provided for winter and full length screens for summer. It will be noticed that the bedroom has a door communicating with the front hall, and also one to bathroom, to dining-room, and from thence to the kitchen. I find this a very good arrangement when company is expected or when visitors are present. With the exception of the kitchen one coal stove has been found sufficient to warm the lower rooms, including a chamber and library, the latter communicating with the sitting-room by an archway. The chimney is centrally located so that no heat is lost in winter. The dining-room has sideboard, china cupboard and dumb-waiter. The kitchen, as will be seen, has door to cellar and to wood or storeroom, while one end of the kitchen is devoted to cupboards extending from floor to ceiling, work table, drawers and revolving flour boxes below. Cook-stove, cistern, sink and pump, occupy the other side. Adjoining this is a closet which every housewife knows how to use to the best advantage. The house is painted brown with olive trimmings, picked out with Tuscan red. The inside finish is butternut trimmed with black walnut, hard pine and white pine done in shellac, hard oil and varnish.

### Extension Ladder.

[A correspondent of *The Metal Worker* touches upon a question that has attracted the attention of our readers.]

*From* W. H. S., *Pikesville, Md.*—I have long been a regular and thorough reader of *The Metal Worker*, and, of course, have



*Extension Ladders.—Fig. 1.—Ladder Shown Closed Up.*

noticed the many questions which are asked through your columns. No doubt I could have answered some of those which have been presented in the past, but, having an aversion to seeing my very plain talk in

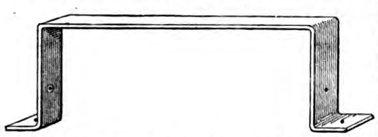


*Fig. 2.—General View of Strap.*

print, I have refrained. A question in a recent issue, however, regarding extension ladders, is one I feel bound to answer for the sake of the trade at large; for I believe that I have the most perfect tinners'

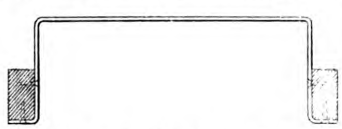


*Fig. 3.—Showing Manner Strap is Fastened to Rails.*

extension ladder in existence. It consists of two 16 feet sections, made of $1\frac{1}{2}$ x 3 inch spruce pine with 1 inch oak rounds, as shown in Fig. 1 of the sketches. The rails of the lower sections set 16 inches

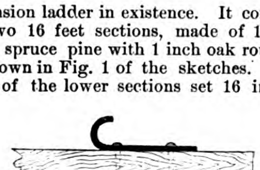
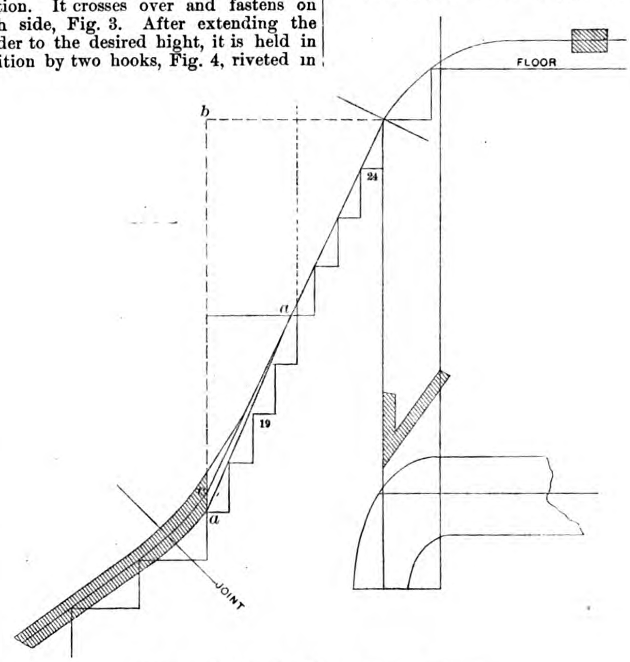


*Fig. 4.—Hook Attached to Lower Part of Sliding Section.*

apart, and those of the upper section 13 inches apart, or just wide enough to fit in between the lower sections and rails, and inserted against the rounds, up and down, as may be desired. The strap (Fig. 2) that holds the sections together consists of a piece of iron $\frac{3}{16}$ inch thick by 1 inch wide, and is placed near the top of the lower section, being let into the wood fair with the inside of the rail and extending frontward far enough to permit the entrance of the rails of the upper or sliding section. It crosses over and fastens on each side, Fig. 3. After extending the ladder to the desired hight, it is held in position by two hooks, Fig. 4, riveted in place, near the bottom of the upper or sliding section, thus forming a strong, light and easily managed ladder. The one that I possess I have used for five years and I would not exchange it for any other pattern that I have ever seen.




*Problem in Hand-Railing.—Fig. 1.—Elevation.*

### Problem in Hand-Railing.

*From* J. B., *Omaha, Neb.*—I notice in the August number of *Carpentry and Building* the communication of a correspondent relative to finding the mold for a stair-rail under certain stated conditions. Concerning this problem, permit me to say that in my opinion the stairs are poorly planned, in that all the winders are placed in the cylinder. In the diagram inclosed I have endeavored to show how to find the mold independent of unfolding the tangent. I have never seen any other than the tangent method presented in *Carpentry and Building*. In the method employed I have unfolded the circle, which permits the lengths of all the balustrades to be determined with the greatest nicety, and it is so simple one cannot forget it, even though he may be out of practice for several years. Can this be said of any of the best standard works at present treating on

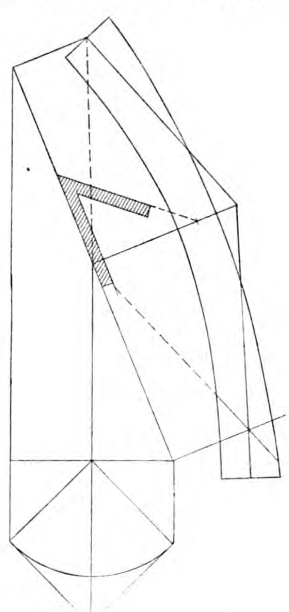


*Fig. 2.—Pattern of Mold.*

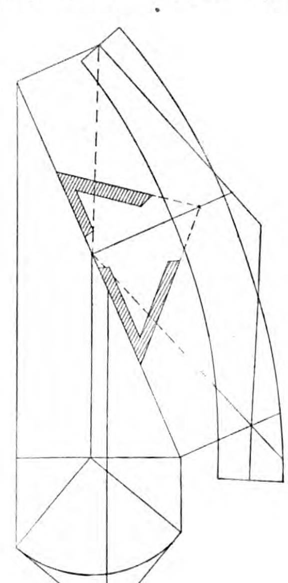
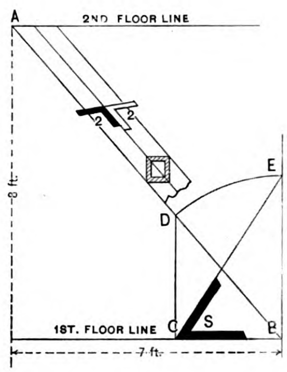


*Fig. 3.—Pattern of Mold.*

hand-railing? The plan referred to may perhaps require a few minutes more time to find the molds than by the tangent method, but it is, I think, preferable. We are requested by the conditions of the problem named to make all balustrades from 19 to 24 the same length. Make the under side of the rail in the center of balustrade the mold, Fig. 2. The hight is *a b* of Fig. 1.




*The Grain Spout Problem as Explained by S. C.*

But suppose we would like to lift the rail a little higher, as *c*; then *b c* is the hight, Fig. 3; but *d* is a fixed point. This makes unequal tangents on the mold, and two bevels are required. The joint is not made square with the plank. Bisect the curve and mark the joint—the shaded part of rail. Take a thick piece of paper and cut it out, as shown. Make a line on the inside of rail for the spring by drawing a line on the mold parallel to the major axis. Sliding the mold up and down we get the spring line correct. By making a joint on the minor axis of the mold we can use a thicker piece to form the easing. The thickness of plank required for the rail never exceeds the length of the diagonal of the square section of rail. Plane the underside of the plank, for it is the last that is destroyed.

*From* N. B. Garvock, *Ottawa.*—A discussion of the merits of any system of lines pertaining to the solution of some of the difficult problems in hand-railing which ever confront the practical workman may find approval from your readers, who, like myself, find the subject one of interest. From an examination of the various works on the subject, the conclusion can be safely drawn that the tangent system has almost universal sway. Although we hear of Riddell's, Monckton's, Gould's and many others systems, yet on examination it will be found that they are all one, so far as the line of rail is concerned, the only difference being in the means employed in producing the face mold. The question can be fairly raised: Does the tangent system of hand-railing present the art in its highest form, or can any improvement be suggested in the art?

1. We think an improvement can be made in the rail over winders by working the easing in the wreath-piece connecting the straight rail instead of the usual patch that generally makes the connection.

2 We think the rail should follow the nosing line of equal winders instead of the usual deviation, which causes balusters to be of unequal length, and the wavy falling line of rail so conspicuous in Monckton's new work, where developed center line of rail is shown.

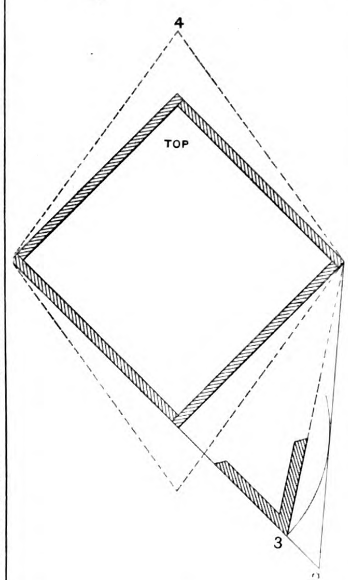
3. The conditions laid down as necessary to the proper working of the system are not the best from an artistic point of view.

4 That many situations present themselves in practice in which the system fails to produce desired results that are attainable by other methods.

The chief thing that can be said in favor of the system is that it is simple and easily learned. This we admit, yet we are inclined to the opinion that simplicity is not the only quality sought after in rail construction, but rather that the workman be master of every situation that comes before him, and able to produce a line of rail suitable to any reasonable conditions that can be laid down.

## Constructing a Grain Spout.

*From* J. P., *Omaha, Neb.*—I notice in the August number the inquiry of the correspondent relative to finding the bevel of a grain spout. I think some of the miter box gentlemen are trying to box up science and others are giving us too much geometry. My solution of the problem would be to make 1 2 equal to the rake, and then draw the bevel. Next, to find the section when cut, 1 4 equals 1 3. Nail the spout together before cutting, using screws near the end, as these may be readily taken out in case they are likely to interfere with the saw in making the cut.




*The Grain Spout Problem Interpreted by J. P.*

In order to find the length, supposing the bottom end cut off, proceed as follows:

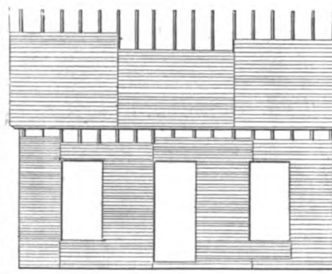
$$\left.\begin{array}{l}8\text{ ft. high} = 96\text{ in.}\\ 7\text{ ft. run} = 84\text{ in.}\end{array}\right\} \div 6 = \begin{array}{l}16\\14\end{array}$$

Start from the long point with 16 in. on the blade, 14 in. on the tongue and run up six times, which will give the length the same as finding the length of rafter or brace.

*From* S. C., *Wichita, Kan.*—On page 171 of the August number of *Carpentry and Building*, I notice the communication from "J. H. D.," asking the readers of the paper to tell him how to obtain bevels so that a grain spout may be cut to fit against the first and second floors, when the spout is placed in such a position that the grain will run in the corner instead of on the flat bottom. I inclose a diagram showing how I should proceed to obtain such bevels. Let A B in the diagram be the given slant of spout. Take any distance from B, say C; square up a line, cutting slant at D; also square up from B. Take B as a center and D as a radius, and describe a circle, cutting the line from B at E. Draw the line from C through E. We have bevel S to be applied, as shown at 2 2. I have cut away the lower end of the spout, but the application of bevels will be the same as above.

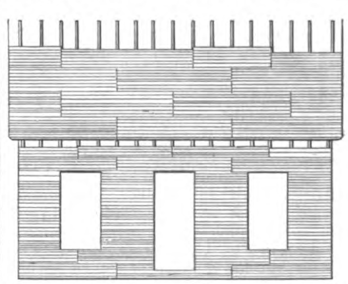
## How to Board a Building.

*From* J. D., *Winchester, N. H.*—I inclose a sketch showing the right and wrong way of boarding a building—that is, according to my ideas. The wrong way is the way the work is commonly done in this part of the country, and, so far as observation goes, in all country towns and likewise in some



*The Wrong Way of Boarding a Building.*

cities. It seems to me that architects should specify that no running joint over 3 or 4 feet should be made on the boarding of any building or laying of lining floor. Running joints of 3 or 4 feet should not be made immediately above the top of a door or window opening, nor occur on a jamb stud. The sketches which I send explain themselves to any man of judgment. That a building boarded in what I have termed the wrong way cannot be as strong as one boarded in the way I have styled the right way must be evident. Should the stud on which a running joint is made happen to be crooked—that is, bowing out or in, it would not straighten up as it would if the joints were broken back and forth over it. I took charge of a gang of men lately who persisted in making a running joint from one of the rafters to the other, or from the sill to the plate of the building. They thought I was a crank because I made them



*Correct Way of Boarding a Building as Described by J. D.*

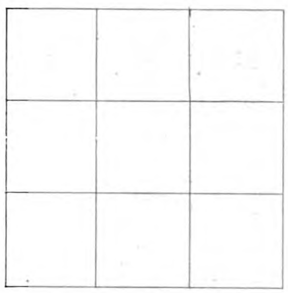
take the boarding off several times and break joints every 4 feet. They were eager to tell me that they never did it that way before. In using boards of various widths, as we do in this part of the country it is much easier to make a continuous joint from sill to plate, &c., than to do as I suggest. I suppose that is the reason why men have got into the habit of working as mentioned. It is no great trick, however, to make the boarding come out even in width every 3 or 4 feet if the intention to do so exists.

### Wood for Plane Stocks.

*From* GAGE TOOL COMPANY, *Vineland, N. J.*—We desire to ask the opinions of practical readers of *Carpentry and Building* on several points: Which is the best wood to use for plane stocks, white or red beech, and what are the reasons for preference? Also, which is the best, sap or heart for stocks, and what also are the reasons for preference in this case?

### A Japanese Puzzle.

The following geometrical puzzle from an exchange may interest the readers of *Carpentry and Building*. It came from Japan,



*Japanese Puzzle.—Fig. 1.—Diagram Showing the Square Divided Into Nine Parts.*

but it is said to be quite new in this country: Take a piece of paper 3 inches square and divide it into 9 square inches with pencil or pen, as shown in Fig. 1.

From Fig. 1 cut out 1 square inch from the upper right-hand corner, as in Fig. 2;

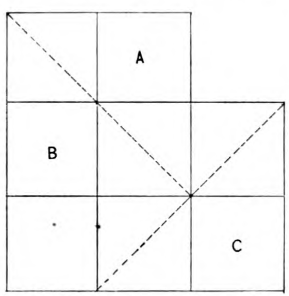



*Fig. 3.—Diagram Showing where Cuts are to be Made.*

then cut this figure into three pieces, and put them together so as to form a square. The dotted lines on Fig. 2 will show where the cuts are to be made, and in Fig. 3 it is shown how the new square is formed. With the diagrams the solution

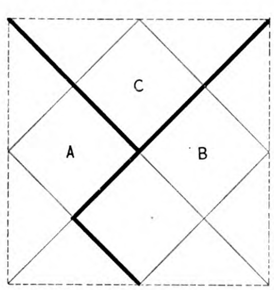


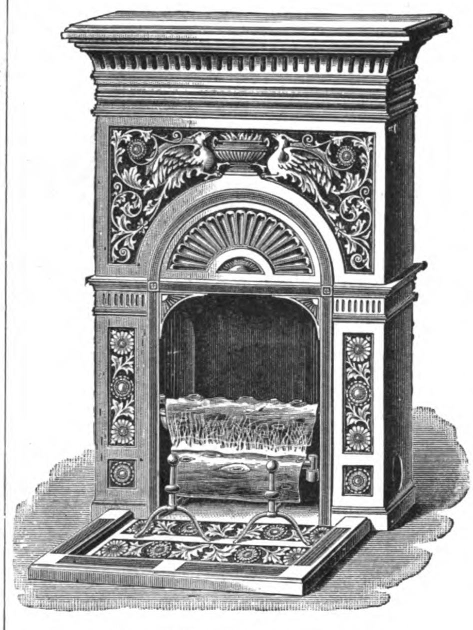

*Fig. 3.—Diagram Showing How the Square is Formed.*

is easy, but without them you will find, if you try it on your friends, that it is a very difficult puzzle.

## NOVELTIES.

### The Backus Steam Heater.

A form of portable steam heater is being introduced by the Backus Portable Steam Heater Company, 22 Park Place, New York, which is of interest to a large number among our readers. Fig. 1 of the



*Novelties.—Fig. 1.—Portable Steam Heater.*

engravings shows one design of this heater, while Fig. 2 shows a vertical section through the heater, and indicates the parts of which it is composed. The heater is adapted for burning ordinary illuminating gas from the street mains, or is fitted,

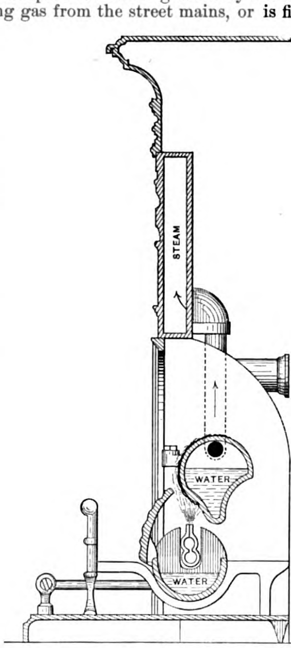



*Fig. 2.—Vertical Section Through Heater.*

as may be required, with kerosene burners. The results accomplished are somewhat remarkable in either case. The cut shows the heater adapted for gas. A cast-iron fire-log, more or less covered with asbestos to resemble moss, receives the flames in their upward course, while the lower part is concealed by a shield. The result is a pleasant, genial glow, made particularly advantageous on account of the construction of the burner, which causes mingling of the air with the gas in burning. The construction of the burner is such that perfect combustion is secured. The fire-log already referred to is a minature steam boiler. By means of a plug a small quantity of water is put into the hollow space, and as steam is generated it circulates, by means of pipes, upward into the hollow chamber of the mantel; in fact, the entire mantel is arranged as a radiator. Among the advantages claimed, and which will be apparent to our readers, are that in this apparatus the heater and mantel are a unit, and further that the heater may be placed at will in any apartment, all that is necessary being to connect the gas-pipes with it. It may be used in a fireplace, or may be set where there is no chimney connection. The steam fills the chamber above, giving its heat to the metal, and then, as it is condensed, returns to the boiler to be again converted into steam. By this means a steady heat is maintained and radiated from the large surface—the front, back and sides of the heater. Added to this, the heat from the flame itself, the radiation from the log and the interior of the grate gives the heater a heating capacity beyond what would be ordinarily estimated for it. This heater is manufactured in a number of different designs, all of which are attractive. It is something in which builders generally will feel an interest, and we suggest that they send to the company for their illustrated catalogues, which contain full particulars.

### The Detachable Empire Sash Cord Fastener.

The accompanying illustration represents an article manufactured by the Empire Portable Forge Company, Cohoes, N. Y., which has been named the Detachable Empire Sash Cord Fastener. Fig. 3 shows the fastener as applied to the sash cord, and Fig. 4 represents it as attached to the window sash. It is explained that the sharp rib extending over the top of the fastener

*Fig. 3.*

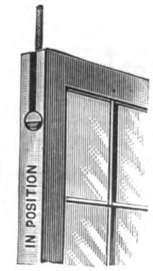



*Fig. 4.*

*The Empire Sash Cord Fastener.*

through the center is by the weight of the sash caused to sink in the frame, and is thus held firmly in place. The manufacturers allude to the following advantages in the use of this simple device: That it costs less than $1\frac{1}{2}$ cents per sash; that it requires no nails or screws; that it can be put in or taken out very quickly; that it prevents the knot from fraying out and getting between the sash and the frame; that there is no liability of its splitting the sash, and that it prevents the cord from running back into the weight pocket.

### The Hold-Back Hinge.

The accompanying cut, Fig. 5, represents a new hold-back spring hinge which has just been perfected and placed on the market by E. C. Stearns & Co., Syracuse, N. Y., and which they state is the result of careful study with a view of remedying the faults and strengthening the parts which in other hold-back hinges have been found weak. They explain that the tendency of hold-back hinges to get out of order, owing to their complication of parts, has been avoided in this hinge by making it in three parts only, so that under no combination of circumstances can it get out of order, while at the same time it is equally well adapted for use on either right or left hand doors and will hold the door either open or closed. The wings are cast, as shown in the illustration, in imitation of hammered work, and japanned. The springs are of steel, nickel plated, described as uniformly tempered and to be depended upon for the regularity and certainty of their operation. The hinge has a surface of $3\frac{1}{2}$ inches and is said to possess great strength.

The same firm are also introducing a single-spring hinge with variable tension, which may be used on either right or left-hand doors. It is of the same size and general design as the hold-back. It is especially strong and is made with either a silvered or japanned spring.

### Improved Lock Washer.

A year or two ago we had occasion to present to our readers a description and illustration of a simple and effective lock washer brought out by the National Lock Washer Company, of Newark, N. J. The principle of the washer was applied in two different forms, one being intended for heavy work, as for example, in connection

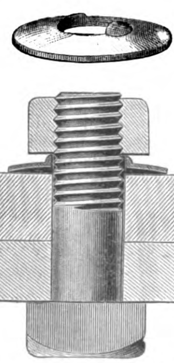
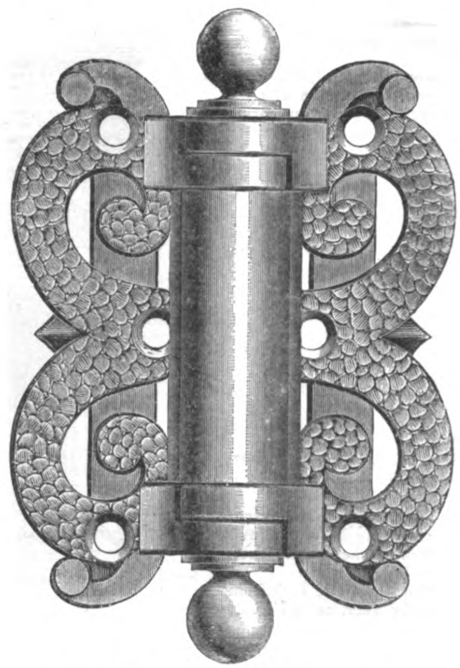


*Fig. 6.—Improved Lock Washer for Woodwork.*

with track bolts, heavy machinery, &c., and the other for lighter work, and also for use in securing carriage bolts and in connection with wood and metal work in general. This latter form was a dished spring washer, provided with a rib extending entirely around its inner edge, and projecting outward, so as to act on the face of the nut, which was screwed down upon it, so that, on the washer being flattened out against the surface of the work through which the bolt was inserted, a portion of he metal of the nut was forced against the bolt, effectively locking the nut and guarding against its working loose. Since then the company have made some improvements, which are embodied in the washer shown in the engraving, Fig. 6.



*Novelties.—Fig. 5.—The Hold-Back Hinge.*

The principle has been retained, but it will be noticed that the inner edge of the dished washer, instead of being provided with the previously mentioned rib, has two projec-

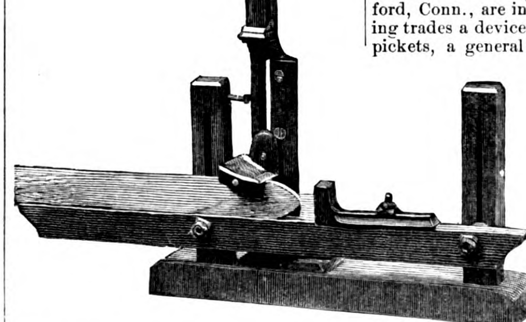
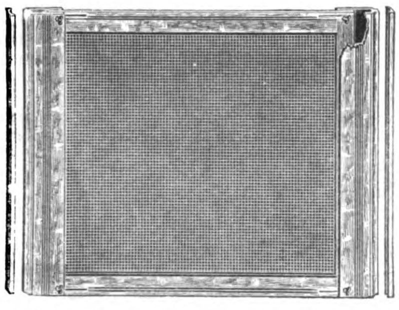


*Fig. 7.—Hand Picket Pointer, Made by I. S. Spencer's Sons.*

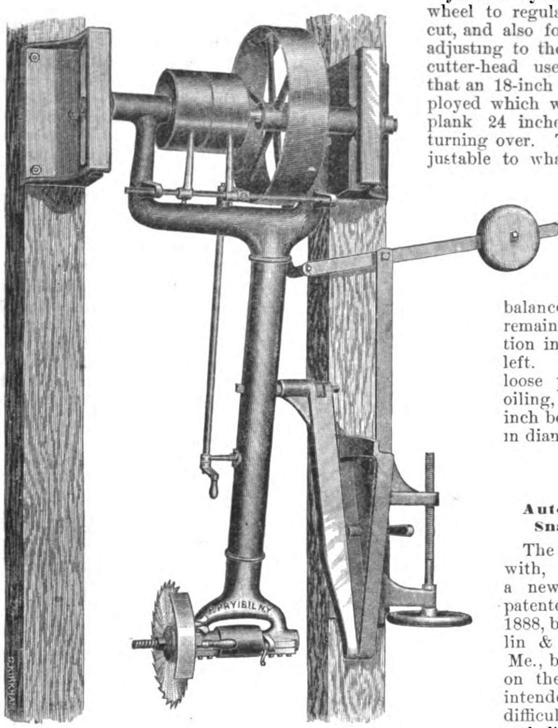
tions, which are spirally inclined in the opposite direction from that of the threads on the bolt. By this arrangement these projections perform the displacing function upon the metal of the nut as the latter is screwed home. The pressure with which the dished washer bears upon the surface of the work while the nut is being screwed on is in the new arrangement greatly diminished, and the adaptability of the washer is therefore much increased for employment with nuts and bolts used in wooden structures, as there is a diminished tendency of the upper edge of the washer to indent itself into the wood. The importance of this point will be readily appreciated. The smaller of our engravings shows a partial top view of the washer, with the displacing projections clearly defined. The larger of the cuts represents a washer in position, with the nut ready to be screwed down upon it. From the engraving it can be understood with little difficulty just what will happen when this is done. The washers, so far as we know, have given excellent results since their introduction, and are turned out, we understand, at a relatively low cost.

### Hand Picket Pointer.

Messrs. I. S. Spencer's Sons, of Guilford, Conn., are introducing to the building trades a device for shaping the tops of pickets, a general view of the machine being afforded by means of Fig. 7 of the accompanying illustrations. It is known as a hand picket pointer, and is provided with a base made of hard wood, having firmly fastened to it two uprights of the same material. Secured to these uprights is an adjustable picket-rest with movable gauge. The iron knife bar, or lever, which is provided with a wooden handle, is attached at its lower extremity to the base by means of a hinged joint, which serves as a fulcrum. The manufacturers state that the knife-holder is adjustable upon the knife-bar, and causes the knife to stand at right angles to the bar. The knife is attached to the lever by screws, clearly shown in the cut. When operating the machine, it is only necessary to place a picket on the rest, as indicated in the engraving, push the lever forward, and the work is done. The lever is thrown back into its original position by a spring suitably placed. The makers state that, when desired, they furnish with the machine a miter attachment designed for cutting or pointing ends of shingles. When this attachment is used, it is fastened to the picket-rest in the place of the gauge.



*Novelties.—Fig. 8.—Adjustable Window Screen.*



*No. 9.—Parallel Swing-Saw Machine.*

**Adjustable Window Screen.**

E. C. Stearns & Co., Syracuse, N. Y., have put on the market their new Monarch Screen, as shown in the engraving, Fig. 8, which shows its special features. The point is emphasized that this screen is so arranged as to slide upon guides, and may be placed in position on the inside of the window and left there throughout the season, as it is so constructed that the window slides past, and may be raised or lowered without disturbing the screen. It presents the same appearance on both sides; and when extended or closed the sides have an adjustment of 4 inches, and are fastened at the required extension by a thumb-screw shown in the cut. The frames are made of maple, attractively beaded, and finished in the natural wood with white transparent varnish. The cloth is described as tightly drawn and securely fastened in the frame, a uniform tension being secured by processes for which the manufacturers have obtained letters patent.

**Parallel Swing-Saw Machine.**

In Fig. 9 of the accompanying illustrations we show a general view of a parallel swing-saw machine manufactured by P. Pryibil, of Nos. 461 to 467 West Fortieth street, New York City. In this machine the arrangement of parts is such that the saw arbor travels in a straight line, instead of rising and falling, as is often the case with swing saw machines as ordinarily constructed. The manufacturer claims that a small saw may be employed for wide and thick lumber, and that the arrangement named allows the use of a dado head for grooving, gaining, rabbeting, tenoning and molding. The hight of the saw arbor above the table is adjustable by means of a handwheel to regulate the depth of cut, and also for the purpose of adjusting to the size of saw or cutter-head used. It is stated that an 18-inch saw can be employed which will cut a 6-inch plank 24 inches wide without turning over. The guard is adjustable to whatever sized saw or cutter-head that may be used. The weight of the moving parts is said to be so perfectly balanced that they will remain in any position in which they are left. The tight and loose pulleys are self-oiling, and for a four-inch belt are nine inches in diameter.

**Automatic Link Snatch Block.**

The illustration herewith, Fig. 10, shows a new snatch block, patented December 11, 1888, by Thomas Laughlin & Sons, Portland, Me., by whom it is put on the market. It is intended to obviate the difficulties of the old style link which cannot be opened or closed without turning the hook in one position, which is often inconvenient. In this block the link is kept in position by a hard rubber spring under it, and will instantly return to position when pulled out to unlock the hook. When the hook is unlocked it is only necessary to press it against the link, which instantly locks it, so that it remains locked whether there is a hold on it or not. The simplicity and effectiveness of this arrangement are alluded to and the point is made by the manufacturers that it is impossible to shake the link open, making the block exceedingly secure and satisfactory. The ironwork is referred to as heavy and the sheaves as large and wide in the score as any other make, the qualityof the workmanship being also referred to.

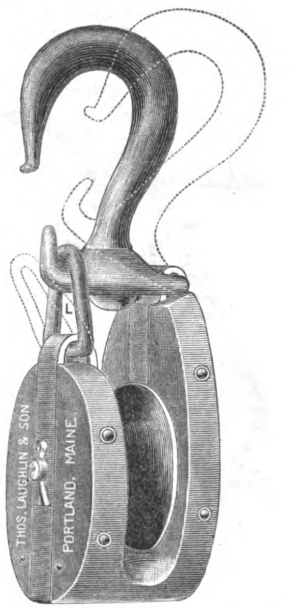



*Fig. 10.—Automatic Link Snatch Block.*

**The Perfection Screw-Drivers.**

J. H. Sternbergh & Son, Reading, Pa., have just entered upon the manufacture of an entirely new line of screw drivers, one of which is illustrated in Fig. 11. The blades of these tools are made of round steel, highly polished, with elegant points, which are referred to as hardened and tempered for the purpose. The Perfection screw-driver is intended to answer the same purpose as the ratchet drivers now in the market, with the advantage of greater simplicity and facility for use. As will be observed by the cut, a twelve-sided cone is fastened to the end of the blade, and this cone fits a corresponding twelve-sided cup which is firmly embedded in the wood of the handle at its strongest point. A coiled steel spring lies in the cup beneath the cone. In driving a screw with this tool the blades become fast by pressure on the handle, as the cone is thus forced into its cup, and when the pressure is released the cone is forced out by the action of the screw, thus making it serve the function of a ratchet screw-driver, so that a screw may be driven into the wood or turned out from the wood without shifting the hand. In this respect the manufacturers allude to the driver as having the advantage of simplicity over the screw-drivers having pawls to shift, and

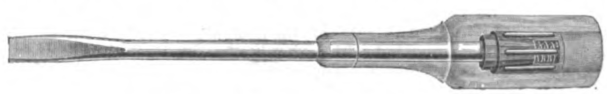
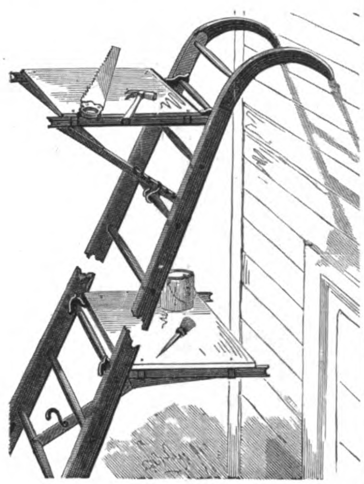


*Fig. 11.—The Perfection Screw Driver.*

being more or less liable to get out of order on account of their complicated construction. The tools are finely finished, with nickel-plated ferrules and ebonized handles.

### Combination Ladder and Roof Bracket.

In Figs. 12 to 16 of the engravings below are shown several applications of a combined ladder and roof bracket, invented by Mr. W. H. Higgins, of Forest City, Pa. The device is designed for the use of carpenters, builders, tinners, masons, and, in fact, of all who have occasion to employ a ladder for any purpose.



*Novelties.—Fig. 12.—Combination Ladder and Roof Bracket. Bracket Used with Ladder.*

Fig. 12 indicates some of the ways in which the bracket may be employed. The construction of parts is such that the platform may be adjusted to any level, and the bracket may be attached to either the upper or under side of the ladder.

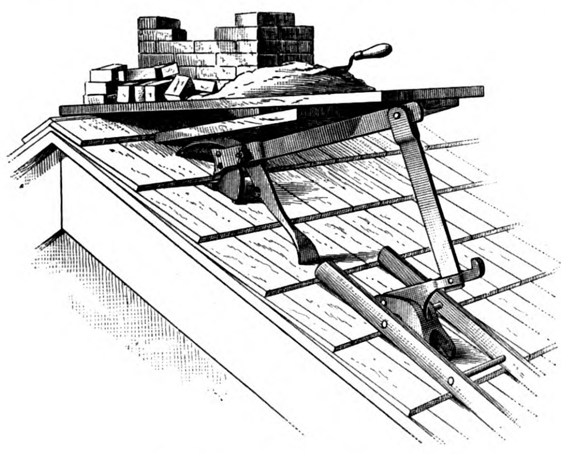


*Fig. 13.—Combined Use of Both Forms of Roof Bracket.*

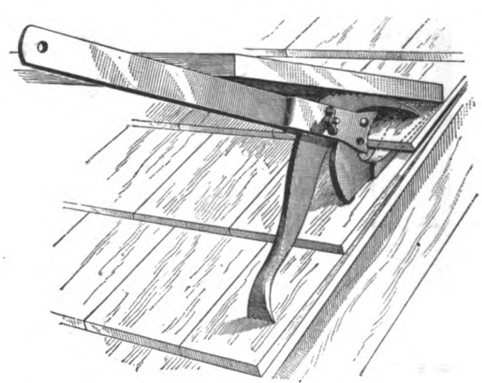


*Fig. 16.—Arm of Ladder Bracket used as Roof Bracket*

The side bars are formed with hooked ends of a rather peculiar shape, provided with a spur in which are mounted S hooks. The ends of these hooks are provided with teeth or serrations, which serve to hold the bracket in place when used upon a roof. By simply uncoupling the Y-shaped leg and removing the platform a roofing bracket is produced, the general application of which is shown in Fig. 16. In connection with a shingled roof, the flattened points are pushed beneath the shingles, bringing the spur in contact with the shingle below, in such a way that while the lower arm of the S hook is pressed outward, the toothed points of the hook are forced into the shingle, giving it a bearing upon three courses. It is stated that the bracket will adjust itself to the roof, will not raise the shingles in a way to injure them and is always positive in its action.

*Fig. 15.—Roof Bracket.*

Fig. 15 is another form of roof bracket for general use by carpenters, and is adapted to be employed with the bracket just described. It can be quickly adjusted, securely locked to the roof and is arranged in such a way that a ladder may be suspended from it, making a runway up the roof. By means of it a shingle roof may be quickly and safely mounted. Fig. 13 shows the application of the two brackets in building a scaffold for the erection of a chimney or the performance of work of a similar nature. An inspection of the cut will clearly indicate the method of arrangement and the manner of attaching the ladder to the lower bracket.

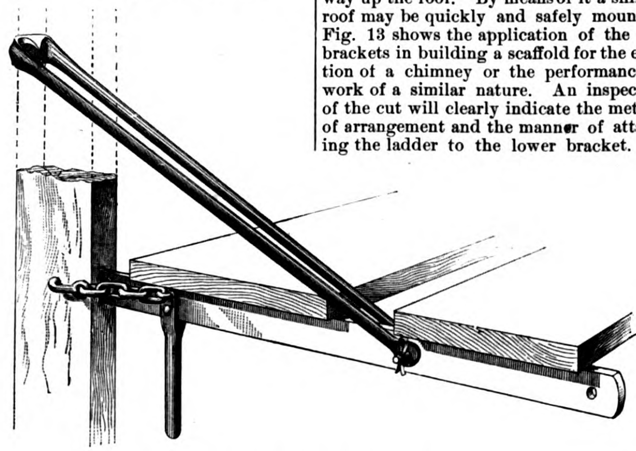
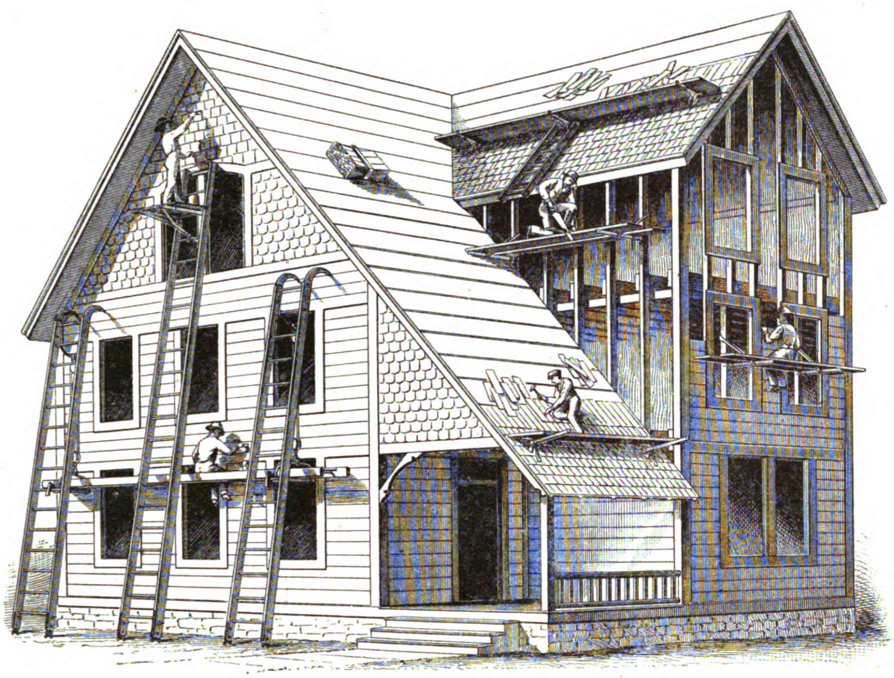


*Fig. 14.—View of End of Builders' Scaffold*

In Fig. 14 we present a view of one end of a scaffold designed for the use of builders. This consists of a bracket and supporting brace, the latter being attached to the studding of the building or to any upright suitable to the purpose. Any downward pressure on the bracket serves to bind the supporting brace or arm against the scaffold upright and force the spurs into it. The hooks and lever shown in the cut and carried by the main arm are to lock the scaffold and prevent any side motion or slipping of the bracket. The latter is made of wrought iron, the main arm being 3 feet long. The inventor claims that by means of this arrangement a wide scaffold is produced, and one which is safe, strong and quickly erected.

### Wrought Steel Locks.

A novelty of genuine interest to builders is being introduced by the Russell & Erwin Mfg. Company, whose New York office is on Chambers street and whose factories are located in New Britain, Conn. It is a wrought steel mortise lock. The lock in its general appearance resembles others of its kind, but instead of the case being a thin casting, and accordingly brittle, it is composed of two pieces of sheet steel struck up in dies to requisite shape, and so combined as to make a neat and effective construction for the purpose. The corners are rounded so as to make it pleasant to handle, while the general weight of the lock is much in favor of the new article as compared with the old. These locks, a general line of which is being introduced, are provided with reversible latches and other improvements. The keys are light, and altogether they are a very desirable addition to the general line of builders' hardware. Those of



*Novelties.—Fig. 18.—Various Applications of Higgins' Improvements.*

our readers who have had trouble with breakages of locks and who want something not so liable to break, and in turn those who admire a neat thing when they see it, will be much pleased with these goods.

### New Panel Raiser.

By means of the cut shown in Fig. 19 of the engravings, we present a general view of a new Panel Raiser which is being placed upon the market by the Cordesman Machine Company, of Cincinnati. This machine is designed especially for raising panels, and will be found a valuable adjunct to the equipment of planing mills, sash and door factories and the like. The manufacturers state that the construction of the machine is such that it will work panels of hard or soft wood, on one or both sides at the same time, of any thickness between a quarter of an inch and 2 inches, and of any depth up to 4 inches, without a change of cutters. The material is fed to the machine by hand, the speed being regulated to suit the quality of the wood. The heads and cutters are easily accessible, and may be quickly removed or replaced. The frame, which is very heavy, is substantially ribbed, cored out, and is cast in one piece. It is provided with an extension which carries a countershaft, and in setting the machine the alignment of both is done at the same time. The tables are made of iron and are sufficiently strong for all purposes. The front table is connected to the rear by a bridge, making them practically continuous and preventing material from dropping between them. The arrangement is such that the front table can be withdrawn yielding fence, made on an improved principle, is bolted to the tables, and may be speedily adjusted for different thicknesses of panels. The yielding side of the fence receives its pressure from steel springs which cause it to hold the material with sufficient firmness to prevent vibration from the head when desired. The makers state that the combined stationary and bration. The spindles are of large diameter, made of steel, and revolve in self-oiling boxes provided with the best of metal. The frames, supporting spindles with boxes, have tongues and are bolted to planed grooved surfaces on the sides of the machine. By means of a right and left hand screw they can be adjusted vertically at such an angle that the length of

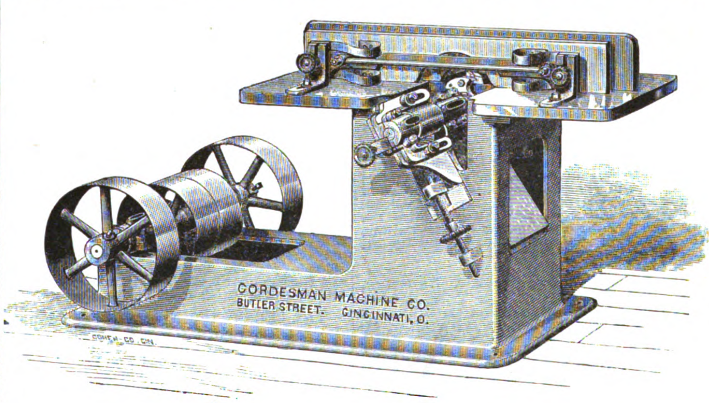



*Fig. 19.—New Panel Raiser, Built by the Cordesman Machine Company.*

belt will not vary The heads are constructed of cast steel, and it is claimed may be run at a high speed. They can be adjusted laterally, so that various thicknesses of panels may be made. The bevel or O G cutters are fitted in planed slots held firmly by steel taper head bolts. The company furnish with each machine one pair of panel heads and cutters, panel fence, bridge, wrenches and countershaft. The tight and loose pulleys are 10 inches in diameter and provided with a 4½-inch face. The manufacturers state that these pulleys should make 900 revolutions per minute.

### Why Circles Please the Eye.

Professor Müller, says a careful reader, in a course of lectures in Berlin, offered a simple and mechanical explanation of the universal admiration bestowed on these curves. The eye is moved in its socket by six muscles, of which four are respectively employed to raise, depress, turn to the right and to the left. The other two have an action contrary to one another, and roll the eye on its axis, or from the outside downward, and inside upward. When an object is presented for inspection the first act is that of circumvision, or going round the boundry lines, so as to bring consecutively every individual position of the circumference upon the most delicate and sensitive portion of the retina. Now, if figures bounded by straight lines be presented for inspection, it is obvious that but two of these muscles can be called into action; and it is equally evident that in curves of a circle or ellipse all must alternately be brought into action. The effect then is that if two only be employed, as in rectilinear figures, those two have an undue share of labor; and by repeating the experiment frequently, as we do in childhood, the notion of tedium is instilled, and we form gradually a distaste for straight lines, and are led to prefer those curves which supply a more general and equable share of work to the muscles.

## TRADE NOTES.

DURING THE past month the United States Mineral Wool Company, No. 2 Cortlandt street, New York, have supplied their product for deadening and filling to the following parties: J. T. Pirie, Sea Cliff, L. I.; Manhattan Electric Light Company, New York City; E. B. Mead, Greenwich, Conn.; J. R. Hunt, Harrison, N. Y.; F. O. Bullock, Succasanna, N. J.

THE *Brooklyn Times* of January 4, in commenting upon our remarks relative to the establishment of an evening class in architectural drawing at Yonkers, N. Y., among other things, says: "The usefulness of which the evening school system is capable is only beginning to be appreciated. The greatest educational advances of the next quarter of a century ought to be made in the improvement of the system, until it furnishes to every one who wishes to profit by it the widest variety for practical as well as literary education."

WE HAVE received, with the compliments of *The Clay Worker*, a journal devoted to the interests of brickmakers, potters and all workers of clay, a very attractive calender for 1889. It consists of a card printed to represent a school slate, upon which appears in white letters the name of the paper and its publishers. To the lower portion of the slate are attached the leaves forming the calendar proper. The imitation is very clever, and is something of a novelty in the line of calendars.

E. C. STEARNS & Co., of Syracuse, N. Y., have issued a very neat folded card designed to show by means of statistics the popularity of the Stuart screen frames manufactured by them. The front page is finished in imitation of one of these frames, while the inside pages are devoted to the text. The firm state that indications point to a largely increased business the present year, and in order to provide adequate facilities have constructed a large warehouse especially designed for this branch of the business.

MR. CHARLES E. ILLSLEY, president of the Western Association of Architects, favors us with a little work compiled by him and entitled "Missouri Architectural Reference Book and Proceedings of the Missouri State Association of Architects." It is a pamphlet of a little over 50 pages, of a size convenient for the pocket, and bound in paper covers. Among the contents we find a schedule of charges and professional practice of architects as indorsed by the American Institute of Architects, a chapter on professional practice and charges of architects sanctioned by the Royal Institute of British Architects, suggestions for the conduct of architectural competitions, a list of books of reference recommended for the professional study of architecture, and tables showing the strength of wooden pillars, and for ascertaining the number of pieces of paper required for the sides of a room.

WILLIAM R. UPTEGROVE & BROTHER, foot of East Tenth street, New York, have issued a dainty little pamphlet on the subject of mahogany. It is faultless in typography, attractive to the eye and contains matter which is of interest to every builder and architect. A suggestive legend on the front page of the cover is: "What the fireplace with its hickory log is to the library mahogany is to interior decoration."

THE FULTON IRON AND ENGINE WORKS, Detroit, Mich., are directing attention to their automatic steel quick lift, sure grip rope hoist, adapted to many of the uses which carpenters have for such devices. They ask the trade to send for their new catalogue.

IN ANOTHER PART of this issue the Bentel and Margedant Co., of Hamilton, Ohio, present in compact shape a general view of several of their wood-working machines.

THE RACINE HARDWARE COMPANY, Racine, Wis., are directing attention to their line of Parquetry, fine floors, wainscoting and similar work. The trade are invited to send for illustrated sheets and estimates of cost to S. C. Johnson, Racine, Wis.

WE HAVE ALREADY directed attention in this journal to Kinnear's Patent Sheet Steel Ceiling. In the interval additional improvements have been made and the firm of W. R. Kinnear & Co., Columbus, Ohio, are now prepared to supply this unique article for churches, stores, lodges, halls, dwellings and other buildings.

LANE BROTHERS BRIDGE AND CONSTRUCTION COMPANY, of Newark, Ohio, direct attention to their facilities for supplying iron work for buildings. Builders are invited to write for estimates.

WE ARE INFORMED by the secretary of the Cincinnati Corrugating Company, of Cincinnati, that they have recently acquired by purchase the machinery, good will, books, &c., of the firm of Caldwell & Co., who have been engaged in the iron roofing business in Cincinnati for over 30 years. Their business consisted for the most part in the manufacture and sale of the Outcalt patent elastic joint iron roofing, in which they built up a very substantial trade. Some of the oldest work alluded to in the circulars sent out by the Cincinnati Corrugating Company is of the Outcult patent, and put on by this firm. One of the prominent features of this style of roofing is that no nails are exposed to the weather. The Corrugating Company are getting into better shape to handle work than ever before, and can execute all orders for plain and corrugated roofing with dispatch.

THE STANLEY RULE AND LEVEL COMPANY distributed among their friends in the trade a very attractive Christmas card bearing an illustration of "Stanley's Odd Jobs," a convenient tool well adapted to the wants of mechanics, amateurs and housekeepers. The design was printed in colors to represent the various iron and wooden parts of the tool, and was accompanied by a list of the combinations that can be made with it. Those of our readers who have not examined this tool, and who have not seen the card referred to, will be interested in sending you a copy because it is so realistic in character as to be almost equivalent to the thing itself, so far as appearance goes.

THE CANTON STEEL ROOFING COMPANY, formerly known as the Canton Iron Roofing Company, of Canton, Ohio, have just completed their new plant. The dimensions of their main building are 100 x 200 feet, and it is covered with the famous H. W. Smith patent steel roofing, and sided with pressed corrugated iron of their own manufacture. To their former extensive facilities they have added the latest improved machinery, also railroad switch, and have increased their office and shop forces. All indications show that they are doing a large business, and expect an increase over last year, which was 60 per cent. larger than that of 1887. The officers of the new company are: T. C. Snyder, president; Jas. H. Richardson, secretary; Clifford Holbrook, treasurer; T. C. Belding, superintendent. The capital stock is $50,000.

JOHN D. EMACK, Slatington, Pa., is directing attention to his facilities for supplying roofing slate of different colors, and also blackboards for school purposes, &c.

THE FOLDING GATES and Window Guards supplied by William R. Pitt, No. 92 B Chambers street, have attained popularity wherever introduced. Our readers will be interested in the catalogue he is supplying.

THE ACME COMBINATION SAW that is being supplied by the Seneca Falls Mfg. Company, 209 Water street, Seneca Falls, N. Y., possesses novel features which are attracting the attention of wood-workers everywhere.

SAMUEL H. FRENCH & Co., of Philadelphia, manufacturers of paints and painters' supplies, have issued a very attractive calendar for the new year. It consists of a piece of heavy cardboard arranged with two eyes at the top and a cord for hanging up. The design is one appropriate to the line of business in which the firm is engaged, and is finished in such a way as to give a varnish effect. At the upper right-hand corner are 12 small sheets comprising the calendar proper. The work is neatly executed and the calendar is likely to be appreciated by all into whose hands it may come.

THE EGAN COMPANY, of Cincinnati, Ohio, are distributing among their friends in the trade a circular which bears the title, "Does the Flooring Machine Feed Too Fast?" In reply to this question the circular states that "it certainly does, or the builders of them would devise a machine to turn out flooring at a far more rapid rate than the machinery now in general use. To make perfect flooring at a high rate of speed requires perfect working machines, and to make it day in and day out without breaking down, or stalling in any way, requires a still better machine." The circular makes the announcement that the Egan Company have originated a flooring machine which is something entirely new, and has a capacity for high class rapid work. The statement is made that this is one of the most remarkable machines for its size, weight and price ever produced.

## NEW PUBLICATIONS.

MODERN ARCHITECTURAL DESIGNS AND DETAILS. Vol. II., No. 3. Six plates. Published by William T. Comstock. Price, 50 cents.

This is the third number of the above work, and contains in addition to six plates of designs and details a gelatine supplement showing a house at Summit, N. J., built for R. K. Munkittrick, a well-known humorous writer, and one at Providence, R. I., designed by Haward Hoppin. The plates show, respectively, a design for a $2500 cottage, by architect J. A. Schweinfurth, of Boston; details of the Colonial period from the exterior of an old house in Litchfield, Conn.; staircase hall in the house of C. T. Barney, New York City; library of a house in Dayton, Ohio; 12 designs for trims or architraves, suitable for interior finish of windows and doors, and some details of parts that can be used in connection with staircases. The publisher makes the announcement that the next number will differ somewhat from its predecessors in that a small cottage will be given, and the more important parts of it detailed throughout.

### Oblique Mortise and Tenon.

Writing upon the subject of mortises and tenons J. Robinson says:

The joint that most of all demands the careful attention of the artist is that which connects the ends of beams, one of which pushes the other very obliquely, putting it into a state of extension. The most familiar instance of this is the foot of a rafter pressing on the tie-beam, and thereby drawing it away from the wall. When the direction is very oblique (in which case the extending strain is the greatest), it is difficult to give the foot of the rafter such a hold of the tie-beam as to bring many of its fibers into the proper action. There would be little difficulty if we could allow the end of the tie-beam to project to a small distance beyond the foot of the rafter; but, indeed, the dimensions which are given to tie-beams for other reasons are always sufficient to give enough of abutment when judiciously employed. Unfortunately this joint is much exposed to failure by the effects of the weather. It is much exposed, and frequently perishes by rot, or becomes so soft and friable that a very small force is sufficient either for pulling the filaments out of the tie-beam or for crushing them together. We are therefore obliged to secure it with particular attention, and to avail ourselves of every circumstance of construction. One is naturally disposed to give the rafter a deep hold by a long tenon; but it has been frequently observed in old roofs that such tenons break off. Frequently they are observed to tear up the wood that is above them, and push their way through the end of the tie-beam. This, in all probability, arises from the first sagging of the roof by the compression of the rafters and of the head of the king-post. The head of the rafter descends; the angle with the tie-beam is diminished by the rafter revolving round its stop in the tie-beam. By this motion the heel or inner angle of the rafter becomes a fulcrum and a very long and powerful lever, much loaded. The tenon is the other arm, very short, and being still fresh, it is therefore very powerful. It therefore forces up the wood that is above it, tearing it out from between the checks of the mortise, and then pushes it along. Carpenters have therefore given up long tenons, and give to the toe of the tenon a shape which abuts firmly, in the direction of the thrust, on the solid bottom of the mortise, which is well supported on the under side by the wall-plate. This form has the further advantage of having no tendency to tear up the end of the mortise.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



VOLUME XI. NEW YORK, MARCH, 1889. NUMBER 3

THE THIRD annual convention of the National Association of Builders was held in Philadelphia, February 12, 13 and 14. Strenuous efforts had been put forth to make this convention one of marked influence and usefulness, and we believe that there was not a delegate or alternate present at the meetings but went home thoroughly satisfied with its results, and feeling well repaid for his expenditure of time. The report published elsewhere is but brief, for a full account of what took place would occupy many pages, and the exigencies of space have made it necessary to omit much that would otherwise warrant insertion. Not to mention the instructive discussions that occurred many times each day, all the reports presented, as well as the papers read, if treated on their merits, deserve to be printed in full. Among the committees' reports of especial interest were those on uniform contracts, lien law and the apprenticeship system, and those who have not seen copies of them would do well to look them up at the nearest builders' exchange. Of the papers read Mr. Tucker's, on Masonry; Secretary Sayward's, on Builders' Exchanges, and Colonel Auchmuty's, on Trade Training, deserve particular mention. Some extracts are presented in the report printed elsewhere, but nothing short of the full papers can give an adequate idea of their contents. Mr. Sayward's address was especially written for a proselyting tract, and we are glad to say that it is to be printed and distributed broadcast throughout the country. Its weighty arguments and clear and concise exposition of the advantages of builders' exchanges cannot but promote a general active interest in the subject of local organizations of the trades concerned with building. The public appreciation of Colonel Auchmuty in the noble work to which he devotes his time and money found expression in the storm of applause that greeted him both before and after reading his paper. But, apart from the actual work done at the convention, there are other features that ought to be noticed, if space permitted. Much of the speech-making was of a humorous nature, and among the builders are many who possess the gift of *extempore* speaking in no small degree. The banquet at the close of the convention, as well as other social features, must be dismissed with a simple mention. If those present at Philadelphia think over all that they heard, there will be plenty to talk about next year when the association meets at St. Paul.

THE STUDENTS of the architectural class at Columbia College who are attending the course of plumbing lectures at the New York Trade Schools are enjoying a privilege that ought to prove of the greatest benefit to them in their after professional work. There is no need of an architect being a skilled plumber, able to manipulate lead and do all the difficult work required in complicated jobs, but it is eminently desirable that he be versed in the practical and theoretical principles of sanitary science and know when the work of detail is executed in a proper manner. Theoretical plumbing can of course be learnt from text books, but unless the lessons are enforced by illustration from actual example they will very likely be forgotten. Instruction, to be efficient, must involve the kindergarten feature whatever be the age of the student, for in no way is the mind so permenently impressed with the meanings of principles as when they are carried out in practical examples. A little manual labor has peculiar power of making the mind retentive of principles. Lest young architects should think we held an especially low estimate of their abilities we will illustrate our meaning from another profession. In chemistry the whole work of analysis is accurately described in text books, and yet without a laboratory experience the student's education amounts to nothing. He can commit to memory the precise method of making an analysis, but unless he uses the reagents and becomes familiar with handling test-tubes, beakers and the other paraphernalia of a chemical laboratory his knowledge will hardly last him over night. So with the architectural students, the practical lectures they attend and the manual work that they attempt with varying degrees of success pound certain fundamental principles into their heads so thoroughly that it will be well nigh impossible ever to forget them entirely. That some such system of instruction is needed the short experience at the Trade Schools already shows, for it must be confessed that the college students have not made a very brilliant showing compared with the regular class of the school.

BUT THE MERE enforcement of principles is not the only advantage of such a course to the student of architecture. He also acquires enough practical knowledge to avoid making egregious blunders in the planning of houses. A thorough knowledge of the theory of ventilation of traps and the ability to figure out the bursting strength of lead pipes will not prevent an architect making costly errors in his house designs. He must know how and where the soil pipes shall run, and not have a closet come over the middle of a parlor ceiling, requiring a long length of horizontal pipe. Mistakes of this kind are of course not likely to happen, but there is ample opportunity for minor faults of planning to occur involving considerable waste of time and money. Furthermore, an architect should be able to tell whether the plumbing of a house is done correctly or not; not only whether the fixtures are set properly and the pipes of the right size, which are things which he ought to attend to in the specification, but also whether the joints in the soil-pipe are calked in the proper manner and the traps ventilated as they should be. All this, of course, presupposes that the architect in person keeps careful watch over the house he is building, and this really is what the architect is supposed to do at present. Whether this labor of inspection and general supervision is part of the architect's duty is not a question for us to discuss at this time, though it is one that deserves attention from the architectural societies, and press as well, for there is no doubt but that something must be done soon to relieve the architect of work which ought really to be none of his concern. As it is, however, the architect must not only plan his house with regard to having it plumbed and heated, but he must also know enough of these two branches of domestic science to be able to tell when the work is properly done. Unfortunately he can get no special practical instruction in the art of house heating, for schools giving practical attention to such matters have not yet been established; but, on the other hand, the young architect should congratulate himself that he may attend the course of plumbing lectures at the New York Trade Schools.

A LATE ISSUE of the *Progressive Age* contains a suggestion concerning the use of gas that may be of interest to our readers. Our contemporary points out that in all large cities and towns where there are buildings heated by steam there is a splendid field for the introduction of boilers using gas as fuel instead of coal. The advantages of gas are evident, and we believe that the principal reason that it is not more extensively used is the popular notion that coal is less costly. That it is applicable for cooking and heating, as well as lighting, is seen by traveling through all the natural gas districts. There it has practically superseded coal in dwelling houses as well as manufactories, and it has been found that it is just as efficient under a hot-air furnace as under the power boilers of a mill or factory. Everything that may be said of natural gas applies to manufactured gas. In the case considered, that of house-heating boilers, whether for steam or hot-water circulation, there is need of attendance, and where the labor of looking after a fire is lessened by the use of magazines or a thick bed of coal a waste of fuel is the price paid. Owners of house boilers forget that coal is only burnt efficiently in a thin fire-bed to which fuel is frequently added in small quantities, and that the piling up of coal to save attendance simply means a waste of heat. All these difficulties are, of course, obviated by the use of gas. It burns evenly and continuously, and no unconsumed products are carried off to waste the heat; and, furthermore, there are no ashes.

A GREAT DEAL of time and thought have been spent in investigating the composition of what is called sewer gas and in tracing out its connection with certain sicknesses. In spite of all research, however, there is a great deal of mystery surrounding the subject, and but little is definitely known. It is an established fact that houses polluted by the air escaping from the sewers or drainpipes are unhealthy, and the remedy is to shut out this poisonous atmosphere. Why the sewer gas is poisonous is a question still to be answered, for chemical analysis has not yet discovered any adequate cause. In spite of the difficulties of the problem, however, it is being constantly worked at, and we may safely say that the riddle will not forever remain unsolved.

ONE OF THE latest attempts in this direction was made by Dr. E. H. Bartley, who publishes an account of his investigations in a recent volume of Wood's "Reference Handbook." Sewer gas, or sewer air, as he prefers to call it, he defines as the air of drains, cesspools and other badly ventilated places containing decomposing animal and vegetable matters. This air, according to the analysis of Professor Nichols, contains from 20 to 30 per cent. of oxygen, about 79 per cent. of nitrogen, half of 1 per cent of carbonic oxide and a trace of sulphureted hydrogen. In extreme cases the oxygen was as low as 14 per cent., while the carbonic oxide and sulphurated hydrogen were as high as 3 per cent. These are the constituents that can be measured by chemistry, but excepting the carbonic oxide nothing very poisonous was discovered, and even where 3 per cent. of this gas is present in the sewer it must become diluted to but little more than a trace where it leaks into the atmosphere of a house.

A COAL STOVE with the dampers shut, or even an open fireplace where the chimney draft is poor will drive more of this poisonous gas into a room than would leak in during a week from the sewer. But, as Dr. Bartley states, acute poisoning by sewer air seldom occurs, most of the sickness being due to specific disease germs and volatile organic matters that it carries in suspension. The detection of sewer gas depends upon the presence of sulphureted hydrogen or ammonium sulphydrate, a test for both being ascetate of lead, while turmeric paper will turn brown when exposed to the latter. Such simple tests, though not altogether reliable, are useful at times, but it is far safer to put trust in well constructed plumbing than in all sewer-gas detectors invented up to date. Thorough ventilation of all conduits from the main sewer to the smallest waste-pipe is the best preventative of sickness, and if we are to believe Milton when he speaks of cities where "sewers annoy the air" we must conclude that our ancestors recognized the efficiency of sewer ventilation.

## The Building Association Competitions.

There are a good many of our readers about this time who are eager to get their copy of *Carpentry of Building*, in the hope that the names of the prize-winners in the competitions will be announced, and the question "Is it I?" be answered. We know quite well that the heart sickeneth through deferred hope, and we are sorry that we cannot, at this time, put

*The Building Association Competitions.—Imaginative Sketch of the Entrance to the Office of Carpentry and Building Just Before the Closing Hour.*

a stop to all anticipations, pull down every castle in the air, and make all but two contributors to each contest envious, by publishing the judgment and announcing who shall receive the awards. But what we suffer under is, as the French term it, an embarrassment of riches, and, for the sake of giving better expression to our difficulties, we have called in the assistance of the engraver, who has reproduced two local scenes. Figure 1 is supposed to represent the entrance to our office at 3 o'clock on Thursday afternoon, January 31. The second illustration suggests the condition of the editor's desk at 4.30 p. m. the same day. The cuts speak for themselves and are pretty accurate, but our artist unfortunately made one or two little mistakes that require a word of explanation. In the first place, the messenger boys in New York do not really grow wings on their heads and heels; they are neither as swift as Mercury always, nor, what is of still more importance, are they the friends of thieves. Our artist, however, is a Western man, and in touching up the sketch he was probably thinking of a Chicago messenger boy when he furnished them with the emblems of unwearying speed. The bundles and packages, also, were somewhat more irregular in outline than the engraving shows—in fact, they included every imaginable size and shape, from an ordinary envelope to a good-sized wooden box. The contents are equally variable, but as the prizes are to be awarded according to merit and not according to appearance, all the designs must be looked over with equal care. The labor of sorting and arranging alone occupied considerable time, but we are glad to say that the judges are already at their task of comparison, and their decisions we will make known at the earliest possible moment. In the meantime, if any reader becomes fretful or nervous, we want him to take up this paper and spend a moment or two in contemplation of these two engravings. We hope and believe that they will have a quieting effect, and that the most restless and uneasy contestant will turn away from them with a soul possessed of patience.

*The Editor's Desk.—An Embarrassment of Riches.*

## THE PLATES.

In plates IX, X and XI we show two cottages received in the Building Association Competition. They are both $1,000 houses. Others will be published later.

In Plate XII is a design by Mr. Robert Brook, which we have entitled "Rennaissance Design for Chimney Piece." It is adapted to use in a grand reception-room or public building. Its great hight unfits it for an apartment of ordinary dimensions. The carved enrichments with which it is embellished would require to be executed with considerable taste, and a knowledge of rennaissance details would be essential for the successful production of such important work. The author suggests that walnut would be a most appropriate wood to use for this chimney-piece, because it lends itself readily to constructive purposes, and is also suitable for carving of every description. The dimensions are as follows: Hight, 13 feet 6 inches; width on top, 7 feet, and width across jambs, 5 feet 9 inches.

## National Association of Builders.

The third annual convention of the National Association of Builders was held in Philadelphia on the 12th, 13th and 14th of February, the meetings taking place in the hall of the Franklin Institute. The number of delegates present numbered over 150 and represented more than 33 different local associations.

*Tuesday Morning.*

The meeting was called to order on Tuesday morning (the 12th of February) by President Stevens, and after a prayer had been offered by the Rev. John Peddie, D. D., the president introduced Mayor Fitler, of Philadelphia, who welcomed the delegates to his city. At the conclusion of the Mayor's remarks President Stevens delivered his address. After a few pleasant words of introduction, he briefly alluded to the work that the National Association had accomplished, referring especially to the uniform contracts, with which our readers are familiar, and also touching upon other questions that were in the hands of committees, such as the Lien Law, Permanent Arbitration, Uniformity of Measurements, Apprenticeship System, &c. Especial emphasis was laid upon the establishment of trade schools, and the reference to the good work done by Col. R. T. Auchmuty, who not only established and carried on the New York Trade Schools, but has also offered liberal aid to similar schools under the patronage of the builders' exchanges of Boston and Philadelphia, was greeted with loud applause. A similar manifestation of approval followed his reference to the princely gift of Mr. Isaac B. Williamson, who proposes to found a mechanical trade school. In closing, President Stevens briefly mentioned the subject of builders' exchanges, and referred to the good work that had been done toward their establishment during the past year. The remainder of the morning session was occupied in the reading of several letters of invitation by Secretary Sayward and in the appointment of a committee on credentials.

*Tuesday Afternoon.*

The first work of the afternoon was the presentation of the report of the Committee on Credentials, which showed that the total number of delegates and alternates present numbered 158. The acceptance of this report was followed by miscellaneous resolutions from different members, one of which related to the establishment of a fire insurance company under the special patronage of the National Association, for the purpose of securing insurance on buildings during erection. In accordance with the wording of the resolution, the matter was referred to a committee. Another resolution, offered by Mr. Prussing, of Chicago, and which was based upon the fact that sub-contractors are frequently defrauded out of their dues for labor and materials furnished by contract for government work, provided that a remedy should be found by requiring a bond of the contractors in a sum sufficient to cover all possible liability. Another resolution was to the effect that the National Association of Builders should disapprove of the conduct of any contractor who, being a member of the association and doing work outside of the city in which he resides, should violate any of the established rules and principles of a local association in the district in which the work is executed. This last, as well as the previous resolutions, were referred to suitable committees. The next order of business was the appointment of a committee to report on the time and place for holding the next convention. Invitations were received from New York and St. Paul to hold the next annual convention at those cities. As St. Paul is the home of Mr. Edward E. Scribner, who was first vice-president of the association, and New York the residence of Mr. John J. Tucker, the second vice-president, an interesting dilemma presented itself, as there is an unwritten law of the National Association that succeeding conventions shall be held at the place of residence of the next president.

### OFFICERS' REPORTS.

The report of Secretary Sayward was an interesting as well as an amusing document, in which he sketched the work of the association during the preceding year. The totals of national, sectional, State and city organizations, as he found in his inquiries, were as follows: Builders' associations and exchanges, 63; carpenters, 26; masons, 31; painters, 50; plumbers, 61; plasterers, 7; roofers, 4; iron workers, 4; sheet metal workers, 2; stone workers, 13; brickmakers, 10; lumber and mill workers, 62; steam fitters, 1; material exhibits, 7; trade schools, 3; real estate exchanges, 3; architects' associations, leagues, clubs, &c., 46; engineers' and surveyors' associations, 29; water works associations, 2. The aggregate for the United States was 425 organizations and for Canada 20.

The treasurer's report showed the total receipts of the year to be $5326.80, which, after deducting expenditures, left a balance of $3.33 in the treasury.

*Wednesday Morning.*

The session of the convention on Wednesday morning opened with the consideration of the report of Committee on Uniform Contracts. The report stated that the joint committee of the Builders' Association and the American Institute of Architects and the Western Association of Architects had agreed to a contract form, and which was the best that the committee could secure to the National Association of Builders. The presentation of the report was followed by considerable discussion, and a number of delegates proposed changes in the contract form with a view to defining the rights of the builders more liberally. In reply to these suggestions, it was pointed out by the committee that they had done everything in their power to insert articles similar to the proposed changes in the contract form, but had found it impossible to do so, and recommended that the report be accepted, and that further alteration in the direction of privileges for builders be left for favorable opportunity. As a result of the discussion, the report was accepted as presented. The excellent plan was adopted of making the committee a standing one, so that whenever alterations and changes made possible and desirable by experience can be effected, there will be a committee to take them in charge.

### LIEN LAW.

The second report taken up, that of the Committee on Lien Law, was one that received a great deal of attention, and gave rise to much discussion. We regret very much that our space is so limited that we cannot present this report in full, together with the accompanying discussion, as it is a subject of interest to every builder in every State of the Union. In the opinion of the committee, the various interests to be considered in the protection offered by lien laws should be placed in the following order—namely, first, personal labor; second, labor furnished or labor and material furnished by sub-contractors; third, labor or materials, or both, furnished direct to owner either by contract or otherwise, and, fourth, material furnished to a direct contractor. As a result of their discussion, it was decided to transpose the second and third items in this enumeration. The report went on to state that it was the opinion of the committee that there was very little real justice in any lien law whatever, and that its existence was an encouragement to unreliability, and in one sense a legal premium on dishonest practices. This clause, when read, was warmly applauded, it being evidently the general sense of the meeting that builders should not receive any more protection in their work than is offered to artisans and tradespeople in other lines. The New York delegation asserted, however, that a most excellent lien law existed in their State, and that nothing but good resulted from its present working. Without dwelling further upon this report, we will simply quote the resolution at the end in the form finally adopted: "*Resolved*, That this association send to the Legislature or Governor of each State in the Union a request that action be taken to secure the amendment of lien laws, so that they will only protect actual personal labor performed by journeymen or laborers upon the property liable to attachment, in amount not to exceed the value of 24 days' work for each individual entitled to protection and the claim of the direct contractor, and these only, and that all filial bodies be recommended and urged to do their utmost to secure in their various State Legislatures the above-desired action."

The next report considered was that of the Committee on Rules and Conditions for Estimating Work, and was adopted as read. The code proposed was one of much interest to builders, and will well repay study with a view to following its provisions. The morning session ended with the approval of the report of the Committee on Permanent Arbitration, which practically amounted to indorsement of the methods of arbitration adopted at the last convention. As the work laid out for the Wednesday morning session was not completed, it was decided to hold an evening session.

*Wednesday Afternoon.*

The afternoon session began with an address by Mr. James John, of Chicago, on Plaster and Stucco Work. Mr. John's address referred chiefly to the method of making plaster fire-resisting, and he noted a method for which he tried to obtain a patent of supporting plaster by a wire netting laid immediately under the finishing coat, but which he found was covered by a patent allowed in 1797. The next paper was a brief sketch of the history of ironwork, past and present, which was read by Samuel J. Cresswell, of Philadelphia. His paper was followed by one on masonry by Mr. John J. Tucker, of New York. Mr. Tucker's address began with a most interesting historical review of masonry, treating the subject from the time of the Tower of Babel down to the present, and continued with an able description of the correct methods of mixing mortar. The paper closed with a description of the proper way to make foundations, and gave some interesting facts concerning fire-proof construction. On account of limited space we are forced to omit the larger part of this paper, and simply give an extract describing the mixing of mortar. Mr. Tucker said:

Masonry is capable of many and varied applications, and when honestly done will rarely fail to meet the most exacting requirements, but, as in everything else, all depends upon the observance of the laws governing its combinations. While it is capable of sustaining a load of many tons to the cubic foot, its maximum strength is only obtained when all the conditions are faithfully carried out. The joints must be thoroughly and carefully filled, and if of brick they must be well wet before laid; even then variations will occur, according to the quality of the material employed.

Another important element in the strength of masonry walls is the thickness, and everything else being equal, the heavier the wall the greater the crushing strength per cubic foot, one of the principal reasons being that the slower evaporation of the moisture not producing the porosity formed in a thinner wall.

In masonry, as in a chain, its strength is measured by its weakest part, and no matter how strong individually the component parts may be, if they are not put together in such a way as to unite that strength in a body the result will be unsatisfactory. In placing small bodies in such a manner as to form a large mass the great secret of success is the bonding, or that particular arrangement which shall make each particle dependent upon its neighbor in such a way as to make the whole mass act as one body. After the bonding the next most important is the uniting body by which each part is held fast to its neighbor, or in other words, the mortar.

The basis of all mortar used to-day is lime, and there are two kinds, common and hydraulic or cement. These materials are the result of calcination of rock more or less composed of carbonate of lime, the carbonic acid being driven off by the heat and leaving the lime in the form of an oxide. The rock used for making common lime is generally almost pure carbonate, while that for the hydraulic is what is called argillacious—that is, less proportion of lime and a percentage of aluminium or clay and silica or quartz.

The first, when mixed with sand and water, will harden by exposure to the air, by the evaporation of the water and a chemical change by which the lime becomes a carbonate by absorption of carbonic acid gas from the atmosphere.

In the hydraulic we have a material which will set or harden without the admixture of any other material than water, and will do so either in the air or when surrounded by water. We will take them up in the order I have named. The common lime is made into mortar by first slacking or dissolving it with water and then mixing with a certain proportion of sand, which will vary with the purpose for which it is to be used. The slacking of the lime is of the greatest importance and may determine the quality of the mortar. Care should be taken to thoroughly dissolve all the particles, and the more completely this is done the better. No more water should be used than necessary, as any surplus will injure its quality, being so much additional to be evaporated and leaving the mortar porous and of less strength. The longer the slacked lime can be kept before using, providing air is kept from it, the stronger mortar it will make. The ancients thoroughly understood this quality, as Vicat and other authorities on mortars say that the Romans frequently kept the slacked lime three or four years before using, and their work proves the wisdom of the course. Lime is granular, and when water is brought in contact with it the chemical action is exceedingly rapid and heat is generated; this turns the water into steam and particles will surround themselves with air, which acts as a wall against the water, and will remain so for some time; by keeping it, therefore, we more completely dissolve these particles.

Circumstances to-day, however, will not permit such delay, owing to the rapid manner we are called upon to perform our work. We are compelled to hastily slack, mix our mortar and use it in the building, and the action that should go on before use now has to take place in the wall itself to a great extent. Next to the slacking the most important part is mixing with the sand, which should be as gritty or sharp as possible, so as to offer irregularity for the lime to adhere to. For many years it was supposed that the more lime used the better the quality of the mortar, but Vicat, who I have just spoken of, proves this to be an error. The lime is the uniting body in the mixture, and is not of equal tensile strength to the sand, and all that should be required of it is to thoroughly unite the particles together in a solid mass. The chemical change by which the mortar hardens is the gradual change from the hydrate of lime, which is its condition when it goes in the wall, to a carbonate, which it becomes by the giving off of the water and absorption of carbonic acid gas from the atmosphere. In this form it is a minute crystal, and in the crystallization it adheres most tenaciously to the nearest foreign substance, which is the sand and the material of which the wall is composed, thereby uniting them firmly together.

In the hydraulic lime or cement we have a slightly different condition of affairs. The lime is not pure as in the other; it is mixed with silica and aluminium, and when the water is applied, instead of forming a hydrate it commences to unite with the silicic acid, and silicates of lime and aluminium are the result, which rapidly crystallize and become extremely hard in a comparatively short time.

Having seen what the results are of mixing these materials we must not assume, however, that the mere putting of them together will make a good mortar. They must be thoroughly mingled and blended with each other, and all the components thoroughly incorporated in the mass, so that the crystallization following may be equally great in all parts of the body. I think in many cases where mortars have not proved satisfactory, and the quality of the material been questioned, the real difficulty has been an insufficiency of mixture or turning of the bed.

We have seen that our bonding is of the highest importance for the securing of stable work, then our uniting material to hold the parts in position; where next should we turn our attention but to the very beginning—to our foundations? If these are of insufficient strength the entire structure is imperiled.

### THE VALUE OF EXCHANGES.

The address by Mr. William H. Sayward, entitled "Builders' Exchanges — their Advantages and Opportunities," was a very able paper. Mr. Sayward dwelt upon the value of the exchanges as a daily *rendezvous* for business men to transact in person business that might not otherwise be accomplished without days and weeks of delay and disappointment; of the protection to the interest of the members, and of the possibilities for permanent advancement and improvement. To those who questioned the desirability of the National Association Mr. Sayward said he would refer but to the subject of the establishment and maintenance of the apprenticeship system; that alone would warrant its continuance. He said the influence of the exchanges was increasing, and it should increase, because of the tendency they had to systematize and elevate the work of the builders. The address was received with much applause. As the address of Mr. Sayward was such a powerful appeal for the organization of local exchanges and associations, the meeting decided to have it printed in pamphlet form and distributed not only to existing exchanges, but also to be scattered generally throughout the country.

The consideration of the report of the Committee on "Bureau for Furnishing Sureties on Builders' Estimates and Contracts" was next taken up. The report provoked considerable discussion, and finally the following substitute for the committee's resolution was recommended, and the committee of five provided for was appointed:

That a committee of five be appointed by the chair, authorized, in behalf of this association, to encourage the establishment of a company for the purpose of giving sureties on builders' estimates and contracts, with the understanding that the said company shall receive the official sanction and co-operation of the National Association of Builders, in consideration of which the said company shall agree to pay a proper percentage of its profits to the treasury of the said National Association.

The closing work of the afternoon session was the consideration of the report of the Committee on the Uniform Size of Brick. It was pointed out in discussion, however, that there was a great deal of confusion still existing as to the proper size of brick, and that there was some doubt as to the exact size recommended by the brick manufacturers. In view of the uncertainty, the report was referred back to the committee for further consideration.

#### *Wednesday Evening.*

The evening session began with the consideration of the report of the Committee on Apprenticeship. The committee had reviewed the method approved at the preceding convention to take the place of the old system of apprenticeship and recommended changes, the principal alteration being in the third clause and providing that the "junior" be entitled to be received by all builders as a journeyman after the proper examination has been passed before a board of examiners appointed by the Association of Builders to which the employer may belong or to which the "junior" may apply for examination. The change was made also providing that any young man who had received a certificate of proficiency from the trade school might apply for a second examination, and, if qualified, receive a special certificate. The report was approved as read, and in connection with the same some very interesting discussion was held. Mr. Harkness referred to the progress of the trade school of the Master Plumbers' Association of Philadelphia, where about 60 boys were receiving instruction. We may here refer to the resolution presented by the New York delegation, to the effect that the convention use its influence and recommend to the different legislatures of the United States the passage of a law making it a felony to prevent or hinder any American youth from learning a trade. This resolution was adopted. The final report considered was that on Insurance against Accident to the Public, in which the committee recommended to the Executive Board to open correspondence with the accident assurance associations of this country for the purpose of securing the adoption of a special form of policy. Before adjournment, a committee was appointed to co-operate with the committee of the National Board of Trade in its efforts to have Congress pass an act to assist in the maintenance of mechanical trade schools.

#### *Thursday Morning.*

The business of the day began with an address on the relation of the architect to the builder, prepared by O. P. Hatfield, of New York, treasurer of the American Institute of Architects, and read by Mr. John McArthur, Jr. The subject treated of was one calculated to keep the attention of the builders, as well as the number of architects who were present in the convention. There was hardly a more delicate subject to be handled in a mixed assembly than the one treated of, and the success of the paper was manifested by the cordial applause which it gave rise to. The writer pointed out that the responsibility is divided between the architect and the builder. The former is responsible for the law of the building, so to speak, and the latter for the proper execution of this law. In referring to the estimate in the public mind of the two professions the writer said: "The architect and the builder come to be looked upon as indispensable in their vocations, and altogether very useful persons in their way. To be sure, as the architect's labors imply a little more active exercise of his brains, and the builder's a little more close handling of heavy materials, the business of one is called a profession and that of the other a trade; but both are regarded as equally honorable and alike deserving to reap the rewards of honest industry. A worthy ambition impels both the architect and the builder to excel in their respective spheres of action, and the fortunate result is that the community profits by their emulation." The paper, though quite lengthy, was interesting throughout, and was written with a view to harmonizing the relations of architects and builders, while at the same time candidly discussing many of the points of difference between them. The second paper presented Thursday was by George Eastburn, M.A., of Philadelphia, who gave a very lucid explanation of the metric system. A notable feature of Professor Eastburn's address was the enthusiasm that he infused into all his remarks. He had evidently made a careful study of the subject, and was thoroughly convinced, and almost, we might say, possessed, of the merits of the system. The subject was treated in a logical manner. Beginning with a brief description of what the units are, he enumerated the principal objections to its adoption, and these objections he answered in turn.

### TRADE SCHOOLS.

The next speaker introduced was Col. Richard T. Auchmuty, who was to read a paper on trade training. The popularity of the speaker and the kind feeling with which he was regarded by the audience were manifested before he had stepped forward to the reading desk. It was some time before he could begin his address and make himself heard above the applause. Colonel Auchmuty began by referring to the needs of the young men of the day and the general advantages of trade schools, and modestly intimated that the seven years' experience he had had in the work had given him some little knowledge of the subject. An interesting paragraph in his address was the division drawn between the skilled trades of the country in the matter of the nationalities engaged in them. He showed, for instance, that in New York stone masonry is mostly done by Italians, while Englishmen and Irishmen lay the brick. The heavy work of putting on the beams or of framing and placing in position the roof trusses is done almost entirely by Germans, while Irishmen and Americans have principal charge of the carpenter work. His remarks concerning the plumbing trade were gratifying, for he stated that owing to the interest taken in the plumbing school that trade would soon be under control of Americans. The artistic work of building was done by Frenchmen and Germans. Naturally following after the statement of the small part which Americans play in the skilled trades came his reference to the disused apprenticeship system, and this was followed by a general reference to the advantages of trade schools. Coming down to particulars, the speaker described the course followed at the New York Trade Schools, with which naturally he was thoroughly familiar. Though the entire section treating of this school will well repay the reading, we cannot more than refer to it here. The next subject treated of was the apprenticeship system as recommended by the National Association of Builders, and Colonel Auchmuty showed the value of the plan proposed by the National Association in regard to examinations. The only portion of the address that we can find room for are the following remarks on the establishment of trade schools, and we particularly desire to print it on account of the practical suggestions which it contains:

The establishment of a trade school need not be looked upon as either difficult or expensive. Some unoccupied workshop, or some vacant plot of land on which temporary buildings could be erected, would give shelter. A committee appointed by the Master Builders' Association of three members for each of the trades in which instruction is given could manage the school. The courses of instruction, the manuals, &c., used at the New York Trade Schools are at the disposal of those who may care to use them. Doubtlessly they can be much improved, but they will do for a beginning. I would advise that not more than two or three trades be taught at first. Bricklaying, plastering and carpentry produce the speediest results. Instruction in plumbing is of the utmost importance in large cities, but I doubt the expediency of starting plumbing schools in small towns. It will not be necessary to raise much money. After shelter has been provided $2000 or $3000 will equip the school and meet the first demands. Such an amount could be easily raised. The Merchant Tailors' Society, of New York, raised $7300 in a few days to maintain a tailoring class in my schools.

The fees should meet the running expenses, for when once it is known that the trade school is the entrance gate to the building trades any reasonable fee required to cover the expenses will be readily paid. It is better for the young men that they should pay the cost of their instruction. Except in the case of the helpless, charity is misplaced and demoralizing. The evening bricklaying class at the New York Trade Schools will pay expenses with 75 members at $20 each. The cost of instruction and the waste of material in the day plumbing class with 50 pupils at $35 each, and in the evening class with 100 pupils at $12 each, will be met. A fee of $12, with 25 pupils, will cover the cost of the evening stonecutting class, and $16, with 40 pupils, the cost of the classes in carpentry and plastering. In addition to the expenses of each class, there must be a considerable outlay for salary of clerk and janitor, for the cost of fire, lights, printing, &c., but a very moderate increase of the fees charged at my schools would also meet these expenses and make the schools self-supporting. I cannot make too plain the fact that the young men do not want charity, but that they will gladly pay whatever is reasonable and will save up their money for the purpose, provided they feel sure that after they have finished their training they shall be at liberty to dispose of their labor for what it is worth, and that they shall have the same right as is accorded to the immigrant when he leaves Castle Garden. Once this right is recognized, all that associations of master mechanics need do will be to hold examinations and give advice. Private liberality, which in this country is ever ready to help any good work, or private enterprise, as was the case with business colleges, will do the rest.

Other subjects were touched upon in the essay of general interest, and the appreciation of the audience of the whole was clearly evinced by the loud applause succeeding it. The convention, not content with clapping hands and testifying their appreciation in the usual way, were apparently carried away by the enthusiasm of the moment and ended their applause by three mighty cheers for the speaker. The only further action taken in the morning session was the adoption of a resolution having in view the upholding of the conspiracy laws now in force.

### *Thursday Afternoon.*

The afternoon session began with the consideration of the report of the Committee on Resolutions. The first, providing for the appointing of a committee of seven to consider the organization of a company under the auspices of the association to insure builders' risks, was adopted, also a resolution from St. Louis in favor of having the Government separate the different branches of public work let out by contract. The other reports adopted were the one condemning contractors who did work outside of their own city and not in accordance with the rules of local associations; and the resolution protesting against the repeal of the conspiracy laws at the instance of labor organizations. A resolution that was not adopted was one to require contractors for public work to file a bond sufficient to cover a possible liability for the special protection of a sub-contractor. This resolution gave rise to quite a spirited discussion, but the sense of the meeting was that its adoption would be in opposition to the action taken on the subject of lien laws earlier in the convention.

### OFFICERS ELECTED.

The report of the Committee on the Time and Place of the Next Convention and the Nomination of Officers recommended that the next convention be held at St. Paul, Minn., about January 20, 1890, and nominated the following officers: Edward E. Scribner, of St. Paul, for president; John J. Tucker, of New York, for first vice-president; Col. A. McAllister, of Cleveland, for second vice-president; William H. Sayward, of Boston, for secretary, and George Tapper, of Chicago, for treasurer. The officers nominated were all elected by acclamation, and the committee's report was adopted. President Stevens then made a speech complimentary to each of the officers, and Messrs. Scribner, Tucker and McAllister responded feelingly. Mr. Scribner was, until recently, president of the Contractors' and Builders' Board of Trade, of St. Paul, and Mr. Tucker is one of Mayor Hewitt's appointees on the New York Aqueduct Commission.

The following gentlemen, named by their various delegations, were then elected directors of the association: E. L. Bartlett, of Baltimore; L. P. Soule, of Boston; D. A. J. Sullivan, of Charleston, S. C.; George C. Prussing, of Chicago; J. Milton Blair, of Cincinnati; R. H. Jenks, of Cleveland, Ohio; W. J. Stapleton, of Detroit; Edward M. Hager, of Buffalo; William Miller, of East Saginaw, Mich.; John H. Hoskins, of Grand Rapids, Mich.; James E. Shover, of Indianapolis; William W. Taylor, of Kansas City; Garret Dunck, of Milwaukee; Barclay Cooper, of Minneapolis; Marc Eidlitz, of New York; William Harkness, Jr., of Philadelphia; Richard Hayward, of Providence; W. H. Gorsline, of Rochester; Frank Clark, of Sioux City, Iowa; John DeClue, of St. Joseph, Mo.; Daniel Evans, of St. Louis; Matt Breen, of St. Paul; William Dickison, of Syracuse; S. J. McCarthy, of Washington, D. C.; William H. Foulk, of Wilmington, Del., and E. B. Crane, of Worcester, Mass.

The remainder of the time of the convention was occupied with speeches, the presentation of badges and various pleasant little formalities. Without giving space to these in any detail, we cannot help remarking the readiness of speech of all those who were called upon in any way to talk before the convention, this happy faculty of extemporary address being possessed in a marked degree by the retiring president, Mr. John S. Stevens. One of the last acts of the convention was the election of Colonel Auchmuty as an honorary member of the association. Thursday evening was occupied with the banquet given in Horticultural Hall, where covers were laid for about 650 guests. The room was tastefully decorated, the banquet was enjoyable, and the responses to the toasts, which began about midnight, and other features, furnished much entertainment to the guests.

## How to Measure a Room for Wall Paper.

It often happens, says an exchange, tha a person living a distance from a city is thrown upon his own resources to determine the amount of wall paper requisite to paper a room. The following rule will meet the case, which, however, is only approximately correct, but sufficiently accurate for all practical purposes. It is better to order a little in excess than otherwise, as the extra portion may be used to replace damp or defective portions or for other purposes. To determine the number of rolls of wall paper to cover the walls of a room, measure the circumference, from which deduct the widths of doors and windows, and divide the remainder by 3.

*Example.*—Let us suppose a room 12 x 16 feet, which has two doors and two windows, which average 4 feet wide.

$12+12+16+16=56$ circumference.
$4 \times 4=16$ doors and windows.

$$\begin{array}{r} 56 \\ 16 \\ \hline 3)40 \\ \hline 13\frac{1}{3} \end{array}$$ or say 14 rolls.

This rule is calculated for a room of not less than 10 or more than 12 feet in hight. For a room under 10 feet high, having a frieze, say, of 6 inches required, proceed as before with the measurement of the room, deducting the width of doors and windows. But in this case multiply the remainder by 2 and divide by 15, for this reason, that we can cut 5 lengths out of a double roll, which, placed side by side on the wall, covers a space 7 feet 6 inches from the ceiling, and instead of multiplying by 7 feet 6, we multiply both by 2.

*Example.*—Take a room 14 x 14, with two doors and window.

| | |
|---|---|
| Circumference of room...... | 56 |
| Less for doors and window... | 12 |
| | 44 |
| | 2 |
| | 15) 88 |
| | $5\frac{13}{15}$ |

Say 6 double rolls, or 12 pieces. Of course, if a dado is required its width will determine how much paper will have to be deducted.

## Frame Dwelling.

The accompanying elevations and floor plans represent a study in the design and construction of a frame dwelling, prepared a short time since by J. McA. Vance, Chattanooga, Tenn. On the first floor is a sitting-room, dining-room, kitchen, pantry, hall and vestibule, with cloak closet under the stairs. On the second floor are three chambers. The author refers particularly to the position of the fireplaces in the sitting-room and dining-room, the sliding door between these two rooms and the arrangement of the hall. The kitchen has two windows but no outside door. The coal cellar is below the kitchen, to which easy stairs lead. The water service is also in the kitchen. The seven rooms are all heated and only two chimneys are employed.

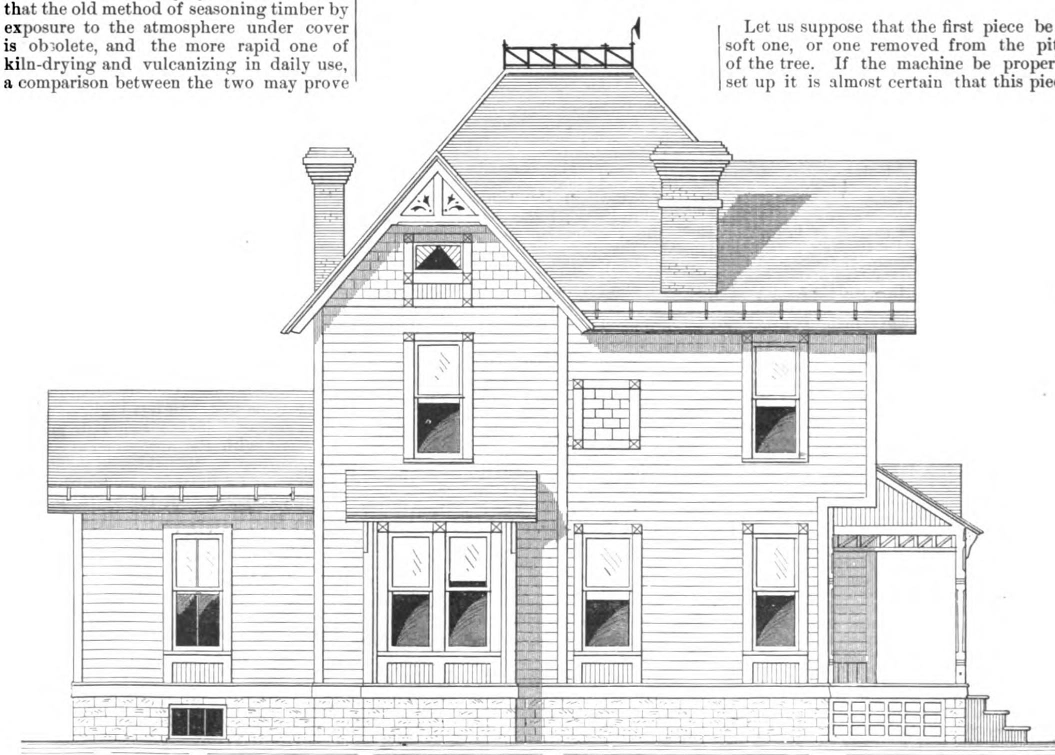
## Kiln-Dried and Vulcanized Timber.

A correspondent who has had more or less experience in the use of various kinds of wood presents the following views upon the relative merits of the two methods of seasoning timber, which we have no doubt will prove of general interest to our readers:

The condition of lumber when it reaches the hands of the mechanic, and its action under tools by reason of its ever-varying natural constitution and the effects of artificial processes of seasoning, show some peculiar results. In the different species of woods the condition imposed on them by artificial seasoning goes to substantiate the truism that all woods cannot endure similar treatment, and that only experience and close observation can determine which will be benefited by a process and which are liable to injury therefrom. Now that the old method of seasoning timber by exposure to the atmosphere under cover is obsolete, and the more rapid one of kiln-drying and vulcanizing in daily use, a comparison between the two may prove of interest. Take, for example, a lot of kiln-dried pine casings sawn and cross-cut to the requisite size and piled behind the machine ready for sticking, and let us examine them as they go through. In taking up piece by piece and inserting it between the feed rolls it is found that they are all comparatively straight on the face both longitudinally and transversely, and straight on edge.

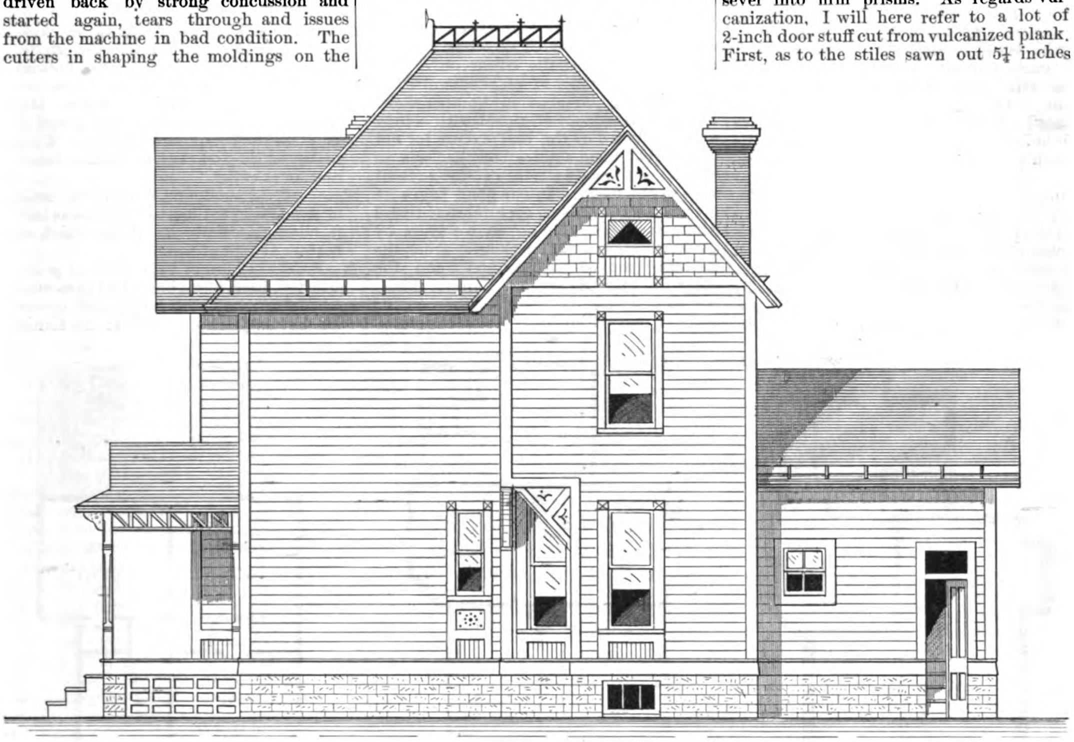
*Frame Dwelling, Prepared by J. McA. Vance, Chattanooga, Tenn.—Front Elevation.—Scale, 1/8 Inch to Foot.*

Let us suppose that the first piece be a soft one, or one removed from the pith of the tree. If the machine be properly set up it is almost certain that this piece will "stick" perfectly straight, without bending or twisting. Then the next is a hard one, either of close-twisted grain or



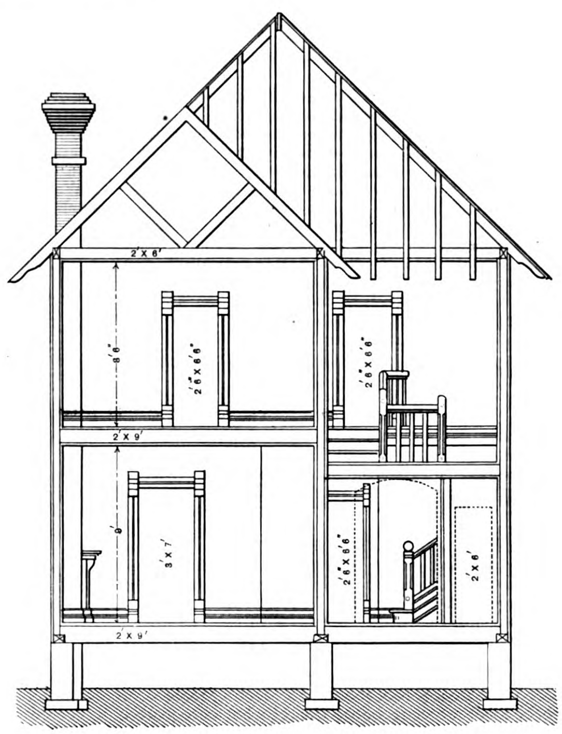
*Side Elevation, Left.—Scale, 1/8 Inch to Foot.*

heartwood. See the effect of the machine! The piece, which runs very hard, so hard indeed as to often require to be driven back by strong concussion and started again, tears through and issues from the machine in bad condition. The cutters in shaping the moldings on the face of the casing have so weakened the center as to throw up the outside edges (this occurring even if it be hollowed on the back), the thinning of the front edge curves the whole length of the stuff, and the piece in itself, restrained before sticking by the full thickness, twists and curves either hollow or round on the edge. Of course this is of no importance to the machine hand, as he is perfectly satisfied if the moldings be run true and clean, but when the carpenter unknowingly takes this same casing and endeavors to nail it on a straight door jamb he finds it extremely difficult, as the casings are so much sprung that they split in nailing and have to be rejected. This is an every-day occurrence and familiar to every carpenter. Pine base, shelving, &c., act in the same way, and whitewood is notorious for being unreliable, to such an extent that it is comparatively worthless for trim, although much used by speculative builders, as it takes stain well and saves the expense of graining. As a finishing wood it is useless, because it warps, twists, cracks and strains according to the slightest variation of temperature—in fact, it is too sensitive for a useful wood.



*Side Elevation, Right.—Scale, ⅛ Inch to Foot.*

I will here consider and show how kiln-drying changes the nature of the wood. First of all, on looking at the grain in the rough, it will be noticed that the fibers are raised up from the body of the wood and that they are open, or the extreme heat, to which the wood has been subjected in the kiln, has entered the pores and caused at once the entire amount of shrinkage in each individual fiber and absorbed too rapidly the sap and other nutritive matter, thereby decreasing its tensile and cohesive strength. It is almost unnecessary to say that the gradual but continual influence of the atmosphere would accomplish this result without injuring the material. To prove the truth of this assertion it is only necessary to watch the shavings issuing from a hand plane working kiln-dried lumber. Instead of long continuous shavings diminishing to nothing, the plane discharges small chips, indicating that the lateral cohesion of the wood is broken, and under saw teeth the wood is soft and crumbly, where it ought to be hard and sever into firm prisms. As regards vulcanization, I will here refer to a lot of 2-inch door stuff cut from vulcanized plank. First, as to the stiles sawn out 5¼ inches by 7 to 7 inches long. Upon laying one on the bench the wood-worker noticed that it was covered with black spots, or burns, then, as he was about to take it out of




*Section.—Scale, ⅛ Inch to Foot.*

wind by laying winding straight edges across each end of the face, he found that if he planed off sufficient on the high corners to straighten the surface the stuff would not stand the necessary finishing thickness, which was $1\frac{7}{8}$ to $\frac{1}{16}$ inch, for he would be obliged to plane off $\frac{1}{8}$ inch of each opposite corner. As a result the stile was rejected as being too thin. He then took another and placed it on the bench, but it was so hollow it would not stay flat on the bench and would not stand thickness. This also was rejected. The next was bumpy and very hollow, but would do, and so on until almost one-half of the number had been condemned, and those rejected were replaced by others cut out of $2\frac{1}{4}$ stuff in order to gain the thickness. This stuff was all planed to a thickness by machine, after being surfaced by hand, and I may add that some of the doors, when completed, were sent back by the architect on account of the black spots.

The above experience may serve to show some of the disadvantages of any objections to the kiln-drying and vulcanizing in their action on pine. Where work is not particular or covered with stain or paint they are rapid and cheap, but for furniture, filled and varnished or polished trim, doors, &c., a different method of seasoning is necessary. In regard to their action on the material, it is most destructive, and will in time be replaced by better means.

### The Pantheon, Rome.

Viollet-le-Duc says: "What, in the Pantheon at Rome, is it that produces the most lively impression? It is that immense vault which derives all its decoration from its very structure; it is that single opening for light, 26 feet in diameter, perforated in its summit, through which the zenith is seen, and which throws upon the pavement of porphyry and granite a large circle of light. It is there that the genius of the Roman appears in full strength. So great is the elevation of this orifice above the floor that its enormous opening scarcely affects the internal temperature. The most violent storms scarcely send down a breath of air on the head of a person standing beneath its orbit; and when it rains, the drops are seen falling perpendicularly down upon the pavement of the rotunda, on which they describe a circle of wet. The cylinder of raindrops, falling from that hight through the space of the building, renders sensible the immensity of that space."

## Building Association Competitions.

In another part of this issue we have attempted, by means of sketches, to indicate the despair of the editor on receipt of the large number of plans submitted in our Building Association Competitions. The embarrassment of riches with which we are afflicted is the best excuse for not being able to announce the decision in either of these contests in the present issue of the paper. In our plate pages we give two sets of plans, each representing a $1000 house, one coming, as we know by the postmarks on the packages, from the Eastern part of the country, and the other from the Mississippi Valley. These are printed over the *noms de plume* of the authors, and without any knowledge upon our part of the designers. They may be prize designs and they may not be. But, in the interests of our readers, and without any violence to the interests of competitors, we present them for consideration at this time. We append the specifications bill of materials, estimates, &c., accompanying these designs.

### General Description of Design for $1000 Frame Cottage.

SUBMITTED BY

The drawings which accompany this description show the arrangement of a small house to cost $1000.

The arrangements have been carefully studied, and we have a plan which is very compact and very convenient.

The hall is so arranged that every room on both floors can be entered from it, thus securing convenience and privacy to the occupants of each room.

There is a large and convenient kitchen with pantry shown.

The dining-room and parlor are connected by sliding doors, thus enabling these rooms to be thrown into one.

Dining-room is arranged so that owner can have fire-place if he should wish.

Every room is well lighted, and each bed-room has a closet attached, and there is also a good linen clost in the upper hall.

Drawings are sent on three sheets. Sheet No. 1 contains two plans and front and side elevation.

Sheet No. 2 contains cellar plan and rear elevation, and details at $1\frac{1}{2}$-inch scale.

Sheet No. 3 contains perspective sketch.

#### General Specifications.

*Excavation.*—The entire area to be excavated to a depth of 4 feet below grade, so as to leave $7\frac{1}{2}$ feet from cellar bottom to top of finished first floor. Also excavate 1 foot outside of walls; this space to be filled with coarse gravel or ashes on the completion of walls. Walls to be set in trenches 12 inches below bottom of cellar.

*Stonework.*—Foundation walls to be built of good, selected local rubble-stone laid in mortar. Walls 20 inches thick at bottom and 16 at top.

*Brickwork.*—Chimney to be built of good, selected, hard-burnt brick laid in mortar.

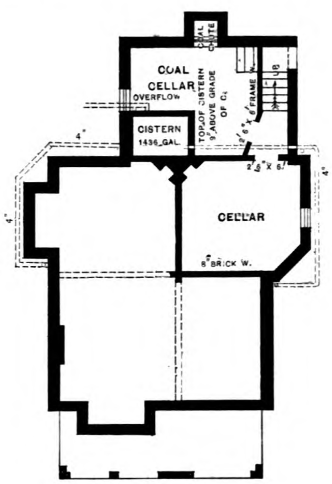
*Lath and Plaster.*—All rooms and closets on first and second floors to be lathed with good spruce laths and plastered with two-coat work.

*Timbering.*—Sills 4 x 6 inches. Girder under main partition on first floor 4 x 7 inches. First-floor joists 2 x 7 inches. Second-floor joists 2 x 6 inches. Plates 4 x 4 inches. Rafters 2 x 5 inches. Outside studding 2 x 4 inches. Partition studding 2 x 3 inches. Valley rafters 4 x 6 inches. All to be of spruce.

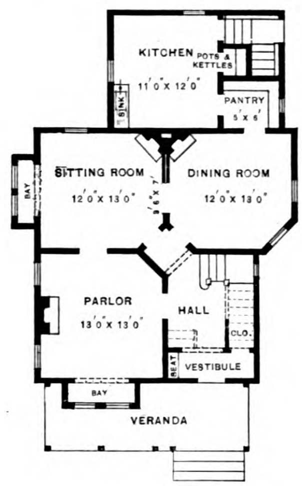
*Window Frames.*—Of clear white pine, all arranged with pulley and weights, except those in cellar, which are to have sash hung on hinges.

*Belt Course.*—To be built, according to detail shown, of best white pine.

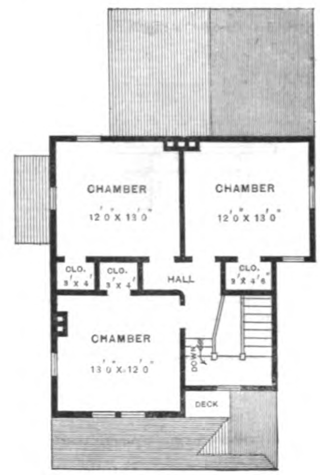
*Door Frames.*—Of good white pine $1\frac{1}{8}$ inches thick and rebated.



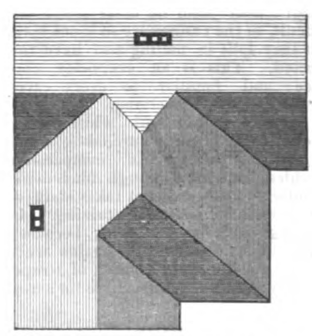
*Foundation Plan.*



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



*Second-Floor Plan.*


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

*Windows.*—To have sash of good white pine $1\frac{1}{4}$ inches thick and glass of medium quality.

*Doors.*—Front door of clear white pine $1\frac{3}{4}$ inches thick. Upper panel with glass and lower ones molded and paneled. All inside doors of white pine $1\frac{3}{8}$ inches thick.

*Cornices* —To be built of pine, as per dctail.

*Roofs.*—To be covered with spruce or hemlock boarding 1 inch thick; these covered with best quality Eastern cedar sawed shingles laid $4\frac{1}{2}$ inches to the weather.

*Conductors.*—Run wooden conductors from gutter to ground wherever necessary.

*Boarding* —Walls to be covered with planed spruce or hemlock boards $\frac{7}{8}$ inch thick.

*Clapboards.*—Clapboards to be of good quality spruce, laid 4 inches to weather, and over layer of good quality sheathing paper.

*Flooring.*—Under floors of first floor to be of planed spruce or hemlock, laid very closely. Upper floors of planed spruce, except in kitchen, which is to be of narrow hard pine. Second floors to be of planed spruce, matched and beaded. All to be $\frac{7}{8}$ inch thick.

*Gables.*—Gables to be shingled with medium quality sawed cedar shingles laid 4 inches to weather. All the rest of wall above lower belt course to have shingles laid 6 inches to weather.

*Inside Finish.*—Windows to be finished on sill and aprons. Windows and doors to have molded architrave 5 inches wide. Base 8 inches high to be molded in dining-room and parlor. Rail and newel post at turn of stairs of black walnut, according to detail shown; all other finish to be of clear white pine.

*Stairs.*—Stairs to be of pine. Risers $\frac{7}{8}$ inch thick. Tread $1\frac{1}{8}$ inches thick, with molding under nosing.

*Plumbing.*—Supply S-trap under sink connected with drain.

*Hardware.*—All doors to have mineral knobs, with good lock and steel key. Front door to have white porcelain knob with bronzed trimmings and butts. Front and back doors to be supplied with bolts. Sashes to have fasteners and to be carefully balanced with iron weights.

*Painting.*—Paint two coats of any color directed by owner.

*Finally.*—It is understood that the building, upon completion, be thoroughly cleaned before delivering to owner, and that all work must be done in a substantial and workmanlike manner, to the full satisfaction of the architect.

### General Estimate.

| | | |
|---|---|---|
| 100 yards excavation. / 65 tons stone laid ... | $80.00 | |
| 4150 feet spruce frame @ 16... | 66.40 | |
| 3000 feet hemlock boards @ 14. | 42.00 | |
| Labor of framing, raising and boarding | .... | $55.00 |
| 125 feet molding for belts | 2.50 | |
| 200 feet boards for corner boards, belts, &c. | 8.00 | |
| Labor on same | .... | 8.00 |
| 15 M. shingle | 60.00 | |
| 500 spruce clapboards | 15.00 | |
| Labor on same | .... | 45.00 |
| 136 feet of cornice put up | 61.20 | |
| 100 feet hard pine for piazza floor and step | 5.00 | |
| Balustrade, rail and balusters. | 1.50 | |
| Labor | ... | 5.00 |
| 12 window frames | 20.00 | |
| 16 door frames | 12.80 | |
| Labor | | 15.00 |
| 16 windows | 22.50 | |
| 16 doors | 27.50 | |
| Labor | .... | 35.50 |
| 1400 feet spruce floor boards... | 30.80 | |
| Labor | .... | 15.00 |
| 800 feet architrave molding | 24.00 | |
| 400 feet base | 12.00 | |
| Labor | .... | 25.00 |
| Nails, sink, door and window hardware | 34.50 | |
| 100 feet boards for pantry and closet | 4 00 | |
| Labor | .... | 19.00 |
| Cellar windows and conductors | 8.00 | |
| Labor | .... | 1.50 |
| Stairs | 30.00 | |
| Lathing, plastering and chimney | 170.00 | |
| Carting | 10.00 | |
| Paint, two coats | 60.00 | |
| Total | $1030.80 | |

I hereby certify that, to the best of my knowledge, the above estimate is correct.

JOHN A. CRANE, builder, Taunton.

## Description of Design for a $1000 Frame Cottage.

SUBMITTED BY "ECONOMY."

The design contemplates a small, economical and complete house, suitable in all respects for the purpose for which it is intended.

The plan or interior arrangements are thoroughly studied to get the most desirable facilities for convenience and practicability.

The rooms are well arranged around the chimney, to give a flue connection for each room and even heating the hall through the stove pipes from parlor and chamber above. The hall is small, but convenient enough to give easy access to the second story by the flight of stairs, also adding to the beauty of the interior.

The windows are located so as to give currents of air through the rooms in summer.

At a future time a bath room may be added, as indicated on plans, at a very small expense.

The exterior speaks for itself, it being attractive and yet a most cheap and cosy home.

### Estimate for Cottage Submitted by "Economy."

| | |
|---|---|
| Excavation, at 18 cts. per cub. yd. | $15.00 |
| Masonry, 15 perches at $3 | 45.00 |
| Brickwork, 4000 brick | 72.00 |
| Plastering, 525 yards | 125.00 |
| Tinwork, gutter and spouts | 26.00 |
| Painting and glazing | 130.00 |
| Carpentry | 150.00 |
| Lumber | 216.00 |
| Stairs | 40.00 |
| Hardware | 30.00 |
| Millwork | 175.00 |
| Total | $1,024.00 |

BILL OF MATERIAL FOR CARPENTRY.

| | Feet. | |
|---|---|---|
| 36 pieces 2 x 8, 16 ft. long, for joist, | 768 | |
| 40 " 2 x 8, 12 " " " " | 640 | |
| | 1,408 | |
| At $16 | | $22.52 |
| 40 pieces 2 x 4, 14 ft. long | 373 | |
| 22 " 2 x 4, 18 " " | 264 | |
| 8 " 2 x 4, 12 " " | 64 | |
| 127 " 2 x 4, 16 " " | 1,354 | |
| 51 " 1 x 6, 10 " " | 105 | |
| 4 " 4 x 6, 16 " " | 128 | |
| 2 " 4 x 6, 14 " " | 56 | |
| 1 " 4 x 6, 20 " " | 40 | |
| 1 " 4 x 6, 12 " " | 24 | |
| 1 " 4 x 6, 6 " " | 12 | |
| 4 " 1 x 6, 14 " " | 28 | |
| 59 " 2 x 4, 10 " " | 386 | |
| | 2,834 | |
| At $17 | | $48.17 |
| 1400 ft. star yellow pine flooring at $22.50 | | 31.50 |
| 930 " sheathing at $15 | | 15.00 |
| 9000 shingles at $3.25 | | 29.25 |
| 1800 ft. studding at $20 | | 36.00 |
| 1500 " 1-inch No. 1 boards at $15 | | 22.50 |
| 300 " $\frac{7}{8}$-inch dressed lumber at $4.00. | | 12.00 |
| | | $216.94 |

*Economy.—Dear Sir:* We propose to furnish materials and perform the labor for the cottage, as per plans and specifications, for the sum of one thousand and twenty-four dollars ($1,024).

Yours truly,

H. F. BENIKE & Co.,
No. 1534 Warren street,
St. Louis.

### Specifications

of a frame cottage to be built for ——— ———, on ———, in accordance with the accompanying drawings and this specification furnished by "ECONOMY."

DIMENSIONS.

The building to have a front of 28 feet 6 inches, by a total depth of 25 feet, exclusive of porch. The cellar under part of house to be 6 feet 6 inches in the clear.

The first story to be 9 feet 6 inches in the clear.

The second story to be 9 feet in the clear.

For all other sizes and dimensions see plans.

EXCAVATION.

The cellar to be dug out its necessary and required depth; dig out cellar stairs and post foundations, cut square down, level same, fill and ram behind all walls when and where directed, haul away all surplus earth and distribute same on lot where owner may direct; trenches for all walls 18 inches wide and 6 inches deep.

RUBBLE MASONRY.

All walls to have a footing 18 inches wide and 6 inches thick, composed of one course of through stone, including foundation for chimney; the outside building walls to be carried up 12 inches thick to 6 inches above the surface ground; the side portion of building to be no cellar; the foundation to be sunk 3 feet in the ground and to be 6 inches above the ground; post foundations to be 12 inches square and 2 feet deep; walls of cellar stairs to be 12 inches thick. The whole of the above to be built of large flat limestone, laid with two-thirds bond, and built in fresh lime and sharp sand mortar, and joints to be struck on both sides; all walls to be built solid and made a first-class job.

BRICKWORK.

Chimney to be built from cellar floor and topped out as shown on plans, flues to be 9 x 9 inches and well plastered on the inside, the chimney tops to be built in pure Louisville cement mortar. All walls around house from top of stonework to bottom of slate to be of ordinary red brick, and outside walls to be faced with dark red brick and pointed in red cement mortar; all walls to be laid in fresh lime-and-sand mortar, and the whole made a first-class job.

PLASTERING.

The wood partitions and ceilings of first and second stories throughout to be lathed with well-seasoned white pine laths, and the first and second stories throughout to be plastered three good coats and finished with the best plaster-of-paris hard finish mortar, to be composed of fresh lime and sharp sand mortar and an abundance of cow hair to be used in the first coat, and walls and ceilings to be laid-off work; all walls to be made perfectly straight and even and corners cut square; all work to be done in the most workmanlike manner.

IRONWORK.

Three ventilators, 6 x 12 inches, to be furnished and fastened on wooden frames on the side part of building. Hooks for hanging lamps in diring-room and parlor; 15 suitable anchors bedded in foundation to secure sills thereto.

PLUMBING.

Connection to be made with $\frac{5}{8}$-inch extra strong lead pipe, run through bottom of cellar 1 foot 6 inches under ground to a point under sink; place in kitchen an 18 x 36-inch enameled cast-iron sink, said sink to have a $\frac{5}{8}$-inch extra strong lead supply pipe and a stop and waste cock in cellar; to be drained with $1\frac{1}{2}$-inch light lead pipe and to have a $1\frac{1}{2}$-inch trap with trap-screw. Said drain to be 3 feet outside of building. Sink to have a $\frac{1}{2}$-inch Fuller faucet and hose attachment. Supply and drain pipe to be fastened with lead cleats to dressed boards not less than 2 feet 6 inches apart. Drain pipe to have stop and waste cock to turn water to outside of building, also turning it to tub under sink.

#### PAINTING AND GLAZING.

The entire exterior of building to receive three coats of strictly pure lead and oil paints and done in three parti-colors, all such tints as owner may direct; all shingles of roof to be dipped in paint before being used or put on building, and the roof to be painted one coat red slate color; when completed, the entire woodwork of first and second stories throughout to receive two good coats of paint, strictly pure white lead and oil, and grained, imitation of cherry, in the best artistic manner, and varnished one good coat of best English coach varnish; outside doors to be grained in the same manner and varnished two coats, and porch roof will be shingled and done in the same manner as the roof of the house; all the windows to be glazed with best quality of American single-strength glass except parlor front windows, which are to be best quality double-strength glass and to be bedded in putty, back puttied and left whole; on the completion of the building the stair-rails to be filed and oiled; small lights in front door to be cathedral glass.

#### TINNING.

All valleys to be lined with 15-inch 12-pound copper; chimney valleys done in the same manner, and all gutters on sides and rear to be 15-inch galvanized iron, O G shape, and to have two 3-inch No. 24 galvanized-iron down spouts; thimbles with covers to be furnished for all flues.

#### CARPENTER WORK.

Joists of first floor to be 2 x 10 inches; for second floor 2 x 8 inches, placed 16 inches to centers, and have a row of bridging through the center of each room of ¼ inch, with two 10d. nails at each end. All joists to be backed, crowned and brought to width, and have proper bearings at the ends. The ceiling joist to be 2 x 4 inches and 16 inches to centers; studs for all walls to be 2 x 4 inches and 16 inches to centers; sills to be 4 x 6 inches, plates 4 x 4 inches, 1 x 6-inch pieces set in studs to receive second-floor joist, the second-floor joist to be well nailed to studding. Inside studdings to be 2 x 4 inches and placed 16 inches to centers; to have double studs to all doors, strong angle braces on the outside partitions in all angles; corner studs to be 4 x 4 inches; rafters to be 2 x 5 inches and placed 16 inches to centers; collar beams for all rafters to be 1 x 6 inches; roof to be constructed as per elevation; porch-floor joist to be 2 by 6 inches, porch rafters 2 x 5 inches; all to be 16 inches to centers. The whole of the above to be of the best quality of merchantable lumber, framed in the most substantial manner. All lumber to be well seasoned, free of large knots, shakes and sap. The entire roof of porch and building to be sheathed with No. 1 boards laid down level and nailed with 10d. nails to rafters. All valley rafters to be double thickness. Outside building to be sheathed with close joints diagonally of No. 2 boards, and well nailed to studdings on top of these boards. Cover the whole with one thickness of best quality sheathing paper, overlapping each successive breadth of the felt about 2 inches upon the preceding breadth, the felt to be under all weather-boards, casings, corner boards, water-table, &c., to be made a perfect water-tight job.

*Flooring.*—The floors of first and second stories throughout to be laid with second rate yellow pine 1 inch tongued and grooved mill-worked flooring. Floors to be laid down with close joints and nailed to each joist.

*Weathering.*—The outside of building in first story to be weather-boarded with clear weather-boards 6 inches wide and lapped not less than 1 inch; this includes all walls and projections; all the exterior sides of windows to have 1⅛-inch casings; 1⅛-inch corner strips to all walls, as shown; all the gables to be trimmed as indicated per plans with 1-inch dressed lumber clear, and rafters of gables to have ⅞-inch beaded facia, and the projecting portions of rafters over walls to be ceiled underneath with ⅝-inch beaded ceiling stuff; second story outside walls, as shown in elevation, to be shingled with cut shingles and properly put up.

*Porches.*—Porch to be made as shown per front and side elevation, to have boxed columns with chamfered edges, railing shown as per elevation, hand-rail to be 2¼ x 4 inches and 1¼-inch balusters. Rafters of said porch to be dressed with chamfered edges, ceiling to be beaded flooring, dressed side turned down. The floors to be laid with 1⅛-inch tongued and grooved clear lumber 3 inches wide, laid in white lead; steps to be of 1¼-inch clear white pine lumber, risers to be ⅞ inch; the panels under floor to be lattice-work.

*Roofing.*—The entire roof of building and porches to be covered with the best quality of sawed shingles, laid 4½ inches to the weather, and each shingle to receive two nails. All shingles to be dipped by the painter before being put on building, and the entire roof to be made perfectly water-tight.

*Windows.*—All the windows to have boxed frames, 1⅜-inch sash; all windows to be hung with turned axle pulleys, cast iron weights and provided with Berlin bronzed sash, locks and lifts; all frames to have 1⅛-inch sub-sills; all windows to be of sizes figured on elevation and plan. Two windows in basement to have 1⅜-inch sash hung double to 1¾-inch plank frames and provided with three bolts each pair.

*Blinds.*—All the windows to have 1⅜-inch outside blinds, hung double to suitable blind hinges and fasteners, and to have rolling slats.

*Stairs.*—A flight of stairs to be built to second story in front hall, to have 1⅛-inch yellow pine trreads, ⅞-inch risers with nosings and scotia returned; to have a molded spandrel in first story and to have 6-inch square-chamfered newel with beaded panels and hand-rail to be 2¼ x 1¾ inches. The balusters to be 1¾-inch fancy turned, said stairs to rest on strong carriages; the rails and balusters to be of cherry; outside cellar stairs to have 2-inch treads and no risers, resting on strong carriages; double trap-door made of tongued and grooved flooring hung with strong strap hinges to 4 x 6-inch cedar copings and provided with a padlock.

*Carpenter Work of Plumbing.*—Lead pipes to be inclosed with boards put up with screws and dressed, the kitchen sink to have a hard-wood dish board to be supported with two turned legs and have a drawer underneath.

*Pantry and Closets.*—A pantry to be fitted up with two large shelves and returned; each closet to have one large shelf and six clothes hooks to each; two molded shelves to be fitted up above kitchen sink about 4 feet and supported by iron brackets.

*Doors.*—Front door to be made as per elevation, to be 1¾ inches thick, have upper panel prepared for glass. Five doors in first story to be 2 feet 10 inches x 7 feet 6 inches. One door to closet in kitchen and one door to pantry to be 2 feet 4 inches x 7 feet 6 inches. Three doors in second story to be 2 feet 10 inches x 7 feet. Four closet doors to be 2 feet 4 inches x 6 feet 6 inches—all of the above doors to be 1⅜ inches thick. Each door to have four panels, raised and machine-molded on both sides; all doors to be hung with 4 x 4-inch butts and to have 4-inch mortise lock, one tumbler and provided with jet knobs. Bronze roses and escutcheons; front door to be provided with night latch. All the doors to have 1⅜-inch jambs rabbeted the full thickness of doors on both sides; all of the above to be hung and put up in the most workman-like manner. All doors to be provided with rubber-mounted stops.

*Inside Finish.*—All the rooms and halls of first and second story throughout to have an 8-inch molded base, with ¼-inch round floor strip; all the openings throughout the first and second stories to have 5 x ⅞-inch pilaster finish, with molded base blocks and molded corner blocks, all properly fitted up; the windows of the entire first and second story, except kitchen, to have plain machine-molded backs; the kitchen is to be wainscoted, 3 feet 6 inches high of ⅝-inch beaded flooring put on the second coat of plastering, and have a molded capping on top; one ¾-inch bead to be put on every corner.

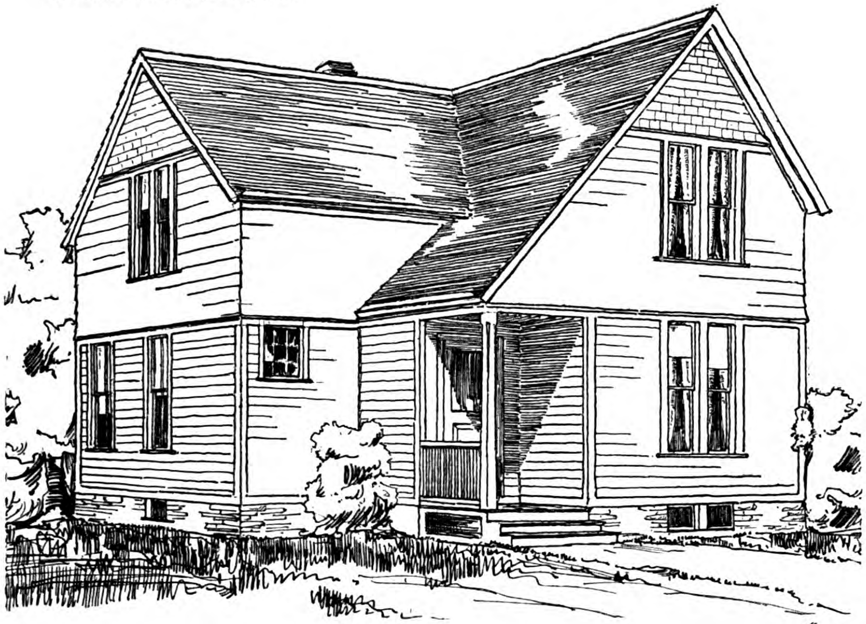
#### FINALLY.

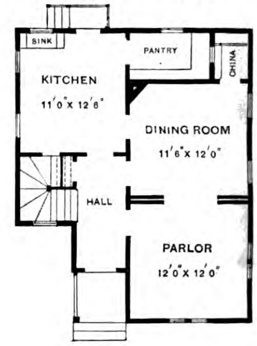
The contractor of the aforegoing work is to furnish all the material and labor to put the building in a complete and substantial condition, all material to be of the best of its respective kinds; all lumber to be well seasoned, and all, such as for windows, doors, shutters, inside finish, porches, stairs, &c., to be clear Wisconsin rafted white pine lumber; the building to be left, ready for occupation, clear of all rubbish, and a bond to be given to the full amount of the cost of building, to be furnished by the contractor.

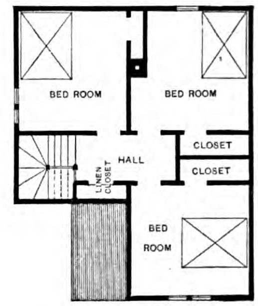
## Good Tin Roofs.

In an article in the January issue of the *Office*, entitled "The Revolution in the Tin-Plate Trade," and in which the course of Merchant & Co. is traced, showing how they have introduced various novelties, all calculated to improve the tin-plate trade and secure better roofs for buildings, there is a paragraph entitled "How Architects and Property Owners have been Assisted." It is of interest to our readers and therefore we quote it as follows:

But the greatest innovation of all, perhaps, and that which best characterizes the independent enterprise of the house, has been the efforts made to educate the trade in the use of the best goods, and thus establish and make permanent the reform so happily instituted. We have already pointed out that the greatest change in tin-plate qualities took place in what are known as roofing plates. Now, architects are responsible for the roofs of all the better buildings that are erected, and it was early apparent to Merchant & Co. that nothing short of technical information, correct as to all the details of the work, would accomplish with them the object in view—namely, securing such specifications of tin roofs as would cause good material and good workmanship to be employed and poor materials avoided. To this end a treatise on tin roofs was prepared, fully illustrated with diagrams of the work in process, showing seams finished and in process of making, and describing in connection therewith the special plates to which the honor of the house is pledged, and likewise showing how specifications should be worded to avoid some of the tricks which dishonest roofers know how to play. The position of an importing and jobbing house issuing technical treatises on the use of the goods in which it deals, and distributing the same broadcast over the land, compared with the stiff, formal cards of the old line of advertising peculiar to the metal trades, shows most graphically the changes wrought in the business and the valuable results following the application of some of those modern methods to which we have drawn attention.





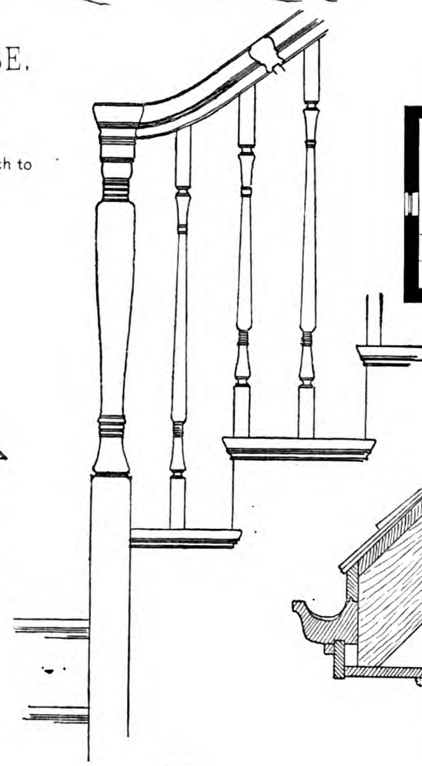



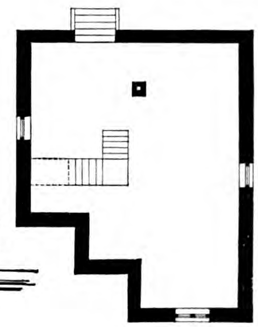

# A THOUSAND DOLLAR HOUSE.

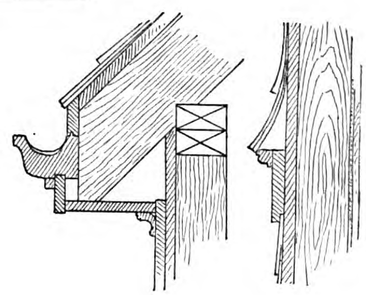
Study by ◎ in the Eighteenth Competition.

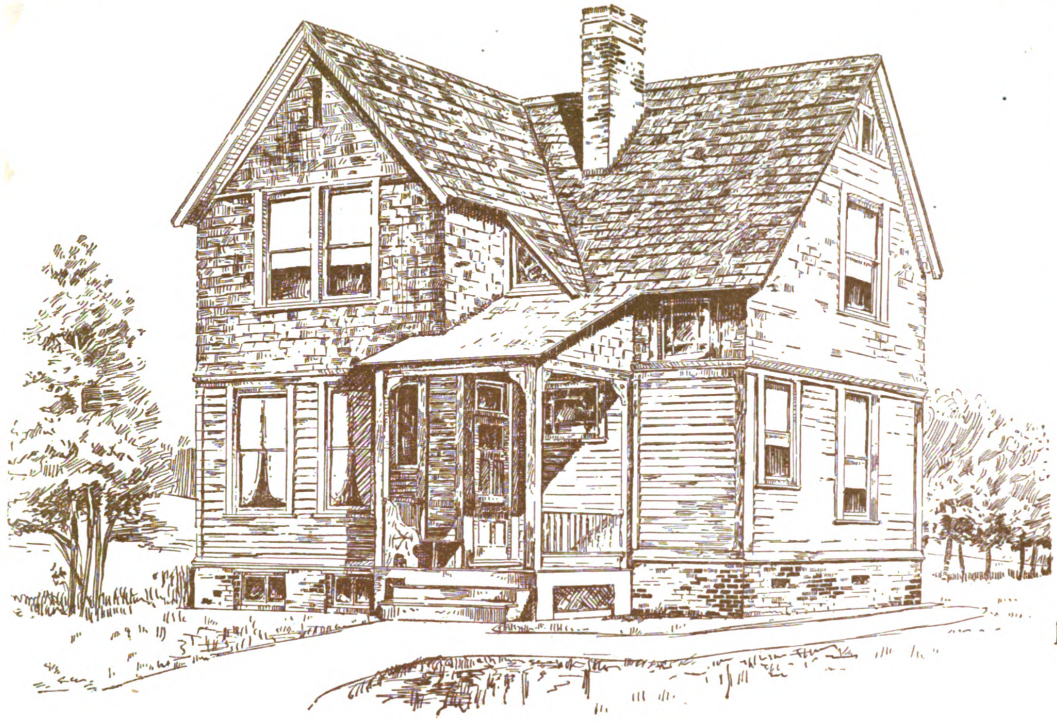
Scale : Elevations, 1-8 inch ; Plans, 1-16 inch, and Details 1 inch to the foot.

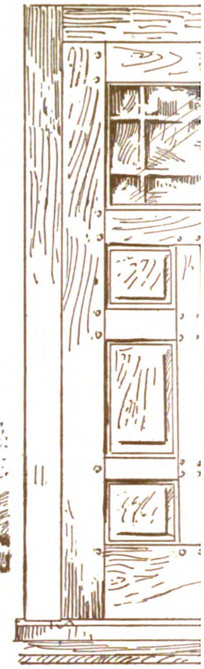
For Specification, Estimate, &c., see page 50.



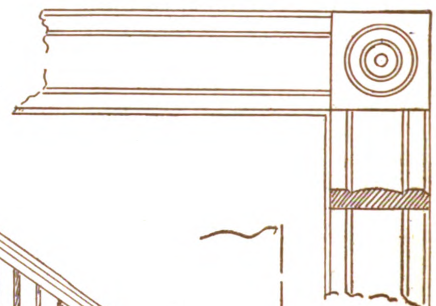








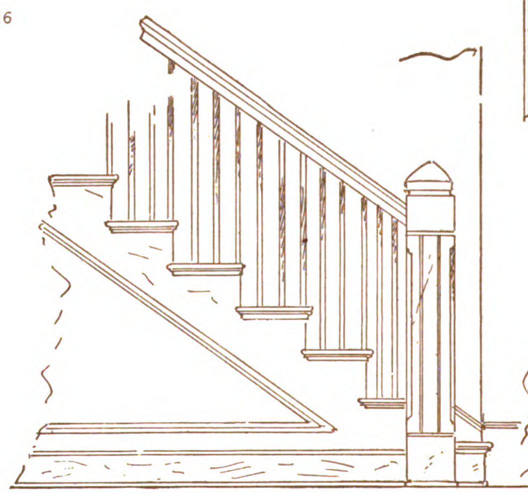
# A THOUSAND DOLLAR HOUSE.

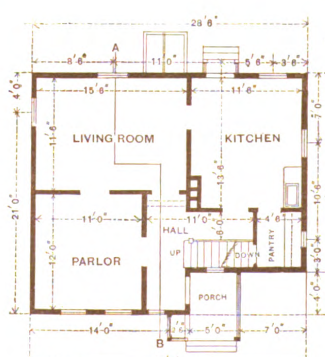


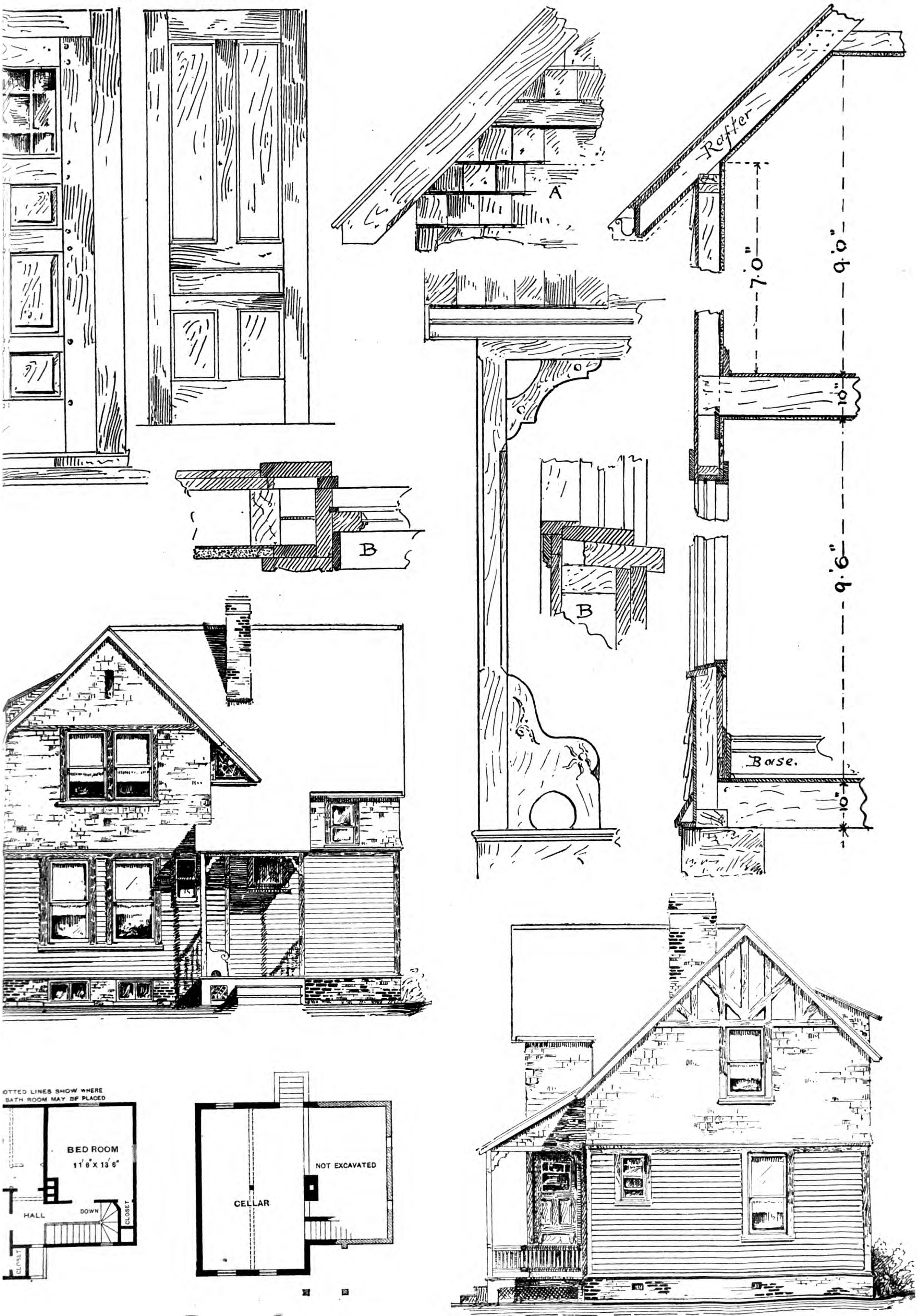
Study Submitted by "ECONOMY" in the Eighteenth Competition.

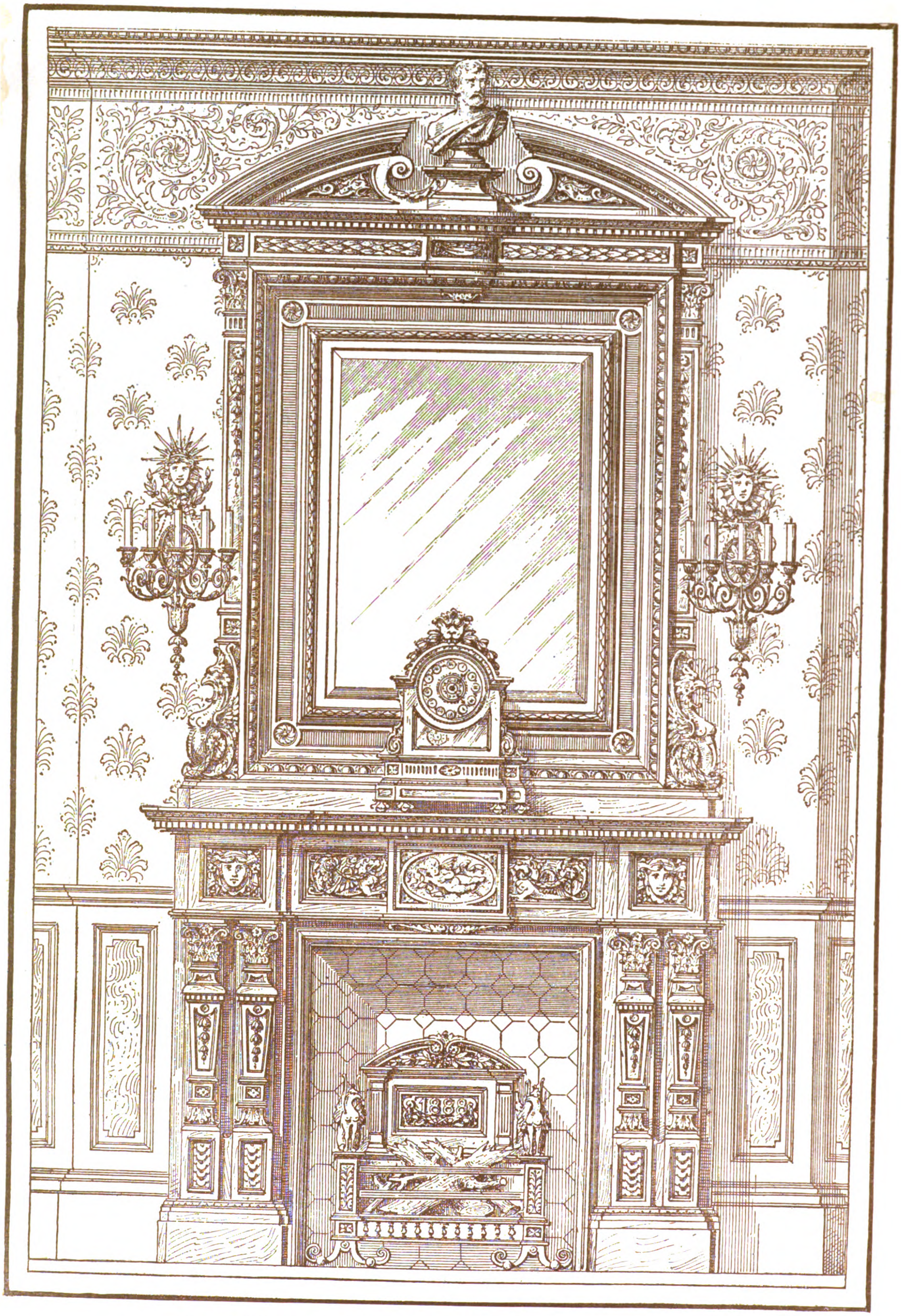
Scale: Elevation and Sections, 1-8 inch to the foot. Floor Plans, 1-16 inch to the foot. Details, 1 1-2 and 1-2 inch to the foot.

For Specification and Estimate, see page 51.



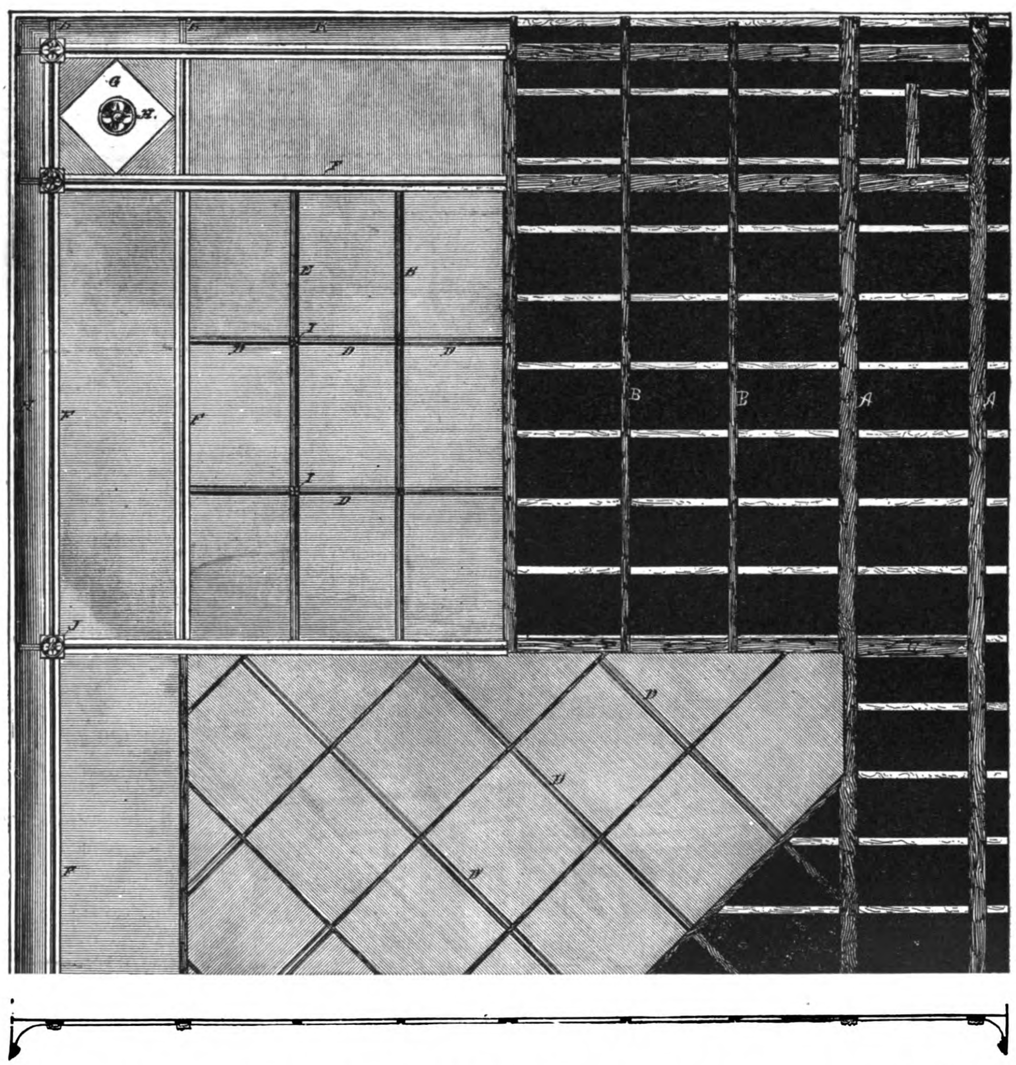


A
Rafter
7'0"
9'0"
10"
B
B
9'6"
Base.
10"
OTTED LINES SHOW WHERE
BATH ROOM MAY BE PLACED
BED ROOM
11'8" X 13'6"
HALL
DOWN
CLOSET
CLOSET
CELLAR
NOT EXCAVATED



A RENAISSANCE CHIMNEY PIECE. DESIGNED BY R. BROOK.

## Northrop's Paneled Ceiling.

From new plates recently prepared by H. S. Northrop, corner of Franklin and Centre streets, New York, we have selected the engraving shown on this page, representing the style and construction of paneled metal ceilings which he is supplying to the trade and putting in place. The work is composed of flat or slightly corrugated sheet iron put in place against grounds of wood, the joints being covered by moldings, which are fastened in place by nailing through. Fig. 1 shows a plan view of a ceiling, and indicates how the wooden grounds are put in place below the floor joists, and also indicates in what forms the ceiling may be worked in order to scure a pleasing effect. Fig. 2 shows a sectional view. The ceiling-work is formed into a cornice for a finish around the angles of the room. The cove cornice is formed of either plain or corrugated iron, according to circumstances, and the ribs are either run through from the first line of molding to the base of the cornice or otherwise, according to circumstances. The work, in its various details, speaks for itself, and more extensive description is scarcely necessary. Various embossed panels are also prepared by Mr. Northrop for use in connection with this work, and he is securing some very excellent effects.



*Northrop's Paneled Ceiling.—Figs.* 1 *and* 2.—*Plan and Section of Metallic Ceiling as Supplied by H. S. Northrop, New York.*

## Chimney Construction and Fires.

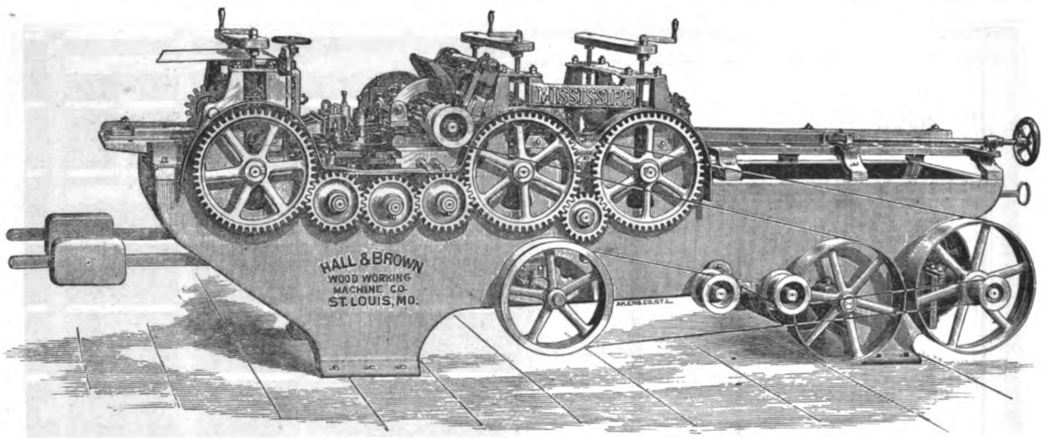
One cause of danger from chimneys, says J. Braidwood, arises from the communication which they often have with each other in one gable. The divisions or partitions being very often found in an imperfect state, the fire communicates to the adjoining chimney, and in this way sometimes wraps a tenement in flames. I know a division of a principal street in Edinburgh in which there is scarcely a single chimney-head that is not more or less in this condition, and I have no doubt that this is not an uncommon case. There is also great danger from the ends of joists, safe lintels or other pieces of timber being allowed to protrude into chimneys. In one instance which came under my notice, a flue passing under the recess of a window had on the upper side no other covering than the wood of the floor; of course when the chimney took fire the floor was immediately in a blaze; but there are many instances of such carelessness. It is a common practice among carpenters to drive small pieces of wood into the walls for the purpose of fixing their work, not paying the least attention as to whether the points run into the flues or not. In the repairs and alterations of old buildings house carpenters are, if possible, even more careless in this particular than in the construction of new. I know of different buildings which underwent some alterations. In both of these safe-lintels have been run into the flues, and both of them, after the alterations, took fire, the one in consequence of a foul chimney, which set fire to the lintel, and although the other did not take fire from the same cause, the lintel was nevertheless very much scorched and obliged to be removed.

SING A SONG of scratch work,  
  Ceiling full of pud',  
Five-and-twenty clam shells  
  Stuck within the mud;  
When the mud was hardened  
  The shells began to fall—  
Oh, weren't they the dainty things  
  To plaster on the wall!

# NOVELTIES.

### Flooring Machine.

The Hall & Brown Wood-working Machine Co., of St. Louis, Mo., are introducing to the trade a flooring machine which has been designed with special reference to high speed and rapid, powerful feed. The reader will be able to gather a general idea of the appearance of this machine from an inspection of Fig 1 of the accompanying illustrations. The frame is heavy and massive, and is 13 feet in length. The countershaft is attached with an outside stand or support at the pulley end. The top and bottom heads are made of solid steel and supplied with steel bolts and case-hardened nuts. The cylinder journals are of large size and each 10 inches long. The top cylinder is driven by two flanged pulleys, while the bottom cylinder has only one, all, however, receiving power from the same countershaft. The upper cylinder journal bearings are cast together by a web extending across the machine, and are raised or lowered at will. The lid has a detachable plate, which may be replaced when necessary. The under cutter head journals are cast together in a heavy frame and made to fit in a recess or pocket in the frame of the machine. These may be adjusted up or down by screws suitably arranged for the purpose. This frame also carries or supports pressure bars for the under head, which are placed on each side of the head, and may be easily removed for the purpose of sharpening or resetting the knives. The hold-down bar over the under cutter head has a vertical adjustment to suit different thicknesses of lumber, and may be instantly moved out of the way by loosening a nut when access to the cutters is desired. The side spindle frames or head stocks are each adjustable across the machine, by which arrangement the friction of the lumber is distributed across the bed, equalizing the wear. In case a heavier cut is desired on the right-hand or grooved side of the machine, the head can be moved up to the work instead of resetting the guide. The feed consists of six rolls 7 inches in diameter, two pair being placed in front of the upper cylinder and one pair at the end of the machine beyond the under head. All the rolls are heavily weighted and geared, the idle gears being mounted on shafts. The manufacturers furnish with each machine one set of knives for upper and lower heads, one set of beading cutters for ceiling, one set of three-winged matcher heads with solid milled cutters for flooring and one set for ceilling, one set of 3-inch jointer heads with jointer cutter, together with all necessary wrenches. The machine is made to work 7, 9 and 14 inches wide and 3 inches thick, single or double.




*Novelties.—Fig. 1.—Flooring Machine, Built by Hall & Brown Wood-Working Machine Company, St. Louis*

### Sash and Blind Finishing Machine.

In Fig. 2 is shown a sash and blind jointing, rabbeting and finishing machine introduced by the Egan Company, of Cincinnati, Ohio. The machine is especially designed for finishing the edges of sash, rabbeting, beading and jointing the edges of blinds, grooving and boring sash for the cords, and a great variety of finishing work of this kind in sash, door and blind factories. The manufacturers claim that this machine is capable of doing the same amount of work as hitherto required three machines to accomplish. From an inspection of the cut it will be seen that the frame presents a very solid appearance, being thoroughly braced and planed perfectly true, with the countershaft connected at the base. The top of the frame receives a sliding table moving in planed ways. A stationary table is also provided for working blinds when the three cutter-heads are brought into operation at once. The bed is adjustable on the frame, and is provided with a saw mandrel for cutting all kinds of grooves. It also has a boring mandrel operated by a treadle for boring the hole in the sash for the cord. The sash is then passed to the grooving saw,

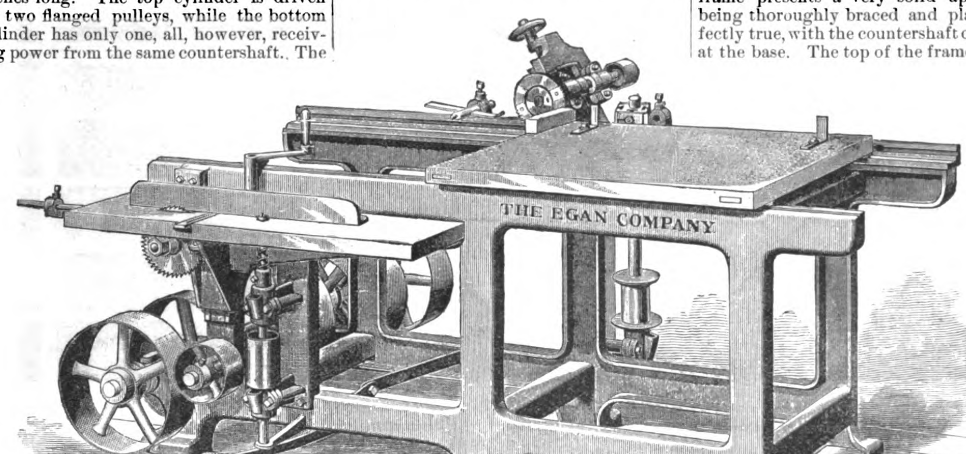
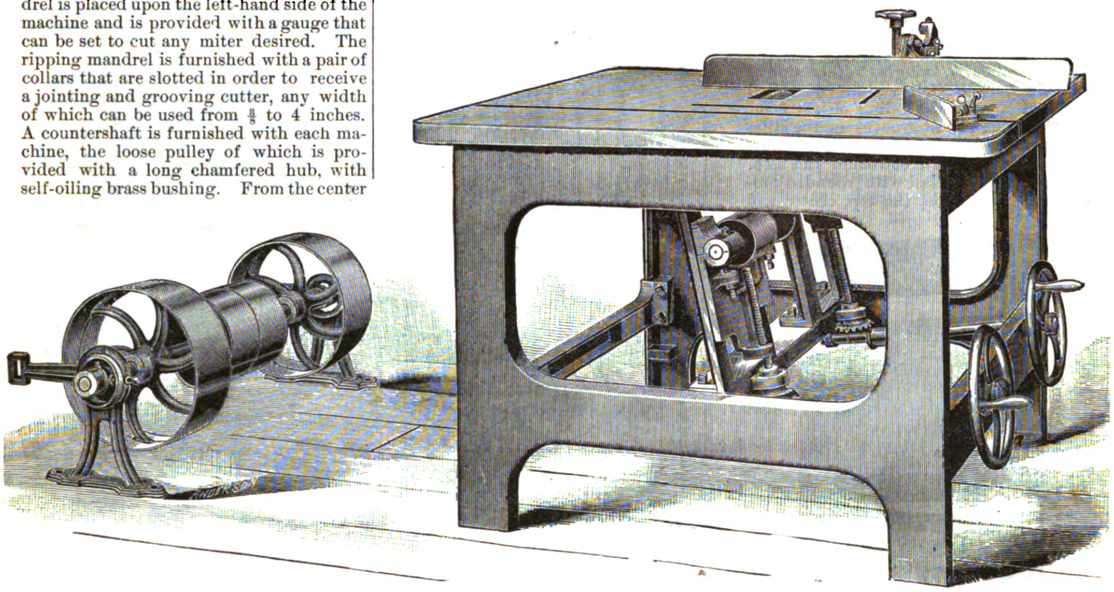



*Fig. 2.—Sash and Blind Jointing, Rabbeting and Finishing Machine, Built by the Egan Company, Cincinnati.*

and the operation is completed without removing the sash from the table. The tight and loose pulleys are 12 x 5½ inches, and should make 900 revolutions per minute. Each machine is furnished complete with the necessary posts, springs, wrenches, cutter-heads, &c.

### Combination Rip and Cut-Off Saw.

In Fig 3 of the accompanying illustrations we present a general view of a new combination rip and cut-off saw just brought out by Frank & Co., of Buffalo, N. Y. In the construction of this device the manufacturers have endeavored to make it first class in every particular, and to meet a well-defined demand for a moderate cost combination rip and cut-off saw without tipping table. In this machine the saws are moved separately by individual adjusting screws. The cut-off mandrel is placed upon the left-hand side of the machine and is provided with a gauge that can be set to cut any miter desired. The ripping mandrel is furnished with a pair of collars that are slotted in order to receive a jointing and grooving cutter, any width of which can be used from ⅛ to 4 inches. A countershaft is furnished with each machine, the loose pulley of which is provided with a long chamfered hub, with self-oiling brass bushing. From the center of the countershaft to the center of the saw-arbor should be exactly 8 feet, in order to give right and left angles to the belts and not have them tighten and loosen by the raising and lowering of the saws. The ripping guide is so constructed that it may be set to any angle desired. The machine is heavily constructed and is strongly braced throughout. Both saw-arbors are made of the best hammered machinery steel and will carry 18-inch saws. The size of the top of the table is 4 feet 4 inches by 3 feet 10 inches. The tight and loose pulleys are 10 inches in diameter with a 6-inch face. With each machine the manufacturers furnish one rip and one cut-off saw.



*Novelties.—Fig. 3.—Combination Rip and Cut-Off Saw, Built by Frank & Company, Buffalo.*

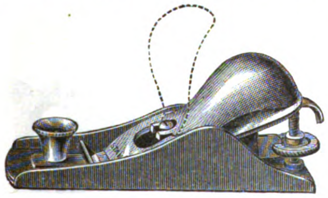


*Fig. 4.—Knuckle-Joint Block Plane.*

### Knuckle-Joint Block Plane.

In Fig. 4 we present a general view of a knuckle-joint block plane which has recently been added to the assortment of tools manufactured by the Stanley Rule and Level Company, of New Britain, Conn. By reference to the engraving it will be seen that the method of clamping the cutter in position is by means of a knuckle-joint in the cap above it, which also serves as a convenient hand-rest after the cutter is secured in place. By the use of the brass thumb nut at the rear of the plane, the cutter can be set forward or drawn back, as may be desired. The curved lever under the cutter is designed for use in adjusting the cutter sidewise, so that the cutting edge may always be exactly straight with the face of the plane. The device is well made in all respects, and is claimed to be a very convenient tool.

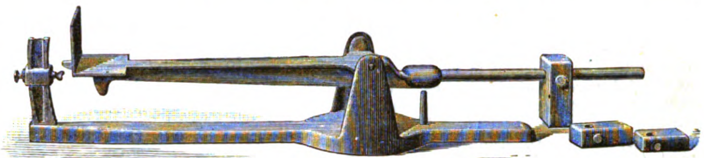


*Fig. 5.—Knife-Balancing Machine.*

### Knife-Balancing Machine.

In Fig. 5 we present a general view of a patent proportional knife-balancing machine manufactured by the Defiance Machine Works, of Defiance, Ohio. This machine is brought out by the company to meet a well-defined want for a machine for perfectly balancing molding knives, planer knives, revolving cutters, knife cap screws, &c. In operating this machine each knife is placed in succession on the platform of the balancing machine with its face toward the end-board, shown at the left of the engraving. At the opposite end of the beam is placed a suitable weight. If it is found that the knives are of the same specific weight, they are then placed in succession with their backs against the end-board just referred to. If they still appear to be of the same specific weight, they are then placed in succession flatwise on the platform in as many different positions as may be possible. By repeated trials it will thus be ascertained when they are all reduced to the same weight in their corresponding parts. The balance weights shown at the right in the engraving are made oblong, so that by placing the heavy end up the entire mass, consisting of weight, beam and knife, may be poised near its center of gravity and thus oscillate more sensitively. If, however, the object to be balanced be very heavy the weight must hang down. From an inspection of the engraving it will be seen that the operator can make the poise more or less delicate according to the varied positions of the knives to be balanced.

### The Howard Door Check.

The accompanying illustration represents a very simple device for holding a door

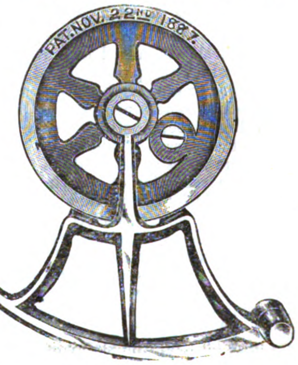


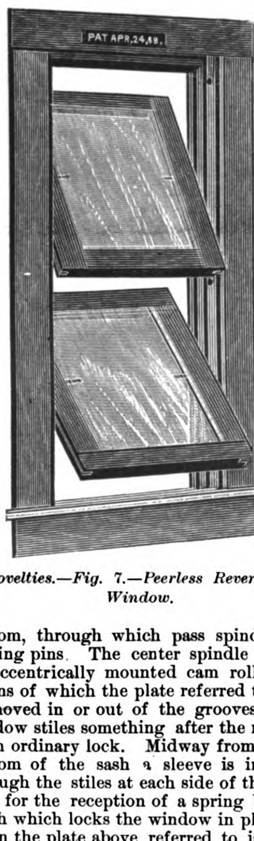

*Fig. 6.—The Howard Door Check.*

open at any angle. It is intended to be screwed on the door, near the bottom, so that the swinging arm can touch the floor.

One screw fastens it to the door. When not in use the arm is turned upward, a lug on the side of the wheel preventing it from revolving completely around. It can be thrown into position to hold the door by a touch of the toe. The arm being slightly eccentric in shape, it can be made to press as tightly against the floor as possible. But one size is made, and it has a total spread of 4½ inches. It is constructed of malleable iron, handsomely polished, and nickeled. The sale agents are H. H. and C. L. Munger, 142 Lake street, Chicago.

### Peerless Reversible Window.

In the engraving presented herewith we show a general view of the Peerless Reversible Window which is being introduced to the trade by Messrs. Edgerton & Metcalf, of No. 120 Twenty-second street, Chicago, Ill. The form of construction employed is such that the window may not only be raised and lowered in the ordinary manner, but it may be reversed without difficulty, bringing either side of top and bottom sash within convenient reach of a person standing on the floor. Inserted edgewise in grooves in the stiles of the window is a clamping plate which extends from top to bottom of the sash. This plate is provided with rounded projections and slots at the top, center and




*Novelties.—Fig. 7.—Peerless Reversible Window.*

bottom, through which pass spindles or bearing pins. The center spindle carries an eccentrically mounted cam roller, by means of which the plate referred to may be moved in or out of the grooves in the window stiles something after the manner of an ordinary lock. Midway from top to bottom of the sash a sleeve is inserted through the stiles at each side of the window for the reception of a spring bolt or catch which locks the window in place or, when the plate above referred to is withdrawn from the jamb, allows the window to be revolved as on a pivot. The groove for the sash cord instead of being in the stiles, as is ordinarily the case, is formed in the jamb or frame inclosing the window proper. The cord plate forms a pivotal connection between the sash cord and the window, so that no matter what the position of the window may be, the cord remains relatively the same. The projections at top and bottom of the clamping plate fit the grooves for the sash cord in such a manner as to prevent the window from rattling, at the same time maintaining a tension that permits the window to easily move up and down. When the window is to be placed in position, the clamping plate is drawn into the stiles by turning with a key the spindles upon which is mounted the cam roller. The perforated end of the cord-plate is then slipped over the inner end of the sleeve, when the window may be set in place.

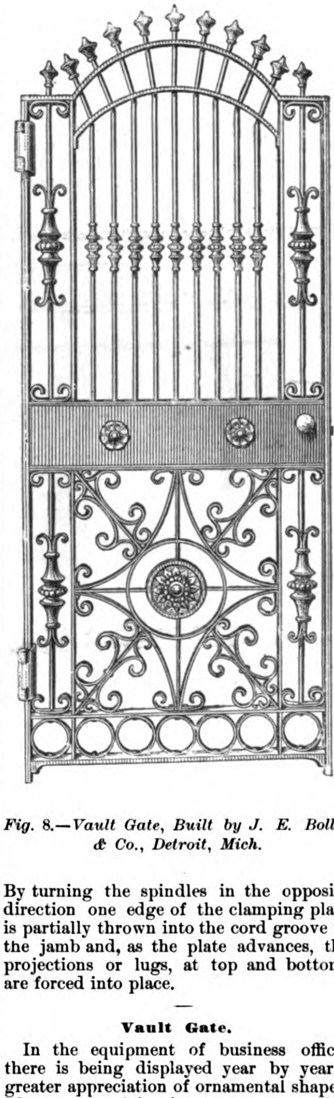


*Fig. 8.—Vault Gate, Built by J. E. Bolles & Co., Detroit, Mich.*

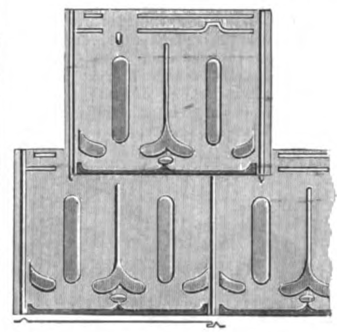
By turning the spindles in the opposite direction one edge of the clamping plate is partially thrown into the cord groove in the jamb and, as the plate advances, the projections or lugs, at top and bottom, are forced into place.

### Vault Gate.

In the equipment of business offices there is being displayed year by year a greater appreciation of ornamental shapes. The severely plain gives way to forms that are really artistic, and utility and beauty are joined in a way to secure the best in each. The accompanying engraving represents a vault gate supplied a short time since to the National Safe Deposit and Vault Company, of Pittsburgh, by J. E. Bolles & Co., of Detroit, Mich. It is a characteristic specimen of work of its class current at the present time. The outside frame is strong, while the interior space is filled with rods, which in addition to obstructing the space affords the foundation for ornamentation which is pleasing to the sight. The spindles on the bars, the rosettes on the back panel and in the center below, together with the scrolls used on the diagonal bars, all afford pleasant resting places for the eye.

### New Design Metallic Shingle.

The Cincinnati Stamping Company, of Cincinnati, Ohio, are introducing to the building trade some new design metallic shingles, a general view of which is afforded by means of the engraving presented herewith. The shingles are stamped from 10 x 14 inch tin plate, and when laid have very much the appearance of 7 x 10 shingles. The lock employed is



*New Design Metallic Shingle.—Fig. 9.—Showing Size of Shingle, Method of Joining and Position of Joints.*

the same as that which the company use in connection with their other shingles, many thousands of squares of which are said to have been placed upon buildings scattered through the country. By reference to Fig. 9 of the engravings, the reader will be able to gather a very clear idea of the manner in which the shingles are put together, the position of the joints and the form of lock employed.

### New B. M. T. Saw.

The new patent tooth B. M. T. Saw, devised by Warren Bundy, Minnesota City, Minn., and manufactured by the Montague-Woodrough Saw Company, 211 and 213 Randolph street, Chicago, Ill., is represented in the accompanying illustration. As shown in the cut, the teeth are arranged in sets of three each and after each set is a recess or gullet for the reception of the sawdust liberated. There are two distinct kinds of teeth in

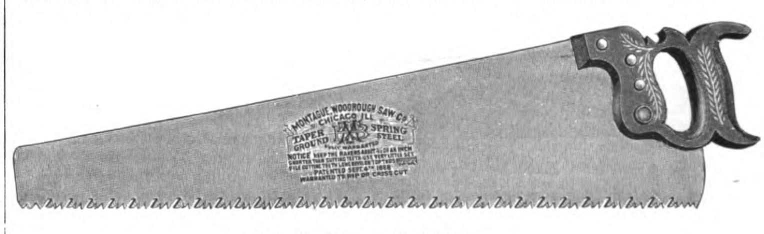
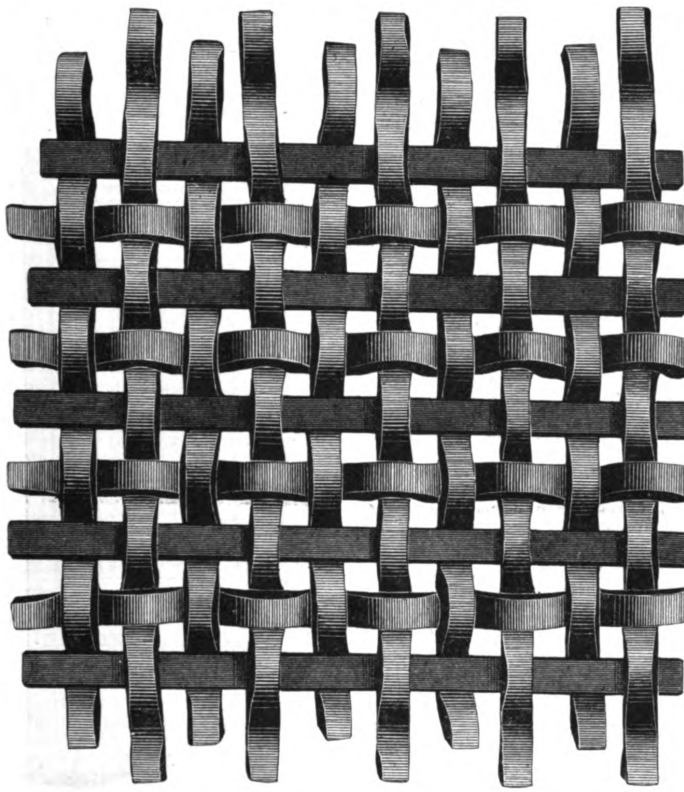


*Fig. 10.—New B. M. T. Saw.*

each set, two cutting teeth and one clearing tooth. The cutting teeth are made with the cutting edge on the outer edge of each tooth, and are arranged in step form, with a rise from the body of the saw of about 45°. The cutting edge is on opposite sides in each pair of teeth, so that the bevels face each other, thus making two parallel gashes in the wood. The purpose of the clearing tooth, which is slightly below the points of the cutting teeth and which is formed like a common mortising chisel, with its cutting edge at a right angle to the gash, is to clear away the wood between the two gashes into the recess or gullet before it, thus leaving the next pair of cutting teeth free from obstruction to their work. On drawing the saw back into the gash, the sawdust is pushed out of the gullet, leaving it clear for the next stroke. The sharp chisel edge of the cutting teeth is referred to as leaving the sides of the wood as smooth as though planed, and, as little set is required, the saving of material is referred to as important, while the absence of roughness and loose fibers lessens the friction, enabling the saw to work successfully with much less power than the V-tooth saw. With this construction it is claimed that the saw will cross-cut, rip or cut in a miter box with equal facility one-third faster than any saw now made specially for either of these purposes. Alluding to circular saws made with teeth of this pattern, the manufacturers refer to the smoothness of the cut, the saving of material lost in dressing, and the length of time that they will run without filing. They point out that the use of cross-cut and ripping tables is made unnecessary, and that no time need be wasted, as at present, by substituting one saw for another. In jig saw work it is stated that the material is cut so smooth that mouldings, &c., are ready for use when they leave the saw. The adaptation of this style of tooth to band saws is also referred to.

It is also pointed out that saws with this pattern of teeth are easier to file and keep in order than others, as with the ordinary teeth it is necessary to file two teeth at a time, making it dificult to have them of exactly the same hight, while in this pattern of saw it is explained that, after jointing, the clearing tooth is first filed $\frac{1}{32}$ inch below the level of the cutting teeth, holding the file almost parallel with the blade of the saw and at a slight upward angle, thus clearing the point of the cutting teeth in front and falling below the bevel of the cutting teeth in back. After all the clearing teeth have been filed the cutting teeth are filed to a point one at a time, so that all can be brought to an exact level. When this is done an oilstone laid flat on the side of the saw and run up and down a few times will reduce, it is said, any irregularity in the set and give smooth cutting. The set is given by placing the tooth on a piece of flat steel with a slight bevel on the edge and striking it with the pein of a hammer in such a way as to set only the front or cutting edge, where in the ordinary saw the whole tooth is turned. The company have a special saw-set made for this purpose, which is referred to as doing its work exactly. The circular issued by the company gives a full description of this saw, and illustrates the manner in which it is filed, and the price list.



*Novelties.—Fig. 11.—Woven Wrought Iron.*

### Woven Iron

In a recent number of *The Manufacturer and Builder*, Mr. Henry D. Plimsoll, of No. 83 Nassau street, New York, describes a fabric wool of iron bars, of which he is the inventor. The appearance and structure of the fabric is shown in the accompanying engraving. The process by which this result is obtained is exceedingly simple, the bars being corrugated separately, with such a difference between the corrugations of the longitudinal and cross bars as will permit of openings, when they are placed in position, for the insertion of straight interlocking bars. Simple as this contrivance is, the fabric, it is said, is exceedingly strong, and, unlike the bridge that "did not bend, but broke," it (the fabric) may bend, but cannot break—it can only be got apart by reversing the process of construction. It is also capable of being made in a great variety of patterns, varying according to the size, weight and shape of the bars or the size of mesh. The tube iron can also be woven in the same way. The purposes to which it may be applied are as follows: A protection for the interiors and exteriors of private dwellings, prisons, safe deposit vaults, and other public buildings, as a fabric made, say, of one-inch bars, with meshes three inches square, while not interfering with the light, would require a large amount of cutting before an opening could be made sufficient for the passage of a man's body. For railway cross-ties, as, where several pieces are so arranged, while there would be sufficient firmness, there would still be sufficient "give" to prevent the wear and tear of tires and rails that is the usual accompaniment of a rigid iron cross-tie. The inventor believes that it would be useful as a netting about ships for protection against torpedoes, and also in the construction of iron clads and as a covering for sunken railways.

### Outrigger Hoist.

We show herewith a compact and complete outrigger hoisting apparatus, made in two sizes of 500 and 1000 pounds capacity by the Energy Mfg. Company, 1115 South Fifteenth street, Philadelphia. As will be seen, the hoisting gearing is placed on two beams inside of building so that it is protected from the weather, the only part being exposed is the rope used for raising the loads. The ropes can be made any length desired. This hoist is fitted with double-acting brakes, both controlled by one brake cord. One being automatic, holds the load at any point when hoisting, and will not allow the load to run down when the hand rope is let go. The other is used when lowering to control speed. By regulating the pull on the brake cord, the load can be lowered quickly or slowly. If the brake cord is pulled hard or let go, the hoist is stopped, so that no accident can be caused by the neglect of the operator. The prices being low, they are within the reach of any desiring a hoisting machine of this class.

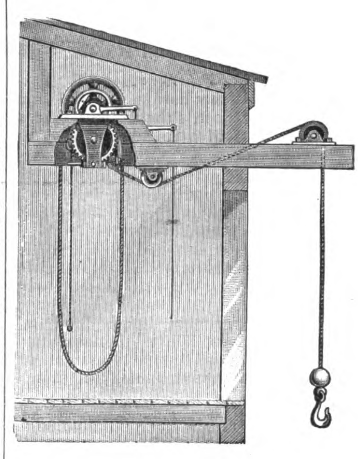
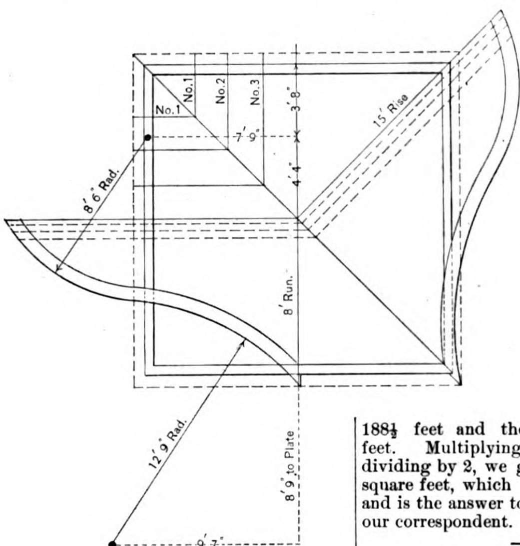


*Fig. 12.—Outrigger Hoisting Apparatus.*

# CORRESPONDENCE.

### Side Bevel of Jack Rafters.

*From* J. D., *Winchester, N. H.*—I submit a plan of a tower roof which I have lately framed and put in place. Will some reader of *Carpentry and Building* tell me how to get the side bevel of the jack rafters in a case of this kind ? I got

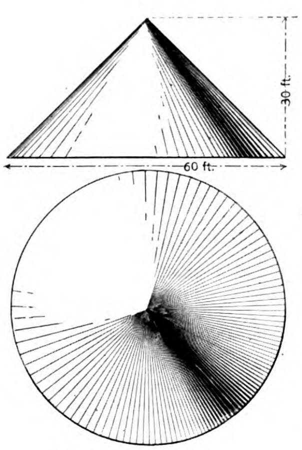



*Side Bevel of Jack Rafters, by J. D.*

the bevel of jack rafter No. 1 the same as I would of any straight rafter, and cut all the rest the same way. No. 1 was a good fit, but Nos. 2 and 3—they made the boys laugh, No. 2 especially, which did not fit at all.

### Area of Conical Roofs.

*From* L. W. F., *Syracuse, N. Y.*—I would like to know how to get the number of feet of boards that it will take to cover the roof of a round building, the



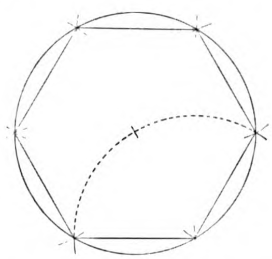

*Area of Conical Roofs.*

dimensions of which are shown in the sketch.

*Answer.*—The accompanying illustration shows the type of roofs our correspondent refers to, and in the dotted lines the dimensions are given, the roof being 60 feet in diameter, 30 feet high and of conical form. The area of a cone, omitting the base, is equal to one-half of the product of the circumference by the slant hight, the slant hight being the distance from the apex or top to any point on the circumference of the base. As this distance, however, is not given by our correspondent, it will be necessary to figure the area by another rule, or, in other words, to calculate the slant hight from the diameter and altitude. To do this we have to add together the square of the hight, or 30 feet, and the square of one-half the diameter, or 30 feet, and extract the square of the sum, which, in the present case, would be the square root of 1800, or 42.4 feet. The circumference of the base is found by multiplying 60 by 3.1416, which is equal to 188.5. We now know that the circumference of the base of the roof is 188½ feet and the slant hight is 42.4 feet. Multiplying these together and dividing by 2, we get the number 3996.2 square feet, which is the area of the roof and is the answer to the question asked by our correspondent.

### Laying Down Polygons.

*From* C. G. S., *Huntington, L. I.*—I notice in the January number of *Carpentry and Building* an article from "L. W. T." entitled "Laying Down Polygons," which he says is scarcely understood by the average carpenter. I am of a similar opinion, for I at first took the drawing to be a spider web. I inclose you a sketch, which is my way of solving the problem, and which I think is a very convenient



*Plan of Laying Down Polygons, by C. G. S.*

way if one is in a hurry. First make a circle and then step off around the circle without altering the compasses. This makes six equal sides. Then with a straight-edge "L. W. T." can make polygons by the yard and cut them off as he wants them.

### Batter Posts.

*From* M. C. M., *Orchard, Fla.*—In answer to the communication of "H. B. A.," Atlanta, Ga., which appeared in the December number of *Carpentry and Building*, would say, first draw a correct sketch with the plumb post 1 foot high, and if the batter is 3 inches to the foot, start it 3 inches from the foot of the plumb post, and then the batter post will be about 1 foot and ⅜ inch. The length of the batter post should be divided into 12 equal parts, and for every inch on the plumb post there will be one of the 12 equal parts on the batter post. Then make a 12-foot pole, with 12 of the equal parts referred to, equal to 1 foot. Use that as the batter post pole. If such a pole is properly made, mistakes are less likely to result, and the work is more speedily performed.

### Specimen of Texas Work.

In the accompanying engraving we present a view of one of a pair of front doors made by the firm of B. H. Myers & Son, of Fort Worth, Tex., for a residence in that place. The pair of doors is made of 1⅝-inch cypress, with ⅛-inch ash veneer on the inside to match the finish of the hall. From an inspection of the cut it will be

*Specimen of Texas Work—View of Door Made by B. H. Myers & Son.*

seen that the design is very neat and tasteful and the work of a high order of excellence. The firm state that they have employed this finish in a number of residences in that locality, using cypress, hard pine, oak and poplar for the purpose.

### Balloon Frame.

*From* R. G. M., *Atchison, Kan.*—In reply to "E. T. H.," Truxton, N. Y., I would say, it is asking too much of the Editor of *Carpentry and Building* to use so much valuable space for such a simple question If he is not too old to learn, I would suggest that he go to work for some good boss, and work a while under his instruction. He will learn soon enough, for I think this book is intended for more valuable information.

*Note.*—We publish this letter because it clearly expresses the idea in the mind of the writer. If "R. G. M." or some other reader will send us particulars of their systems of construction, we shall find space to publish in a way to offend no one, and to please many besides the one asking the question.

### Howe Truss Bridge.

*From* EDWIN F. MAY, *Moberly, Mo.*—I send you by this mail a set of blue prints for a Howe truss bridge of 134-foot span, with a bill of materials and estimates of cost. The bridge represents work done for the Wabash Western Railroad Company.

*Note.*—The engravings presented on the following pages are reduced from the blue prints referred to in our correspondent's letter. Accompanying it are bills of materials, &c., which we reproduce herewith. The first is a bill of timber, as follows:

*Timber.*

| Name of pieces. | Number of pieces. | Length of pieces. | | Size of pieces. | | Board measure. |
|---|---|---|---|---|---|---|
| White Pine. | | Ft. | in. | In. | In. | Feet. |
| Lower chord. .... | 16 | 42 | | 7 | x 16 | 6,272 |
| " " ....... | 4 | 40 | 6 | 7 | x 16 | 1,512 |
| " " ....... | 4 | 30 | | 7 | x 16 | 1,120 |
| " " ....... | 4 | 20 | | 7 | x 16 | 747 |
| " " ....... | 4 | 10 | | 7 | x 16 | 373 |
| Upper chord ...... | 12 | 42 | | 7 | x 13 | 3,822 |
| " " ....... | 4 | 40 | | 7 | x 13 | 1,213 |
| " " ....... | 4 | 30 | | 7 | x 13 | 910 |
| " " ....... | 4 | 20 | | 7 | x 13 | 607 |
| " " ....... | 4 | 10 | | 7 | x 13 | 303 |
| Main braces....... | 8 | 26 | | 12 | x 13 | 2,704 |
| " " ....... | 8 | 26 | | 11 | x 13 | 2,479 |
| " " ....... | 8 | 26 | | 10 | x 12 | 2,080 |
| " " ....... | 8 | 26 | | 9 | x 12 | 1,872 |
| " " ....... | 8 | .. | | 8 | x 12 | 1,664 |
| " " ....... | 8 | .. | | 8 | x 11 | 1,525 |
| Counter braces.... | 4 | 26 | | 10 | x 10 | 867 |
| " " .... | 12 | 26 | | 8 | x 8 | 1,664 |
| " " .... | 8 | 26 | | 6 | x 8 | 832 |
| Lateral braces..... | 48 | 18 | | 6 | x 8 | 3,456 |
| Floor beams....... | 64 | 21 | | 7 | x 15 | 11,760 |
| Stringers.......... | 39 | 21 | | 6 | x 12 | 4,914 |
| Bolsters .......... | 8 | 10 | | 8 | x 16 | 853 |
| Yellow Pine. | | | | | | |
| Keys ............. | 56 | 1 | 4 | 3 | x 16 | 299 |
| " ............. | 28 | 1 | 4 | 2½ | x 16 | 149 |
| " .. .......... | 88 | 1 | 1 | 3 | x 13 | 310 |
| " ............. | 44 | 1 | 1 | 2½ | x 13 | 156 |
| Clamps............ | 24 | 8 | | 3 | x 16 | 768 |
| " ........ | 12 | 8 | | 2½ | x 16 | 64 |
| Bolster keys..... . | 4 | 2 | 8 | 3 | x 16 | 43 |
| Oak ties.......... | 23 | 12 | | 7 | x 9 | 1,449 |
| " " ... ....... | 85 | 12 | | 7 | x 7 | 4,165 |
| Guard rail......... | 18 | 16 | | 5 | x 8 | 960 |

| | |
|---|---|
| Total number feet white pine....... | 53,549 |
| " " " yellow pine....... | 1,789 |
| " " " oak ............. | 6,574 |

The second is a bill of cast iron, as follows:

*Cast Iron.*

| Name of pieces. | No. of pieces. | Length of pieces. Ft. | In. | No. of holes. | Size of hole. Inches. | Distance C. to C. Inches. | Length of leg. Inches. | Total weight. Pounds. |
|---|---|---|---|---|---|---|---|---|
| Angle blocks .......... | 8 | 3 | 2½ | 5 | 2½ | 8¼ and 9¼ | 15½ | 14,960 |
| Angle blocks.......... | 8 | 3 | 2½ | 5 | 2½ | 8¼ and 9¼ | 13½ | |
| Angle blocks .......... | 14 | 2 | 8 | 3 | 2½ | 8¼ | 15½ | |
| Angle blocks.......... | 14 | 2 | 8 | 3 | 2½ | 8¼ | 12½ | |
| Half blocks.......... | 4 | 2 | 8 | ........ | ........ | ........ | ........ | 672 |
| Lateral blocks ......... | 46 | | 10 | 1 | 1⅝ | ........ | ........ | 782 |
| Iron clamps............ | 24 | 1 | 4½ | 4 | 1¾ | 3 9-16 and 4⅛ | ........ | 1,848 |
| Lateral washers........ | 46 | | 6 | 1 | 1½ | ........ | ........ | 207 |
| Ogee washers . ........ | 668 | ........ | | 1 | 1⅛ | ........ | ........ | 501 |
| Packing washers....... | 60 | ........ | | 1 | 1⅛ | ........ | ........ | 150 |
| End brackets........... | 6 | ........ | | ........ | ........ | ........ | ........ | 1,400 |
| Total.................. | | | | | | | | 20,520 |

The following is a schedule of the general dimensions of the bridge:

*General Dimensions of a 134-Foot Howe Truss Bridge.*

| | Feet. | Inches. |
|---|---|---|
| Depth of material below top of stringer......................... | 4 | 3 |
| Depth of truss from out to out of chord.................. ....... | 26 | .. |
| Total length...................... | 134 | .. |
| Length of chord to chord of half blocks... ..... ................. | 126 | .. |
| Whole width from out to out...... | 20 | 4 |
| Width in clear between trusses.... | 15 | .. |
| Width of bottom chord......... . | 2 | 8 |
| Width of top chord.............. | 2 | 8 |
| Depth of top chord........... ... | 1 | 1 |
| Depth of bottom chord............ | 1 | 4 |
| Length of main bottom panels.... | 10 | 6 |
| Length of main top panels........ | 10 | 6¼ |
| Length of lateral panels........... | 10 | 6 |
| Length of abutment....... .... | 4 | .. |
| Distance between top of rail and underside of end bracket........ | 20 | 6 |

The third is a bill of wrought iron, as follows:

*Wrought Iron.*

| | No. of pieces. | Length of pieces. | | Size of iron. | Weight in pounds per foot. | Total weight in pounds. |
|---|---|---|---|---|---|---|
| | | Ft. | in. | Inches | | |
| Truss rods.... | 32 | 26 | 8 | 2 | 10.58 | 9,028 |
| " " .... | 32 | 26 | 8 | 1⅞ | 9.300 | 7,936 |
| " " .... | 12 | 26 | 8 | 1¾ | 8.101 | 2,592 |
| " " .... | 6 | 26 | 8 | 1½ | 5.952 | 952 |
| Lateral rods.. | 23 | 21 | | 1¼ | 4.133 | 1,996 |
| Chord bolts.... | 172 | 2 | 10 | ¾ | 1.488 | 725 |
| Stringer bolts. | 60 | 1 | 4 | ¾ | 1.488 | 119 |
| Lateral dowels | 21 | 1 | | ¾ | 1.488 | 31 |
| Drift bolts.... | 50 | 1 | 4 | ¾ | 1.488 | 99 |
| Clamp rods.... | 36 | 9 | | 1½ | 5.952 | 1,928 |
| Clamp bolts... | 168 | 2 | 10 | ¾ | 1.488 | 708 |
| Plates......... | 24 | 3 | 2½ | 1 x 6 | 20.21 | 1,576 |
| " ........ | 20 | 2 | 8 | 1 x 6 | 20.21 | 1,093 |
| Total............................. | | | | | | 28,783 |

The following is the cost, omitting the bridge seat, which is not included in either the bill of materials or the cost:

*Cost.*

| | | |
|---|---|---|
| 53,549 feet white pine, at...... | .$27 = | $1,445.83 |
| 1,789 feet yellow pine, at...... | 24 = | 42.94 |
| 6,574 feet oak, at............. | 16 = | 105.18 |
| 28,783 pounds wrought iron, at | 3¢ = | 863.49 |
| 20,520 pounds cast iron, at.... | $1^6/_{10}$¢ = | 328.32 |
| Labor framing........................ | | 268.00 |
| Labor erecting.................. ...... | | 603.00 |
| Total cost........................ | | $3,656.76 |

### Weighting Windows.

*From* J. J. A., *Madison, Neb.*—In answer to "J. S.," Center Bennington, Vt., who asks about weighting windows, I would say that I always use weights of the same avoirdupois as the sash, or as nearly so as practicable. My reason for this is that if the weight is heavier or lighter than the sash, the windows will not work freely nor stop wherever desired. Use a good sash lock and it will hold the window firmly in place when closed. For a cheap lock the Matthews or Ives is a good one, both being burglar-proof.

### Beech Plane Stocks.

*From* GAGE TOOL COMPANY, *Vineland, N. J.*—We desire to learn, through *Carpentry and Building*, who get out beech plane stocks in shape for manufacturing.

### Questions in Handrailing.

*From* E. S. C., *Pittsburgh.*—I would like some of your readers to explain the drawing and working of a molded hand-rail wreath around a 12-inch cylinder—a half circle—the rise to be 7 inches and the tread 10 inches. The stairs are to be a continuous flight.

### Measuring a Circle.

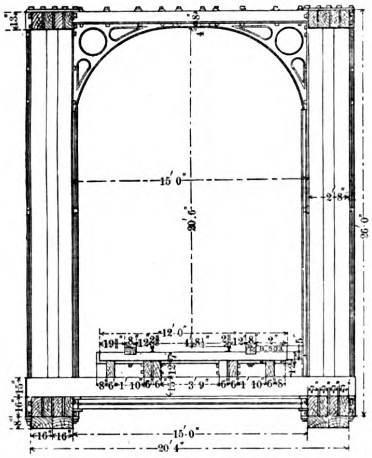
*From* A. O. S., *Woodstock, Ont.*—Will you please explain the way to obtain the measurement of the circumference of the circle?

*Answer.*—We presume that our correspondent desires a rule for calculating the circumference of a circle when the diameter is known. The ordinary rule is, multiply the diameter by 3.1416, or an approximate result may be obtained by multiplying by the fraction $\frac{22}{7}$. The circumference is just a little over three times the length of the diameter; of course, if the radius only of the circle is known it would be necessary to multiply it by either one of the above factors, and then multiply again by 2.

### The Sheeting Question.

*From* D. W., *Hicksville, Ohio.*—In answer to "S. F. B.," of Wellington, Ohio, whose communication appeared in the November number of *Carpentry and Building*, I will, with the editor's permission, give the readers of the paper my experience with outside sheeting. I agree with most of the arguments of the correspondent above referred to. I find by using our native wood a sheeting on the outside will rot the siding and damage the paint. I would ask "S. F. B." to examine a house that has no sheeting at all, and he will find back of the siding a great deal of dampness after a rain storm, there being no circulation of air. When siding is nailed on the sheeting will rot the siding sooner than when sheeted on the inside. I have no trouble with crooked or wavy walls. All studs are resawed to a certain width, then sheeted inside, which makes the wall straight, and we get a solid job of plastering. This makes a little waste of siding, but it is made up in lathing diagonally on the sheeting, which results in no waste whatever of lath.

*From* W. R. L., *Remington, Ind.*—Will you permit me space to answer a few points in answer to "S. F. B.," Wellington, Ohio, in regard to sheeting buildings, and to begin with I ask to make quotations from a little work published in 1858 by Wm. E. Bell, a (at that time) prominent architect and builder of extended experience, and from whom I got my first hints in regard to inside sheeting. He says: "After an experience of 15 years in constructing and repairing baloon-framed buildings, I have found it best to line the frame on the inside for three reasons: First, the work is more durable, for when a frame is lined on the outside (the common way) it is very difficult to weatherboard it sufficiently tight to prevent the rain beating in between the siding and the lining and thus rotting both, since there is so little opportunity there for the moisture to dry out. Second, the lining is stiffer and warmer, for in that case the lath being but half an inch from the lining boards, the mortar is pressed in between every board, making it almost air tight. Third, the wall itself is made more solid, for the mortar, being pressed against the lining boards, is forced both ways, both up and down, forming more perfect clinches." Bell, in a footnote, says: "When a building is thus lined on the inside it is best to lath it in the following manner: Single strips of lath are first nailed perpendicularly, 16 inches apart, upon the lining boards, and to these the laths are nailed in the usual manner." Now we must admit that in 40 years there



End Elevation of Bridge.

has been a great stride in the building of dwellings. Ideas have changed as well as styles of building. In localities where Queen Anne styles are all the rage, with shingled gable and ornamental friezes, outside lining is really necessary. Then, again, in this locality we use combined lathing and sheeting—*i. e.*, the sheeting grooved by special machines to receive the mortar, which, for solidity and economy combined, is what we in the West have been looking for for years. If "S. F. B." will permit me I will say to him that when he says, "the studding will vary in width," the argument is not well taken; for if builders in this locality were to stud up a building and leave it for the masons to size the studs and joists, it would be called, and justly so, "Jerry work;" for at the cost at the present time of getting piece stuff sized at the mills, there is no excuse for not having it worked. Then, again, in regard to siding and making laps between studs, or not letting every siding nail reach and hold in a stud, would, in my estimation, be a very serious matter in a good building. But it is nice to have an opportunity for a friendly interchange of ideas through such accommodating journals as *Carpentry and Building*. I can remember when such papers would have been snapped up at $10, or even more, a year. I have two works at $12 each, and I have derived more real benefit from one year's numbers of *Carpentry and Building* than from all the books I have, and throughout this great country this and sister journals have, in the last 20 years, brought the building interests from darkness to broad daylight. The days of Andrew Jackson Downing were really the beginning of a radical reform in American architecture, for no man can deny us the right to a style that is our own. Although the groundwork may be borrowed, is it not possible to still improve it?

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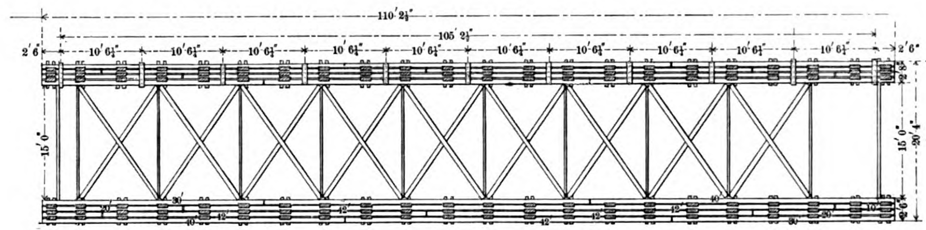
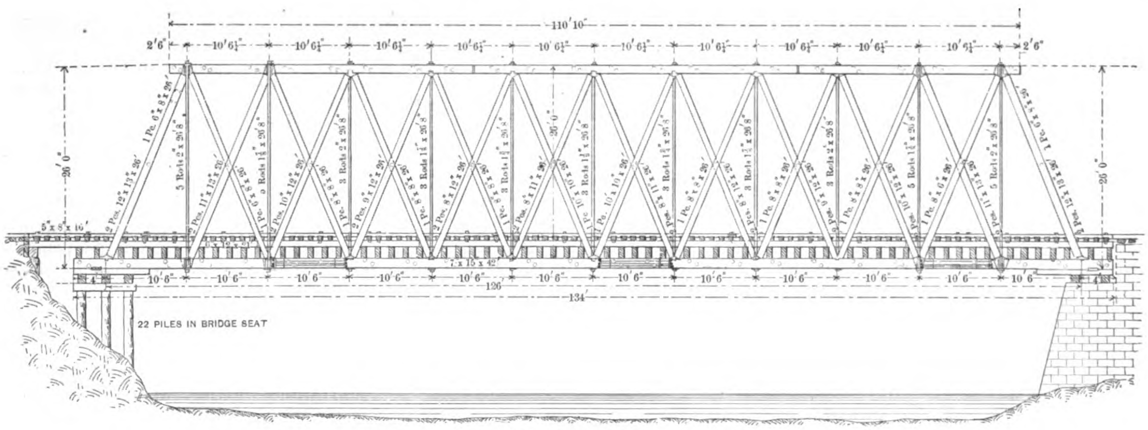
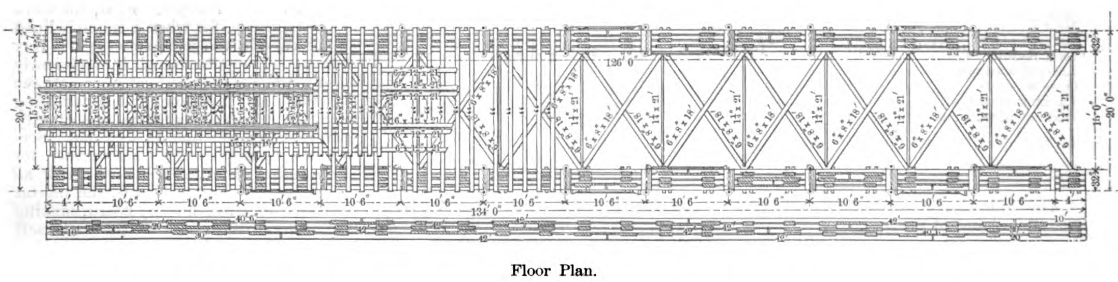
*From* R. G. M., *Atchison, Kansas*.—According to the November number of *Carpentry and Building*, inside sheeting is mentioned by "S. F. B.," of Wellington, Ohio, as a lost art. In this I think he is badly mistaken. For instance, in Kansas, we seldom ever use (of late) any other studs for outside studding than sized to a regular shape, so it makes no difference on what side the sheeting is applied. It will always make a straight wall. The dimensions of the pocket-book is another item. As to the ability of the builder, if he can afford it, he will have both sides sheeted, but for the plain and cheaper houses I prefer ⅞-inch drop sidings on the outside and ⅞-inch sheeting on the inside. Cover with building paper and plaster over it, and it will make a strong wall. Nails can be driven in any spot without shattering the plaster by trying to find a stud with a hammer. I fail to see, therefore, where the lost art comes in.



Plan of Upper Chord.




Side Elevation.



Floor Plan.

*Howe Truss Bridge, Wabash and Western Railway Co., 134-foot Span. For Description See Preceding Page.*

### Creosote in Chimney.

*From* E. W. & S., *West Burke, Vt.*—We have a case here for which a remedy is wanted. The house in question is a one and a half story, with a ten-foot brick chimney, and the creosote condensed to such an extent in the chimney that it was destroyed and a new one was built with an 8-inch flue, yet the creosote condenses worse than before. The stove used in connection with the chimney is a first-class one.

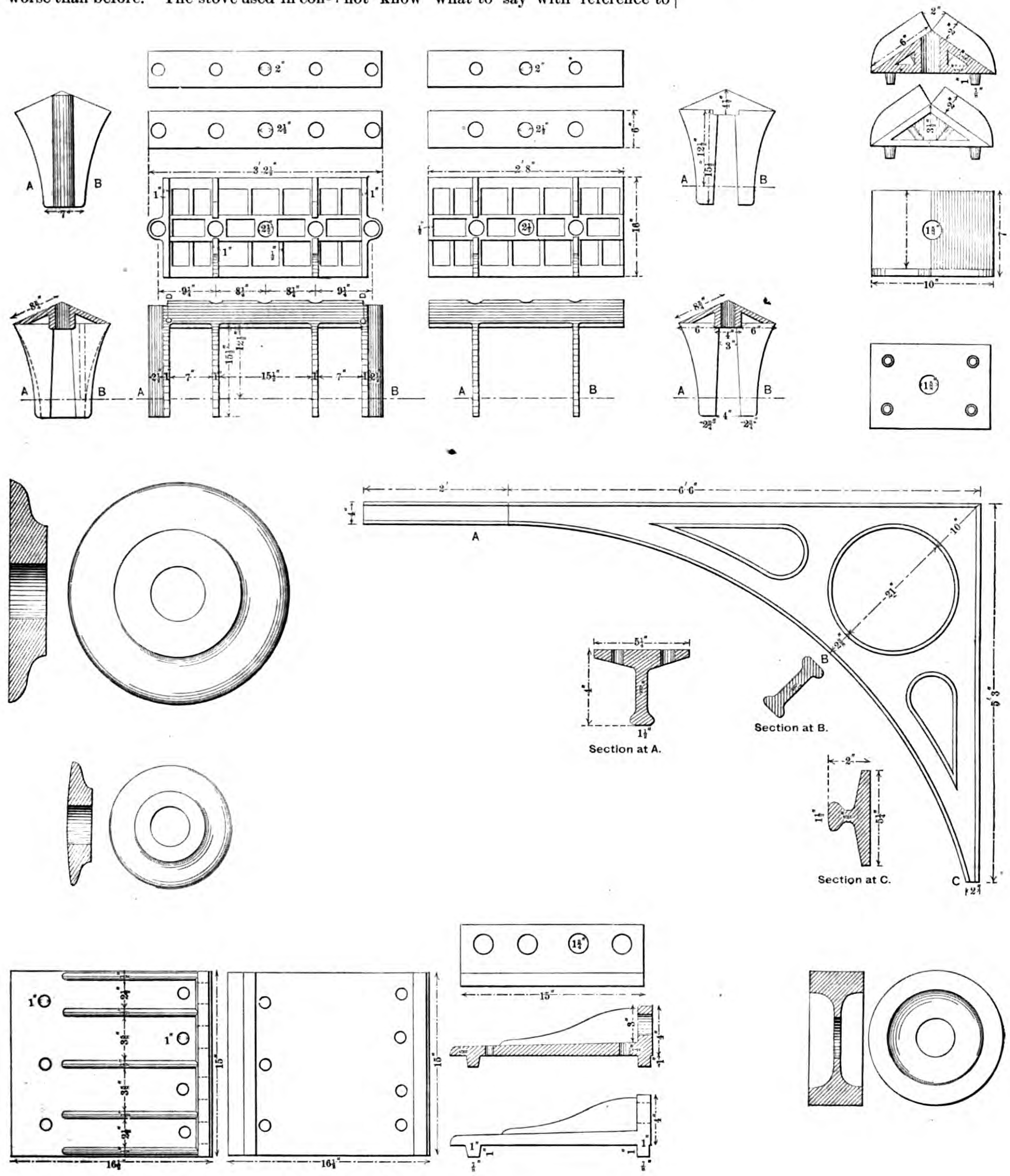
*Answer.*—When green wood is used for fuel the smoke contains a large amount of moisture and acids, and if the chimney is damp and cold, it is apt to condense. This may be the cause of the trouble our correspondent speaks of. To remedy the difficulty it would be necessary to prevent the vapors condensing within the chimney, so that they would be carried off into the air. This suggestion, however, is of little use unless some of our readers who have had experience with similar difficulties will describe a plan for preventing the condensation.

### How to Improve "Carpentry and Building."

*From* A. T. S., *New Albany, Ind.*—I do not know what to say with reference to improvement of the paper upon the part of the editor, but I can tell the readers what to do in order to make it still more serviceable than it is at present. That is, to send more to the Correspondence Department. Let every subject that comes up in every-day work be discussed in that part of the paper. For myself, just at present, I would like to see some trusses for self-supporting roofs, also different designs for inside finish. I know mechanics in almost every State of the Union have different ways of doing things, and it seems to me a comparison of ideas would be intensely interesting.

### Marking Steel Tools.

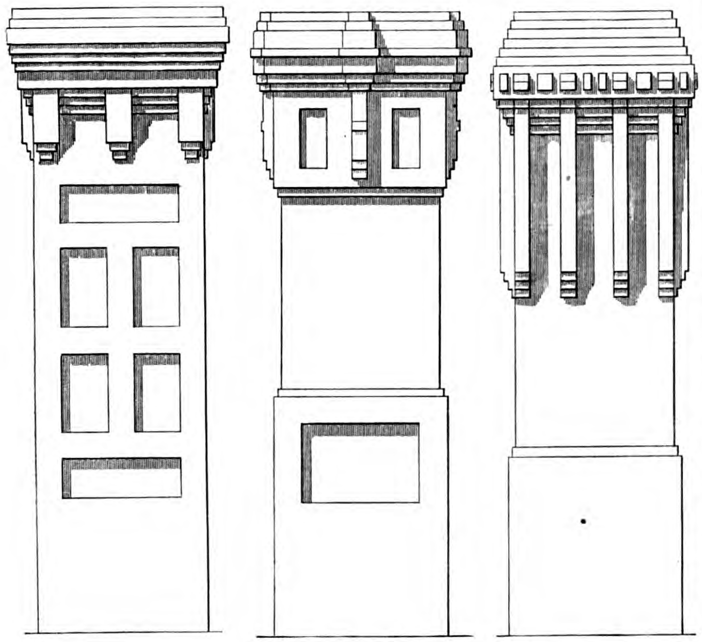
*From* H. P.—The following recipe for marking steel tools may be of interest to the readers of *Carpentry and Building*. Take soap, vitriol and table salt in equal parts. Use just enough soft water to dissolve them. The resulting liquid must be kept in a bottle. Put a thin layer of hard soap or wax over the tool. Take a sharp-pointed instrument and mark the name, then fill the lettered part with the liquid and let it remain on the tool from one to ten minutes. The soap can be applied cold.



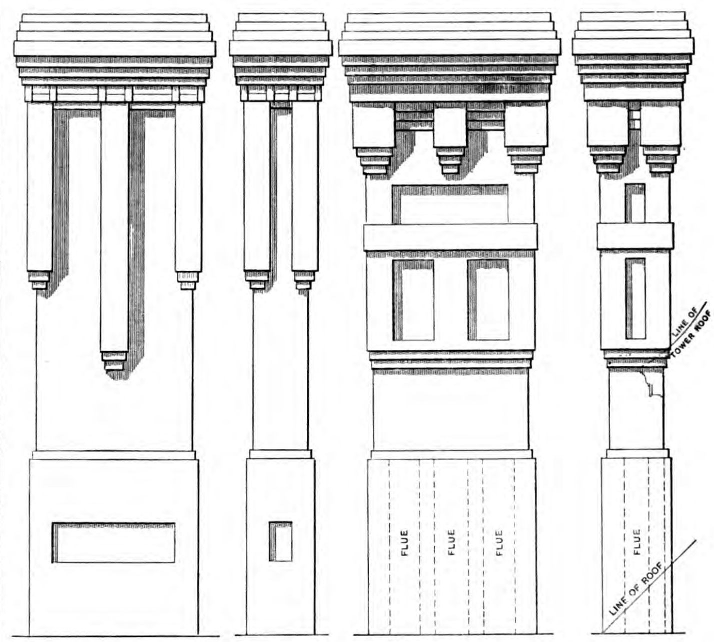

*Details of the Howe Truss Bridge Shown on Opposite Page.*

### Chimney Tops.

*From* John Dalrymple, *Winchester, N. H.*—I mail you a few designs for chimney tops which were prepared for a client from which to select for a house that was being built. The chimney in question is close to the side of the tower. This accounts for the dotted line which shows the outline of tower roof and the cornice. The sketches may be of interest to your readers.



*Designs of Brick Chimney Tops by J. Dalrymple.—Scale, ¼ Inch to the Foot.*




*Designs of Brick Chimney Tops by J. Dalrymple.—Scale, ¼ Inch to the Foot.*

### Decorating Lincrusta Walton.

*From* E. J., *New York.*—Would you or some of your readers kindly inform me how to decorate lincrusta walton similar to the decoration done by some of the lincrusta decorators of London, England? I have seen work of the kind in Manchester, where there is a large amount of it used, and I am told that it does not alter in color, but remains the same for years. What I have seen here soon gets discolored and spoils the decoration.

### Chicago's Tall Buildings.

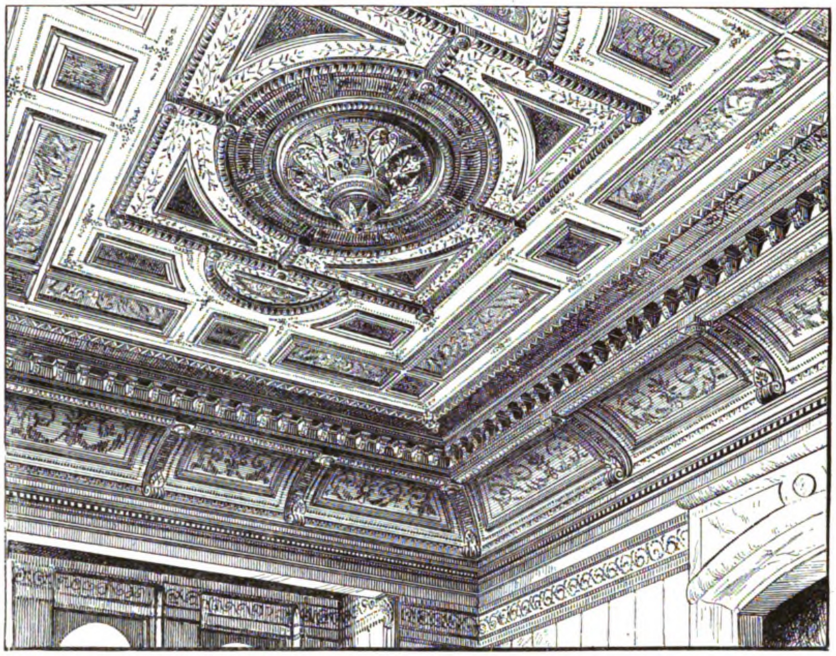
The craze for tall buildings in cities where ground room is unusually valuable shows no signs of abating, and the year 1889 is likely to witness the completion of a number of what may be termed "sky-scrapers." In Chicago there are at present in progress of erection three buildings which very properly come within the meaning of the term here used. These are the Tacoma Building, 100 x 80 feet in size and 13 stories high, located at the corner of Madison and La Salle streets; the Owings Building, 50 x 75 feet in plan and 14 stories high, at the southeast corner of Dearborn and Adams streets, and the new Chamber of Commerce building, 93 x 181 feet in plan and 182 feet high, at the corner of La Salle and Washington streets. These buildings are designed for business purposes, and are being erected more with regard to space, light and convenience than to architectural beauty. Two of them are plain, business-like structures, making no pretensions to picturesque or architectural effects, while the third embodies to some extent the latter characteristics. The Chamber of Commerce building will be of iron throughout, although externally it will have the appearance of stone, the iron frame being covered with terra-cotta backed with brick. Immense stone foundations, pyramidal in form, have already been laid, and upon these, just inside the walls, are placed the iron columns that will carry the superstructure. Heavy cross walls and steel girders will secure stability to the outer walls. The building will cost some $700,000.

In the Tacoma Building the foundations consist of large steel beams imbedded in concrete, from which rise strong iron columns carrying the superstructure. In the center is a strong buttress of solid brick, and from this heavy walls run to the four sides, giving the structure a solidity not suspected by those who only examine the shell-like exterior. Each front of the building bulges with tiers of bay windows, adding many square feet to the rentable floor space. The cost is estimated between $400,000 and $500,000. The Owings Building is erected with the first three stories of stone, the walls being 3 feet thick and resting upon massive pyramidal stone piers, which stand upon a substratum of concrete covering the whole lot two feet in thickness, and having railroad iron imbedded and interlaced in it. Above the third story the exterior, still gray, is of terra-cotta and Anderson pressed brick of Roman shape. The gable is roofed with red Akron tile, and the cone-shaped roof of the tower is to glint and glisten under a sheathing of copper. Solidity is given to the structure by steel girders on every floor, while at the top of the third and eighth stories heavy steel girders encircle the entire building. The cost is estimated to reach $300,000.

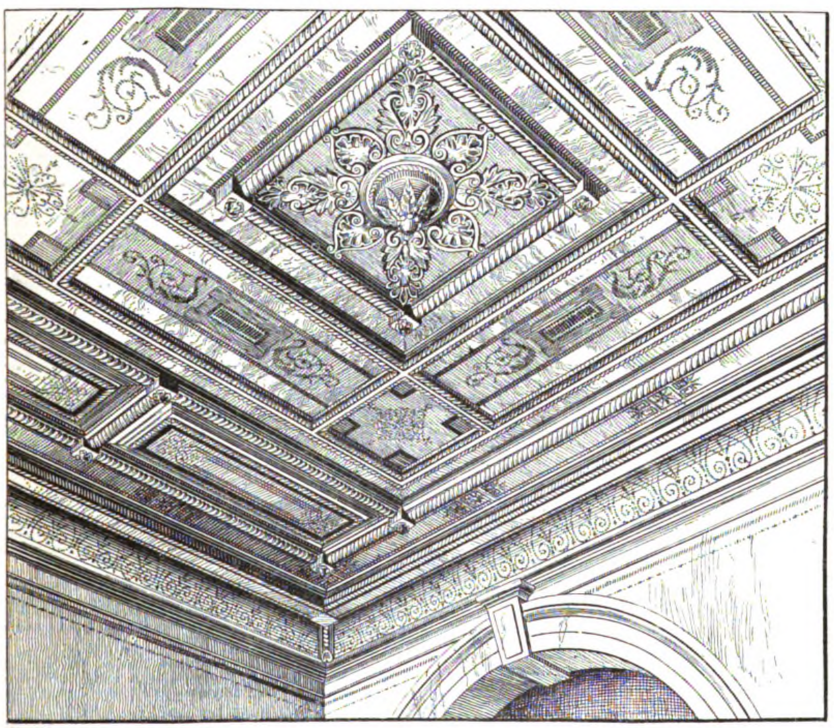
Since writing the above advices from Chicago are to the effect that on Sunday, February 17th, the ten lower stories of the Owings Building fell in one after the other, leaving the walls and four upper floors with the roof in a rather unstable condition. It is supposed that the setting of the structure caused the flooring, which is composed of tile fitted together like key-stones, to give way, and this falling to the floor below displaced other tile, which in turn fell through the opening thus produced, the mass gaining in weight as it descended. When the fifth story was reached the falling mass bore away the iron beams on this and the floors below, bending them out of shape and shaking the walls of the foundation. The exterior looks much the same as before, but within there is an irregular-shaped opening 25 feet square extending from the basement to the tenth story. During the week there are 125 workmen engaged upon the structure, but on the day of the collapse there were only a few about and these escaped uninjured.

### Sheet-Metal Ceilings and Center Pieces.

We take pleasure in bringing to the notice of our readers this month two designs of sheet-metal ceilings, by Bakewell & Mullins, Salem, Ohio, made for the courthouse at Council Bluffs, Iowa, to designs prepared by Eckles & Mann, Architects, of St. Joseph, Mo. The firm have recently issued a catalogue of center-pieces, the most comprehensive of its kind ever put out. The special features of such work depend, of course, upon the designs, and it is therefore entirely superfluous to give any lengthy description, for the cuts describe the work better than words could. The center-piece designs are almost entirely new and original and quite different from those usually made from plaster or stucco. Sheet-metal work of the kind referred to here has been extensively used in Europe, and its merits are being rapidly appreciated in this country. Apart from the recommendation of economy, the advantages of sheet-metal center-pieces are that they are much lighter than stucco and cast work. They are all finished before leaving the factory and painted a lusterless white to correspond with the plaster finish of ceiling, but they may be colored to correspond with the decorations of the room. The center-pieces are secured to the ceiling after the plaster is put on.



*Sheet Metal Ceiling in the Courthouse at Council Bluffs, Iowa.*



*Sheet Metal Ceiling in the Courthouse at Council Bluffs, Iowa.*

The New York Building Bureau reports that the applications for the construction of new buildings the coming spring are much more numerous than usual at this season of the year, and that prospects are much more favorable than ever before.

## NEW PUBLICATIONS.

#### Pope's Directory of Architectural Societies.

We have received from W. Pope, 16 Holborn, E. C., London, a copy of Pope's Directory of Architectural and Kindred Societies, of the issue for 1889. This book has been compiled from official sources as a book of reference for architects, surveyors, engineers and others interested in building. In addition to English societies, to which it might be considered to relate specially, we find that the American societies are also included. Among the American societies listed are the Architectural Guild, of Toronto; the Canadian Society of Civil Engineers, the American Institute of Architects, the Baltimore Chapter of the American Institute of Architects, the Boston Society of Architects, the Chicago, Cincinnati, Indianapolis and Philadelphia Chapters of the American Institute of Architects. Also Rhode Island, San Francisco, St. Louis and Western Chapters of the same organization. The membership of the Western Association of Architects then follows. The Architectural Association of Iowa, the Association of Tennessee, Illinois State Association, Texas State Association, Association of Ohio Architects, Wisconsin State Association of Architects, and also the

Western New York State Association of Architects are next mentioned. French societies are likewise listed. We believe this is the first attempt at an international register of professional men in the engineering, architectural and allied lines.

## TRADE NOTES.

THE CHARLES W. SPURR COMPANY, foot of East Tenth street, New York, with Boston office at 135 Bedford street, inquire of our readers if they are building or remodeling, and then direct attention to Spurr's Natural Wood Veneers and Spurr's Patent Wood Carvings, which they manufacture. They offer sample carvings and views of interiors which they have finished on special terms.

THE BENJAMIN MACHINE COMPANY, of Chicago, Ill., have distributed among their friends in the trade a catalogue devoted to the Triumph planing and resawing machines, improved band-saw mills, pulleys, shafting, hangers and wood-working machinery in general. The catalogue consists of something over 70 pages of descriptive text, profusely illustrated with engravings of specialties of the company. In the arrangement of the matter the descriptive text is placed upon the same or opposite page as the cut, a feature which will be appreciated by all. In presenting this catalogue to their customers the company call attention to the illustrations of their new works, which are divided into four special departments, and occupy a floor space of 50,000 feet. These various departments are equipped with all the latest tools and improved machinery, and the company feel that they are in a position to satisfactorily meet all demands which may be made upon them. In addition to illustrated descriptions of their machines, the catalogue contains a general description of a bandmill, a list of repairs for various machines, together with valuable rules, tables, recipes and general information for business men, steam users, engineers and mechanics. A comprehensive index at the close of the catalogue greatly facilitates reference.

WE ARE INDEBTED to Mr. Edward Atkinson, president of the Boston Manufacturers' Mutual Fire Insurance Company, of 31 Milk street, Boston, Mass., for a package of interesting circulars relating to slow-burning construction, which is attracting a great deal of attention just at the present time. The circulars before us contain a number of studies, embracing plans for a slow-burning wooden church, for a dwelling-house and also for a brick hospital, all of which will be found of more than passing interest by architects and builders generally. The subject to which these circulars refer is one of growing importance to the trade, and the information which is being circulated by the company above referred to will go far toward a thorough understanding of the principles involved.

ON WEDNESDAY EVENING, February 13, Messrs. Green and Le Boutillier gave an illustrated lecture at Smith & Nixon's Hall, in Cincinnati, under the auspices of the Architectural Club. The lecturers were honored with a large attendance of interested persons who showed their appreciation by close attention to what the gentlemen had to say.

SOME TIME SINCE in these columns we noticed a little pamphlet issued by Merchant & Co., of Philadelphia, relating to tin roofs and addressed particularly to architects. A new edition of this work has recently been prepared in which illustrations are employed. The construction of a roof in all its details is considered and all the features which go to make up a good tin roof, whether of the flat seam or standing seam variety, are carefully described. It is somewhat unusual for a mercantile concern to go out of its way to put into the hands of builders and architects technical information. This house, however, is doing it in a way that is very acceptable to the building trades, and are making it possible for architects and builders to specify a good roof—something which was impossible only a short time ago. Those of our readers who saw the old edition of this pamphlet will be eager to send for a copy of the new.

WE HAVE FREQUENT INQUIRIES for the makers of portable houses. In another part of this issue the American Patent Portable House Mfg. Company, of Corona, Queen's County, N. Y., call attention to their facilities for supplying work of this kind. Their houses are described as being suitable for all climates, and are said to be in use in different parts of the country.

THE PICTURE FORMING the advertisement of the Sure-Grip Steel Tackle Block, supplied by the Fulton Iron and Engine Works, Detroit, Mich., while exhibiting something entirely foreign to wood-working, cannot fail to attract attention. The smith and his forge are very cleverly typified.

THE ROCHESTER SASH BALANCE COMPANY, corner of Frank and Centre streets, Rochester, N. Y., are directing attention to the device which gives the company its name. It is claimed to be the cheapest and best means for hanging window sashes. The weight of the sash automatically regulates the tension, or lifting power of the balance.

THE E. D. ALBRO COMPANY, of Cincinnati, Ohio, have just issued their new price list in pamphlet form, including very full quotations of both foreign and domestic hard woods. The pamphlet consists of 24 pages of neatly printed letter-press, bound in paper covers of attractive typographical designs. The company supply lumber and veneers in almost endless variety, and now manufacture 3-ply and 5-ply material and veneered panel stock. These articles are said to be in active demand from builders, and a satisfactory business is in progress.

HEAD'S IRON FOUNDRY, of Utica, N. Y., have recently issued a pamphlet of some 16 pages devoted to an illustrated description of the Utica Standard Warm-air Furnaces. These goods are well made in all their parts, embody the modern features of construction, and are claimed to give very satisfactory results in operation. Full information as to the principal features of interest are set forth in the pamphlet, together with directions for using the furnaces. Nearly one-half of the pamphlet is devoted to testimonials from persons in different sections of the country who have handled the goods of the company.

JENKINS & TIMBY, of Oswego, N. Y., have issued a neat little circular devoted to their burglar-proof sash lock and ventilator, which is manufactured from the best malleable iron, steel, brass and bronze metal. It is stated that only one lock is required for a window, and that it securely fastens one or both sash in any position desired. It is claimed to be simple in its construction, automatic in action, and to possess ventilating qualities which render it very desirable.

WE HAVE RECEIVED from the St. Louis Steel Range Company, of St. Louis, Mo., an interesting circular devoted to an exposition of the merits of the Joy Range, manufactured by them. This range is provided with improved grate, large oven, spacious ash-pit and other features of obvious utility. The circular presents a great number of testimonials, showing the esteem in which these goods are held by persons using them.

THE UNIVERSAL DRILL COMPANY, of Cincinnati, Ohio, are distributing among their friends in the trade a calendar for the new year, which will be issued in monthly installments. It consists of a piece of cardboard nearly square, lithographed in colors, and presenting an illustration of their Universal Radial Drill. Each issue will present a different design, the object being to give to the mechanical public each month a brief description of one of their machine tools, presented in an artistic and useful form. The drill shown on the calendar for February, which is before us, is built in two sizes, and a third is in process of construction.

THE WIRE GOODS COMPANY, of Worcester, Mass., have bought out the plant of the Burditt & North Automatic Blind Fixture Company, together with the various patents and rights pertaining thereto. They will move the entire business to Worcester, Mass., and engage in it upon a considerably enlarged scale, and will add it to their already quite extensive line of hardware. They will be ready to supply the trade for the coming season from their factories at Worcester, Mass.

THE ANNOUNCEMENT is made that the Canton Steel Roofing Company, of Canton, Ohio, have brought suit against the Kanneberg Roofing Company, in the United States Circuit Court, for infringement of what is known as the H. W. Smith patent for sheet metal roofing. Counsel from Chicago, Cleveland and Canton have been retained for the complainants.

JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J., are distributing circulars referring to Dixon's Graphite Pipe Joint Grease. This article was put on the market in the spring of 1887 under the name of Dixon's Smear Grease, but as the name was not altogether appropriate, it has been changed to the one above mentioned. The product is intended to take the place of red lead, which it is said to be far superior to, as well as more economical. A particular merit claimed for it is that it makes a tight joint which can be opened with ease many years after coupling. It is also useful for bolts, screws, &c In addition to the description presented in the circular, there are a number of references to concerns that have made use of the Dixon grease with satisfactory results.

MR. I. B. JENKINS, of Oswego, N. Y., is directing the attention of builders to his sheeting lath, manufactured under the Byrkit-Hall patents. A circular which he has issued sets forth the reasons why this lath is better than the old style, and presents directions for using it, besides other information of more or less interest to those engaged in building operations.

WE HAVE RECEIVED the new catalogue issued by the Ducker Portable House Company, 735 Broadway, N. Y. This company, who also have offices at Nos. 30 and 31 Swithin's Lane, London, England, have a very fine line of portable houses intended for various purposes, including Camping Cottages, Summer or Seaside Cottages, Lawn Pavilions, Boat Houses, Contractors' Buildings, &c. The assortment is quite as complete as any we have ever seen. The book is one in which our readers generally will feel an interest.

E. J. JOHNSON, 18 Burling Slip, New York, is calling attention to his stock of roofing slates; also slates for blackboards, hearths, sills, lintels, &c. He offers estimates on drawings and other information on demand.

AULD & CONGER, 100 Euclid avenue, Cleveland, Ohio, make a specialty of hand-shaved Bangor slate for blackboards and other purposes. They also refer to their Bangor, Union, Albion and Mammoth Vein quarries, and claim to produce the finest slate in Pennsylvania and Vermont. They also deal in slaters' tools and machines, and offer a desirable manual of instruction.

THE GURNEY HOT WATER HEATER has been before the public for some time past, but has recently been greatly improved, and at the American Institute Fair last fall, as we are informed, outstripped all competitors. Illustrated catalogues and testimonial sheet are offered by the Gurney Hot Water Heater Company, 237 Franklin street, Boston, Mass. In another part of this issue, in the card of the company, will be found a list of their sales agents.

L. S. STARRETT, Athol, Mass., illustrates in another part of this issue Starrett's New Extension Beam Trammels, an instrument in which many of our readers will feel an interest. A full list of mechanics' tools is offered.

THE JOSEPH DIXON CRUCIBLE COMPANY, Jersey City, N. J., refer in another part of this issue to Dixon's Carpenters' Pencils, which can be obtained through the trade or samples can be purchased through direct correspondence. The reputation of the Dixon pencils is world-wide.

CHARLES A. STRELINGER & CO., Detroit, Mich., illustrate in another part of this issue a number of tools used by carpenters and builders, and present an address to the trade with reference to the needs that are likely to be experienced as the trade opens. Their new catalogue, containing 200 pages and 700 illustrations, is offered on receipt of postage.

THE CINCINNATI STAMPING COMPANY, 386 to 402 Walnut street, Cincinnati, Ohio, have recently brought out a new design of metallic shingle. These are made of 10 x 14 material and are laid lengthwise of the roof. The lock by which adjacent shingles are joined together is the same as used upon other goods made by this company in the past, but the breaking of joints up and down the roof is upon a unique plan. Their circulars are of interest to the trade at large.

THE E. D. ALBRO COMPANY, Box 20, Cincinnati, Ohio, invite architects and builders to correspond with them with reference to mahogany and other hard woods. This company import foreign woods direct and refer to Cincinnati as the natural central market for domestic hard woods.

THE AMERICAN SCREEN COMPANY, Brookline, Mass., are inviting the trade to send for circulars and prices of their metal frame-sliding wire window screens.

THE AMERICAN BIT-BRACE COMPANY, Buffalo, N. Y., are directing attention to Pedersen's Patent Bit-Braces, with and without ratchets. These can be obtained through the trade, but builders who fail to find them at their hardware stores are invited to correspond with the manufacturers.

THE SILSBY MFG. COMPANY, Seneca Falls, N. Y., are calling attention to their apparatus for warming dwellings and other buildings. Their steam heaters have the advantage of freedom from dust, noise and gas, and are also simple and safe. An illustrated catalogue is offered to all applicants.

THE FOLLOWING ANNOUNCEMENT was issued to the trade under date of Chicago, February 1, 1889: The firm of Knisely & Miller Bros., composed of Abraham Knisely, James A. Miller and Robert B. Miller, having been dissolved by the death of Abraham Knisely, the surviving partners have assumed all guarantees, will complete all contracts, and collect all accounts of Knisely & Miller Bros. and of the firms to which they were successors, and will continue the business at the same location, 129 and 131 South Clinton street, under the firm name of James A. Miller & Bro.

TOWER & LYON, No. 95 Chambers street, New York, in another part of this issue present a challenge to the trade concerning their plans which will scarcely fail of attention upon the part of many of our readers.

OUR READERS will be interested in the card of the H. W. Johns Mfg. Company, which appears in another part of this issue. Their goods are standard and are well known to our subscribers at large

LOVERS OF FINE TOOLS will be interested in the illustrated catalogue which is offered by the Standard Tool Company, Athol, Mass.

WOODEN LATH is being rapidly superseded in different kinds of buildings by iron laths, which, in combination with plaster, make good fireproof construction. In another part of this issue the Cincinnati Corrugating Company, Cincinnati, Ohio, call attention to a special form of iron lath they are manufacturing.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



VOLUME XI. NEW YORK, APRIL, 1889. NUMBER 4

## NOTES AND COMMENTS.

THE OPINION prevails in some quarters that the manufacturers of wood-working machinery should get together for the purpose of regulating matters pertaining to their particular line of business. It is thought that buyers and users of woodworking machinery would be benefited by some scheme looking to a proper adjustment of the differences at present existing as to the best method of serving the trade. Already a movement is on foot to establish a better understanding among wood-workers and lumbermen and to ascertain just what are their requirements. The initiative in this movement has been taken by the Egan Company, of Cincinnati, Ohio, who hope to bring about the necessary steps to have the builders of wood-working machinery come together at an early day. There is now no organized effort which has a tendency to give the wood-worker better and standard machinery for his purposes, and it is to his advantage that recognition be given to the promoters of this proposed improvement in the tools which are so essential in his business. At no time in the history of the industry have the manufacturers convened for the purpose of becoming better acquainted with each other, and it is to be hoped that the outcome of this movement will bring about the best results to all concerned.

DURING THE PAST few years the city of Pittsburgh has witnessed the erection of a number of imposing buildings designed for offices and business purposes, and the impetus which has been given to this branch of trade is seen in the variety of edifices at present in progress. In general appearance and convenience these structures will probably rank with those of any other city in the country. Among the first to be erected was the Lewis Block, at the corner of Smithfield street and Sixth avenue, which is at present being enlarged by the addition of two stories. Following this came the erection of the Hamilton Building, the Schmidt and Friday Building, the Stevenson Building, the McClintock Buildings, the Bissell Block and many others. What will probably be among the handsomest and most costly structures in that city is the edifice about to be commenced by the German National Bank. It will be located at the corner of Sixth avenue and Wood street, with a frontage of 30 feet on the latter and 130 feet on the former. It will be an imposing edifice seven stories high and constructed of granite. A feature of the building will be a safe deposit department, which will occupy about one-half of the vault and will contain 2500 boxes. The vault will be 22 feet long, 8 feet wide and 10 feet high in the clear. The architects are Messrs. Bickle & Breman, of No. 5 Seventh avenue, Pittsburgh. It is expected that the structure will occupy about two years in construction.

IT IS WELL KNOWN that some architects (so-called) do not hesitate to accept commissions from material men and contractors. They first pledge themselves to their clients, and for their (alleged) services receive a percentage on the cost of the structure that is built. They then stultify themselves by allowing materials to be used, or certain contractors to do the work, not on the merits of the case or because it is to the best interests of their clients to have it so, but because thereby they are able to put money in their own pockets. We characterize such men as architects "so called," for certainly such practices as we refer to are unprofessional and by rights should rule those who follow them out of the ranks and debar them from the use of the name architect. Indeed, the various organizations among the architects of the land have recently taken steps looking to this very end. We refer to the relationship of these so-called architects with the owners of buildings by the term "alleged" services, for it is evident that they do not serve their clients, but themselves instead. This work is a trick—a deceit—something that will not bear examination and which as a consequence is very generally conducted on the sly.

THE ACCEPTANCE of commissions by architects at the present time is not so common as it was a short time since. Awhile ago it was more respectable than it is now, and of those who formerly took commissions many have discontinued the practice since they have seen the current of public opinion setting against it. The trade press has done the good work in this case, as in many others, of casting light into dark places and causing this question to be intelligently discussed. The practice is one that cannot be defended, and the more closely attention is directed to it the more certain it is to be given up and relegated to the lumber room along with other business iniquities and abuses. The idea that architects do accept commissions has become so rooted in the minds of a certain class of business men that we occasionally hear of ventures launched with the idea that they can be floated into success by this sort of professional bribery. Some of these are most cunningly devised withal, but to the credit of the fraternity it is to be said they very seldom succeed, and nearly, if not quite, all of those to which our attention has been called have come to grief in very short order. Again, so rooted is the idea that architects do accept commissions that when some article to be used about buildings, and which to gain its place must be specified by architects, begins to succeed and be in prominent use, it is openly charged that the promoters of that article are feeing architects right and left. We know of several instances of this sort, and we also know of cases where unsuccessful men, who have tried the bribery plan and failed, are charging their successful rivals, who have pursued the better plan of depending upon the quality of their materials alone, with paying commissions to architects in general. They fail to see the real reason of their own failure, and are unable to realize that their charges are an insult to the business sagacity of the time, for at present as never before in the history of business is honesty the best policy.

IN VIEW OF THE FACT that many in the community believe that architects as a rule do accept commissions, and that successful material men pay commissions as a matter of course, it is not strange to find movements instituted on the part of both the architects and material men looking to a correction of public sentiment in this regard. We have already referred to the action of the architects in their professional organizations. They have taken such steps as make it inexpedient, to say the least, for any member to take a commission or fee of any kind from any one except his legal clients. On the other hand, certain leading material men, not content with the simple denial of the assertion that they pay commissions, are energetically following up every charge of this kind, and by bringing their accusers into court, either through libe suit or otherwise, are showing that they are not to be trifled with in this manner. Prominent among those who are now acting in this manner are Merchant & Co., of Philadelphia. Out of a number of cases pending in different parts of the country, they have recently put their accusers to rout in two instances, to the serious financial cost of those who have carelessly asserted that commissions to architects are the reason for the preference for their roofing plates. With still other suits pending, and being vigorously pushed, it is fair for the trade at large to assume that it is not safe to charge this house, at least, with dishonest practiees. We hope their good work in this direction will receive the support it deserves, first, from others in correlated lines of trade, who, in justice to themselves, should emulate the example thus set them, and, second, from the roofers and other sub-contractors, who can be of substantial assistance in bringing offenders to the test. Commissions to architects are wrong—wrong to the man who receives them, wrong to the man who pays them, wrong to the house owner, whose interests are trifled with whenever they are paid, and wrong to the community at large, whose fair name is tarnished by every transaction that is not strictly honest. It is manifestly appropriate that a house that has been conspicuous in its stand in the past for honesty in the tin-plate trade should lead in this movement. But we say again we hope, for the sake of good morals and good buildings, others will follow their example, and that the good work may go on to its conclusion—when no commissions will be paid, and no one will be accused of paying them.

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IN THE MARCH issue of *Carpentry and Building* we presented a brief description of three tall buildings at present in process of erection in Chicago, referring at the close of our remarks to reports from that city that one of the edifices had been seriously damaged by the falling of the 10 lower floors. Since the accident occurred it has been the topic of discussion by the technical press of the country and has attracted a great deal of attention from architects and builders in all sections. That the reports of the accident as published were more or less colored by the imaginative reporter is evident after a perusal of the facts in the case as set forth by the *International Fire-Proofer*, of Chicago. In referring to the accident it says: "The correct version of the affair proved to be that in hoisting upward a heavy iron tank, designed to be used in connection with the elevators and weighing several tons, through the empty well of an unfinished stairway, the workmen had swung it in upon the tenth floor to rest while the hold of the tackling blocks could be moved higher up. This being accomplished, in the effort to swing the tank away from its bearings crow-bars were used to dislodge it, a newly-filled sub-floor of fire-proofing blocks freshly laid in green mortar serving as a fulcrum. As might have been expected, the clumsy effort forced downward the camber of the arch, and the whole panel of fire-proofing between the iron beams, some 6 feet wide by 16 feet in length, fell to the floor underneath, which, being unable to sustain the shock, in turn gave way. Thus gaining weight and momentum with the accumulation of the *débris* from each succeeding floor overtaken and broken in the downward course, the mass of dislodged sections was precipitated to the cellar bottom. The construction may have been faulty—indeed, all *voussoir* arch construction of this character is; but the accident would not have happened had the hard pottery blocks of which the sub-floor was composed been covered with a superficial floor of wooden planks, as is the general practice in like cases."

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BOYS WHO HAVE undergone mechanical training in the appropriate department in Girard College, Philadelphia, have comparatively little difficulty in securing good places in which to commence business. This statement is confirmed by the superintendent of mechanical instruction. Said T. Mason Mitchel, the gentleman referred to: There are boys in South America, who have gone from here, earning $2500 and $3000 a year. They are all through the West, in New York and the Eastern States. The agent whose business it is to obtain places for the boys has very little trouble now, and we have many demands for the boys. They generally leave when they are about 15 or 16 years old, and with the knowledge they have obtained in this department many of them secure positions in workshops and manufactories paying them $4 or $5 a week. After that the boy must work out his future for himself. The trade of machinist seems to have the preference among the boys, and to this calling more go than either to wood-working, foundry-work or mechanical drawing. The advantage of school-taught mechanics gives the boy a standing upon entering workshops much above the raw beginner, and if he has proved a worthy student his acquirements are soon discovered, and his time under instruction in the shop is shortened, and he is generally paid much higher wages.

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IN THE introductory portion of the address delivered by Col. R. T. Auchmuty at Philadelphia before the National Association of Builders an interesting classification, according to nationality, was presented of the different workmen employed in this country in the skilled trades, the artisans connected with the building trade being principally considered. The foreign countries represented here are England, Ireland, France, Italy and Germany, and the following is the way the writer classified them: "In New York, for instance, the stone masonry is mostly done by the sons of Italy; Englishmen and Irishmen lay the brick. When the heavy work of putting on the beams or of framing and placing in position the roof trusses begins, seldom an English word is spoken, the broad shoulders and brawny muscles of the German furnishes the motive power. Irishmen and Americans, in about equal numbers, do the carpenter's work. In the plumbing trade, where science is as needful as skill, thanks, perhaps, to the interest the master plumbers have taken in the plumbing school, our own countrymen will soon have control. Where delicate artistic work is required, we find the Frenchman and the German. In all the trades, except the plumbing, we find that the best workmen, those who command the steadiest employment, are of foreign birth." New York is undoubtedly the best city in this country on which to base such a classification, for it is distinctly cosmopolitan and is least affected by local conditions. The one trade in which the American is at a premium is plumbing, and in view of the developments that are taking place in plumbing and the great advances of which it is capable, it is consoling to think that the trade is destined to be largely in the hands of our own countrymen; for whatever may be said of the thoroughness of foreigners, there are none so quick to devise improvements and take up with new ideas as the American. While accepting Colonel Auchmuty's statement about the nationalities of city artisans, it is doubtful if the classification would apply in the country districts, for we imagine that the further we go away from cities the larger will be the proportion of Americans in every calling. Foreigners like city life and naturally gravitate toward centers of population, while the American is less anxious to leave the rural districts. In investigating a subject of this kind, it would be interesting to compare a trade census of the cities with a similar census of the country at large, and note in each the distribution in the trades of the several nationalities.

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## The Building Association Competitions.

The two competitions in cheap houses announced some time since, and which expired by limitation on February 1, have attracted marked attention throughout the whole country. In our March issue we published two designs selected from among the $1000 houses, and stated that we hoped soon to announce a decision in that contest as well as in the other. At the time of going to press with this issue, the committee have reported on the $2000 houses, but not upon the $1000 houses.

The decision in the XIXth Competition, or $2000 houses, is as follows: First prize to George W. E. Field, 46 Wiggins Block, Cincinnati, Ohio; second prize, Edward W. Smith, 111 Sheridan avenue, Jamaica Plain, Mass. We have pleasure in presenting in another part of this issue the drawings submitted by Mr. Field.

In closing this announcement of the decision in the XIXth Competition, we would remark that many of the designs submitted far exceed, in cost to build, the limitations made in this contest. It is hard to understand why competitors in a case of this kind should send in designs of houses which cannot be built for less than twice or three times the limit, but such things occur. We have had this same experience in other contests which have been conducted by this journal in the past, but perhaps never to such an extent as in the present instance. As one result, we have before us some excellent designs for $3000, $4000 and even $6000 houses, many of which will be published in our columns in the future. That they are not $2000 houses, is the fault of no one but the designers themselves.

In deciding a contest of this kind, the judges are necessarily confined to the terms originally laid down for the competition. They are obliged to award prizes to the best of the designs received which come within the limits of the specification. In assigning prizes they have no choice except to make such a selection as we have specified. This fact is sometimes overlooked by those who are willing to criticise the prize plans, for occasionally they seem to reflect upon the judgment of the committee, forgetting that the judges do not originate the plans, nor yet have the opportunity to select those upon which they are to pass. We solicit criticism and discussion of all that we publish, and hope all our readers will favor us with their opinions, but, in doing so, we trust that they will bear in mind that the responsibility of the judges ceases when they have pointed out which are the best studies of those submitted. Altogether our XVIIIth and XIXth Competitions have been spirited, and the many excellent designs thus secured for publication in *Carpentry and Building* will undoubtedly be a gratification to our readers for many months to come.

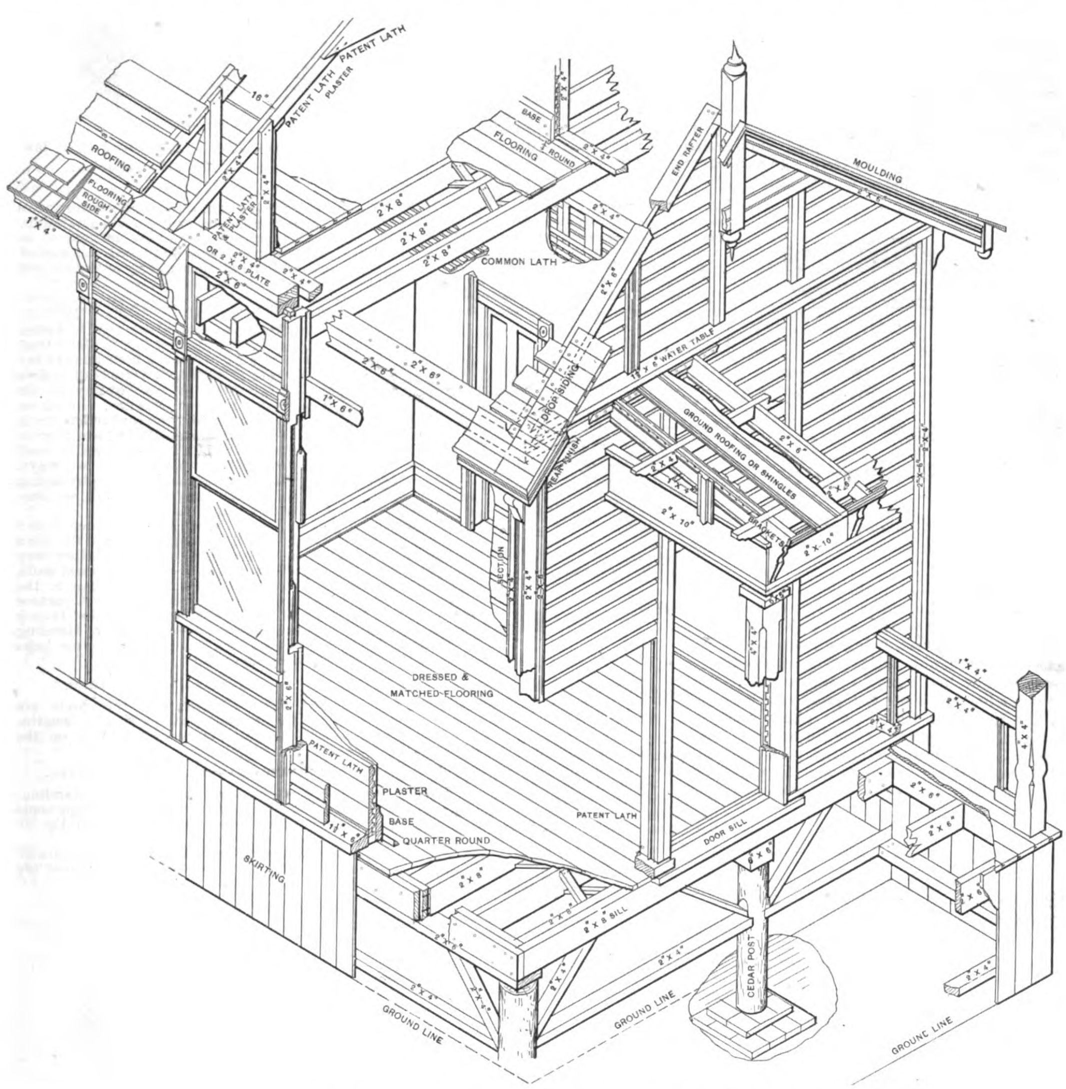
## THE PLATES.

In plates XIII, XIV and XV we show a study of a $2000 house submitted in the XIXth Competition.

Frame or timber houses as constructed in this country at the present time are very different specimens of architecture from some things that have been done in the past. In plate XVI we show a reproduction of a photograph of a remarkably picturesque old house located in the Rue St. André, Rouen, France. It will bear study as being a specimen of wood architecture as interpreted by the builders of previous generations in France.

## Ready-Made Houses.

The T. W Harvey Lumber Company, of Twenty-second and Morgan streets, Chicago, Ill., are manufacturing ready-made buildings, which they claim meet all the requirements of a warm, substantial, practical and attractive structure. The company have been led to engage in this particular branch of industry in order to meet a well-defined demand, especially in localities where labor is high, for a ready-made house which should fill the requirements above mentioned. In the engraving presented herewith we show an isometrical view, with portions of the building broken away to indicate the interior construction. The houses made by the company are not what may be termed portable structures, for when erected they cannot be taken apart with any more facility than the ordinary frame house, owing to the fact that they are lathed and plastered. The economy of this form of house results, it is claimed, from the manner in which it is constructed, and from the fact that nearly all of the work is done by machinery. This, it is claimed, not only saves labor, but renders it possible to do better work than can be performed by ordinary carpenters, as everything is true, uniform and perfect fitting. All material is trimmed and cut, so that nothing is shipped except what is actually required in the construction of the house. All studding, joists, sills, rafters, plates, &c., are trimmed and cut ready to be put instantly in place. It is stated that any carpenter can put up one of these houses, the only assistance required being the plans, which are furnished by the company with each building. When the houses are put upon the cars at Chicago they are painted one coat, while the paint for two additional coats is also placed in the car with the work. All material employed is kiln-dried and of good quality. The company inform us they are in a position to execute contracts in any part of the United States, and to furnish houses of all kinds and sizes. During the past year they state that they have furnished houses in all the central States as well as in Texas, Montana, Virginia, Southern California, Wisconsin, Colorado, Dakota, Kansas, Nebraska and Iowa. The company make a specialty of large contracts and wish it understood that they are able to furnish on short notice lots ranging from 10 to 100 houses of one kind.




*Isometric View Showing Features of Construction of "Ready-Made" Houses.*

## Japanese Art.

A very attractive art journal, entitled *Artistic Japan*, has been brought to our attention. It is a monthly illustrated magazine of arts and industries, for the use of the artist, the amateur, the manufacturer and the artisan. Each number is issued in an attractive colored cover, varied monthly. In addition to illustrated text it contains 10 royal quarto-colored plates, being reproductions of fine examples of Japanese art. Although it is not many years since the rulers of Japan allowed foreigners to enter the portals of this mysterious country, its art, which has been the wonderment of civilization, is still but little known and still less understood by the majority of those upon whom it should confer not only pleasure but profit. Whatever other benefits this contact with Western nations may have brought to Japan, it has had a most disastrous effect upon its art. No one, says a recent writer, with any understanding of artistic feeling can compare the products which are now being poured into this and other countries in such profusion with the rare and beautiful specimens which adorn the cabinets of collectors, without perceiving what a decadence has set in in this industry. The journal to which we have reference is therefore published with the object of educating the public in the real art of this country. It is issued simultaneously in France, England, Germany, Italy and America. S. Bing, No. 220 Fifth avenue, New York, is the American representative.

## How to Lay Tin Roofs.

For a mercantile house to issue volumes of technical instruction is somewhat of a novelty. But such a departure from precedence is justified when the volumes referred to contain directions for the use of the goods in which they deal. The firm of Merchant & Co. have been noted for a long time past for their stand in the matter of good roofing plates. They have taken such steps and introduced such measures as have secured to architects and builders features in plates which, but for

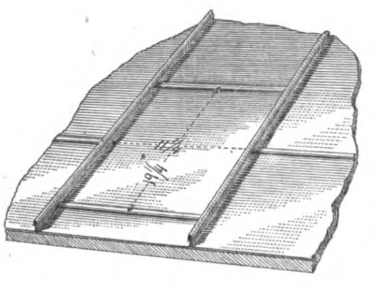


*Fig. 1.—Standing-Seam Roof of 14 x 20 in. Plates Worked the Narrow Way.*

their endeavor, would perhaps never have come into use. In order to secure fair treatment for their plates—that is, in order to prevent other plates being mistaken for them—and to avoid their being misused by careless or incompetent workmanship they have issued a little pamphlet entitled "A Tin Roof," in which their plates are described and a great deal of information supplied. We propose at this time to make some extracts from it for the purpose of showing the scope of its contents.

*Fig. 2.—Sheets of Tin Combined for a Standing-Seam Roof, Single Lock.*

After referring to how tin plates are made and giving attention to misleading terms which are frequently encountered in the trade, they dwell upon "assorting," and show how the quality of a roofing plate depends upon the way in which the defective sheets are culled from the primes or perfect sheets as the plates are boxed. After describing what "wasters" are, and remarking that there is a demand for wasters because they can be sold upon the reputation of the primes, they make the telling point that there are no wasters imported of either Gilbertson's Old Method or Camaret, the two plates of which they make specialties. Sizes, thicknesses and weights are similarly discussed, after which the stamping of sheets is presented, the plan resorted to in order to enable architects and builders to know even after a roof is laid and painted that the proper plates have been used. Attention is also given to actual net weights, which the firm brand upon the boxes, a radical departure in the marketing of tin plates, and something in which architects and builders must feel an especial interest, for light plates are frequently palmed off upon the unsuspecting. The hieroglyphics or symbols by which thicknesses or weights have been indicated in the past have been beyond all finding out, so far as builders were concerned, although supposed to be intelligible to tinners. Merchant & Co have translated these symbols by a very simple yet adequate plan. They brand each box with the actual weight of the plates contained, thus showing at once whether they are of thick or thin gauge.

We quote from the pamphlet the chapter entitled "Kinds of Tin Roofs" with the accompanying illustrations:

After the brand of tin has been selected for a roof, there yet remains the question of how they shall be worked by the tinner in forming the roof. Two leading styles of tin roofs are recognized. One of these is known as "Flat-Seam," or "Flat-Lock," roofing, and the other is designated by such terms as "Standing-Seam," or "Standing-Groove" roofing. These two styles are not necessarily in competition with each other, for one of them is more particularly adapted to flat or level roofs, while the other is better for use on roofs having considerable pitch. In some parts of the country tinners do not seem to be acquainted with standing-seam roofs at all, and use the flat-seam on all occasions.

Flat-seam roofs are laid by locking the sheets together on all four edges alike and soldering, the result being one huge sheet covering the

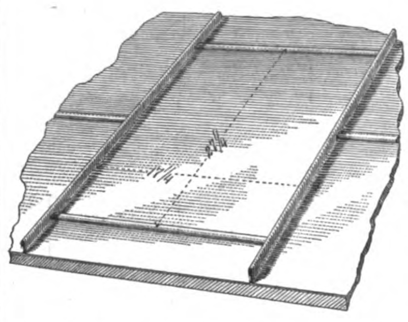


*Fig. 3.—Standing-Seam Roof of 20 x 28 in. Plates Worked the Narrow Way.*

entire surface of the roof. As the sheets are laid they are securely fastened to the roof by nailing through them under the edges turned up for the locks, or, preferably, by the use of flat cleats. After laying the seams are pounded flat and soldered. Such a roof is best for flat surfaces, but where a pitch of ½ inch to the foot, or greater, can be obtained, better results are secured by laying the roof standing seam, which is illustrated in detail in the following pages.

Standing-seam roof is variously laid, and in the space of this pamphlet we can do no more than indicate the more common methods and illustrate one of them. The sheets are first joined in the shop in long lengths by locking and soldering well on the upper side. The long

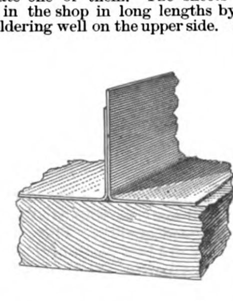


*Fig. 4.—Edges of Sheets Turned Up—First Operation in Laying a Standing-Seam Roof.*

strips are then rolled up and taken to the building. The strips are placed up and down the roof, and are united at their edges by the kind of joints that give the name to the style of roofing—namely, standing seams. The construction of these joints is illustrated in in Figs. 4, 5, 6, 7. Either of the sizes of sheets before mentioned may be used in a standing-seam roof, and each of them may be worked in either of two ways; that is, either the wide or narrow way. Probably the larger number of standing-seam roofs the country over are laid the 20-inch way of the sheets, whichever size of plate is used. Different roofers prefer different methods, and in all cases more depends upon the intelligence with which the work is done than upon which way of the sheet the roof is laid, or of the size of the sheets. In the

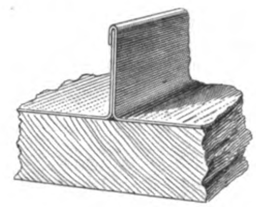


*Fig. 5.—The High Edge Bent Over the Lower—the Second Operation.*

same way the hight of the standing seam varies from ¾ inch minimum to 1¼ inches maximum. In the diagrams which we have introduced in this connection we have employed the size of seams to which a large majority of tinners are accustomed to work.

### STANDING-SEAM ROOFS—14 x 20 PLATES.

Many roofers claim that a better roof can be made of 14 x 20 plates than of 20 x 28. It costs a little more to lay a roof of the 14 x 20 size than it does of the 20 x 28 size, owing to the greater number of seams. In our estimation locality or custom has much to do with the use of the two different sizes. The 14 x 20 plates can be used for standing-seam roofs in two ways. The more desirable way is by laying the sheets the 14-inch way, as illustrated in Fig. 1.

Using the tin in the manner shown in Fig. 1, as compared with the plan of working the sheets the other way about, requires more cleats and nails, as well as labor. The figures in the engraving represent the net surface of each sheet when laid the 14-inch way and finished with a standing seam 1 inch in hight. The cross locks are calculated ⅜ inch wide.

### PUTTING TIN TOGETHER.

Fig. 2 shows how the sheets are formed and put together in lengths, preparatory to laying them on the roof.

### STANDING-SEAM ROOF—20 x 28 PLATES.

Fig. 3 shows the appearance of a standing-seam roof laid, of 20 x 28 sheets, and represents the net surface of each sheet when laid the 20-inch way.

If two roofers figure to lay a roof of 20 x 28, and one lays it the 20-inch way, he cannot lay

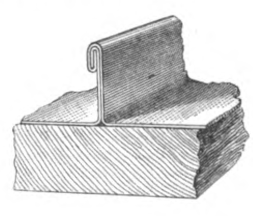


*Fig. 6.—The Top Turned Over the Second Time, Forming the Double Seam.*

it as cheaply as the one who would lay it the 28-inch way. But the 20-inch way makes the better roof.

### ADVANTAGES OF A STANDING-SEAM ROOF.

Where there is enough slope or fall to the roof, we recommend that the standing seam be used, and the same run down as far as within 5 inches of the level of the gutter water line, and that the cross seams be well soldered.

The advantage to be derived from the standing seam is an allowance for a greater amount of expansion and contraction than from the flat seam, as flat seams, being soldered, make the entire roof practically a solid sheet.

We show in Figs. 4 to 7, inclusive, the

method of making a standing seam. Fig. 4 shows sheets formed, or the edges turned up; Fig. 5 shows the first seam turned, and Fig. 6 shows the seams double-locked, closed, with paper under a standing-seam roof, also showing cleat in finished seam.

CLEATS FOR STANDING-SEAM ROOF

Are made of tin about 1½ inches wide by 4½ inches long, and they should be placed at inter-

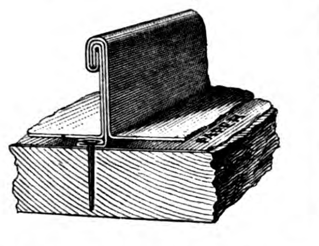


*Fig. 7.—Paper Under a Standing-Seam Roof; also Showing Cleat in Finished Seam.*

vals of not more than 14 inches, and should always be used of style as shown in Fig. 8.

Two good-sized barbed wire nails should be used for holding the cleat in place. Nailing through a single thickness of tin is not enough to hold the work in place. Always cover the heads of the nails and prevent them coming in contact with the roof covering. These considerations give rise to the form of cleat illustrated in Figs. 8 and 9.

*Fig. 8.—Cleat with Double Nailing Flange and Cap.*

Red rosin-sized paper under a flat or standing seam tin roof, as under all metal roofs, is an advantage. Fig. 7 illustrates the combination, and also shows the form of cleat illustrated in Figs. 8 and 9 in position.

With reference to painting a tin roof the pamphlet has the following:

The best paint for the purpose is composed of 7 pounds Prince's metallic paint, dry, 1 gallon pure linseed oil (half boiled and half raw).

The above amount will cover 500 square feet.

The substitution of benzine or fish oils for the pure linseed oil should not be allowed.

The roof will last longer and be less liable to rust if painted on the under surface before

*Fig. 9.—Same Cleat, with Cap Covering the Nail Heads.*

laying, and should be so painted in every instance. It should also have two coats of paint on upper side as soon as the roof is laid and soldered. It is a good plan to put one or two layers of felt paper under the tin, to serve as a cushion for the same and to deaden the noise made by the rain falling on the tin. This also prevents the annoyance of condensation on the under side, which frequently causes such a drip as to make it appear that the roof leaks.

A year after the first painting the roof should be painted again, and then a good roof will only require painting once in five years.

## Woodwork Fixing.

The usual wood plugging, says a writer in one of our English exchanges, which is driven into the joints of brick walls has the serious disadvantage of disturbing the bricks and loosening the mortar joints. The old-fashioned wood bricks have also the disadvantage that they shrink and thereby become loose. A better plan is to have wooden slips built with the wall into the joints; the shrinking is then immaterial, and the weight and grip of brickwork keep the slips tight. When the nails are driven into the slip a tight hold is obtained. Another plan is to bore holes in the brick or stone walls, into which plugs can be driven. A still more useful substitute for the wood brick is a brick made of breeze and Portland cement, that can be built into the wall in the place of a brick, as this composition brick never shrinks, but rather expands, and so forms the most desirable fixing block. A further and considerable advantage of this form of fixing block is that it is fireproof, and can, therefore, be built without risk near any flue, which cannot be done with the wooden bricks or plugs. One or two admirable kinds of bricks are in the market which architects would do well to specify. We have seen the old wood bricks become quite loose; ill-selected and green timber is converted for the purpose. If they do not shrink loose they soon become rotten, and the grip on the nail is lost. The linings of jambs, dadoes, and skirtings soon begin to work loose if these wood bricks are used; door jambs or linings in half-brick walls are particularly liable to get loose, owing to the slamming of the door, the repeated action of which loosens the wood bricks, which are only held at the top and bottom by mortar. In these situations, wherever doors are hung, the wooden slip or the breeze brick is absolutely necessary to secure the jamb linings.

## The Frieze of the Parthenon.

Pericles' ulterior purpose in the whole matter (of the national festival), says T. Davidson, was to bring about a confederation of all the Greek States under the hegemony of Athens; and, second, that inasmuch as most of the Ionic States were already under her leadership, and the Aiolic States at least not unfavorable to her, this purpose mainly resolved itself into a scheme for inducing the Doric States of Peloponnesus to enter the confederation. We should, therefore, naturally expect that one of the processions would be mainly Ionic, the other mainly Doric, and that the two would be clearly distinguished—the one as Ionic or Athenian, the other as Doric or Spartan. Instead of Ionic and Doric, indeed, we may write Athenian and Spartan, for Pericles meant nothing less than to see Sparta placed under the hegemony of Athens. Let us next, as a second preliminary to our examination of the frieze, try to make clear to ourselves the problems which the artist desiring to represent the subject supposed would have to solve. First, he would have to represent two processions, and show that their purpose was a common sacrifice; second, he would have to distinguish these processions as respectively Doric and Ionic; third, he would have to show that the sacrifice had reference to a multiplicity of gods; fourth, he would have to show that the aim of the sacrifice was to bring about reconciliation and union where there had previously been alienation and division; fifth, he would have to show that the effect of the union was the acknowledgment of the headship of Athens. Now, a very cursory glance at the frieze will show us that the artist of it solved all these problems satisfactorily. First, he has given us two processions, clearly marked as distinct by separation and difference of direction; and, by introducing cattle and other objects of sacrifice, he has shown us their purpose. Second, he has distinguished the two processions as Doric and Ionic, by making the one approach the gods specially worshiped by the Dorians, the other the gods specially worshiped by the Ionians. Since the two races differed but slightly in appearance and attire, it is difficult to see how they could have been otherwise distinguished than by their gods, who, as we shall see, had to be introduced for another reason as well. To demonstrate that the gods are distinguished as Doric and Ionic would require a somewhat lengthy discussion. At present the fact must be provisionally accepted. Third, the artist has shown that the sacrifice has reference to a multiplicity of gods by introducing these gods themselves, and we may safely assert that he could not have accomplished his purpose otherwise. Fourth, he has shown that the object of the sacrifice is to bring about reconciliation and union where there was previously alienation and division, by making the favoring gods of the one people turn their backs upon those of the other, while the two processions approach each other and also a group standing between the averted gods and preparing for a ceremony which must make these turn toward each other and unite in a common acceptance of offerings. How skillfully this middle group is managed, so as to express the act of reconciliation, will be shown hereafter. Fifth, the artist has shown the effect of the union will be the acknowledged headship of Athens, by placing her chief divinity in a place of honor equal to that of Zeus.

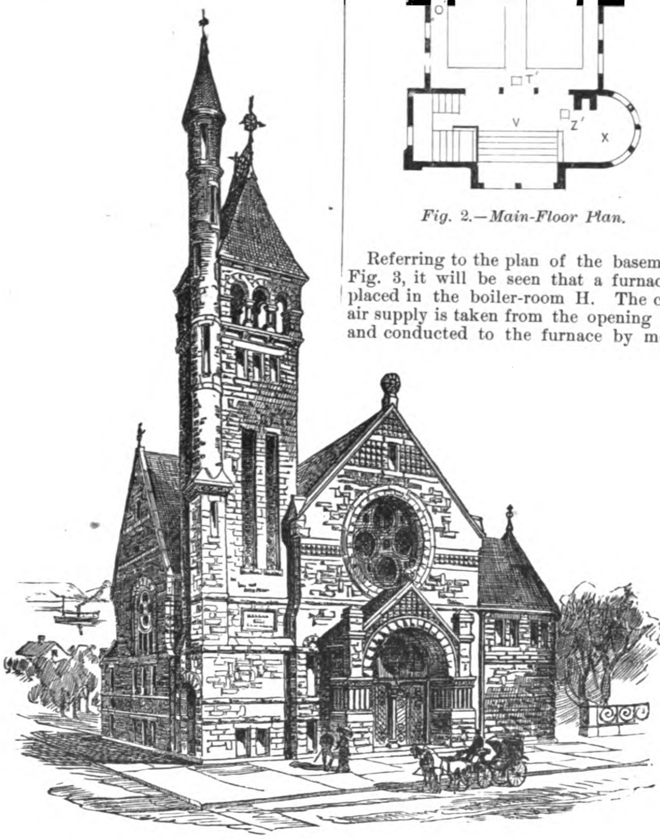
## Weakness of Short Columns.

E. Hodgkinson says that cast-iron pillars with flat ends uniformly bear about three times as much as those of the same dimensions with rounded ends; and this was found by experiment to apply to all pillars from 121 times the diameter down to 30 times. In flat-end cast-iron pillars shorter than this there was observed to be a falling off in the strength; and the same was found to be the case in pillars of other materials, on which many experiments were made, to ascertain whether the results, as obtained from the cast-iron pillars, were general. The cause of the shorter pillars falling off in strength was rendered very probable by the experiments upon wrought iron, for in that metal a pressure of from 10 to 12 tons per square inch produced a change in and reduced the length of short cylinders subjected to it; and about the same pressure per square inch of section, when required to break by flexure a wrought-iron pillar with flat ends, produced a similar falling off in strength to that which was experienced when a weight per square inch, not widely different from this, was required to break a cast-iron pillar with flat ends. The fact of cast-iron pillars sustaining a marked diminution of their breaking strength by a weight nearly the same as that which produced incipient crushing in wrought iron and a falling off in the strength of wrought-iron pillars rendered it extremely probable that the cause (incipient crushing or derangement of the parts) produced the same change on both these species of iron. The pressure which produced the change mentioned above in the breaking of cast-iron pillars was about one-fourth of that which crushed the materials. I shall therefore assume here that one-fourth of the crushing weight is as great a pressure as these cast-iron pillars could be loaded with, without their ultimate strength being decreased by incipient crushing; and that the length of such a pillar, if solid and with flat ends, would be about 30 times its diameter.

## Heating a Church.

The following letter from "K. M. H.," Oshkosh, Wis., reached us a short time since:

We have just completed the exterior of a church in this city, a view of which I inclose (see Fig. 1), and by a year from now will probably occupy the main auditorium, and will, of course, need some apparatus for warming it. We occupy the basement now, which is ceiled and warmed by stoves; the plan will show how it is divided. I wish to provide for heating the main auditorium D and vestibule V, size, 60 x 80 feet and 30 feet high. The objection to heating by steam or hot water is that the pipes cannot be run along the wall to the rear of the auditorium, as there are short pews abutting against the wall, as shown in Fig. 2. The vestibule has a large flue for ventilation, and an open grate, shown at X in Fig. 2. What I wish to find out is the best and most economical method of warming this room in cold weather, when the thermometer is, say, 25° below zero.



*Heating a Church.—Fig. 1.—Perspective View.*

To the foregoing we offer the following reply: As the conditions under which the heating of the church is to be done are rather peculiar, we publish the perspective and plans of the church in question. Under existing circumstances it appears that hot air would be a good scheme to employ in heating the edifice, consequently the engravings showing plan of basement and first story have been made with that end in view. The only change made in our correspondent's request is by suggesting a plan for heating the chapel. Under some circumstances we consider it economical to use two or more furnaces for heating churches and similar buildings, as during the spring and fall one furnace may afford enough heat to produce the desired effect, and as the weather becomes colder the second furnace can be brought into requisition.

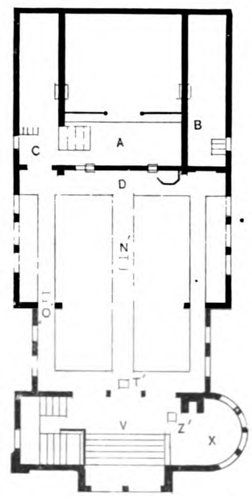



*Fig. 2.—Main-Floor Plan.*

Referring to the plan of the basement, Fig. 3, it will be seen that a furnace is placed in the boiler-room H. The cold-air supply is taken from the opening C H and conducted to the furnace by means of the cold-air box, shown by dotted lines. Two hot-air pipes are taken from this furnace. The pipe T leads to the auditorium and the pipe Z to the vestibule, as shown in Fig. 2 by T' and Z' respectively. With this furnace in operation, the fresh air from the outside is heated and delivered into the vestibule or auditorium as required. It is proposed to locate the second and larger of the two furnaces in the chapel, as shown by J in Fig. 3, and as this furnace is to be partly used for heating the chapel, and is exposed to view, it would be well to make the casing and hot-air pipe of planished iron. The cold-air box could be made of galvanized iron and painted. Only one heating pipe, N, is taken from this furnace and carried to the center aisle in the auditorium, as shown at N'. The air supply for this furnace is taken from the floor of the auditorium a O' down through the pipe shown in chapel at O, and into the base of the furnace J. This arrangement of pipes allows the air in the church to circulate freely, and tends to a great extent to prevent the cold air from remaining near the floor, and causes a more even temperature. In Fig. 4 is shown a view of the proposed arrangement of pipes. The cold air from the floor of auditorium is taken down through the cold-air pipe O, through the furnace, and out the pipe N to the room above. Regarding the arrangement for heating the chapel F, two or more doors like the one shown at S are placed in the bonnet or hood of the furnace, or any other means employed whereby the hot air can be allowed to escape from the top of the furnace when desired. Two doors similar to the one shown at W are to be placed in the base of the furnace casing. When it is desired to heat the chapel, the dampers R and Y are closed, and the doors S and W opened, which allows the air to be drawn up through the furnace and rapidly warmed.

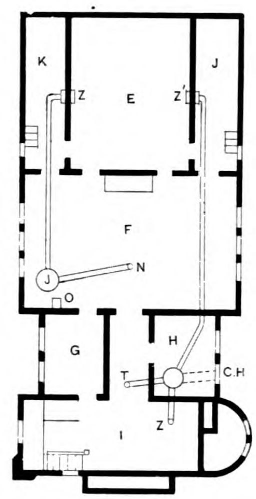



*Fig. 3.—Plan of Basement.*

In the above we have described the method of taking the cold air out of the auditorium and passing it to the furnace, thus heating the same air over and over again. Such a plan in a building of large area like a church has economy to justify it, and if it be combined with a cold-air vent from the outside so as to give a fresh supply of air when the church is occupied, it is comparatively unobjectionable. We do not, however, like the plan for houses, living-rooms, &c., because it is opposed to health.

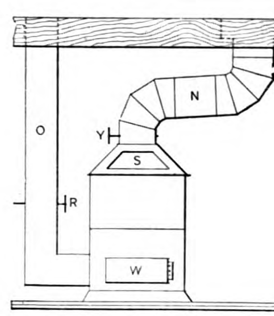



*Fig. 4.—Proposed Arrangement of Pipes.*

## Building Association Competitions.

Below we present the estimate and specification of the house design to which has been awarded the first prize in the XIXth Competition. The author is Geo. W. E. Field, No. 46 Wiggins Block, Cincinnati, Ohio. The perspective view, elevations, plans and details will be found in the plate pages of this issue.

### Estimate.

MASON WORK.

| | |
|---|---|
| 125 cub. yds. of excavation @ 25 cts | $32.00 |
| 60 perch limestone @ $3.50 | 210.00 |
| 8000 brick @ $12 | 96.00 |
| 2 fireplaces and hearths | 25.00 |
| 7 sills, 4 in. x 8 in., 3 ft. long, and 2 chimney copings | 30.00 |
| 750 yards of plastering @ 25 cts | 188.00 |
| Total | $581.00 |

CARPENTRY.

| | |
|---|---|
| 7000 ft. spruce for framing @ $15 | 105.00 |
| 4600 ft. hemlock boards @ $12 | 56.00 |
| 46 squares cedar shingles @ $4 | 184.00 |
| 1660 ft. spruce flooring @ $22 | 37.00 |
| 100 ft. hard pine flooring @ $32 | 3.20 |
| 3000 ft. chestnut stock @ $30 | 90.00 |
| 15 inside door frames @ $1.60 | 24.00 |
| 5 inside door frames @ $2.40 | 12.00 |
| 2 outside door frames @ $2.25 | 4.50 |
| 21 doors (19 @ $2; 2 @ $3.60) | 45.20 |
| 2 sliding doors | 40.00 |
| 20 window frames and sash @ $4 | 80.00 |
| 7 cellar frames and sash @ $2 | 14.00 |
| 150 ft. crown molding @ $2.50 per 100 | 3.75 |
| 140 ft. galvanized-iron gutter and downspout @ 15 cts | 21.00 |
| Stairs complete | 75.00 |
| 2 mantels @ $12 | 24.00 |
| Hardware | 75.00 |
| Painting and glazing | 125.00 |
| Sink and boiler | 30.00 |
| Carpenter labor | 410.00 |
| Total carpenter work | $1,458.65 |
| Mason work, &c | 581.00 |
| Total | $2,039.65 |

Certified to by WILLIAM WHITE.

### Specification.

*Excavation.*—Excavate cellar where shown to a depth of 5 feet below average grade, and further dig all required trenches for foundation walls to a depth of 2 feet 6 inches below grade.

*Foundation Walls.*—Foundations to be 18 inches thick, of good ledge stone laid in brown mortar and neatly pointed inside, and outside where showing above grade.

*Chimneys* — Brickwork. — Chimneys of common hard-burned brick laid up in white mortar. All courses showing above roof line to be laid in red mortar. Flues to be pargetted.

*Framing.*—Frame with sound spruce of following timber dimensions: Sills, doubled, 2 x 8; girder, 6 x 10; posts, 6 x 6; plate, doubled, 2 x 4; first-floor joists, 2 x 10; second-floor joists, 2 x 8; rafters, 2 x 6; collar braces, 2 x 4; studs, 2 x 4; all 16-inch centers; joists, 16-inch centers; rafters, 20-inch centers.

*Sheathing.*—All outside walls, porch and roof to be covered with hemlock boarding.

*Inside and Outside Finish.*—All inside and outside finish to be in best quality clear chestnut, molded as per details. Shingles to be good, clear cedar dipped in creosote stains before laid on. Three color stains to be used, one for roof and two for walls.

*Galvanized Iron.*—Galvanized-iron gutter as shown per detail.

*Window Frames.*—Pine box frames, 1⅜-inch sash, glazed with single thick Pittsburgh glass; 2-inch plank sills to all windows.

*Doors.*—1½ inch thick; plain, raised panels, all in pine.

*Floors.*—All floors to be laid with spruce flooring of best quality.

*Mantels.*—$24 allowed.

*Plastering.*—Two-coat work; spruce lath.

*Painting.*—Stain shingles as mentioned in carpenter's specifications; outside wood finish to be best three-coat work in harmonious colors; inside finish—kitchen, two coats shellac rubbed down; all other finish throughout house to have one coat shellac and two coats varnish.

*Hardware.* — Contractor to furnish all necessary hardware throughout and to leave everything in perfect order and provided with all usual fittings, lock furniture, &c.

*Bells.*—One bronze lever front-door bell.

*Stairs.*—All in chestnut finish. See details.

*Sundries.*—All flashing to be carefully and neatly done wherever required. Put up four rows shelves as shown in pantry and china closet; all closets to have hanging strip and one shelf. Sink to be supported on open frame with turned legs.

## Painting.

A writer in one of our English exchanges gives his conception of paint-work, as he calls it, and lays down some facts governing estimates which, while prepared for other readers than ours, may still be of interest to the subscribers to this periodical. The article referred to is as follows:

It may be useful to know that a gallon of paint will cover from 450 to 630 superficial feet of wood. On a well-painted surface or iron the gallon will cover 720 feet. In estimating painting to old work, the first thing to do is to find out the nature of the surface, whether it is porous, rough or smooth, hard or soft. The surface of stucco, for example, will take a great deal more paint than one of wood, much depending on the circumstances whether it has been painted and what state the surface is in. We have known prices tendered for outside painting that have been seriously wrong owing to the want of knowing the condition of the stuccowork. A correct estimate of repainting woodwork cannot be made from the quantities only: a personal examination ought to be made in every case where there is much work to be done. A great many painters trust to the quantity; the consequence is nothing is allowed to remove old paint, or scouring, and the stopping of cracks. Then there is painting and painting. It can be done well and artistically or indifferently, and few trades allow of greater scamping. In first-class work, after the first two coats have been put on, the paint, when dry, should be rubbed down with pumice-stone before the finishing coats are put on. Inferior painting is so common that it has a demoralizing effect on painters of the day. The quality of the material, especially the white lead, has much to do with permanency. We find painting done on old work without any cleaning, stopping, or even pumicing. A slovenly and inartistic class of grainers are also met with, who repaint and regrain on work that ought to be well rubbed with pumice-stone or sandpaper before the first new coat is laid. For painting three coats, the following materials are given for 100 superficial feet of new work. Paint 8 pounds, boiled linseed oil 3 pints, spirits of turpentine 1 pint; the work taking three men for one day. According to Saxton, 45 yards of first coat, including stopping, will require 5 pounds of white lead, 5 pounds of putty, 1 quart of oil. The same quantity of each succeeding coat will require the same allowance of white lead and oil. The best materials will last for seven years, but the ordinary painting seldom lasts three. It is questionable in building whether a saving is not possible by reducing the painted work as much as possible, and in using hard and ornamental woods for all ordinary interior framing exposed to wear like doors, cupboard fronts, dadoes, stair balusters, spandrels, &c. In a few years the cost of repainting would more than repay the extra expense of materials. Take, for instance, an ordinary dwelling house let for £35 to £40 a year. In seven years the whole interior paintwork requires redoing—an expense that generally falls upon the landlord, who is generally tempted to have the work done cheaply, with the usual consequences that every new tenant wants the painting done.

## India Ink.

Speaking of India ink, a writer in one of our English exchanges says:

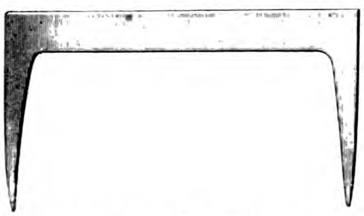
India ink hasn't any more connection with India than a good deal of the "dairy" butter on the market has with a dairy. Somebody who didn't know what he was doing named the useful article India ink, but, as a matter of fact, it ought to be called Chinese ink. To be sure, before steamships and sailing vessels began to ply between China and this country it used to be shipped through India; but the Indians had nothing to do with its manufacture. Thousands of years ago the Chinese were expert in the manufacture of many articles of which Europeans knew nothing. Ink was one of these articles, and was first made of lac, which is a resinous substance deposited by a small insect, and largely used in the manufacture of shellac. Afterward a peculiar black stone was found, which could be dissolved in water, and later on lac and fir-wood were burned, and the resulting smoke gathered on some hard substance, scraped off and rolled into balls. It is one of the traditions of the Chinese that one Tien Tchen invented the process of making India ink some thousands of years before the Christian era. However that may be, a Mongolian named Litchao and his son Liting Kouei went into the ink-making business, and turned out about as good ink as has ever been made.

Their successors were not as successful, and for a time the business rather languished. The process now employed by the Chinamen in the manufacture of their India ink is not radically different from that in use in ancient days. The old principle that burning resinous material will throw off thick smoke in large quantities is employed, only the smoke thus obtained is a little more scientifically handled. In the middle of a big porcelain dish, about 2 feet in diameter and 3 inches or 4 inches deep, they place a stand of about 6 inches diameter and the same hight as the dish. Several small lamps rest upon the stand, and by means of arms fastened to the sides of the dish small conical dishes are held just over the lamps. The dish is filled with water almost up to the tops of the lamps' wicks, and the lamps are lighted. The smoke condenses on the conical dishes hung over the lamps and is collected in the form of a dense, black powder. This powder is placed in a vase, and a warmed mixture of nine parts of fish glue and one of animal glue strained into it through a piece of silk held over the mouth of the vase. The contents of the vase then being thoroughly stirred, are rolled into balls, wrapped in cloth and immersed in hot water.

Kneading, another immersion, and beating with a hammer follow, the paste is scented, and in the form of long sticks is placed in various-shaped molds. Wrapped in paper, the sticks are placed in a dish filled with rice-straw ashes, and in a day or two are thoroughly dried. Rubbing with cloths and brushes serves to clean and polish them, and they are then ready for the market. The soft paste can, of course, be molded in any shape, but as a rule is made into short, slender sticks, which are generally ornamented with more or less Volapük inscriptions or Chinese designs. The peculiar qualities of the ink render it indispensable to sketch artists and draftsman and nothing has been found to take its place.

### Slate-Roofers' Tools.

The increased use of slate as a roofing material during the past few years may be taken as an indication of its growing popularity, as may also the fact that it is being used to a great extent upon the better class of buildings. The variety of colored slates that can be obtained gives the architect a good opportunity, while securing a good roof, to display his skill in the use of color and produce effects



*Slate-Roofers' Tools.—Fig. 1.—Dressing Stake.*

that are impossible with any other roofing material. While it is true that very flat roofs must of necessity be covered with sheet metal, an objection to the use of this material is that most of the metals used ror roofing, with the exception of copper, must be painted, in order to protect them against destruction by oxidation. On this account, if on no other, a slate roof is to be recommended, for it never requires to be painted. Even though a metal roof is well painted, the action of the air causes the surface of the paint to become rough when compared to the surface of slate. To sum up still other advantages, a slate roof presents a clean, smooth surface that is not apt to gather dust, does not collect vegetable

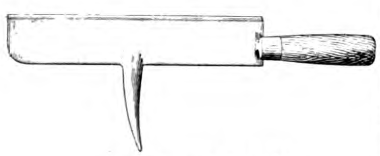


*Fig. 2.—Slater's Knife.*

growths as does wood, and permits the water to be collected for domestic use in a pure condition.

There appears to be no reason why a tinner, roofer or corniceman who is accustomed to laying tin or iron roofs, and knows how to do the flashing about chimneys, skylights, dormer windows, &c., should not be able to do an ordinary job of slating, especially as it frequently happens in building work that the sheet-metal cornice and slate and metal roofing are all let together. The advantages of controlling all this work without the necessity of subletting any portion of it are self-evident. The time was when the putting on of slate roofs was a separate trade, but at present there are many mechanics who work as tinners, cornicemen or slaters in turn. As slate and metal roofing, as well as sheet-metal cornice work, is usually done by the same firm, it is only natural that mechanics should become accustomed to performing the three kinds of work. Such men are frequently advertised for, and are sometimes called three-branch hands Some years ago the slate roofer who wished a set of tools applied to a blacksmith, and by the use of models or drawings endeavored to make him comprehend what was required. As a result he secured tools the excellence of which depended to a great extent upon the blacksmith's skill. Now all this is changed, for tools for the slate roofer's use can be bought ready-made, as well adapted to his use as are the tools used by other mechanics. When slates are being applied to a roof they

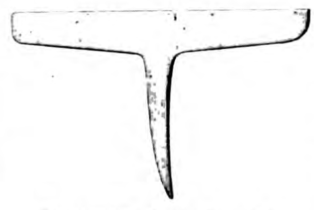


*Fig. 3.—Slater's Roofing Stake.*

have to be cut in various shapes, depending upon the style of roof; they must be cut and mitered at the hips and cut at the valleys or about dormer windows and skylights, and worked in such shapes as the nature of the work may require. In order to do this cutting, as well as the laying, a number of tools are used that are peculiar to the slater's trade.

Fig. 1 of our engravings shows the dressing stake, which is provided with two pointed projections, so it can be secured in any desired place by driving the points into a board or block. The slate to be dressed is taken in the left hand and held over the edge of the dressing stake; then the knife shown in Fig. 2 being taken in the right hand is brought down past the edge of the dressing stake, cutting

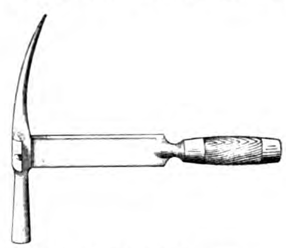


*Fig. 4.—Slater's Hammer.*

or shattering the waste slate at the right of the stake. The knife, Fig. 2, besides being used for cutting or trimming, has a pointed projection on the back that is used for "holing," that is, pricking the two nail-holes in the slate. This is done by holding the slate over the dressing stake near the place the holes are wanted, and striking it with the point. The result is a

*Fig. 5.—The Ripper.*

hole is broken through the slate, the size of which, as well as the character of the fracture, depends upon the skill of the operator. Fig. 3 shows the roofing stake which is used for light work and when working on a roof. The single projection allows of its being driven into the roofing boards, and it is then used on the roof for the same purpose as is the dressing stake on the ground.

The hammer used by the slate roofer is different from that used by any other mechanic. On the side is a claw for extracting nails that may bend in driving. The face is used for driving, while the part corresponding to the pane in some other hammers is drawn out to a point, so as to be used for pricking or punching the nail-holes in the slate. A peculiarity of the slater's hammer is the handle, all excepting the part grasped by the hand being of steel.

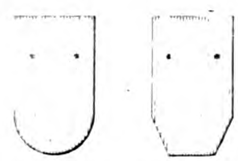


*Fig. 6.—General Shapes Cut by Hand Tools.*

The object of this is to adapt it for use on the roof in place of the knife, so that one tool may be used for cutting and holding slate as well as driving and extracting nails. This fits it for the considerable dressing that of necessity must be done on the roof. In Fig. 5 is shown the ripper, a tool altogether peculiar to the slater. It is used for removing broken slate after in place on the roof, or those whose color is objectionable. It is a long, straight blade, made thin so as to slip up between the slates as they ley on the roof. The end is notched, and on each side are two hooks. By slipping the ripper between the slate and bringing the notch or one of the hooks in contact with the nail that holds the slate to be removed, the nail can be cut or broken. In this manner the nails are re-

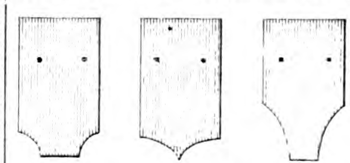


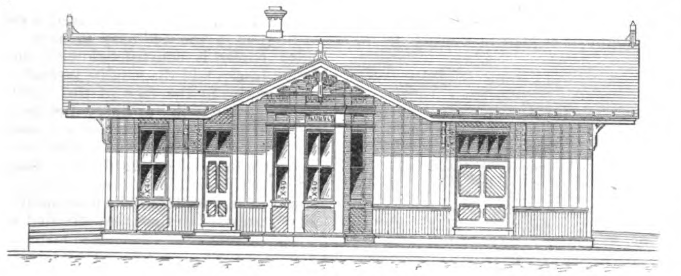
*Fig. 7.—Additional Shapes Made Possible by Use of Machine.*

moved so that the slate can be slipped out. The handle of the ripper is bent like that of a mason's trowel, so the hand will not come in contact with the slate when the ripper is being used.

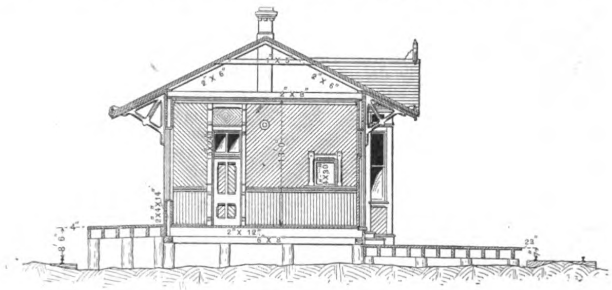
In order to give a slate roof an ornamental appearance other than that produced by the use of slate of different colors the ends of the slate are cut in different shapes. By the use of hand tools ornamental slating was restricted to the general shapes shown in Fig. 6. The introduction of the machine slate dresser, which is at present in very general use, has rendered it possible to give slate other ornamental forms, for example such as are shown by Fig. 7. Not only are the slates cut to almost any desired shape by this machine, but at the same time the nail-holes are punched. All this results in a great saving of time as well as secures a greater degree of accuracy than could be obtained by the use of hand tools.

### Redwood.

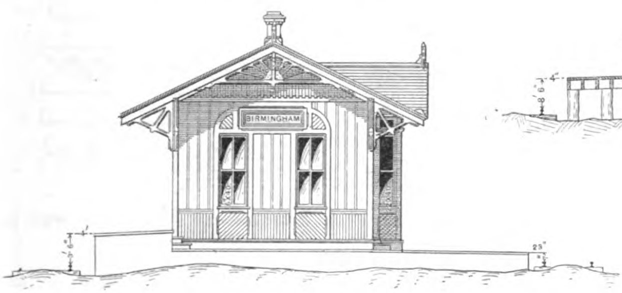
A correspondent of a paper published on the Pacific Coast becomes very enthusiastic over redwood. In the course of his remarks he describes some of the peculiarities of this material, which is already in extensive use in the East, and likewise refers to the supply, which is slight in California. We append an extract from his letter: No known wood can compare to it, and it will stand more fire and is easier quenched when on fire than any other wood. Its durability is unquestioned and cannot be excelled for foundations, bulkheads, sewers, piling, fence posts and railroad ties; it is the best known wood, resisting the action of both air and water with matchless durability. It is a close-grained timber, splits good and works beautifully under the plane and cannot be excelled for general building purposes. It has the merit of retaining its place without warping; it will stand the hot scorching suns of summer of six months or more, and six months or less of rain, year in and year out for 25 or 30 years without showing but little wear and very few season checks. Among all the woods of commerce the redwood of California has a wider diversity of uses than any other in the known world. The redwood is not excelled for beauty and diversity of grain by any wood that grows, and by careful selecting you can get any color desired. I have seen it as dark as lignumvitæ and as light as yellow pine and superior in beauty to either rosewood or mahogany. Like mahogany, the wood grows darker and richer with age. When treated to French polish the grain is brought out with a sheen of light and shade resembling the finest satin in effect. It has taken the place of beach walnut to considerable extent for picture frames, molding and for many articles of furniture. All that is necessary to produce this effect is to rub on linseed oil with a woolen rag, and few can tell it from walnut. Those beautiful veneers and trimmings so highly prized in the Eastern States and Europe, and there known as French mahogany, are nothing more nor less than our redwood stumps sawed up diagonally. When so sawed it is susceptible of taking the finest French polish. Even the plainest redwood if cut diagonally to the grain will produce a surface far superior and vastly more durable than any grainer or painter can make. But the redwood buhrl from which the finest veneers are made is truly the queen of all that is beautiful, some of which are as dark as rosewood and others of many hues and colors so delicately blended together, and have many characteristics of bird's-eye, maple, that the beholder never fails to be impressed with its beauties. In the near future redwood will command a higher price than any native wood in the United States, not even the California laurel or Eastern black walnut excepted, and Sonoma County possesses a great advantage over most of the agricultural counties of this State in its immense source of wealth in its redwood timber, which is estimated at about 720,000,000 feet. Fed by the rich alluvial soil and watered by the annual fogs of summer, the trees grow to an enormous size, some of them measuring over 20 feet in diameter, and often over 350 feet in hight, and would make over 150,000 feet of lumber to a single tree. Mr. Alexander Duncan told me a short time ago that he had cut down a tree that measured on the stump 11 feet 5 inches in diameter, and it made 18 16-foot saw-logs, and made over 80,000 feet of lumber, worth over $2000. If 11-foot trees cut that much, what will one 20 feet make, which figures over three times as much? At Camp Meeker, on Russian River, lies a windfall that measures over 22 feet in diameter, and at the camp experts on timber say that some of it will cut over 1,000,000,000 feet to an acre. This is included in the large tract of 1760 acres of timber sold a few days ago by Meeker Bros. to a lumberman from Michigan for over $100,000. And yet few persons can appreciate the grandeur of these redwood forests for camping out and holding camp-meeting. The forests are unexcelled. They were God's first temples, and to-day they look like a place made for worship; all their sentiment and association seem of a sacred and solemn character. Nature, as Longfellow says, seems kneeling there in prayer.



*Front Elevation of Railway Depot.*



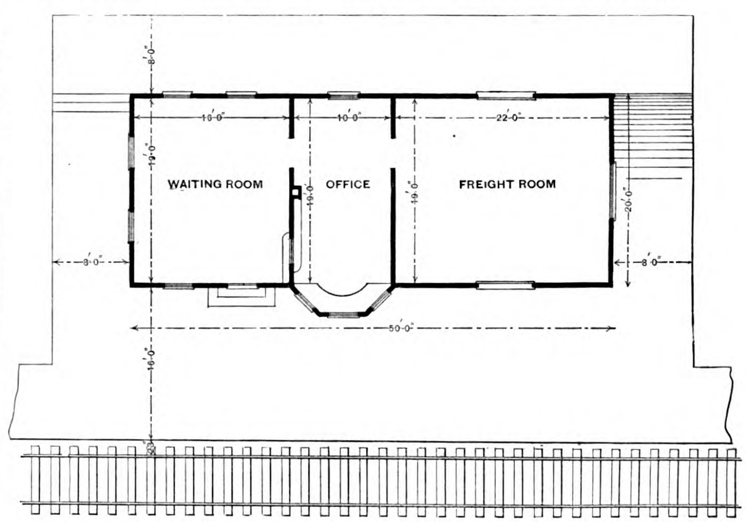
*Cross Section.*




*End Elevation.*

### Railway Depot.

In a letter recently received from Edwin F. May, Moberly Mo., he says: "I send you blue prints of a depot building representing a structure built for the Wabash Western Railroad Company. The depot is 20 x 50 feet, and cost complete $1088 18. It is on our line of road near Kansas City." We have pleasure in showing on this page engravings made from the blue prints referred to.




*Plan.*

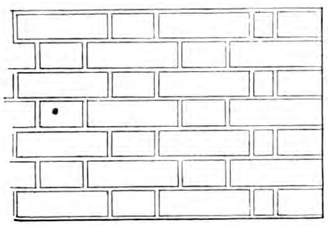
# BRICKLAYING

## Brickwork and Brick-Laying.—IV.

BY ARTHUR SEYMOUR JENNINGS.

(Continued from page 233, November, 1888.)

It has already been observed that while running bond is generally employed in this country, English bond is most suitable



*Bricklaying.—Fig. 1.—Flemish Bond.*

for ordinary purposes by reason of its great strength. There are, however, other bonds besides those already described, each of which has its special advantage. Flemish

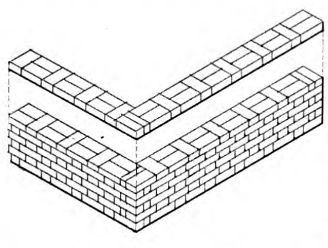


*Fig. 2.—One-Brick Wall in Flemish Bond.*

bond is to be commended chiefly for its light and graceful appearance. In elevation it consists of headers and stretchers laid alternately in each course, as shown in Fig. 1. Closers are inserted at the corners to close or finish the courses, and the bricks in the interior of the wall are laid

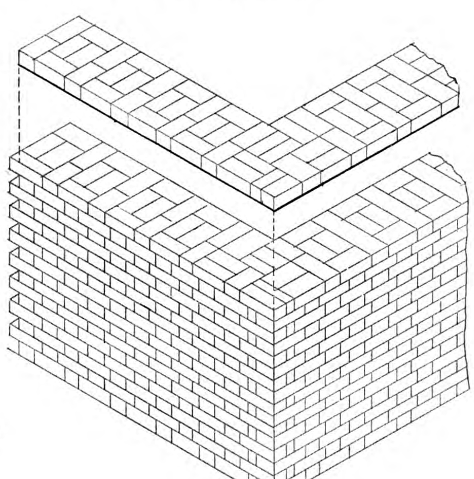


*Fig. 3.—Two-Brick Wall in Flemish Bond.*

headers as far as is consistent with maintaining the proper appearance of the exterior face. In some cases where walls are exposed to view on both sides it will be advisable that a true Flemish face should be shown on both of them. The method of building a wall in this bond, as applied to a 9-inch wall, is shown in Fig. 2, and it may be observed that where one-brick walls are seen on both sides they should on no account be erected in English bond, as

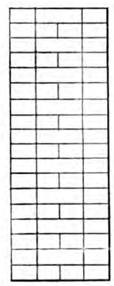


*Fig. 4.—Section Through Wall Shown in Fig. 3.*

the variations in the lengths of the bricks gives rise to considerable inequalities on the surface. A two-brick wall erected in Flemish bond is shown in Fig. 3, from which the construction will be sufficiently clear

In England, Holland, and some parts of France and Germany, Flemish bond is almost universally used on exterior walls, while English bond, or its equivalent, is employed for those walls which are not exposed to view. It is probable that, taking into consideration everything connected with appearance and strength, this system of construction is one of the best that could be employed. There is, however, no doubt that Flemish bond is not a little inferior in strength to English, while at the same time it is considerably superior to running bond. The reason of its weakness will be understood on an examination of Fig. 4, which indicates the manner in which the mortar joints at certain points come over one another, a distinct violation, as already explained, of the principles on which good brickwork should be constructed.

Of other bonds a few of the principal may be here mentioned. What is known as diagonal bond is illustrated in Fig. 5 as applied to a two-brick wall. This form of construction is probably the strongest in existence. The method of erection is as follows: The footings having been brought up to the proper hight, a course of stretchers is laid as represented in the engraving. Upon this is placed a course of headers in the ordinary manner. The third course is constructed with the interior bricks laid diagonally, instead of at right angles to the face of the wall; the fourth course is the ordinary header one; the fifth an ordinary stretcher one, and the seventh a similar diagonal course to that in course four, excepting that the diagonal bricks are laid in the reverse way. The object of laying the bricks diagonally is to give a greater lap than that afforded when

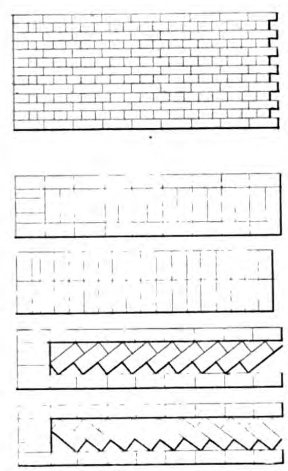
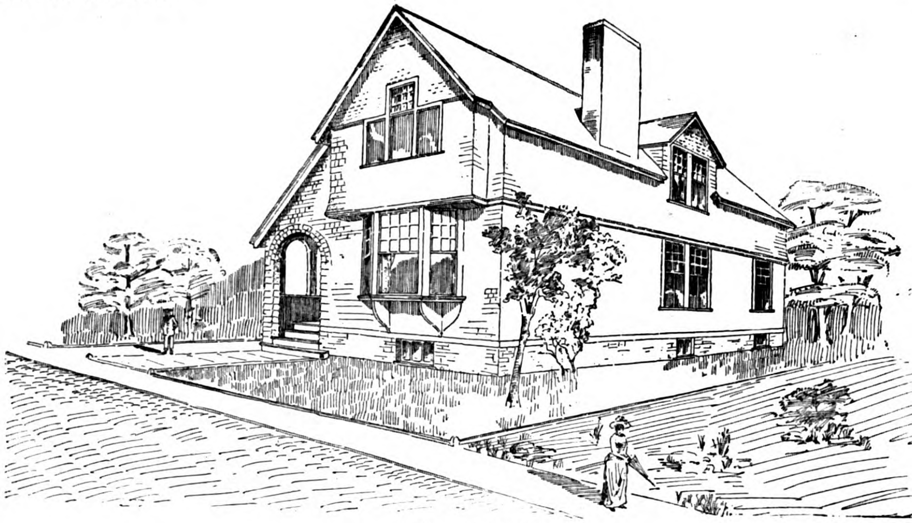


*Fig. 5.—Plans and Elevation of Wall in Diagonal Bond.*

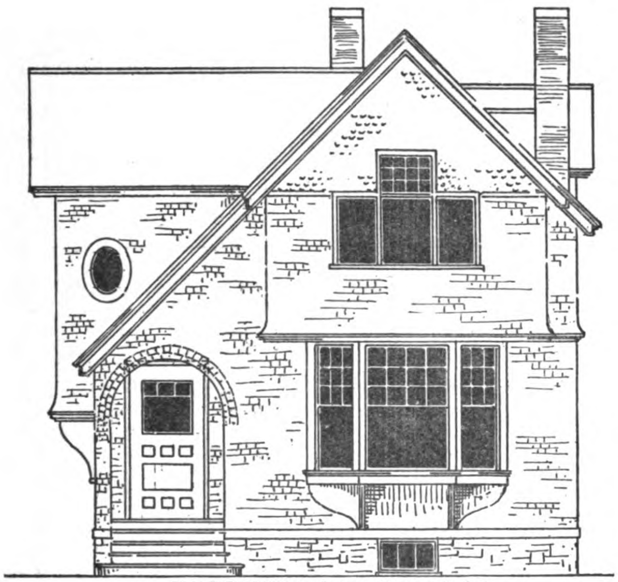
the bricks are laid in the ordinary manner, which only allows 2¼ inches. An objection, however, to the method is the small triangular pieces left on each side, but when these are filled in with small pieces of brick the objection is not of great moment. It will be observed from the engraving that the ends of the wall are finished by inserting return closers in the same manner as in ordinary English bond. This form of bonding can only be applied to walls which are at least two bricks in thickness, and the method is only advisable where great strength is required.

Cross bond may be referred to in passing, as it is almost universally employed in Germany. The construction of it is similar to that of English bond, excepting that headers cross alternately in every fourth course, with the real or assumed object of producing a better bond. It is doubtful, however, if this object is realized, while it is certainly the fact that the finish and proportion of the quoins is considerably impaired.

What is known as "garden wall" bond in England is the same as running bond here, but in that country it is only employed in positions where but little strength is required, as, for instance, boundary walls between two lots or fields. The manner in which hollow bonds are carried out has already been explained in this journal. The reader is referred to our December, 1886, number for an account of this very useful form of brick construction. As a remedy for dampness in isolated buildings there is probably no form of construction which exceeds in value that of cavity walls, the construction of which has already been explained at length in a previous number of this paper.



PERSPECTIVE VIEW.



FRONT ELEVATION. Scale, 1-8 inch to the foot.

# Two Thousand Dollar Frame Dwelling.

First Prize Design in the XIXth Competition.

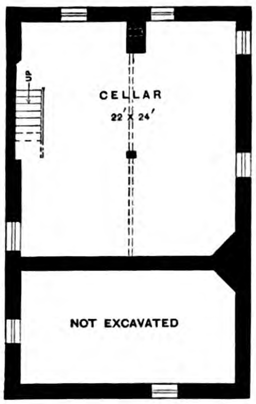
GEO. W. E. FIELD, Architect

Cincinnati, Ohio.

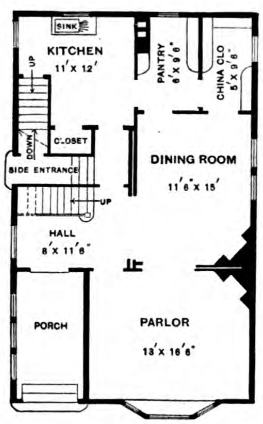
For Plans and Details, see Plates following.

For Description, Estimate and Specification, see page 71

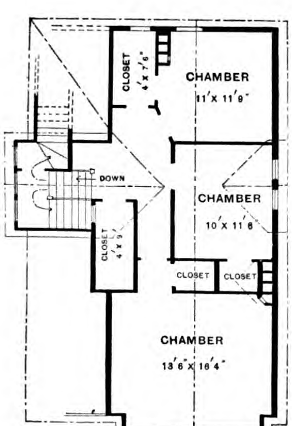
SIDE ELEVATION. Scale, 1-8 inch to the foot.



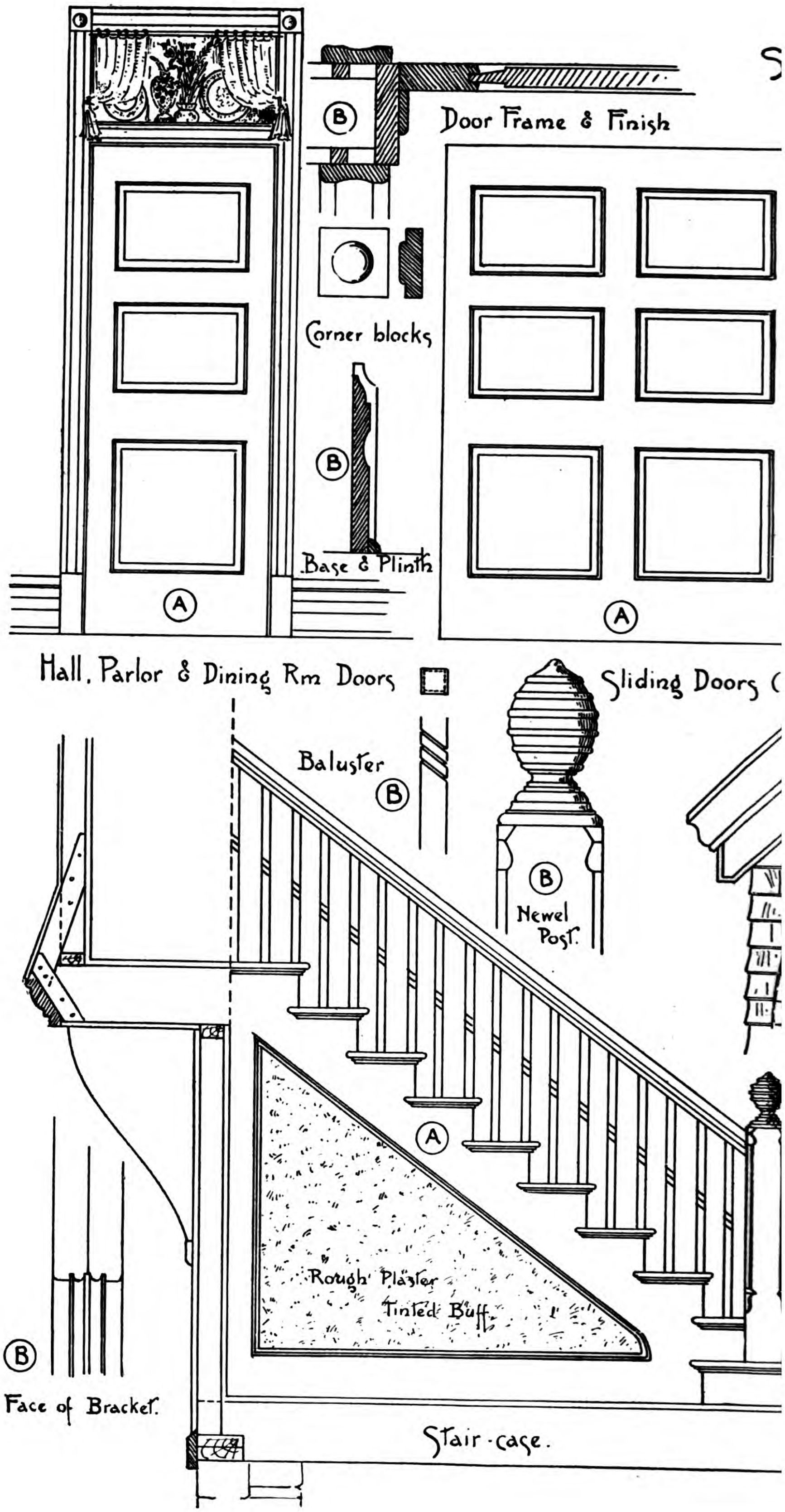

FOUNDATION PLAN.

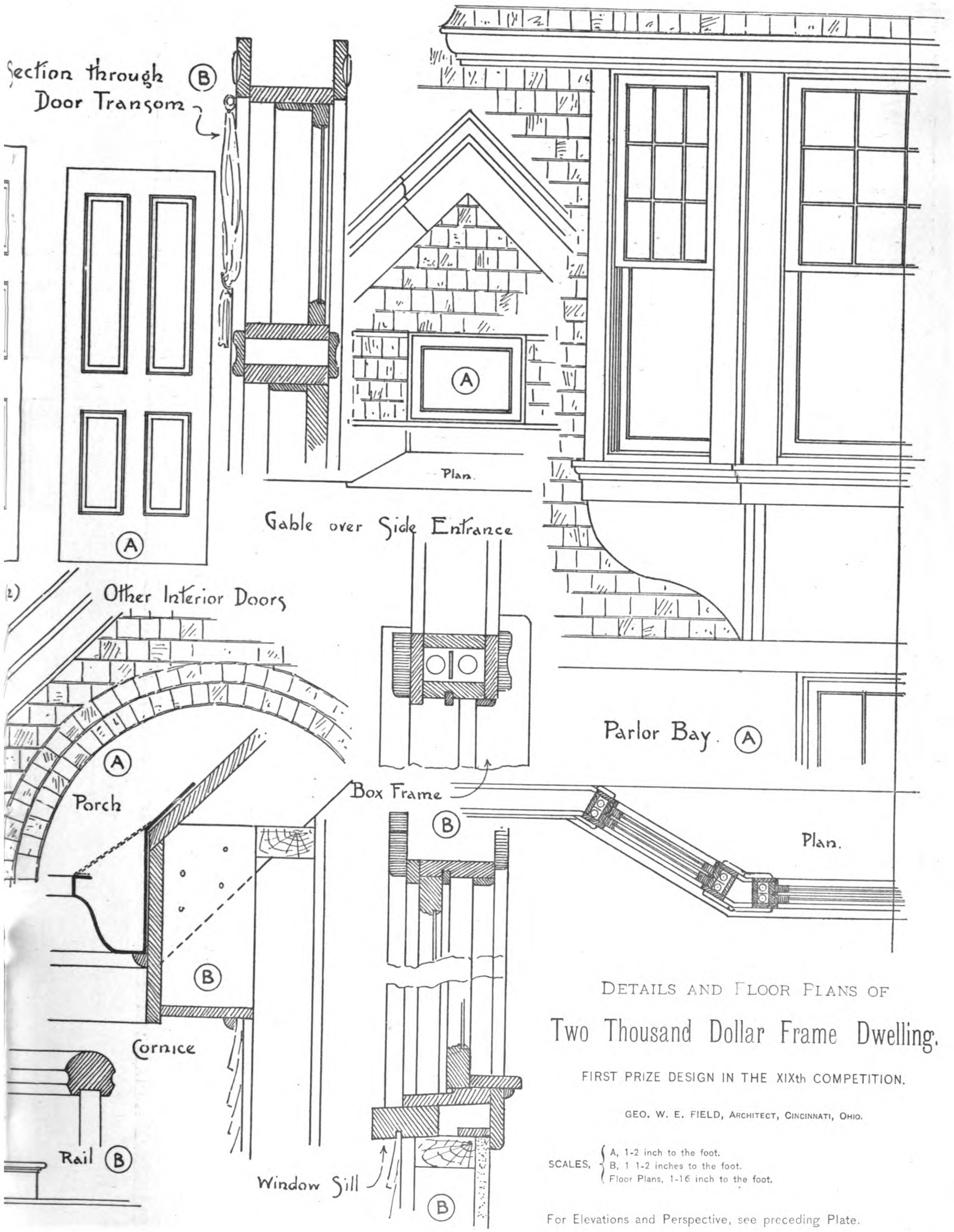



FIRST-FLOOR PLAN.




CHAMBER PLAN.






DETAILS AND FLOOR PLANS OF

# Two Thousand Dollar Frame Dwelling.

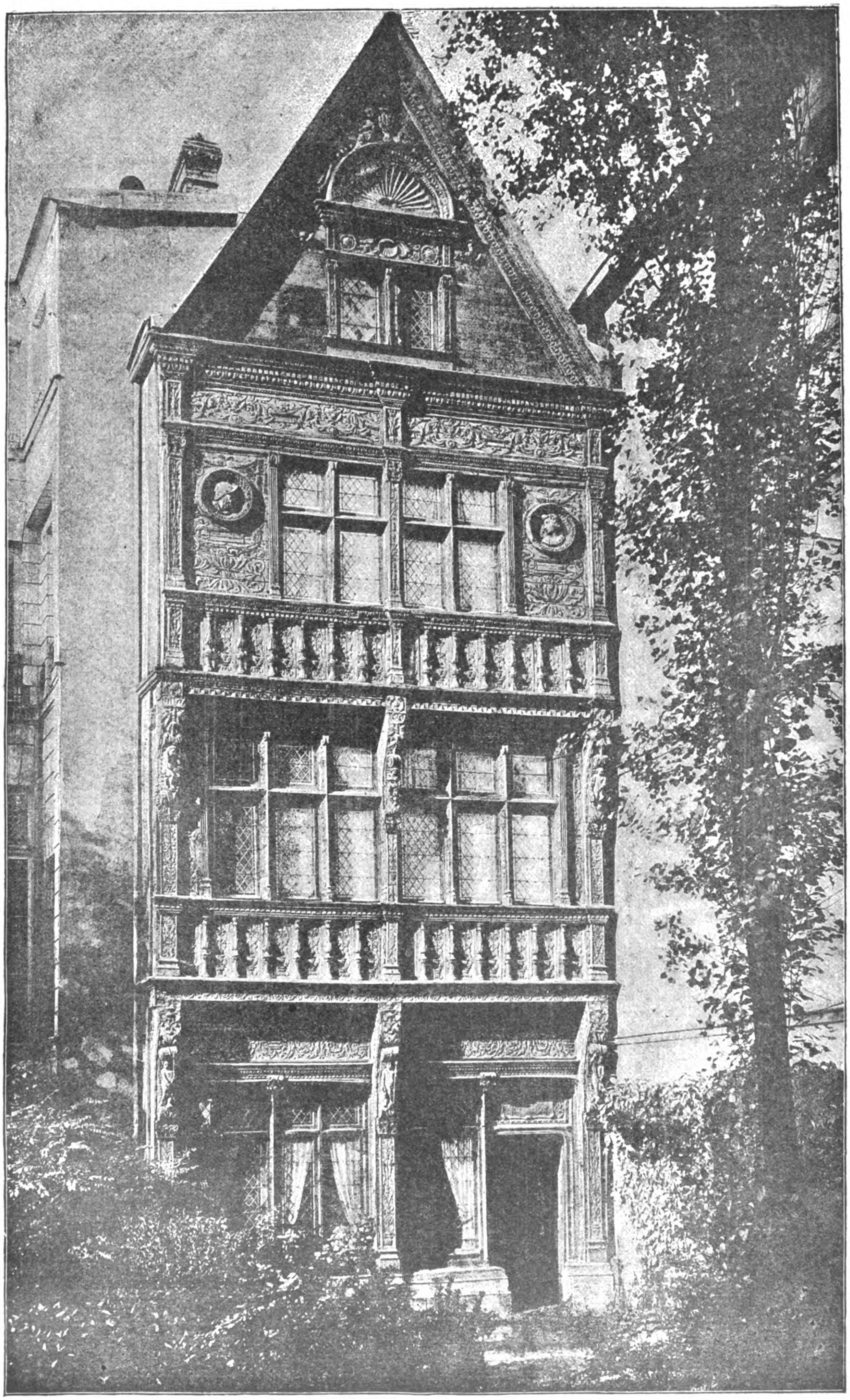
FIRST PRIZE DESIGN IN THE XIXth COMPETITION.

GEO. W. E. FIELD, ARCHITECT, CINCINNATI, OHIO.

SCALES, { A, 1-2 inch to the foot.
B, 1 1-2 inches to the foot.
Floor Plans, 1-16 inch to the foot.

For Elevations and Perspective, see preceding Plate.

For Specification and Estimate, see page 71.



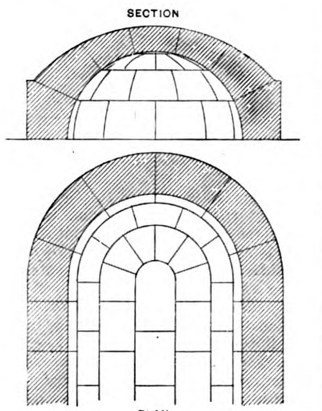
PICTURESQUE OLD HOUSE LOCATED IN THE RUE ST. ANDRÉ, ROUEN, FRANCE

# MASONRY.

## Masonry and Stone Cutting.

(Continued from page 13, January.)

*Semi-Domes.*—An apse is often finished by a barrel vault ending in a semi-dome. Semi-domes can be constructed in two ways; most often they are constructed exactly like a dome (Fig. 54)—that is, in horizontal courses of masonry, with beds forming zones of vertical cones, the apices of which are at the center of the spherical cupola. As can be seen in examining the




*Masonry and Stone Cutting.—Fig. 54.—Semi-Dome Constructed in Horizontal Courses.*

models of cupolas made by the class of masonry, the surface of the bed-joints resembles exactly that of an inverted lamp-shade. On the other hand, the vertical joints which separate the several stones of the same course are simply vertical planes, namely, the meridian planes which pass through the vertical axis of the dome. As may be seen in the plan of Fig. 54, the courses of the semi-dome following the

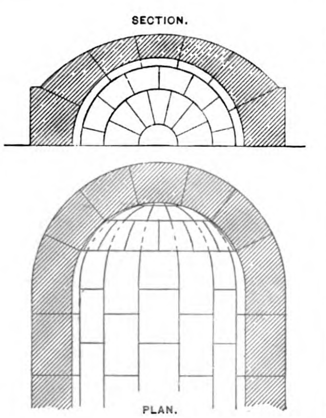



*Fig. 55.—Another Arrangement of Jointing Semi-Domes.*

courses of the barrel vault and the surface of the bed-joints is continuous, although it belongs to a plane in the barrel vault and a cone in the semi-dome. The cutting of the voussoirs of such semi-domes is done exactly as those of the cupola (Fig. 22, Lesson 4); but some care must be taken in working the voussoirs, which belong partly to the dome and partly to the barrel vault, for the third method of working the stone by producing a cup would not apply to them.

The other arrangement (Fig. 55) of the jointing of semi-domes is more rarely met with, but it is of great interest to us as containing the germ of the circle-on-circle arches, called in French *trompes*. Instead

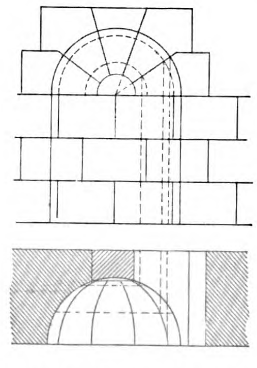


*Fig. 56.—Manner of Getting Bed Molds for Spherical Niche.*

of considering the semi-dome as a surface of revolution round a vertical axis, we treat it as a surface of revolution round a horizontal axis. Then the joints present themselves as so many vertical rings, as may be seen in section (Fig. 55). The surfaces of the joints are the same as those of the horizontal bed-joints in the former arrangement—namely, the zones of cones. The cross-joints are in this case no more vertical planes, but are planes which radiate from the horizontal axis exactly like the planes of the bed-joints of the barrel vault. In this arrangement there is no keystone, but the dome presents at its springing facing the spectator an eye from which all the joints radiate. It must be noticed that, were it not for that eye, each ring of the semi-dome would form an arch unconnected with the ring next to it, the conical shape of the joints having a tendency to push it outward. It will therefore be advisable to keep the eye firmly in its place by backing it with masonry, with a cross-wall or buttress, for instance. A still better system is to continue the bed-joints of the barrel vault down to the eye of the semi-dome, and break the joints of the conic beds; thus all the stones will be bound together.

The working of the *voussoirs* in this second arrangement is again the same as before, the *voussoirs* being of the same shape, but arranged differently.

*The Spherical Niche* (Fig. 56) is a small semi-dome. It is constructed as an arch with a spherical soffit scooped out of it. On plan (Fig. 56) is shown the way of getting the bed molds, and in Fig. 57 the way of working the stone. A prism is first cut out, as shown by dotted lines; then the outline of the arch is delineated on the face, and the outline of the eye on the soffit. Guided by these two curves, the spherical surface is worked with the help of a templet placed on datum marks. The solid eye itself is a semi-cylinder; on its lower part (Fig. 58) the curve E I F is drawn with a templet cut to the section of the niche; then, fixing the templet on the point I, the spherical surface of the eye is cut by working round the templet.

All vaults forming surfaces of revolution, whatever their sections may be—segments of circles, ellipses, parabolas, as long as they are concave—are constructed exactly on the same lines as the dome (Fig. 22, Lesson 4). Their beds will again be

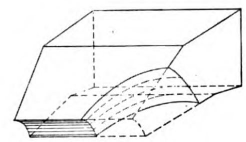


Fig. 57.

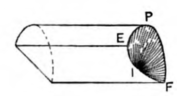



Fig. 58.

*Figs. 57 and 58.—Manner of Working the Stone in Spherical Niche.*

zones of cones; but the apices of these cones will no more be in the same point, although they will be in the same vertical line, that of the axis of revolution.

In the case of an *Annular Vault* (Fig. 59), the outside of the ring has all the properties of domes. Like domes, it may be stopped at any level without falling in. On the other hand, the inside of the ring forms a fan vault the joints of which radiate from the axis, and therefore each stone forms a wedge, which will slip out if the other half of the vault be not there to prevent it.

The stones of annular vaults and fan vaults are worked exactly by the two first methods shown in constructing a cupola, and everything we have said there with a view to saving stone applies again here. We shall study more fully the construction of this vault in connection with the groins formed therein by the penetrations of arches radiating from the center of the ring, as occurs in the circular aisles round the choirs of churches.

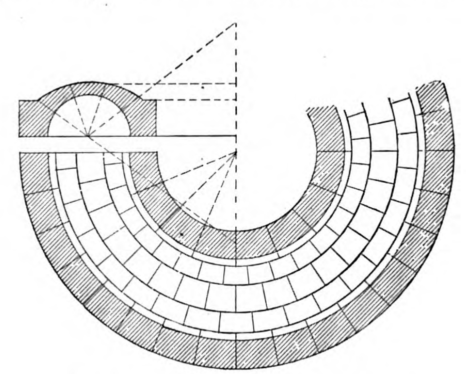


*Fig. 59.—Construction of Annular Vault.*

(To be continued.)

## Hints on Workshop Drawing.—III.

(Continued from page 30, February.)

Thus far, then, we are in a position to draw upon paper any figure having its sides at right angles to one another. The system, however, is equally applicable to any shaped figure, all that is required being to set out the solid in a frame-work

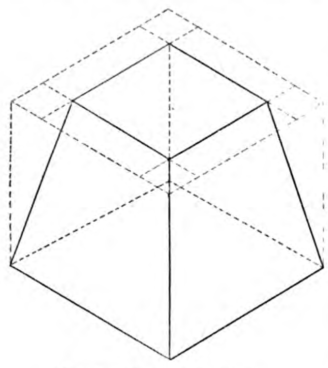


*Fig. 5.—Truncated Block.*

of lines drawn by the 30° triangle, as before. The case of a truncated square pyramid will serve as an example. Let us suppose such a solid measures 2 inches on each side of the base and 1½ inches side of top, as shown in Fig. 5. This is set

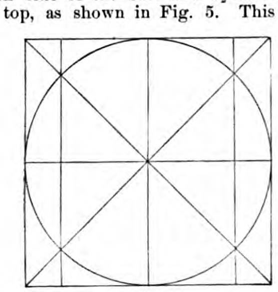


*Fig. 6.—A Circle with Intersecting Lines.*

out as follows: Draw the three construction lines, either as shown in Fig. 2 or Fig. 4. Upon the upright one measure off 2 inches, and to the lines to the right and left also 2 inches. Draw parallel lines

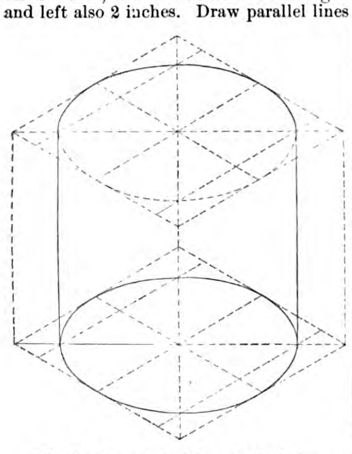


*Fig. 7.—Isometric View of Cylinder.*

top and bottom and on each side, forming a cube, as shown in the dotted lines, Fig. 5. On the rhomboid forming the top of the cube mark off ¼ inch on each side and draw lines across parallel to the sides of the rhomboid. Where the last drawn lines intersect will give the extent of the top of the figure.

Coming now to consider those solids which have curved surfaces we will take a cylinder as an example. In view of what has been said it will be unnecessary to describe the process in detail. In Fig. 6 we have a plan of a cylinder—namely, a circle surrounded by lines and intersected with others which must be first drawn. This frame-work is thrown into isometric projection, and the curve is then drawn through the points of intersection as shown in the upper part of Fig. 7, which represents the top of the solid. The bottom is obtained in a precisely similar manner,

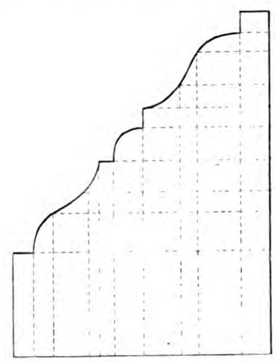


*Fig. 8.—End of a Stone Block.*

using, of course, the same sized circle, and the elliptical figures are then connected by two tangental and parallel lines, completing the solid. It will be unnecessary to observe that inasmuch as the curve is drawn in free-hand the greater number the points of intersection obtained the

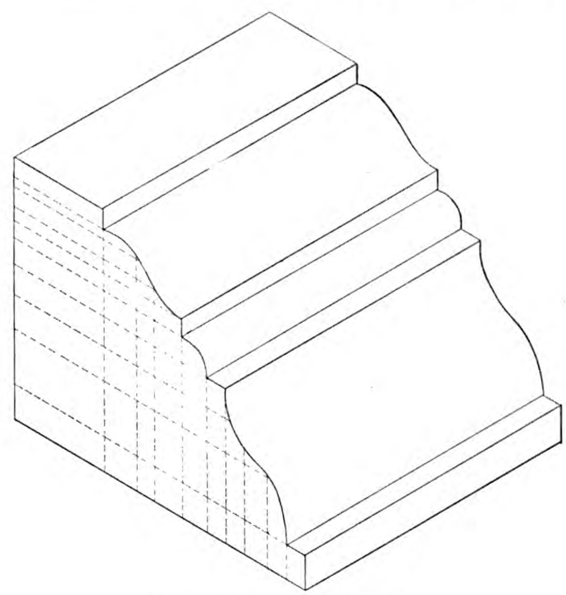


*Fig. 9.—Stone Block in Isometric.*

greater will be the accuracy of the curve. It would be advisable, in the case of a circle of the size of that shown in the drawing, to use eight or more intersecting lines, but these are omitted in the drawing for sake of clearness.

In order to give further examples of the adaptability of this form of projection to ordinary work we have represented in Fig. 8 the end of a stone molding, and in Fig. 9 the same is thrown into isometric projection. The method by which this is done will be obvious on a careful reading of the above. Although in the examples given inches have been used as the standard of measurement for the sake of simplicity, yet it will be understood that objects may be drawn to a scale in the ordinary manner where desired, it being only necessary to remember that all measurements must be taken on one of the lines shown in Fig. 2, or others parallel to them. A difficulty is frequently experienced by

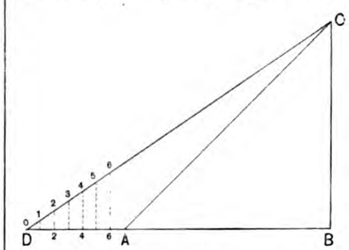



*Fig. 10.—Isometric Scale.*

beginners in studying this subject from the fact that the lines being inclined to the plane of projection do not show their true length upon it. When, however, it is considered that the measurements are all along the various lines, without making any deduction it will be obvious that the real scale is not interfered with, inasmuch as all the parts are treated alike. As it may be advisable that the difference in the measurements between the actual projected length and that represented on paper should be understood, it may be observed that they are to one another in the ratio of 2 to 3. To obtain this proportion in the actual construction proceed as follows: Draw a right angle, A B C, having the side A B equal to B C; extend A B, and upon it from B set off the length of the diagonal A C in the point D; join D with C, and any measurement which is set on A D and is dropped or projected onto A B will be thereby reduced in the proper isometric proportion, as shown by the divisions marked 1, 2, 3, &c.

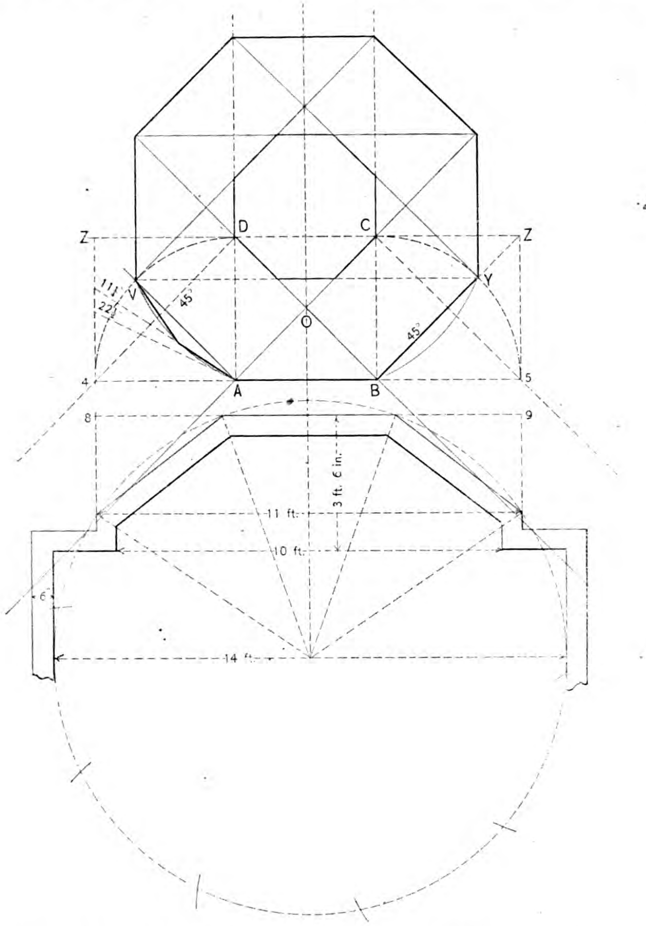
It is recommended that the learner should make drawings by this system of common details of construction, such as an uncovered floor, a sash, &c. It will be surprising how simple it is.

(To be continued.)

# CORRESPONDENCE.

## Laying Off an Octagon Bay Window.

*From* L. W. T., *Upper Alton.*—In the August number of *Carpentry and Building*, "W. S. W.," of Newton, Kan., in answer to a former question "on the ootagon," lays down the law by word and diagram "in 29 parts," but as he fails to explain why he does thus and so, I will ask for space in the valuable pages of *Carpentry and Building* to explain said diagrams by illustration and comparison. As he neglected his duty to his scholars by not telling why he used 29 parts, I hope he will not yelp too loud if he meets with a little good-natured criticism. Before I jump on Mr. "W. S. W.," I will tell a "little story" and present a plan and octagon diagram that will illustrate, explain and answer the question in a manner much more comprehensively than he has done Some few months ago I was called upon to erect a new front addition to a very old house. When I reached the place with my kit the mason had about finished the main foundation walls, and wanted the template by which to build the bay foundation (see plan, Fig. 1, ¼-inch scale). They wanted a 10-foot span opening, and for the want of front-yard room and a brick walk we could only get 3 feet projection, when I thought that looked squally for an octagon bay, which was the demand. Going to a surfaced board with my square and dividers, I drew a little ¼-inch scale plan and run the line 8, 9, as it is shown, and looking at it, the outside being 11 feet, I thought about 4 feet would be equal to any one of the three sides. Drawing the center line and placing 2 feet on each side, and taking 4 feet in the dividers, as per scale, I struck the arcs intersecting, as shown on the outside corners, and discovered that about 4 feet 4 inches was what was wanted. This gave the direction of the center and the bevels for the corners. With a 12-foot board on the main wall and the center line to square by, it was easy to make a correct template, the sides being known. Curiosity led me back to the board to see what kind of a polygonal form we had. Striking the line 4, 5 further up and dividing it into three parts, 4, A, B, 5, I tried an equal run on each blade of the square, and placing them at A and B, with the corner at O, struck the two lines D, O, B and C, O, A, extended right and left. This showed at once that the sides of our bay were not "29 parts octagon," for the lines of the two would not parallel. This is so because the octagon corner and pitch of sides are found on the angle 45°. The above-mentioned lines were all that were necesary to prove what I wanted to know, but in order to prove my position I have dotted up the other two divisions and formed three squares of equal dimensions to clearly show up the miter line 45°. The arc or quadrant is drawn, showing the pitch of sides and correct points for the corners V and Y. The rest of the figure is made by paralleling lines established. It being desired to subdivide these eight sides, it can be done, but the pitch of the sides, one from the other, will be about 11¼°. Any polygonal figure of any number of sides, even or odd, can be made, and the pitch of sides obtained by properly dividing the quadrant. Now, boys, when a plan comes to you from an architect, draftsman or any other source having an octagon bay window, do not believe it before you apply the test, which can be done on any plan. My experience in working on them is that there are very few of them octagon sides; outside room, projection, width of span and outside harmony of proportions prevent it. "If the court please," we will now look back at "W. S. W.'s," Figs. 1 and 2. They are reproduced in every measurement as nearly correct as I could make them, and are placed in connection with my Fig. 2 for comparison. The test lines parallel two sides, and I pass his Fig. 1 as "29 parts octagon;" one-eighth of the circle being 45°, the three sides and the chord should contain 135° of the segment. The chord comes close to it, which may be an accident. Since he lays down the plan without explanation, exception or reservation, we may take advantage and place the chord nearer the center or further away. Then how will the 29 parts work? Will the sides be octagon? We are now at his Fig. 2. Please look at the sides which fail to parallel with the 45°. I would like to know by what kind of a stretch of imagination he gives us Fig. 2 as octagon. I pass to the 29 parts not octagon. If it is desirable to place a corner at the center




*Laying Off an Octagon Bay Window.—Fig. 1.—Plan, ¼ Inch to the Foot.*

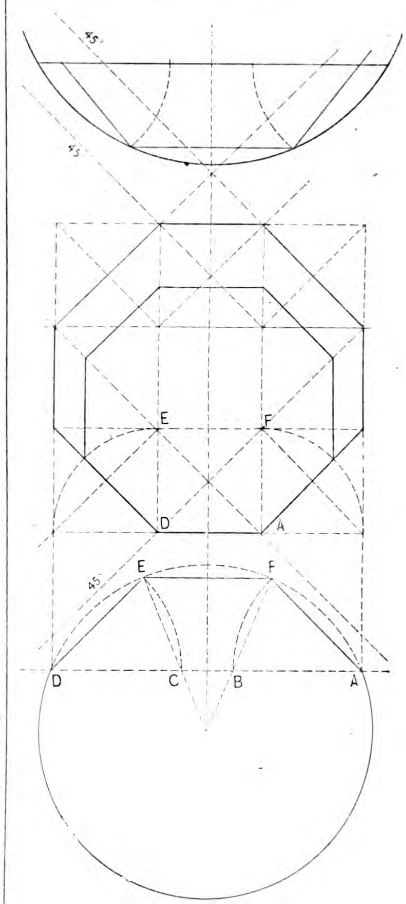


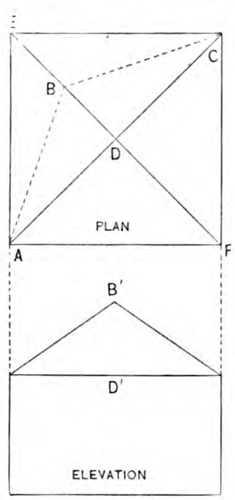

*Fig. 2.—Sketch Showing L. W. T.'s Figure in the Center Compared with W. S. W.'s.*

line, then the rise from the horizon would be 22½°, as seen at Fig. 1. Let all people, young and old, big and little, jump on the drawings and what I have said with both feet, hammer and sledge, and knock the rotten out of it. I am getting old now, and before I die I wish to learn some of the secrets of this much-abused octagon question. When working on plans furnished by others than myself, I have found the octagon corners varying on each plan; in fact, as uncertain as the tide, which is said to be governed by the changes of the moon, and Mr. Moon is accused of cutting his round of capers once in 29 days, which perhaps accounts for "W. S. W.'s" 29 parts. If he is not moon-struck he must be moon-eyed if he cannot see that his Fig. 2 is not octagon. Thus it is with the three-sided bay windows. They are often creatures of circumstances, but pass under the general name of "octagon." My central figure is composed first of nine equal squares, and would sometimes pass as an octagon. The smaller inside figure shows the difference between right and wrong.

### Hip Rafters.

[The following from a recent issue of *The Metal Worker*, although not intended for builders, may interest some of our readers:]

*From* K. G., *St. Louis, Mo.*—As a general thing the worker in sheet metal does not have much to do with hip or corner




*Hip Rafters.—Fig. 1.—Plan and Elevation of Hip Roof.*

rafters, yet it is sometimes convenient to know how to get their length and shape from the plan and elevation. In Fig. 1 is shown a form of roof that is often made to cover a ventilator shaft, and if the skeleton frame to hold the sheet iron is to be made in the shop, about the first step is to determine the length of the corner rafters. On the plan, A E C F gives the size of

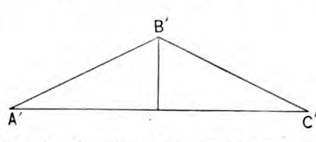



*Fig. 2.—Showing Shape of Hip Rafters.*

roof, as D' B' on elevation does the hight. If the skeleton of this roof was to be made of bar iron, a piece could be formed as shown by A E C F. The next step would be to get the length and shape of the corner or hip rafter. To do this set off on the line D E of plan the hight of roof, derived from D' B' of plan; then by connecting A B and B C, we have the length and form of the hip rafters. If a piece of iron is formed this shape, as further shown by

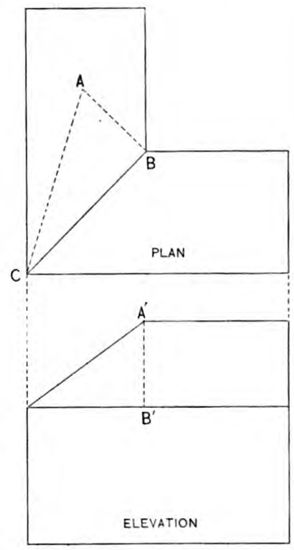



*Fig. 3.—Plan and Elevation of Another Form of Roof.*

A' B' C' in Fig. 2, and placed in position from A to C in Fig. 1, and then two rafters like A B are placed in position, the lower ends of the two rafters being placed at E and F respectively, and meeting the rafter A B C in the center, the skeleton or

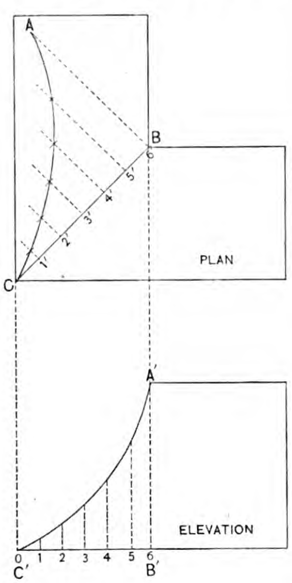
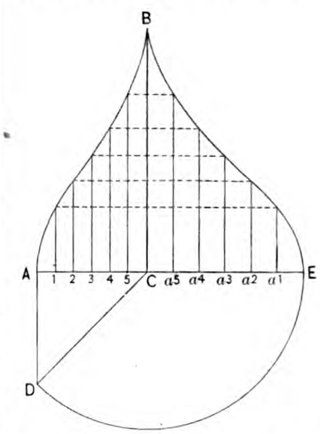



*Fig. 4.—Method of Obtaining Profile of Hip Rafter for a Mansard Roof.*

outline of the roof would be formed. Fig. 3 shows plan and elevation of another form of roof. In order to get the length of the hip rafter at right angles to the line C B of plan, draw the line A B in length equal to A' B' of elevation, which is the hight of the roof. The line C A being drawn, it gives the length of the hip rafter. In Fig. 4 we have a roof similar in plan to Fig. 3, but of a form often given to mansard roofs. In order to get the profile of the hip rafter we proceed in a similar manner as in Fig. 3. At right angles to the line C B on plan draw the line B A, equal in length to the hight of roof, derived from A' B' of elevation. Divide C' B' of elevation into any convenient number of parts and carry lines from these points to the profile, as shown by the dotted lines 1 to 6. C B of plan is to be divided into the same number of equal parts and lines carried at right angles indefinitely, as shown. The length of lines 1 to 6 in elevation is then to be carried to corresponding lines in plan and the points thus obtained marked, when a curved line traced free-hand from point to point will give the shape of the hip rafter A C of plan.

### O G Rafters.

*From* H. H., *Sullivan, Ind.*—In reply to "R. G.," whose inquiry appeared in the December number, I send the following sketch, which I consider very simple, and which is undoubtedly correct, as I have used it for years. I did not see the former articles on this subject; hence I do not know whether this is the




*O G Rafters.—Diagram Submitted by H. H.*

method heretofore explained or not. Referring to the sketch, let A B be the shape of the roof or the common rafter, A C the run and C B the rise. Make A D equal to A C, and draw the diagonal D C, which is the length of the run of principal rafter. Carry this distance around to E, making E C the run and C B the rise for principal rafter. Draw the ordinates 1, 2, 3, 4 and 5. Draw the dotted line at right angles from 1, 2, 3, 4 and 5. Make the curved line E B through the junction of the dotted lines with ordinates at $a1$, $a2$, and $a3$, &c., which will be the profile of principal rafter.

### Problem in Handrailing.*

*From* J. H. V. Secor, *New York City.*—In the August number of *Carpentry and Building* there is a problem in handrailing submitted by "J. H.," of London, England. The plan which he sends is rather an awkward one to begin with, but in order to answer his questions I will follow his plan as near as possible. He gives the hight of risers as 7 inches and the tread as 10 inches, rail 3 inches thick and 4¼ wide, as corrected in the October number. The conditions are as follows: The rail on the landing is to be 3 feet from the floor to the top of rail, and the flight over the flyers is to be 2 feet 8 inches to the top, measuring plumb above the face of the riser. The balusters on the winders, Nos. 19, 20, 21, 22, 23, 24, are to be the same length as the short balusters on the flyers. Where are the best positions for

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**Problem in Handrailing.***

[An unfortunate error occurred in the make-up of pages 78 and 79, discovered only after the paper was printed. We had in hand two articles from Mr. Secor, both on handrailing and each containing a large cut. The cuts were exchanged, and this slip is printed to make correction. The cut herewith belongs to the matter on pages 78-79 in the paper, and the matter herewith belongs to the cut in the paper.]

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*From* JOHN V. H. SECOR, *New York City*.—In the December number of *Carpentry and Building* is a communication from James H. Monckton, in answer to the problem on handrailing in the August number submitted by "J. H.," of London. Mr. Monckton starts with a criticism of the plan submitted, and proposes to instruct the correspondent in drawing a plan as in his judgment will be far better. He puts five treads in the large quarter in place of eight, as in the original plan of "J. H." He changes the width of the flyers from 10 inches to 9 inches, and puts in two winders, one 8 inches and one 7 inches, between the flyers and the chord line, and locates the line of travel 14 inches from the front string. This is his improved plan. In going up-stairs, when on the 19th step you are in advance of the rail on this step about 4 inches, and the rail is nearly 3 inches higher than along the flyers. At the intersection of the two center lines to form the ramp and incline of the cylinder, he starts two treads below the chord line, making it still worse, for the ramp easily covers nearly four treads. If the 8-inch tread had not been put in it would be a better plan, and then start one tread below the chord line to form the ramp it would be much better. The rail should be the regular hight at the chord line. There should be no stiffness in the casing lines, but if the distance to be eased is too great, as in this case it appears nearly straight, in running his tangent up over the landing quarter he has the bottom of the rail 4 inches above the floor; then he will be too low, as one of the requirements is 3 feet to top of the rail. In his explanation found at Figs. 1 and 2 he says: "To prepare the plan for developing the center line of wreath showing the exact relation of wreath to the unfolded elevation of the treads and risers, also the length of each baluster, however placed on the winders * * * space the balusters as required. Draw the line A C, and from the center of each baluster, in the quarter B C, draw lines to the tangents parallel to A C." Again, he says that the balusters will be in their exact position to get the lengths. How is it that ordinates will give the exact location of the balusters on the line of tangents? If this is correct, then the number of spaces on the curve would be produced in equal proportion to the stretchout of the tangents, and perpendiculars erected from these points extended to the bottom line of the rail would be all that is required. By inspecting his plan it will be seen that the spaces are not equal, as they should be, if correct, for all the treads are alike in the quarter. This can be done correctly, but not in the way he does it. He now gets the stretchout of the curve line to develop the center line of the rail. In this he says: "Take the treads in the cylinder, each in two parts, for the purpose of getting more accurately the stretchout of the center line. * * * Again, at Fig. 2 (this is the elevation which has already been spaced for balusters), mark on each tread the center of balusters as taken from the plan." This is all unnecessary work, and can be done with less drawing.

I have duplicated Mr. Monckton's improved plan, using the general points and a few lines in giving the location of the balusters in connection with the elevation of tangents and the development of the stretchout on the bottom line in both cases. I have also given an elevation from the same plan omitting the 8-inch tread and correctly locating the balusters in the quarter, so as to get the lengths without using the stretchout of the curve line.

I have marked the plan the same as Mr. Monckton, and will make E B the base line. I locate the balusters in his way, as at 1, 3, 5, 7, 9, 11 and 13, and on the elevation along the bottom of the rail they are shown at 2, 4, 6, 8, 10, 12 and 14. At $a$, $b$, $f$, $d$, $h$, $j$, $l$ and $n$ are the locations as taken from the curve line and shown in the elevation at $a$, $c$, $e$, $g$, $i$, $k$, $m$ and $o$. At $x$ is the angle in tangents for the ramp. It will be seen by this that the length of balusters may all be taken at the line of tangents in the elevation if spaced correctly. In the upper elevation this is shown, and also the ramp in its improved condition. At the landing quarter will be found the thickness of the plank and how to locate the centers for the rail in working.

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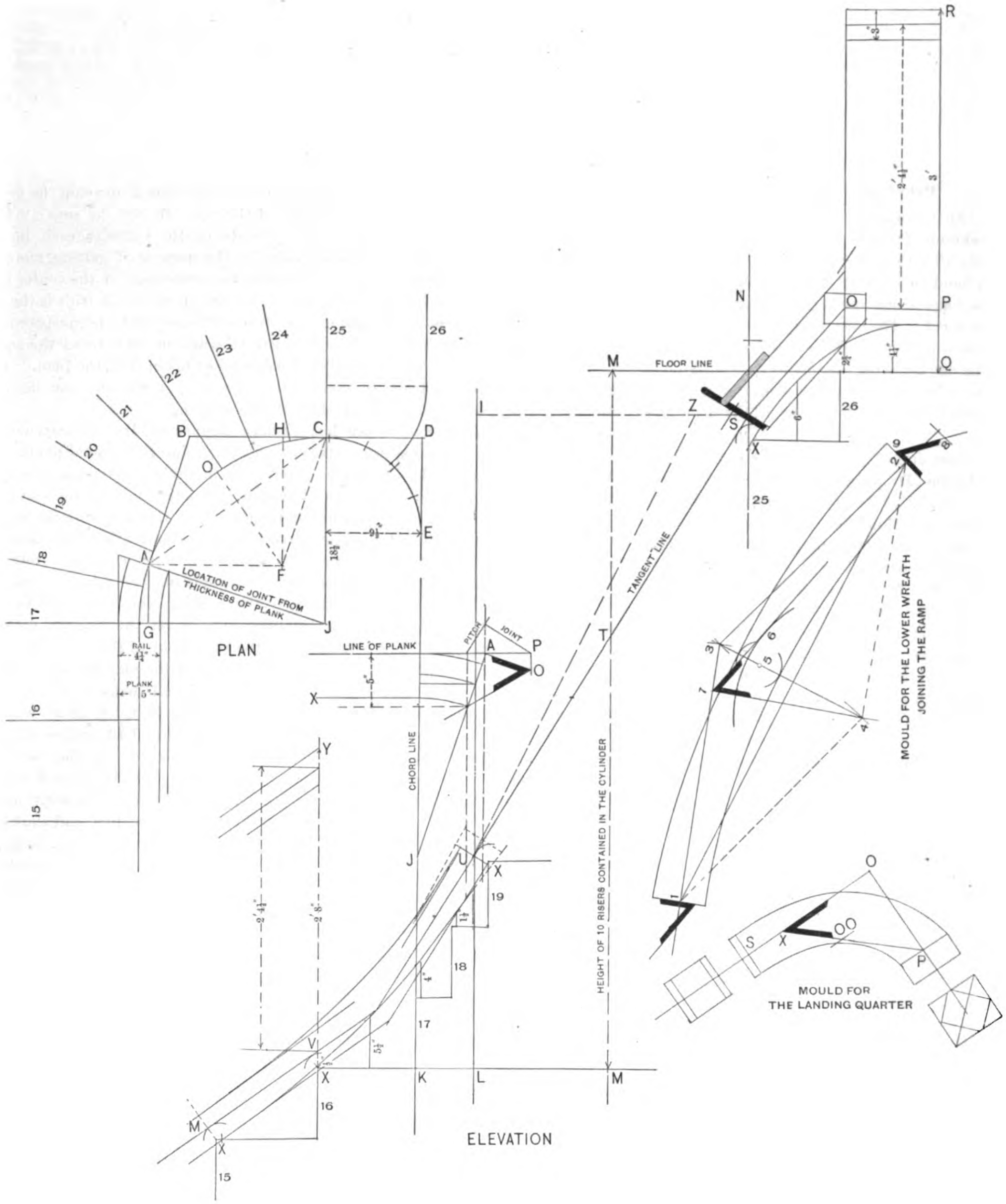


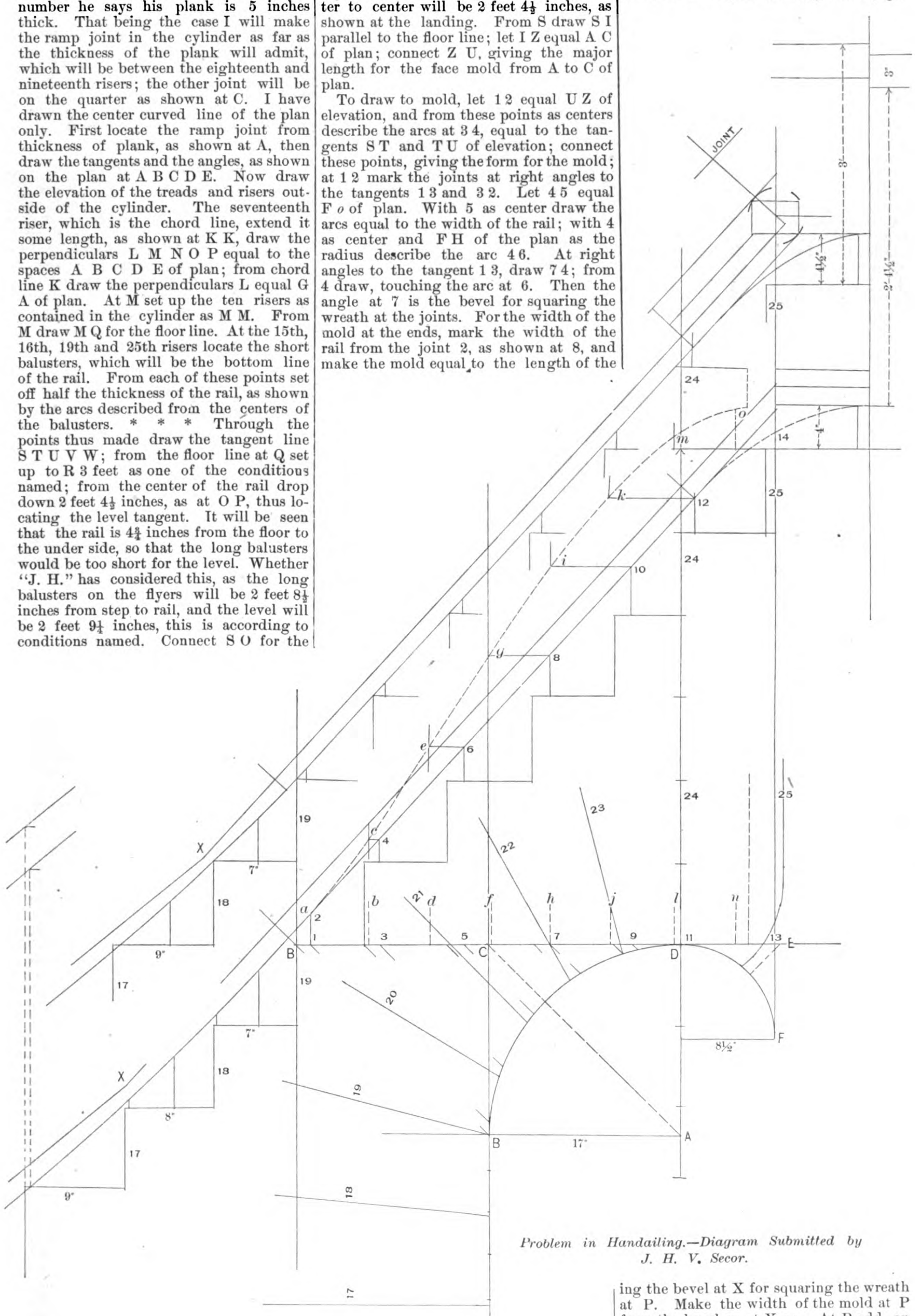

*Problem in Handrailing.—Diagram Accompanying Article by J. H. V. Secor.*

the joints so as to produce the rail under the above conditions? In the October number he says his plank is 5 inches thick. That being the case I will make the ramp joint in the cylinder as far as the thickness of the plank will admit, which will be between the eighteenth and nineteenth risers; the other joint will be on the quarter as shown at C. I have drawn the center curved line of the plan only. First locate the ramp joint from thickness of plank, as shown at A, then draw the tangents and the angles, as shown on the plan at A B C D E. Now draw the elevation of the treads and risers outside of the cylinder. The seventeenth riser, which is the chord line, extend it some length, as shown at K K, draw the perpendiculars L M N O P equal to the spaces A B C D E of plan; from chord line K draw the perpendiculars L equal G A of plan. At M set up the ten risers as contained in the cylinder as M M. From M draw M Q for the floor line. At the 15th, 16th, 19th and 25th risers locate the short balusters, which will be the bottom line of the rail. From each of these points set off half the thickness of the rail, as shown by the arcs described from the centers of the balusters. * * * Through the points thus made draw the tangent line S T U V W; from the floor line at Q set up to R 3 feet as one of the conditions named; from the center of the rail drop down 2 feet 4½ inches, as at O P, thus locating the level tangent. It will be seen that the rail is 4¾ inches from the floor to the under side, so that the long balusters would be too short for the level. Whether "J. H." has considered this, as the long balusters on the flyers will be 2 feet 8½ inches from step to rail, and the level will be 2 feet 9¼ inches, this is according to conditions named. Connect S O for the pitch tangent over the landing quarter so that the joint at S must be sprung, as shown by the bevel. By running the other pitch up it would be 4½ inches too high, hence the sprung joint. Plumb over the sixteenth riser, set up 2 feet 8 inches to the top of the rail, as X Y, then from the center to center will be 2 feet 4½ inches, as shown at the landing. From S draw S I parallel to the floor line; let I Z equal A C of plan; connect Z U, giving the major length for the face mold from A to C of plan.

To draw to mold, let 1 2 equal U Z of elevation, and from these points as centers describe the arcs at 3 4, equal to the tangents S T and T U of elevation; connect these points, giving the form for the mold; at 1 2 mark the joints at right angles to the tangents 1 3 and 3 2. Let 4 5 equal F *o* of plan. With 5 as center draw the arcs equal to the width of the rail; with 4 as center and F H of the plan as the radius describe the arc 4 6. At right angles to the tangent 1 3, draw 7 4; from 4 draw, touching the arc at 6. Then the angle at 7 is the bevel for squaring the wreath at the joints. For the width of the mold at the ends, mark the width of the rail from the joint 2, as shown at 8, and make the mold equal to the length of the bevel, as shown at 8 9. Complete the mold by drawing the curve, using a flexible strip for the purpose.

To draw the mold for the landing quarter, draw the tangents at right angle. Let P O and O S equal the same in elevation; let P X equal the tangent S O, giving the bevel at X for squaring the wreath at P. Make the width of the mold at P from the bevel as at X *o o*. At P add on about 2½ inches straight wood; also at S ¾ of an inch to spring the joint. Complete the mold by drawing the curve.

Draw the ramp as shown, make the end at U longer and wider, as shown by the dotted lines; draw the cord line I L down




*Problem in Handailing.—Diagram Submitted by J. H. V. Secor.*

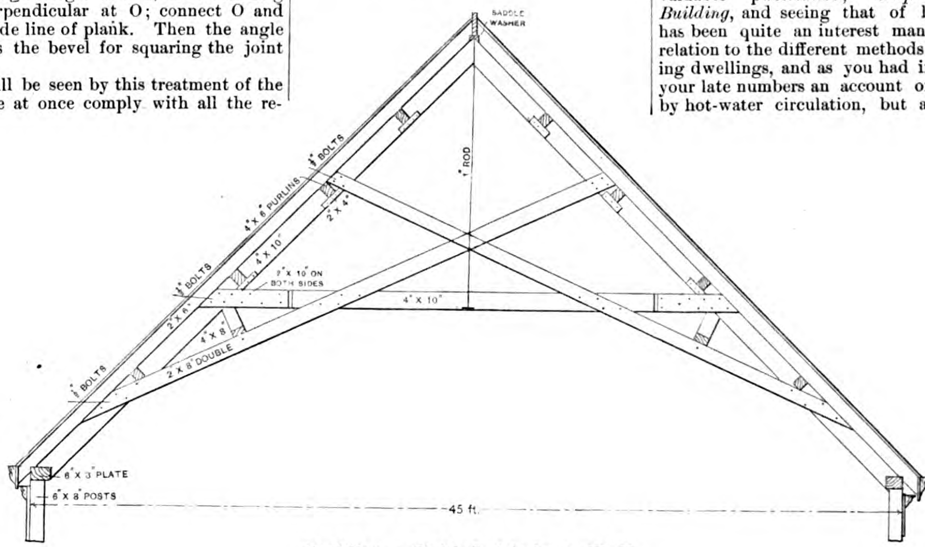
and across the face of the pattern; likewise the two dotted lines from inside and outside of the section to be used for making the joint. This will be sawed square through the plank, and will require a bevel to square it at U. This will be found in the following manner: At the cord line K K of the elevation, draw the section of the plank and the joint from the plan G A. At the intersections of the joint and the thickness of the plank, as shown by the dotted lines, apply the pitch of the ramp as it is at U of the elevation, and at right angle to the pitch draw the joint, touching the outside of plank at P, from which point drop a perpendicular. From A, at right angle to A J, draw touching the perpendicular at O; connect O and the inside line of plank. Then the angle at O is the bevel for squaring the joint at U.

It will be seen by this treatment of the plan we at once comply with all the requirements, and also somewhat equalize the lengths of the rail, as it shortens the lower wreath about 14 inches from what it would be if made on the quarter. Jointing the lower end of the ramp at the fifteenth riser gives a length of 3 feet 4 inches and the wreath 4 feet 3 inches. Now, as regards the length of the balusters, we have on the steps from 19 to 25, all of one length—viz., 2 feet 4½ inches from the step to the rail. It will, however, require three extra-length balustrades in the landing quarter, and will be found in the following manner: Divide the space between N P of the elevation in as many spaces as is shown on pan of the quarter. From the bottom line of the rail on the level to the bottom at S draw the curve line, and giving the lengths as shown—viz., 6 inches, 2¾ inches and 4¼ inches, which is to be added to the short balusters—those for the ramp will be ½ inch, 5½, 4 and 1½ inches longer than the short balusters.

### Roof Truss.

*From* A. W. H., *Westfield, Mass.*—I was very much interested in reading the letter from "E. F. M." on the subject of truss roofs. I inclose you a sketch of a roof drawn to a scale of ⅛ inch to the foot which I have used in a building here. The construction and parts are so clearly shown that extended description is not necessary. I would be glad to hear from the brotherhood in regard to its strength. The building in question is to be timbered with the best of spruce. The truss is used in a building where the ceiling is required to be as high as possible and where the condition exists that none of the truss is to show in the room.

*Note.*—We have reproduced our correspondent's sketch. It is in a little different form from something that has come up in our Correspondence department frequently during the years in which this paper has been published. Many of our readers will recognize it as an old acquaintance. In its present interpretation the design is better than in some of the other cases, on account of the horizontal cross pieces. The diagonal braces from opposite sides, which were not re-enforced by the cross pieces mentioned, have the effect of causing the roof to sag more or less. In a 45-foot span, as in this case, assuming the timber is of the best quality and that care is exercised in combining the parts, we presume this truss will answer a good purpose. Our correspondent does not state the distance between the trusses. This would be an important consideration. The roof is so steep that it is not likely to be weighted by ice or snow.




*Roof Truss.—Sketch Sent in by A. W. H.*

### Scale on Rule.

*From* C., *Little Falls, N. Y.*—Inclosed please find a drawing of the edge of H. Chapin's center variety 2-foot rule No. 46. I wish to know the meaning and use of the scale; also the use of the brass slide in the face of the rule. I think an answer to this question through the columns of *Carpentry and Building* will be of interest to your readers in general.

*Note.*—We have not thought it necessary to reproduce the scale of which our correspondent sends us a drawing. Those of our correspondents who have the kind of rule referred to will be able, by inspection of the instrument, to see what this correspondent refers to. The graduation in question is the division of a foot into one-hundredths, and is especially useful in engineering and surveying problems. The manufacturers of the Chapin rule, as we understand it, put this scale upon certain sizes and styles of rules intended for woodworkers' use. On the other hand, the Stanley Rule and Level Company, making a competing line of rules, restrict this scale to the rules manufactured specially for surveyors and engineers. With reference to the brass slide in the rule, its only object is a simple extension of the rule, making it possible to measure a longer space than would otherwise be possible.

*From* J. H. B., *Louisville, Ky.*—Will you please tell me what the graduation on the Stanley Rule and Level Company slide rule No. 12, on the edge, is used for? The divisions run up to 200 in 2 feet. I would like to learn the use of this scale. The information will also be of advantage to other mechanics in this neighborhood.

*Note.*—The scale referred to by this correspondent, which appears on some grades of rules, notably slide rules with a single joint, is the divisions of a foot into one-hundredths. The use of this scale is largely in engineering work, but it is applicable to the use of all mechanics who prefer to employ decimals in measurements for drafting or for other purposes.

### Hot-Water Heating.

*From* JAMES WHITELY, *North Adams, Mass.*—Being a constant reader of your valuable publication, *Carpentry and Building*, and seeing that of late there has been quite an interest manifested in relation to the different methods of heating dwellings, and as you had in one of your late numbers an account of heating by hot-water circulation, but as it was only theoretically explained, I will with your permission tell my brother readers my actual experience with this system. Last fall I put in a hot-water heater of a well-known maker. I heat eight rooms with it, and I wish to tell the readers that I am more than satisfied with the way it works. There is no danger whatever, as in steam; it requires no more attention than a common stove. That is, I mean where a lady can attend to one coal stove she can attend to the heater in case the man of the house should be away all day, as I am. In the coldest of weather she can put a little coal on at noon-time and it will be all right at night. I have considerable experience with steam, and though steam is far ahead of stoves, hot-water heating is further ahead of steam than steam is of stoves. Hot-water circulation, when properly piped, is perfectly noiseless; the heat is as near a summer heat as is possible to conceive. There is no danger of children being burned by the radiators, no burning the packings out of valves and no danger of bursting pipes, boiler or fittings. As the expansion tank is open to the atmosphere, and that being placed 3 or 4 feet above the highest radiator and constantly filled with water, there can be no pressure except the weight of water that is in the expansion tank. One thing that must be remembered is to have it piped well to get a free circulation, and be sure to have radiating surface enough in each room. As to economy of fuel, I have not burned, in thoroughly heating eight rooms, as much coal as I would have done with two good stoves. I hope that any of my brother readers who have been prejudiced against hot-water heating as being a new and untried thing may take courage from the fact that it has been in use in England, where I came from, for at least 20 years to my recollection.

# NOVELTIES.

### Bartlett's Bit Box.

The accompanying illustration represents this article, which is put on the market by Geo. H. Bartlett, 79 Chambers street, New York. This box, which is made of wood, has, it will be seen, holes in it to receive bits of the different sizes,


*Novelties.—Fig. 1.—Bartlett's Bit Box.*

the cut representing one adapted for a full set of 32½ quarters. The hinges are, it will be observed, so constructed as to allow the cover to be raised clear of the shanks of the bits, and then tipped back. When the box is closed the jointed pieces of brass which constitute the hinges are inserted in the apertures made in the box to receive them, so that the cover rests tightly on the box, where it is fastened by the hook shown. With this construction, if desired, the top of the box with the hinges can be entirely removed from the box, and replaced by simply reinserting brass bars. The points made in regard to this box are: That the bits are thoroughly protected and separated, so that they cannot get loose or come in contact with one another; that there are no catches or springs to get out of order, and that the size of each bit is plainly stamped in the box. This is referred to as a convenience in actual use, as the location of any bit can be seen at a glance. These boxes are made to contain any assortment of bits desired, the following being the regular sizes: 4, 6, 8, 10, 12 and 16 sixteenths; 4, 5, 6, 8, 12, 14 and 16 sixteenths, and a full set of 32½ quarters. These boxes are, we are advised, meeting with a demand from the jobbing trade, who by means of them are enabled readily to make up their own assortments.

### Stanley's Patent Roofing Bracket.

Our readers will be interested in the illustration we give of a new device for supporting stagings on a roof, Fig. 2. Two brackets are represented in position for use, and another one is shown detached. The material used in constructing the bracket is spring steel, and the parts are riveted together at a point near the base. The two beveled ends can be inserted under two layers of shingles, already laid, and any pressure from above will then fasten both sets of prongs firmly on the roof. Steel spurs which project from the upper bearing surface of the bracket will secure the staging boards in place. It is claimed that one dozen per minute can be put in position or released, and that no nail-holes are left in the roof, a further advantage being that the brackets are always ready for use, and afterward can be dropped from a roof to the ground without fear of breaking. The manufacture of these goods by the Stanley Rule and Level Company, of New Britain, Conn., has recently been undertaken, and they report a good demand for the brackets, as also favorable testimonials from carpenters and painters who have already used them.

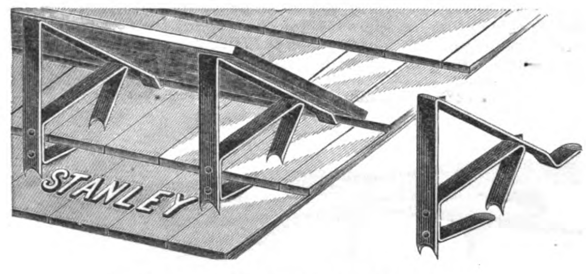
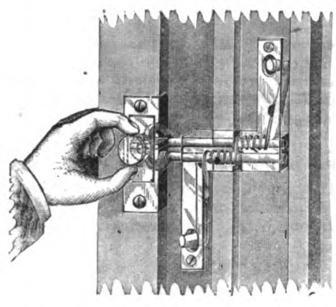



*Fig. 2.—Stanley's Patent Roofing Bracket.*

### Timby's Burglar-Proof Sash-Lock and Ventilator.

Messrs. Jenkins & Timby, of Oswego, N. Y., and 102 Chambers street, New York, are introducing to the trade what they are pleased to call Timby's Burglar-Proof Sash-Lock and Ventilator, a general idea of the construction and operation of which may be gathered from an inspection of the accompanying illustrations.



*Timby's Burglar-Proof Sash-Lock and Ventilator.—Fig. 3.—Section of Window Frame, Showing Application of Lock.*

Fig. 3 shows a section of the window frame with the lock applied, the cut being semi-transparent for the purpose of showing the interior construction, actuating

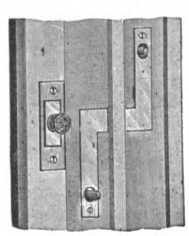


*Fig. 4.—Section Showing Thumb-Nut Moved Upward, Releasing Upper Sash.*

spring, &c. Fig. 4 shows the device with the thumb-nut moved upward in a position to release the upper sash. Fig. 5 is a back view of the lock and operating device, the thumb-nut being moved upward and the bolts thrown back, the same as in Fig. 4. The bolts employed in this device are made from the best malleable iron, the case is of wrought steel, while the face-plate and thumb-nuts are made of brass and bronze metal highly polished and lacquered. The manufacturers state that this lock is very simple in construction and operation, and is readily adapted to any window. One lock is employed to fasten either one or both sash, as may be desired, securing them in any position, whether the windows are entirely closed or are adjusted for purposes of ventilation. The device is said to automatically secure the sash in place, and the lock is applied in such a manner as to be burglar-proof.

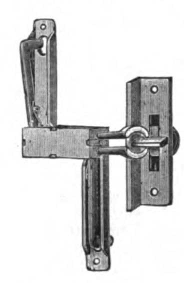


*Fig. 5.—Back View of Lock and Operating Device.*

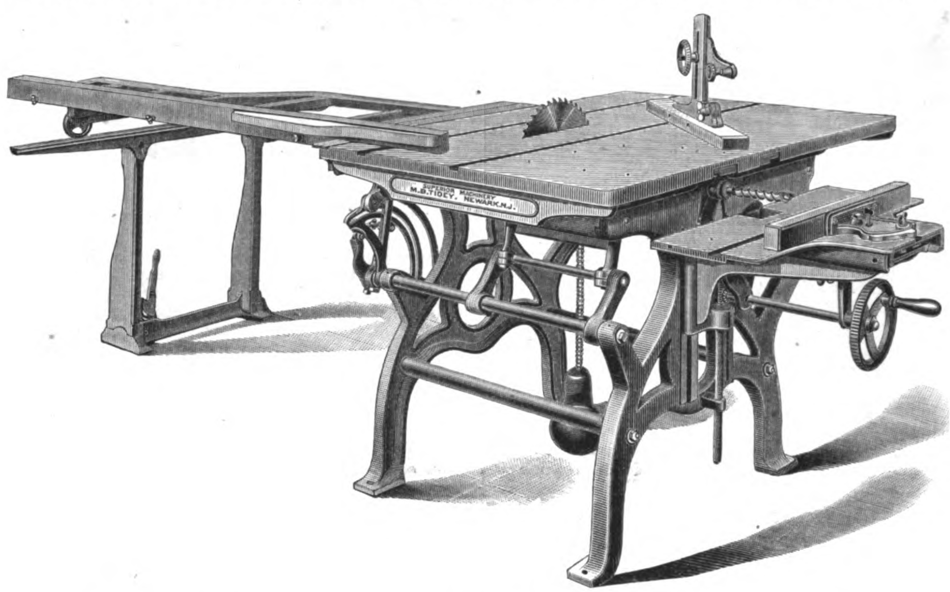
It is said that varying thicknesses of sash or inside strips do not interfere at all with its application. It may be used on windows having sash adjusted with or without weights, and does not obstruct the employment of weather-strips or inside blinds. The principal features of construction are covered by letters patent granted to T. F. Timby, under date of March 29, 1887. The firm are meeting with a very gratifying demand for this novelty, and inquiries are daily received from all parts of the country.

### King's Windsor Cement.

We have been favored with a specimen of cement for plastering walls and ceilings which is being introduced by J. B. King & Co., No. 24 State street, New York. It is known as King's Windsor Cement. It may be described as an entirely new plastering, material patented and manufactured by the firm named. We are informed that this cement is being offered to the public only after a series of trials and experiments which have fully demonstrated its utility for the purpose named. The manufacturers are convinced that they have an article very much superior to the old hair-and-lime plastering which has been in use for many years. They state in a circular which is before us that the builders of England and France discovered many years since the necessity of a material superior to the old hair-and-lime plaster. After many trials and experiments they adopted what is known as Keene's cement, which is a most excellent material, but has the objection of great cost, which prevents its coming into general use. The firm claim for their Windsor Cement that it will answer for plastering purposes just as well as imported Keene cement, while it has the advantage of costing only one-third as much. The sample before us shows a porous cement, strong, and with excellent properties in general. It is harder than other materials used and does not readily chip or pit. Among the advantages to which the makers refer in the circular mentioned, we find the following: "This material requires one-third less labor to prepare and apply than the old-style plastering. No hair is used, and houses finished with this material may be safely occupied three weeks earlier than those finished by the old method. The plastering when in place does not require any sizing for decorating or papering. It is fire and vermin proof and may be worked in any style or form that is possible with ordinary plastering. The material is supplied in barrels ready to be mixed with sharp sand and water. Work done with this cement does not require 'floating,' but simply straightening with a darby. It can be applied by any first-class man."

### Adjustable Circular Saw Bench.

We present in Fig. 6 of the engravings a general view of a lever movement adjustable circular saw bench, with cross-cutting and boring attachments, which is being offered to the trade by M. B. Tidey, of Newark, N. J. The construction of this machine is such that the operator is enabled at all times to use the saw at a point no higher above the table than the work requires, thus greatly reducing the liability to accident. The lever, by which the saw is moved and held in place when set, is shown at the left side of the bench, and within easy control of the operator, enabling him with the left hand to regulate at will the position of the saw. This lever is self-fastening by means of a spring. The saw bench is provided with a cross-cutting attachment, by means of which squaring-up, trimming, gaining, &c., may also be accomplished with perfection and dispatch. The carriage and stand are said to be readily detachable, and may be removed at pleasure. The boring attachment is so arranged as to in no way interfere with the working of the saw. It is stated that stock can be bored at any angle from the end to the side very rapidly. When the boring slide is not otherwise in use it may be raised to a level with, and used as an extension of, the saw table, thus increasing the range of the saw gauge. The size of the table and of the saw bench proper measures 38 x 52 inches, and has an adjustment of 6 inches. The manufacturer claims that the saw bench proper is complete without the attachments named, and is made with reference to all the requirements of a first-class machine.




*Novelties.—Fig. 6.—Adjustable Circular Saw Bench, Built by M. B. Tidey, Jr., Newark, N. J.*

### Paulmier's Patent Key Fastener.

This ingenious contrivance applied to a lock, manufactured by S. H. Paulmier, Madison, N. J., is represented in the accompanying illustration, which indicates its utility. From this it will be seen that inside the lock, in the position shown in the small cut to the right, a gravity guard is placed so constructed as to permit the unobstructed entrance of the key, while the key, after it has been turned in the lock, is turned by the pressure of the guard to one side or other of the keyhole, so that it is not liable to drop out on the jarring of the door, an annoyance which, with other locks, is often troublesome. The simplicity of the device and the efficiency with which it does its work, as well as its comparative inexpensiveness, are points that are made in its favor.

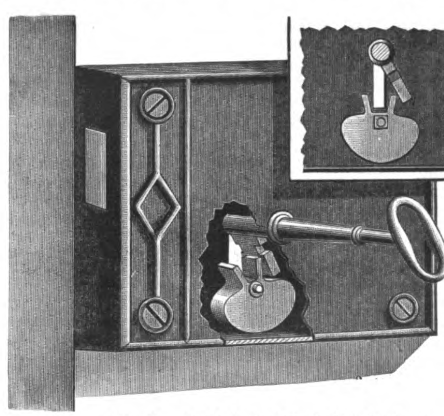
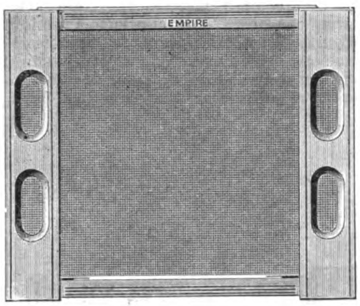


*Fig. 7.—Paulmier's Patent Key Fastener.*

### The Empire Window Screen.

This article is manufactured by C. J. Sherriff & Co., Morristown, N. Y., for whom C. F. Guyon & Co., 99 Reade street, New York, are agents. A general view of the screen is given in the accompanying illustration, Fig. 8, and a view of the fly-escape is given in Fig. 9. These window screens are made of maple or birch finished in the natural color, and are referred to as strongly as well as neatly constructed. The corners are double-mortised and glued, and not simply wire-nailed, as others. The manufacturers call special attention to the fact that the wire screen is tightened perfectly smooth by having inlaid wood strips nailed into the frames through the entire length. The screen is made with an automatic spring adjustment by which the side pieces are pressed outward, making them fit snugly in the window. The screens are also made with metallic slides, the advantage of which, as not affected by dampness, is alluded to. It will be observed that the sides or extensions are paneled, thus admitting more light and air than when made solid. * Fig. 9, which represents the fly-escape, shows the outside




*Novelties.—Fig. 8.—The Empire Window Screen.*

of the screen as it is placed in the window. It will be seen that above the wire cloth are small openings made by the curves in the upper part of the outside piece of the frame, permitting the flies going up on the wire cloth to pass under

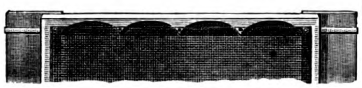


*Fig. 9.—Fly-Escape.*

the inner upper piece of the frame, and out through the aperture thus afforded. The point is made that they will thus make their escape from the room, while at the same time there is no likelihood of their entering through these openings.

### The Ostrander Door Opener.

This door opener, patented November 6, 1888, and manufactured by W. R. Ostrander & Co., 21, 23 and 25 Ann street,

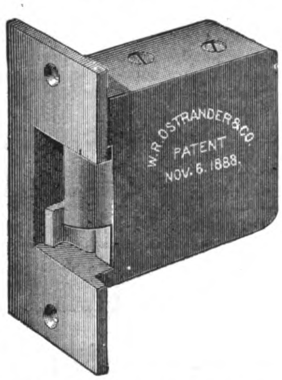



*Fig. 10.—The Ostrander Door Opener.*

New York, embodies some new features, and is illustrated in the accompanying engraving. It is so constructed as to be operated either by compressed air through a pneumatic tube or by electricity with batteries. The manufacturers call attention to the fact that the movement in a gravity one, and that it is devoid of any delicate springs or delicate mechanism, so that it is not liable to get out of order. It is protected by metal sides to prevent dirt, plaster or chips from interfering with its operation. The movable bolt shown in the cut is a steel drop forging, and the other parts are described as made of the best wrought iron and steel. Especial care has been taken in the construction of the door opener, so as to make it of requisite quality and secure its satisfactory operation. The point is also made that it is positive in operation, and withstands wind and other force and cannot be jarred open. Its mechanism also is such that the opening of the door is not interfered with by pressure upon it, as in the case of other similar devices. The operation of this article has been tested in practical use since the patent was applied for.

### Combined Ventilating and Check Rail Window Sash Lock.

White & McLure, Penn Building, Pittsburgh, Pa., for whom H. C. Mechling, 12 Cliff street, New York, is agent, are putting on the market the sash lock repre-

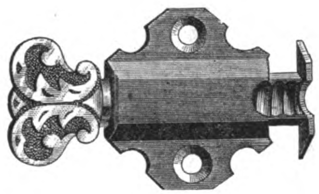


Fig. 11.

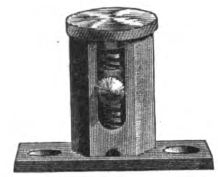


Fig. 12.

*Holman's Combined Ventilating and Check Rail Window Sash Lock.*

sented in the accompanying illustrations, Fig. 11 showing the part attached to the top or sides of lower sash and Fig. 12 the part attached to upper sash. The lock, Fig. 11, is operated by a slide and screw, the thumb piece of which is shown in the cut. This slide terminates with a flat butt end in which is a semicircle which engages with the sphere attached to the vertical screw, Fig. 12, the latter being adjustable to any hight required. The manufacturers make the following points in regard to this lock: That it has an adjustable screw for any width of sash; that the lock can be used on either side of sash or on top of lower sash and will lock the window at any desired point with safety; that by using the lock on top corner of lower sash the upper sash can be dropped and fastened, or the lower sash raised and the upper one dropped, thus giving ventilation to the room and securely locking the window; that this lock can be employed as a ventilator by the use of the adjustable screw, which can spread the sashes apart or draw them together; and that by its use rattling is prevented. The sash lock is made in Tucker and plain bronze, japan and nickel.

### Ideal Sash Pulley No. 2.

This sash pulley, shown in the illustration herewith given, is made by the Stover Mfg. Company, Freeport, Ill. The points

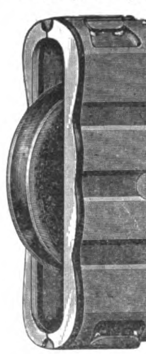


*Fig. 13.—Ideal Sash Pulley No. 2.*

made in regard to it are: That it has a cone bearing axle pulley, noiseless and free in operation, easily and quickly applied, requiring no screws or brads to hold it in place, and when in the frame making a perfect fit. It will be seen that there are lugs or projections on either side of the case for spacing the auger holes, and these lugs are also referred to as holding the pulley in the frame after it is applied, thus serving a double purpose. In applying the pulley four holes are bored with a $\frac{7}{8}$ bit on a straight line parallel with the parting groove, using the markers on the pulley case for locating the center of the holes. The pulleys are furnished either ground or unground wheels, and are packed in kegs of about 25 dozen and barrels of 125 dozen.

### Automatic Air Valves.

The emission of air from the radiators and coils in steam heating apparatus is of the greatest importance, and appliances by which the air can be removed automatically are receiving very general attention in the heating business. Among the recent introductions in this line the Acme automatic air valve, offered to the trade by W. H. Ransom, 94 Centre street, New York, is one of the newest. The principal claim for this valve is the ease and economy with which the expanding material can be

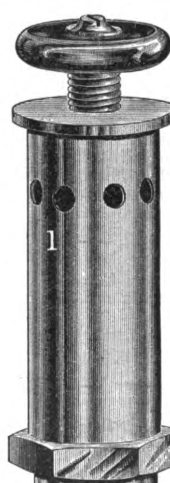
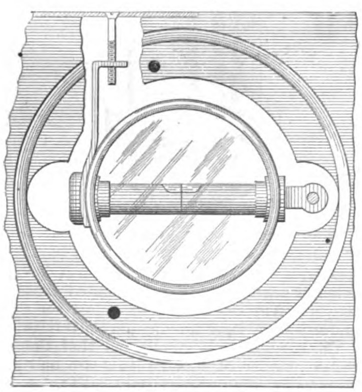


*Fig. 14.—Valve for Vertical Nipple.*

replaced by any steam-fitter, should it become less sensitive. It is also stated that this valve will act readily at a low temperature—that is, a low pressure; this is of value when it is recollected that the greater number of steam plants are now designed for low pressure only. Fig. 14 illustrates the air valve as designed to screw on any ordinary vertical nipple, with wooden wheel on screw for adjusting valve. This is a desirable form for indirect radiators or coils. Another form is used for screwing into holes tapped in the columns or sections of direct radiators; it is made with a removable cap covering adjusting screw, and is fitted with an attachment for waste-pipe. The advantages and disadvantages of waste-pipes on automatic air valves on direct radiators are worthy of notice. Where it is possible to conduct a single waste-pipe from an air valve to a cellar, and leave it open over a sink or some such receptacle, it is desirable. It then prevents the air from the radiator being discharged into the room, and this confined air has sometimes a disagreeable odor This waste-pipe should never convey water from the radiator; water should not accumulate in a radiator, and the radiator that retains water until it is forced through the waste-pipe of the air valve should be re-connected, as the piping is at fault. A waste-pipe from an air valve should not be connected to a drain or sewer pipe, as it forms a passage by which sewer gas can enter a radiator, and it is not desirable to connect a number of waste-pipes from air valves together, forming a network of small pipes, because if one valve leaks it is difficult to discover it.

### Cook's Spirit Level.

C. E. Jennings & Co., of 97 Chambers street, New York, are introducing to the



*Novelties.—Fig. 15.—Sectional View of Cook's Patent Level.*

trade a spirit level known as Cook's patent, a general view of which was published in the August issue of *Carpentry and Building* for 1887. Since that time some important improvements have been made in the construction of the level, a general view of some of which is presented by means of Fig. 15 of the accompanying illustrations. The engraving represents a section of the level, showing one of the tubes carrying the bubble. This, it will be observed, is set in a frame faced with glass on either side and placed in the body of the stock. Instead of looking at the top and down into a narrow groove as is usually demanded, the construction of the level is such that the eye is directed to the side and notes at a glance the position of the level. There are two of these tubes used in the level, one being designed for testing vertical lines and the other for leveling. The parts holding the tubes are arranged with screws, as will be readily seen from an inspection of the cut. The screw reaches to the plate on the upper edge of the stock, making the level adjustable and possible to correct for any inaccuracy which may exist. The manufacturers direct special attention to these features of the level, and to the fact that it can be used in many positions which is not possible with the ordinary device. It is a carefully made instrument, being highly finished, and in its improved form is expected to prove more popular with the trade than ever.

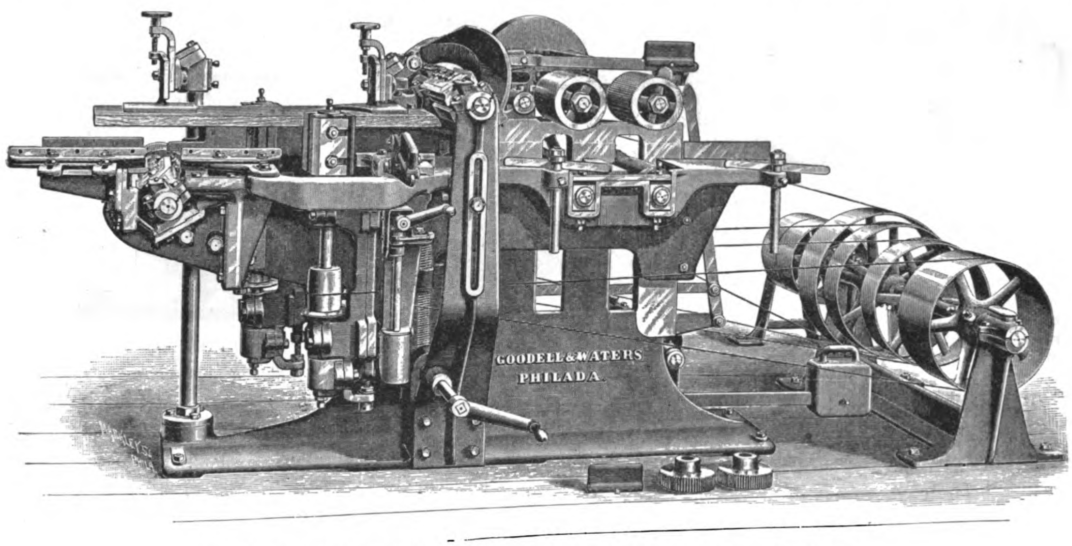



*Fig. 16.—New Outside Molding Machine, Built by Goodell & Waters, Philadelphia.*

### New Outside Molding Machine.

In Fig. 16 of the accompanying illustrations we present a general view of a new outside molding machine which is being placed upon the market by Goodell & Waters, of Philadelphia, Pa. This machine is constructed with all the conveniences and possessing the advantages of an outside molder combined with the strength and capacity of an inside machine. Its capacity is varied and includes within its range flooring, ceiling, moldings, siding, and in fact all work that can be done on a molding machine. It is constructed to work 10 or 12 inches wide, as may be desired, and planes four sides 6 inches thick. The bed drops to plane two sides 12 inches thick. The frame is cast in one piece, rendering it very rigid and tending to keep all the bearings in line. The feed is very powerful and consists of four 6-inch rolls driven by a train of heavy gears well protected from dust and shavings. The feed is susceptible of four changes. The top and bottom cutter-heads are of solid forged steel slotted on four sides. The top feed is provided with lateral adjustment, together with chip-breaker and bonnet, which may be moved back to allow any depth of cut, and can be swung up and back to allow of easy access to the cutters. The side-head frames have solid bearings top and bottom and the strain of the plates is brought against the box instead of the cap. When the side frames are set to the required position they are held firmly in place. They also have a vertical adjustment which moves the spindle as well as both boxes. A weighted chip-breaker is applied to the outside head in order to prevent the tearing out of loose pieces. The inside spindle is provided with throat-pieces which are adjustable to any depth of cut. The under head has vertical and lateral adjustment, besides throat-pieces and guides, which are also adjustable to any size of cut. The construction of the machine is such that the end table and guides swing aside from the cutters, giving ample room for setting the knives. When the bed is in position it is held firmly in place by a bolt under the box of the top cutter-head and the clamping device under the bottom head, which serves as a strong support to the bottom cutter and top pressure bar.

### Abbe's Patent Sash-Cord Fastener.

The accompanying illustrations, Figs. 17 and 18, represent a new device which is manufactured by Edwin W. Abbe, New Britain, Conn. It is intended, as the

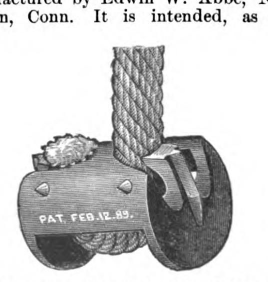



*Fig. 17.—Abbe's Patent Sash-Cord Fastener.*

name and illustrations indicate, for fastening braided and all hard laid cords to the sash and weights without tying knots. As will be seen by these illustrations, the cord passess down through the opening in one end of the fastener and up through the opening in the other end, when the spurs or points in both ends are driven in so as to hold the cord securely. The point is made that this fastener can be applied in much less time than it takes to unbraid and tie a knot in the old cord iron, and that its use saves cord. The two points on top which by the weight of the sash are drawn into the wood are re-

*Novelties.—Fig. 18.—Sash-Cord Fastener with Sash Weight.*

ferred to as keeping it from working against the casing. These sash-cord fasteners are manufactured in two sizes. No. 1 is the most commonly used and takes Nos. 7 and 8 cord, while No. 2 takes No. 9 and No. 10.

### New Pony Planer and Smoother.

In Fig. 19 of the accompanying illustrations we present to our readers a perspective view of a new pony planer and smoother which is being introduced to the trade by Mr. Frank H. Clements, of 131 Mill street, Rochester, N. Y. The machine is of interesting design, and has been constructed with special reference to executing smooth and rapid work for furniture, carriages, sleighs, chairs, &c., and for fine door and panel work. The machine is well constructed throughout, careful attention being given to every detail. The frame is very rigid and heavy, and cannot be strained or twisted either by bolting down or by the settling of the floor. The cylinder boxes can be kept screwed down close on the journals when running at a high rate of speed without heating. This feature, the manufacturer claims, tends to avoid what may be termed wavy work. The bed is solidly ribbed under the cylinder, and has six points of support on the frame, with gibs to take up lost motion, rendering vibration under the cut impossible. The cylinder is a solid steel forging carefully fitted and balanced. The box caps are planed into recesses to prevent vibration sidewise, and have large oil cups. The feed works are especially strong, and the gearing is extra heavy. All adjustable gears travel together, so as to be in uniform mesh and not ride on the points of the teeth. The pressure bars work very close to the knives and are both adjustable to the lumber independently of each other and the feed rolls. The feed rolls are set close to the cylinder, and are arranged to hold the board firmly to the bed. The upper in-feed roll is fluted and pressure obtained by weighted levers. Two styles of this machine are made, No. 1 being single-belted, with lower rolls not geared, while No. 2 is double-belted and fed from the cylinder.

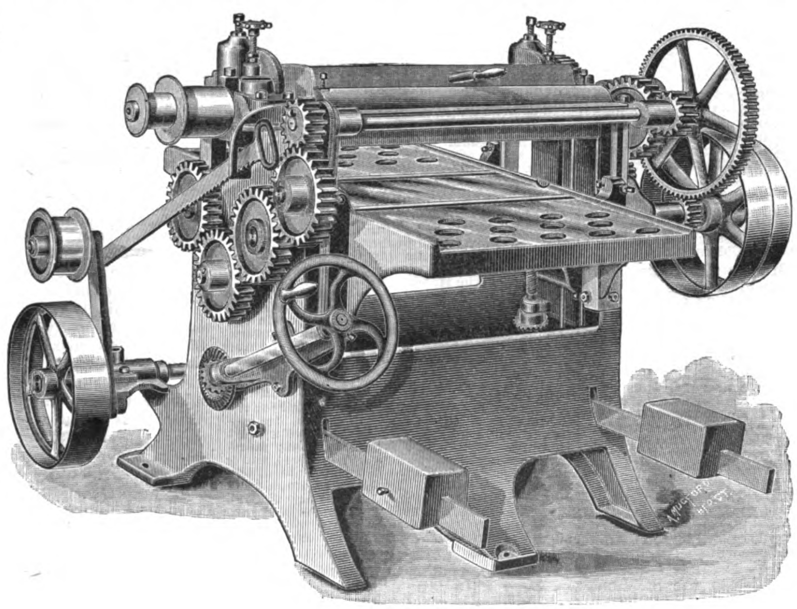


*Fig. 19.—New Pony Planer, Built by Frank H. Clement, Rochester, N. Y.*

### Combined Sheeting and Lath.

In Fig. 20 of the accompanying illustrations we present a view of a section of Timby's combined sheeting and lathing, which is being placed upon the market by T. F. Timby, of 32 Warren street, New York City. This lathing is made in 6-inch strips, and so constructed that each section may swell or shrink without affecting those on either side of it. This is accomplished by making in the back deep kerfs which pass the bottom of the face grooves, thus leaving no solid wood on a center line through the board from edge to edge. This sheeting-lath may be used outside as a sheathing and back plastered between the studs, making a frost-proof wall, or it may be used in lieu of lath on the inside. With the studding turned the flat way and set 24 to 30 inches apart, both sides being finished with this patent sheeting-lath, the manufacturer claims that a stronger partition is made than when studding is set 12 inches apart and finished with common lath. The construction suggested above is not only cheaper than the usual form, but is also more economic of room. By the use of this material a solid groundwork for moldings, center-pieces and cornice-work is provided, besides constituting an excellent backing for wainscoting. By the use of this lathing no care in the spacing of joist or studding is necessary, neither are furring strips required, while the peculiar shape of the grooves is such as to firmly hold the mortar in place. It has the further advantage of using less mortar than the common plan. The lathing is made with both edges finished alike, as shown in the illustration presented herewith, and is supplied six pieces in a bunch. It is claimed that the use of this material effects a great saving of studding in partitions, prevents straining or breaking of clinches and cracking and falling off of the plaster, a result, it is said, which no other article of its kind has attained.

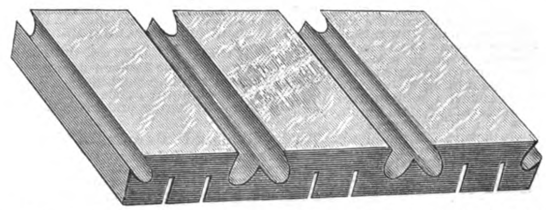


*Fig. 20.—Combined Sheeting and Lath, Manufactured by T. F. Timby, New York.*

# TRADE NOTES.

THE WILLER SLIDING BLINDS, manufactured by William Willer, of Milwaukee, Wis., are meeting with much favor from architects, builders and the general public. They are now being placed in the residence of the widow of the late Emil Schondein, of Milwaukee, which is a palatial edifice, having been erected at a cost of over $300,000. A public schoolhouse in Denver, Col., has lately been fitted with these blinds, the order amounting to nearly $6000. The sales for 1888 reached a total of over $100,000. There is a force of 150 men employed in the factory, of whom 110 are engaged exclusively in the manufacture of these blinds. The new catalogue for 1889-90 is now in press, to be issued about May, and it will be among the most artistic of its kind in the country. A separate catalogue will be issued for fine stair-work.

WE HAVE RECEIVED from the Adamant Mfg. Company, Syracuse, N. Y., a copy of their new catalogue describing the Adamant wall plaster and chromolith, which they manufacture, and which they describe as the cheapest and only superior substitute for common plaster. This material has been tested for three years past, and has already achieved an enviable reputation. A medal of excellence was awarded to it by the American Institute at the exhibition last fall. The catalogue is something that will be of interest to builders in general.

THE PORTABLE HOUSE MFG. COMPANY, 335 Broadway, New York, and with works at Tenafly, N. J., offer illustrated circulars and estimates of their portable and permanent houses. There is a growing demand for manufactured houses all over the country, and the above company is one of the earliest to occupy the field.

THE CINCINNATI CORRUGATING COMPANY, of Cincinnati, Ohio, remind our readers this month of their readiness to supply goods in their line by simply presenting their name. This constitutes a unique and, in this case, no doubt, effective advertisement.

WE HAVE RECEIVED, with the compliments of Mr. Samuel Cabot, of No. 70 Kilby street, Boston, Mass., a very interesting little pamphlet of sketches which has just been issued. The little work consists of a number of plates presenting views of some of the houses in which creosote wood-preserving stains have been used. The collection of sketches includes samples of nearly all the modern styles of architecture, while the authors of the plans embrace some of the leading architects of the country. Considered from an artistic standpoint the pamphlet possesses much of interest and value, and we have no doubt that it will prove an acceptable addition to the library of architects and builders throughout the country.

A FIREPROOF FURRING of sheet metal intended for incasing iron and wooden columns and beams, and also for use in other places about buildings, is being introduced by E. Van Noorden & Co., 383 Harrison avenue, Boston, Mass. They request the trade to send for illustrated circulars.

WILLIAM R. PITT, 92B Chambers street, New York, is offering a line of steel folding gates and ornamental ironwork, including grills and office inclosures that are of special interest to architects and builders.

THE INDIANA MACHINE WORKS, Fort Wayne, Ind., announce to the trade that their descriptive circulars, including estimates, are furnished to all applicants. Two machines are illustrated in their card, which appears in another part of this issue.

WOOD ORNAMENTS are in demand for various purposes in house-finishing, and we have frequent inquiries concerning their manufacture. Those of our readers who are interested in this industry will note the card of the Taft Company, Hartford, Conn., which appears in another part of this issue. This company produce rosettes, borders, escutcheons, corner blocks, panel ornaments, &c., and issue a very complete catalogue.

AN IMPROVED DUMB-WAITER for dwellings, with automatic catch and adapted for any size of shaft, is being introduced by M. B. Sweezey, 120 Twentieth street, Chicago. An illustration of this device will be found in another part of this issue.

WE ARE INDEBTED to the St. Louis *Lumberman* for a little pamphlet containing the rules for inspection and measurement of lumber in the St. Louis market, together with other matter of interest to the trade. Among other things it contains a republication of an article which appeared in that periodical some time since with reference to quarter sawing. It is illustrated with diagrams, and is made up from letters received from different practical sawyers in different parts of the country.

THE VARNEY HEATING & MFG. COMPANY, Leavenworth, Kan., invite our readers to send for an illustrated catalogue of their wrought-iron and steel warm-air furnaces. This line of heaters has the special advantage of being constructed for Western coal.

THE ROLLSTON MACHINE COMPANY, 43 Water street, Fitchburg, Mass., present in another part of this issue a list of second-hand wood-working machinery which they have on hand for sale. They inform our readers that these machines were taken in exchange trade for new tools, and have been thoroughly overhauled at their works and made ready for shipment. This would seem to be a favorable opportunity to secure good machines at low prices.

J. C. HENDERSON & CO., 196 River street, Troy, N. Y., show in another part of this issue the tubular dome furnace in the form that is applied for brick-setting. C. H. Henderson is the agent for Kansas City, Mo.

CHARLES E. LITTLE, 59 Fulton street, New York, is the Eastern agent for W. F. & J. Barnes' workshop machinery. Mr. Little offers these well-known goods at factory prices, and tenders catalogues and price lists to all applicants.

GEORGE F. BARBER, of Nashville, Tenn., whose house designs are known to many of our readers, is offering what he calls the "Cottage Souvenir," a collection of low-cost houses. His card will be found in another part of this issue.

MR. I. P. FRINK, of 551 Pearl street, New York, of Patent Reflector fame, whose reflectors are extensively used with gas, oil, electric and day light, has orders now on hand covering a great variety of buildings, among which are: Eliot Street Congregational Church, Newton, Mass.; St. George's Church, Astoria, N. Y.; Baptist Church, Bristol, Conn.; Tabernacle Baptist Church, Brooklyn, N. Y.; Centenary M. E. Church, Jacksonville, Ill.; Pilgrim Congregational Church, Duluth, Minn.; Garland Street M. E. Church, Flint, Mich.; Free Reformed Church, Jersey City, N. J.; First Presbyterian Church, Englewood, N. J.; Cumberland Presbyterian Church, Murfreesboro', Tenn.; the Court-House at Las Animas, Col.; Town Hall at Wickford, R. I.; the Assembly Rooms of the School Buildings at Mechanicsville, N. Y., and Galveston, Tex.; the art galleries of David C. Lyall, Brooklyn, N. Y.; W. H. Hogencamp, Paterson, N. J.; Chatelet Club, Newark, N. J.; Opera House at Wilkesbarre, Pa., and Paris, Mo.; retail carpet department of Arnold, Constable & Co., New York, and Heath & Drake, Newark, N. J.

THE PEERLESS BRICK COMPANY, of Philadelphia, favor us with a souvenir of the third annual convention of the National Association of Builders of the United States, recently held in that city. It consists of four cards, each handsomely printed and containing matter relating to the company and its business. The cards are of a very delicate shade of pink and the illustrations printed in such a manner as to suggest steel-plate work. The souvenir is of very appropriate design, and we have no doubt that it will be treasured by all into whose hands it may come.

ON FRIDAY, February 22, the winter term of the St. Louis Academy of Architecture and Building was brought to a close. The examination of the students showed the progress that had been made, and their work in drawing and modeling was commended by the examiners. The object of this school is to educate carpenters, bricklayers, stone-masons, &c., and to raise the standard of the trade and render those engaged in it more competent to discharge the duties of their profession. The course is divided into three terms of 12 weeks each, so placed as to enable future master builders to work during the summer and study during the winter.

THE CANTON STEEL ROOFING COMPANY, of Canton, Ohio, are distributing among their friends in the trade an interesting little pamphlet of convenient pocket size, devoted to specialties manufactured by the company. Full information is presented relative to the roofing made under the H. W. Smith patent. The cost of roofing is considered; also the durability of steel roofing, and a great deal of other information of special value to those engaged in the roofing business will be found within its covers. The little pamphlet is profusely illustrated, and gives diagrams which will be found of service in ordering roofing material.

MR. W. H. CALDWELL, of Rochester, N. Y., reports a very gratifying demand for the Caldwell sash balance, an illustrated description of which appeared in our columns a short time ago. The device is meeting with much favor among house-owners and builders, and is being rapidly introduced to the trade in all sections of the country. The latest triumph is its adoption by Everson & Co., hardware dealers, Syracuse, N. Y., in their new fire-proof seven-story block. The manufacturer states that among recent orders was one for Japan for a large quantity of these devices.

THE O'DONNELL & BARRETT ELEVATOR COMPANY is the name of a concern which has recently been incorporated at Cleveland, Ohio, for the purpose of manufacturing steam, hydraulic and hand passenger and freight elevators of all kinds. The gentlemen composing the firm have been engaged in the manufacture of elevators for a number of years, but in order to increase their facilities have formed a stock company. Branch offices have been established in New York City, New Orleans and Columbus, Ohio.

A CIRCULAR LETTER issued by the Cincinnati Corrugating Company refers to their Sheet Metal Lath in the following terms: "By improvements which we have made in the machinery and processes of manufacture of this lath, we are now enabled to furnish it in the forms most approved by the architectural profession and builders generally, and also at a price which will compare very favorably with the wire cloth or any other improved lath now on the market. Hence, as can be readily seen, there is a great advantage in the corrugated metallic lath as we now make it, on account of its great rigidity, the fact that it can be adapted to any kind of furring, to special curved surfaces and between large spans where it would evidently be impossible to use the wire cloth. Another great advantage consists in the fact that it requires no stretching in putting it on, which makes it very difficult to make a good job, unless by an expert in the business and very careful work; that is to say, it would be almost impossible with our lath to slight the work, as in the case of many other kinds."

THE GOULDS MFG. COMPANY, Nos. 28 to 38 Ovid street, Seneca Falls, N. Y., and No. 60 Barclay street, New York City, present an announcement of their goods in this issue under the general title of "Free Water and Fire Protection." The explanation of this somewhat curious announcement is to be found in their No. 20 catalogue, to be sent to all applicants.

THE WARREN-EHRET COMPANY, 428 Market street, Philadelphia, desire builders to communicate with them for samples and prices of rosin-sized sheeting, asbestos building felt, prepared roofing, sanitary parchment, deadening felt and other specialties.

THOSE OF OUR READERS who are looking for small motors, desiring something that is free from the objection of boiler, coal bill, engineer, extra insurance and water rent, will be interested in the announcement of the Van Dusen Gas Engine Company, No. 71 East Second street, Cincinnati, Ohio, which appears in another part of this issue.

DALTON & INGERSOLL, of 59 Purchase street, Boston, Mass., by means of an illustrated four-page circular, are directing the attention of the trade to the Boston Syphon Closet and Cistern, provided with an improved float valve. The construction of this closet is such as to contain a large body of water in the bowl, and at its outlet is provided with the manufacturers' patent floor connection, for which strong claims are made. It is practically noiseless in operation, while the valve is automatic in its action.

WE HAVE RECEIVED from William Connors, 171 Hill street, Troy, N. Y., a circular, sample cards and other advertising matter relating to the American Seal Ready Mixed Paints. One of these relates to family colors for inside and outside work; another to floor paints, and a third to wall paints. A larger circular relates to regular house paints for inside and outside work. The colors shown are brilliant, and are prepared and put up in a very attractive form.

LAWRENCE & MEDENHALL, 197 West Fourth street, Cincinnati, send us a catalogue of building and hardware specialties which they have just issued. They are manufacturers' agents for the following: American Terra Cotta Company; Pecora Mortar Stains; Anti-Kalsomine; Plastice; Willer's Sliding Blinds; Boda House Finishing; Hodges' Metal Lathing; Johnson's Parquetry Flooring; Pullman Sash Balance; Gilbert Locks and Knobs, Rolling Shutters and other goods.

# NEW PUBLICATIONS.

MONCKTON'S PRACTICAL GEOMETRY. By James H. Monckton. 5 x 7½ inches in size. Illustrated by 42 full-page plates. Second edition, revised. Published by William T. Comstock. Price, $1.

This little work consists of a series of lessons in geometry covering such problems as are likely to be found of interest and value to every class of mechanics, and which are needed for instruction in mechanical schools. In the arrangement of the matter the problems occupy the right-hand page, while the complete explanation is given a place on the facing page, rendering reference easy and convenient. The drawings are well executed, the lines being clearly defined and the lettering accurate and distinct. In the introductory pages a few remarks are presented upon the subject of drawing tools and materials required and the proper method of using them, which will be found useful to the student of geometry. Mr. Monckton and his works are pretty well known to the readers of *Carpentry and Building*, and therefore do not call for extended introduction at this time.

Just as we go to press with this number we have the advance sheets of a new work on stair building, entitled the "Nonpareil System of Hand Railing," by J. V. H. Secor. The author is well known to many of our readers as a practical stair builder of long experience, and a writer who presents his ideas in a manner to interest and instruct his fellow mechanics. We shall refer to this work at some length at another time.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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## NOTES AND COMMENTS.

IN THE building trades the first of April always marks the beginning of a new year, and the several branches of the industry name that day upon which to enforce either a new scale of wages or a reduction of the hours of labor. In the present year the various branches of the building trades in this city have met with considerable success in securing the adoption of their scale. The framers report a few small strikes for the advanced union scale, which is 40 cents an hour for nine hours' work five days in the week and eight hours on Saturday, but it is stated that every important employer in the city signed the contract. The painters, organized in the Co-operative Painters' Union, the German House Painters' Union and the Brotherhood of Progressive Painters, agreed upon a scale of $3.50 for nine hours' work for five days and eight hours on Saturday, and this scale has been accepted by practically all employers of painters. The Granite Cutters' Union asked for an advance of its scale from $3.50 to $4 a day, with the same hours of labor as above mentioned, and up to the hour of latest advices the terms were accepted by the employers of the 250 members of the trade working in this vicinity. The scale of the unions of Progressive Varnishers and Custom Varnishers is $3 a day, and a new rule for limiting the number of apprentices is said to have been adopted. It is also understood that the locksmiths' and rail-makers' unions have prepared a new contract. Altogether there has been less trouble in the building trades in New York and vicinity than was generally expected some time ago. There has, however, been considerable trouble in some of the other cities, strikes being reported from both Western and Eastern States. The chief difficulty has been in St. Louis, where something like 1700 carpenters went out on strike. At Buffalo there was a strike of nearly 1000 carpenters and painters, but this was of short duration.

FROM INDICATIONS which cannot fail to be apparent to the careful observer, some of the trades unions of this country are beginning to realize the necessity of apprenticeship, and are taking steps calculated to result in benefit to all concerned. The public mind has recently been called to the subject by the action of the United Carpenters' District Council of Pittsburgh and vicinity, representing 30 United Brotherhood of Carpenters' Unions, in adopting apprentice and working rules which have been approved by the General Executive Board. The apprentice rules, which went into effect May 1, state that the members of the unions believe the indenturing of apprentices is calculated to make the most proficient workmen, and that under this system the best returns can be made to employers who desire to turn out competent workmen. Any boy under 21 years of age may engage to learn the trade, but must serve four consecutive years. Such apprentice, however, must be indentured in writing and also registered in some local union of the United Brotherhood in the district. All local unions must keep a list of age and time of indenture of all apprentices and the name of employer, and submit a copy to the District Council. The apprentice under no circumstances shall leave his employer unless with his full consent, except under certain exigencies that are amply provided for. The working rules constitute nine hours as a day's work and time and half time for all overtime. Sundays, Christmas, July 4, Washington's Birthday, Thanksgiving and Labor Day shall be double time. Two dollars and seventy-five cents shall be the minimum wages, except by permission from the local unions and approved by the District Council.

THE TRAINING for the professions which come in contact with the numerous manual trades is at present attracting some attention. The architect, it may be said, has more intercourse with a great variety of trades than any other specialist in the department of engineering. To give general satisfaction, and afford each trade employed in the construction of a building a fair opportunity to carry out their portion of the work, an architect requires more than a superficial knowledge of the various businesses. As we have mentioned before, a practical step to acquire a proper insight to some of the trades has been taken by the School of Architecture of Columbia College, the students in which have just finished attending a course of lectures on practical plumbing and masonry at the New York Trade Schools. The good effect of this short course will, we believe, be thoroughly appreciated when the young architects begin their active professional life, and if, in addition to this knowledge of plumbing and masonry, they could in a similar way acquire familiarity with the other trades, such as carpentry, plastering, roofing, heating, &c., a still greater benefit would result. Such technical education of architects will meet with the approval of the members of all trades, as its effect will prevent the collisions and bungling that now occur between them during the construction of a building. It will be more satisfactory for a contractor to cooperate with a professional man who has enough practical knowledge of the work in hand to be able to appreciate what its requirements are than to have to act with a man who has only a superficial knowledge attained by hearsay or accident.

THE MULTITUDE of great mechanical accomplishments of the past half century has bred in people such a degree of indifference that hardly any wonderful or startling thing is given more than passing attention. The Eiffel Tower, which is to be the feature of the coming exposition in Paris, affords a striking instance of the decay of the sentiment of wonder. The newspapers, especially foreign ones, give it considerable attention, but after the first surprise with which the project was regarded the public everywhere outside of Paris contented themselves with showing a lazy interest in the progress of the work; and we venture to say that even now there are thousands of newspaper readers who are unaware that the work is completed, or if questioned could give any definite information about the bigness of the tower. We have referred to the structure occasionally during the progress of its building, and now that it is completed a few words by way of summary may obtain notice. The idea of erecting a colossal tower (in modern times) dates back to 1832, when Trevithick, the famous English engineer, proposed to build a 1000-foot cast-iron tower as a memorial of the passage of the Reform bill. The project was revived at the time of the Centennial Exposition at Philadelphia, but no definite steps were taken in the matter. Finally, when the Paris Exposition was assured, M. Eiffel proposed to construct a tower 300 meters high provided he was granted certain rights and assistance. His proposition and the plans of the tower proving acceptable, work was begun in the fall of 1886. The engineer whose name the tower bears was well qualified for the stupendous work he had undertaken, for his occupation for many years had been the erection of long-span bridges and other large structures in all parts of the world.

THE LOWEST PART of the tower consists of four legs, rising obliquely from the corners of a square, the sides of which would measure about 360 feet. At a hight of 190 feet these legs support the first stage or platform, 220 feet square, around the outside of which is a promenade, while the main platform in the middle will be inclosed and used for restaurants. The next gallery is about 380 feet from the level of the ground, above which the booms or legs unite, and are carried up to the third gallery, which is supported at an altitude of 905 feet. Upon this third gallery a campanile or cupola tower is built 79 feet in hight, which makes the total hight of the Eiffel Tower 984 feet, or 300 meters. The cupola is topped with a flag-staff, which serves as a lightning rod, and it is proper to mention here that the danger to the tower from lightning, owing to its extreme hight, and the fact that it was a metallic structure, was considered by a special commission, who devised a careful system of protection. For the ascent of the tower both elevators and stairways will be provided. From the ground to the first platform there will be four elevators and four stairways, the latter being straight and having frequent landings. Above the first platform a spiral stairway ascends to the cupola at the very top, the total number of steps, counting from the ground, being 1700. Between the first and second platforms there will be two elevators, while a single elevator will run from the second to the third floor. Those who care to go still higher will have to mount to the cupola by the spiral stairway. The total weight of the ironwork of the tower is 6500 tons, the weight of the rivets alone, of which there are 2,500,000, being 450 tons. It should be noted that the tower is not built of steel, but of wrought iron, the use of the latter material increasing the weight somewhat, but on account of the greater stability thus secured this was not a disadvantage. When the enormous size and hight of the structure are considered it seems almost incredible that so little material was used, the fact being that a horizontal section close to the base contains but 32 square feet of solid iron. The nearest approach to the Eiffel Tower in point of hight is the Washington Monument, which rises to an altitude of 555 feet, or but little more than one-half the hight of the former, while Cologne Cathedral, the next in order of hight, is 525 feet.

## The Idea in Art.

Speaking of the "Idea in Art," J. S. Blackie says:

The value of the Platonic idea may be shown by an illustration from the region of the beautiful. The marble figure which some stone-working poet has baptized a Corinna or a Sappho, and whose features, expression and attitude combine all that is most dignified in a queen, all that is most simple in a shepherdess, all that is most inspired in a poetic thinker, and all that is most attractive in a Venus—this figure, for the possession of which to adorn their museums the heads of great monarchies will contend with rival diplomacy and emulous gold, when dashed to pieces by a sudden precipitation is only so much lime which the farmer can fling upon his land like straw or dung or any other refuse. Its value is gone as soon as it has lost its form; the material is common and worthless. Whence, then, is this form, this ειδος (*species*), the superaddition of which imparts so much value to an otherwise trivial material? Whence did it come, and what is it? It is plainly neither more nor less than an image impressed by the plastic power of mind on a material utterly destitute of formative force, and the value of the work consists altogether in the amount of this force, or organizing intellectual energy, which has been made to act upon it from without. But this formative force is a thing altogether bloodless and untangible. Shatter the substance of the finest statue in the world to pieces, and the amount of calcine substance or earthy matter of lime remains the same as before the disintegration. It follows, manifestly, that the only real element in the admired object is that which according to common phraseology has no reality in it, viz., the idea in the mind of the artist which has been transferred to stone. This idea is, in fact, the only thing which truly exists so far as the work of art is concerned. It is the only thing also that possesses permanency; for whereas the marble may be broken at any moment, the idea may at any time be recovered from the intellect of the artist where it was originally generated, and where it permanently resides. That the ideas which belong to genius or original creative power are innate, in the highest Platonic sense of the word, most people will be willing to concede. For, if not, why cannot every eye see in a daisy as much as a Burns or a Wordsworth saw? Why is not the physiognomy of every dog as eloquent and as pregnant with profound expression to me and to you as it was to Landseer? A common observer "wants the eye" to see in common objects what the great artist sees—that is to say, he wants an internal plastic and organizing force; for it is by this mental force only, and not by mere pupils, corneas, retinas, and other apparatus of mere sensuous vision that the man of genius obtains his superior insight.

## Ancient Chimneys.

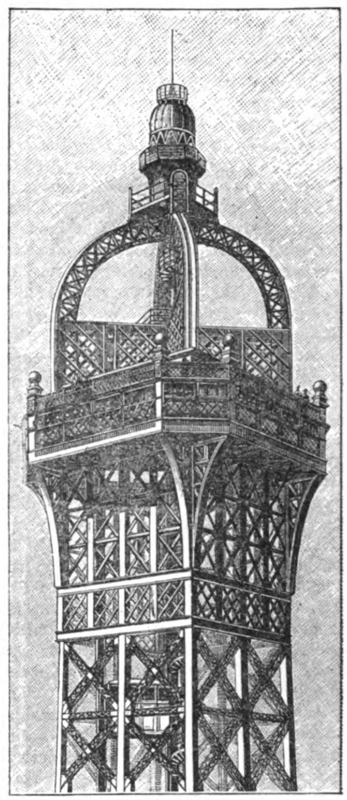
Just when chimneys were invented is, perhaps, impossible to define. Sir W. Gell, writing upon this subject, says:

Chimneys certainly existed in Greece, for not only does a scholiast speak of tubes and canals for smoke, but Aristophanes, in "Vespes," mentions a person who, being imprisoned in a house, escaped, or tried to escape, by the chimney. Appian says, on one occasion, that some tried to escape through chimneys. "In fumariis et summis tegulis se abscondisse." The testimony of Horace and of Juvenal, who talk of smoky houses, "fumosos" and "lachrymoso non sine fumo," seems to make it probable that the people suffered from the want of them; and Vitruvius gives no account of such an invention. They not only burned, in the better apartments, a more expensive sort of wood, which, from emitting no smoke, was called *acapna* and *amurca*, according to Martial, but, from a carpet found spread on a mosaic pavement, upon which stood a *bracciero* or *foculare*, with the charcoal in it, in a room at Pompeii, it is evident that the inhabitants used the same process for heating their chambers as the moderns of the same country previous to the introduction of chimneys by our countrymen. The modern Greeks, on the contrary, have fires and chimneys in their rooms. It is, however, certain that, in a shop, and in a chamber of the Temple of Isis, chimneys may be found at Pompeii. Chimneys existed also at all times in the kitchens of the south of Italy.

## The Manufacture of Roman Bricks.

In a recent number of one of our English contemporaries Mr. J. Tumer presents the following particulars relative to Roman bricks and their process of manufacture:

They had several sizes of bricks, one of which they called bipeda, or 2 Roman feet long; another, didoron, about 6 inches broad and 1 foot long. In Palladio's time artificial stone or bricks were called quadrels, and, according to Pliny, those chiefly used were 1½ feet long and 1 foot broad, which also agrees with the size mentioned by Vitruvius, though Alberti says: "We see in some of their buildings, and especially in their arches, bricks 2 feet every way." He afterward remarks that in several of their structures, particularly in the Appian Way, were several different sort of bricks, some smaller and some bigger, and he mentions having seen some not longer than 6 inches, nor broader than 3 inches, and 1 inch thick, but these were chiefly used in their pavements and edgewise. Palladio observes, bricks may be made bigger or smaller, according to the nature and quality of the building and the use to which they are designed. They also made bricks of other forms than those enumerated. "I am best pleased," says Alberti, "with their triangular ones, which they made in this manner; they made one large brick 1 foot square and 1½ inches thick; while it was fresh they cut it in two lines crosswise from one angle to the other, which divided it into four equal triangles. These bricks had the following advantages: They took up less clay; they were easier to dispose of in the kiln and to take out again; they were more convenient for working, because the bricklayer could hold four of them with one hand, and with a small stroke divide one from the other; when placed in the wall they appeared like complete bricks of 1 foot long. Some of these bricks are to be seen in the walls of Rome, particularly that part built by the Emperor Aurelian." Hope



*Top of the Eiffel Tower.*

speaks of bricks being made in the form of lozenges, and some were even molded, or were, after being cemented together in regular layers, carved out into every variety of architectural ornament, as we see at Rome in the remains of the Amphitheatrum Castrense, of the temple of the god Ridiculus, and in another building, where even the capital and foliage of the Corinthian order are cut out of solid masses of brickwork. With regard to the method of manufacture, we learn from Vitruvius that a red or chaldy white earth, of a strong sandy nature, mixed with straw, was considered the best, on account of its not being heavy, which it was thought better to dig in the autumn, and make it into brick early in the spring; after they were molded they were placed in the shade to dry, and, when made properly, they were not put into the kiln for two years afterward. Alberti says the ancients mixed marble with the red earth; and it was also customary for the Romans as well as the Egyptians to inscribe and impress their bricks with various devices. In the bigger sort holes were left, that they might dry and burn better.

## The Eiffel Tower.

The general characteristics of the famous Eiffel tower at the Paris Exposition, now completed, have become familiar to all through the drawings printed in the illustrated press. The magnitude of the work is hardly appreciated, however. No drawing gives so adequate a conception of the structure as the accompanying perspective view, for which we are indebted to the *Génie Civil*, whose editor, Max de Nausonty, eloquently describes the impression it makes. The photograph, which embraces that part of the tower below the first story, was taken at a short distance from the base, showing its four legs, in which the elevators will run.

In the illustration on page 88 a general view is presented of the campanile or cupola that crowns the tower. This part of the structure rises about 79 feet above the highest platform, and the top of the cupola, which is 984 feet above the ground level, supports a flagstaff, as shown in the engraving.

*The Eiffel Tower—Perspective View from Below.*

## Cleaning Metal and Stonework.

During the year 1886 the masonry and ironwork of the Madrid and Baudin bridges at Paris, says *Engineering*, were thoroughly cleansed by Mathieu and Peigné, who work the processes of M. de Liebhaber. These processes, which are purely chemical in their nature, were at first applied solely to the cleaning of limestones, but in these bridges materials of a very different nature were successfully dealt with. The surfaces to be cleansed are submitted to the action of a jet of mixed hydrochloric and sulphuric acids, and left for two or three hours, when they are well brushed, and finally washed down with a water-jet, which completes the process. In the case of limestone masonry, the hydrochloric acid unites with the calcium, forming chloride of lime, which is then decomposed by the sulphuric acid, forming a calcium sulphate, this being precipitated on the face of the stone, and containing all the impurities, which are then removed by the action of the brush and of the water-jet. In many cases this acid treatment will not succeed unless the stone is previously prepared, as the masonry frequently becomes coated with a black and shining deposit of all the impurities contained in the atmosphere of a large town, which entirely prevents the acids reaching the stone. In this case M. de Liebhaber, before applying the acids, covers the stone with an alkaline paste, consisting of a mixture of carbonate of soda and calcium hydrate, which he has named "tolugene." This paste is spread over the face of the masonry with a trowel to a thickness of from ½ to 1 mm., and left there for from three-quarters of an hour to an hour, when the excess is quickly washed down and brushed off, and the acids applied as previously described. In cleaning ironwork the "tolugene" alone is used; it is spread over the work either with trowel or brush, and in the course of an hour or so will have united with all the oil of the paint, leaving the red lead on the work in the form of a dry powder, which can be easily washed off with a jet of water. The metal is said to be cleansed much better than by the older method of burning and scraping off the paint. For cleansing brickwork M. de Liebhaber makes use of the property which hydrofluoric acid possesses of separating the silica from silicates. The work is first painted with a solution of ammonium fluoride, and this immediately afterward is treated with a jet of concentrated sulphuric acid, which liberates hydrofluoric acid *in situ*, and this immediately attacks the silicates, robbing them of their silica. The whole surface is afterward thoroughly washed with water. With regard to the cost of the processes, a total of 502 square yards of masonry, of which about 165 were sandstone, were treated at the Madrid Bridge at a cost of from 6/7 to 8/4 per square yard, and brickwork at the Baudin Bridge cost 8/4 per square yard, the prices including the cost of erection of such scaffolding as was necessary. With regard to the ironwork, the contract price was 10d per square yard for plain work, and 1/3 per square yard for molded work, but the contractors are said to have lost money in carrying out this part of their contract.

## NEW PUBLICATIONS.

**The Nonpareil System of Handrailing.** By John V. H. Secor; 78 pages; illustrated with 157 engravings. Published by The Office Publishing Company. Price $2.

The author of this work is a well-known practical stairbuilder of many years' experience, who has brought out the above treatise on handrailing at the earnest solicitation of numbers of his fellow workmen more or less familiar with the system. His aim has been to lead the learner step by step from the simplest problems to those of the most complex character, and so defining principles and illustrating methods as to make him competent to execute any job that may arise in practical work. One of the leading features of the book is the method of ascertaining the length of mold. The system of bevels presented is also simple and of universal application. In order to make the system easily understood the author has first introduced the simplest problems, using the fewest lines for illustrations. Following these are problems with a gradually increasing number of lines, which are given for the purpose of fully illustrating the principles of the work. After these we find problems the number of lines in which gradually decrease toward the close of the book, which concludes with those problems involving as few lines as it is possible to employ in handrailing. It is not intended to teach the art of stairbuilding by means of this little work, but rather to enable any one in the line of joinery to draw the molds for any kind of stairs that may have been constructed. A number of pages are devoted to a glossary and simple geometrical problems, following which there are presented 18 problems, constituting the key to the system. In these problems the portion of cylinder to be covered by a rail and the tangents in elevation are given. In order that the reader may be able to gather a better idea of the problems contained in this work we present the following selection from pages 19, 20 and 21:

Fig. 42.—*An Acute Base Having Unequal Pitches Requiring Two Bevels.*—Let A B C D be the base or ground plan, and E the center from which the curve line is described. From A to F set up the full hight. From B erect the perpendicular indefinitely. From F apply the pitch, cutting the perpendicular at J. From B as center and B C as the radius describe the curve C G. Connect G J, giving the length of short tangent. For major length, take A for a center and A C as the radius, describe the curve C H and connect H F, giving length required.

*To Find the Point for Sub-Normal.*—From J draw the line J K parallel to A B, cutting the major length at K.

*For Minor Length of Mold*, extend the tangent G J, as indicated by the dotted line, cutting the perpendicular at Y. Then erect the perpendiculars from D E O P R. Let D M equal F Y, and connect M B, which gives the minor length of mold as required. Then S T U will be the width of mold as applied at Fig. 43.

Fig. 43.—Let 1 3 equal F H, 1 2 and 3 4 equal F J, and 3 2 and 1 4 equal J G, completing the parallelogram. Make all points on the minor length from 2 4 equal all points from B M. To find the sub-normal, let 1 9 equal H K, and connect 9 4, giving sub-normal. From 5 draw the minor axis, parallel to 4 9, and at right angles draw the major axis. The minor axis is the normal point of mold, as explained in Figs. 37–39. Again the points 4 and 5 are reversed from those in Figs. 37–39, &c., 4 in each case forms the parallelogram, and 5 corresponds to the ground plan at E, and from which the curves are described. Then 5 will be plumb over the point E when in position, and must be the center of axis. The chord lines are drawn from 5 to 1 and 5 to 3. For the width of mold at ends proceed in the manner already described, no further explanation being required.

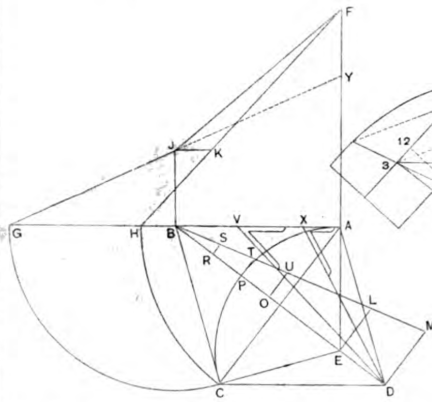


*Fig. 42.—Acute Base with Unequal Pitches.*

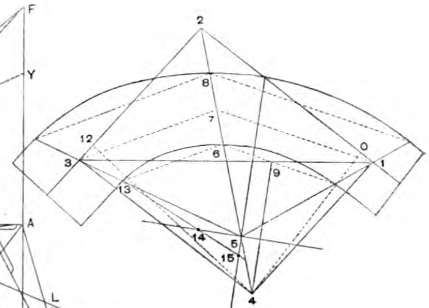


*Fig. 43.—Manner of Drawing Mold.*

*For Bevels* in like manner as described. D X equals 4 0; then the angle at X is the bevel for the long tangent. Let V D equal 4 12; then the angle at V is the bevel for short tangent.

*For Length of Trammel-Rod.*—Let 13 14 equal E O, extend to minor axis at 15, giving length required. Find outside length in the same manner.

The following illustrative problem will be found on pages 27 and 28 of the little work referred to:

*An acute angle base with an elliptical curve, having tangents of equal pitch, and requiring one bevel to be applied at both ends.*

Fig. 58.—Let A B F E be the portion to draw the mold, with C D added. From A to G set up the full hight. With radius B C describe C H, connect G H, giving length and pitch of tangents. With radius A C describe C K, and connect G K, giving major length. From J B erect the perpendiculars, cutting the tangents at M and L. Draw S T parallel to A B, the distance between to be equal to the width of mold at its normal point, and where the bevel D P crosses this line will be the width of the mold at the ends P and V.

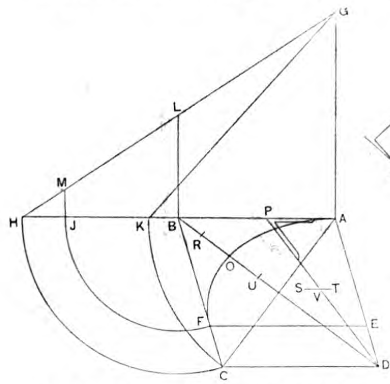


*Fig. 58.—Acute Angle Base, Elliptical Curve, Tangent of Equal Pitch.*

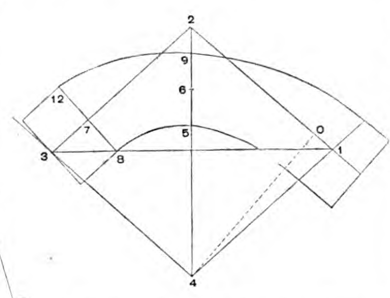


*Fig. 59.—Manner of Drawing Mold.*

Fig. 59.—Let 1 3 equal G K; 1 2 and 3 4 equal G L; 3 2 and 1 4 equal L H and complete the parallelogram. Connect 2 4 as the minor length. Let 4 5 6 9 equal D U O R. Let 8 12 equal P V as the width at both ends. Complete the mold by drawing the curved line through the points indicated. For joints on short tangent, let 2 7 equal L M, and draw square from tangent, giving point required. For the bevel, let D P equal 4 0; the angle at P will then be the bevel required for both ends of the mold.

The following problem is found among those for general practice, and appears on page 41:

*A plan of stairs with winders at the landing, having four risers in the cylinders, to which straight treads run.* In this case there will be no ramp, but the mold will have two pitches, forming a half easement. Scale, ¾ inch to the foot.

Fig. 86.—Let A B C E I be the line of tangents. From D stretch out the tangents as shown, making three spaces equal to D C, D H being the floor line. From D drop four risers contained in the cylinder at K. From K draw the elevation of steps and risers outside the cylinder. Locate the short balusters as shown at L M by the dotted line. From this line set off half the thickness of the rail, and draw the tangent from these points extending to N. From the floor line at H set up 5¼ inches to the center of the rail on the landing at J, and connect O J, giving the length of tangents. For major length of mold let S R equal E D and connect R T, giving length required. For the minor length proceed in the usual way, as shown at D E F; this needs no further explanation.

Fig. 87.—Let 1 3 equal T R; 1 2 and 3 4 equal P O; 1 4 and 3 2 equal O T, and complete the parallelogram. For the bev-

els take the length 4 5 and 4 6, and place them on the elevation from W to U Y. Lay off the width of the rail, as shown, below the bevels, and extend the line at the side, cutting the bevels at X V. For the width of the mold at the ends, X W for the long tangents at 3, and W V for the short tangent at 1; make the points on indefinitely. At any convenient point below A space off six risers, as at N O; draw the elevation of steps and risers from the perpendicular B; from P and Q as the center of the short balusters set off half the thickness of the rail. Draw the center line of the rail as the tangent extended to R. From X X as the floor line set up length required. For the minor length from H, set up J 7 equal to F 6 V; connect J 7 F for the length requir:d. Find the width of the mold on the minor length in the usual way, as at O O and P P.

Fig. 115.—Let 1 3 equal Z B 2, 1 2 and 3 4 equal S Y, 1 4 and 2 3 equal S B 2, and connect 2 4. Let 4 5 6 equal C 3, D 4 and E 5. For the bevels draw a line parallel to 1 3, the distance from 4 to be the same as from B to the nearest point X X on the line A D. Let 4 8 equal 4 7, touching the parallel line. The angle at 8 will be the bevel for the end at 13. Let 4 12 equal 4 9, touching the parallel line.

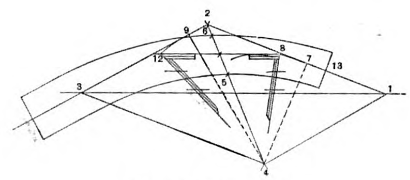


*Fig. 115.—The Mold.*

The angle at 12 will be the bevel for the end at 3. For the joint at 13 let 1 13 equal V Y as the borrowed length; mark the joint at right angles to the tangent; add the straight wood required. Find the width of the mold for the ends by the bevels in the usual way, and complete the mold by drawing the curve.

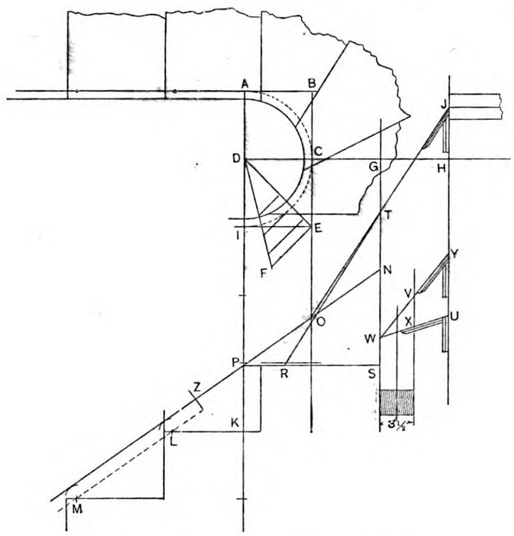


*Fig. 86.—Plan with Four Risers in Cylinder.*

minor length 2 4, the same as from D to F. Draw the curve and complete the mold. Let the straight wood 1 7 equal P Z, sections at 8 and 9 showing the end of the twist as squared from the plank.

The following example is taken from pages 55, 56 and 57:

*A plan of stairs starting with four winders, the cylinder being a thumb ellipse. The flight piece of rail will be an obtuse base. The starting or easement will be acute. The straight treads start from the chord line—no ramp required. Scale, ¾ inch to the foot.*

Fig. 114.—Let A B E be the portion for the flight or upper piece. Draw the par-

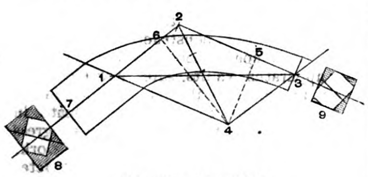


*Fig. 87.—The Mold.*

allelogram, all sides equal to A B. Then A B C D is the parallelogram. The starting will be E F G H, with 1 as the center

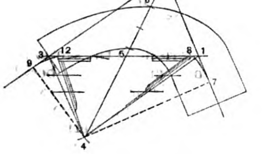


*Fig. 116.—The Mold.*

from which the curve is described. From B as center draw E J C K and F L. From L set off to M, equal to F G. From the points A B J K L M drop perpendiculars 4 inches and half the thickness of the rail at T. Connect T S, giving length of tangents. For the major length of Fig. 115, let A I Z equal A C and connect Z B 2, giving length required. For the minor

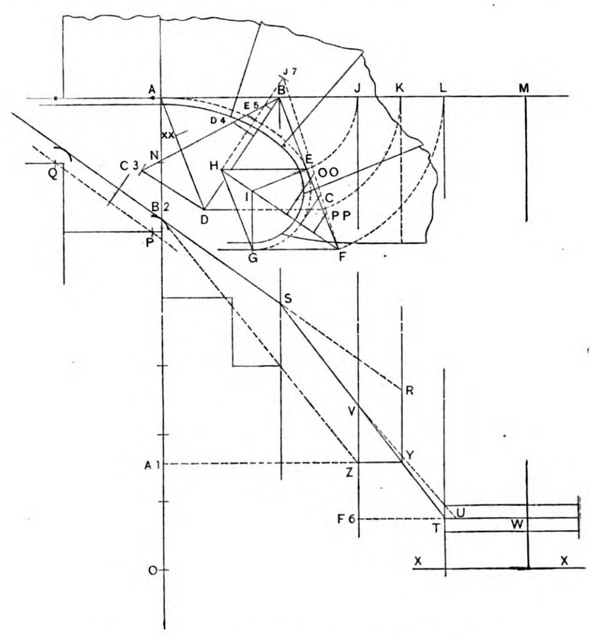


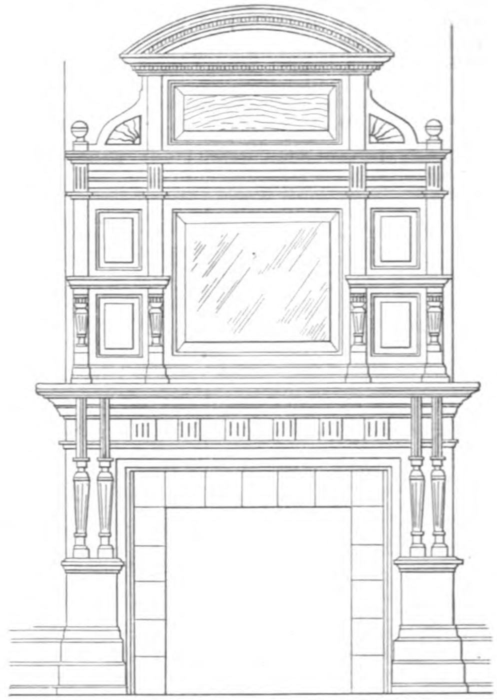
*Fig. 114.—Thumb Ellipse, Acute and Obtuse Angles.*

length let D C 2 equal Y R and connect C 3 B, giving the length required. Find the width of the mold on the minor length in the usual way, as indicated at D 4 and E 5. For the minor length of Fig. 116 see Fig. 114 preceding. Let U F 6 equal E G and connect U V, giving

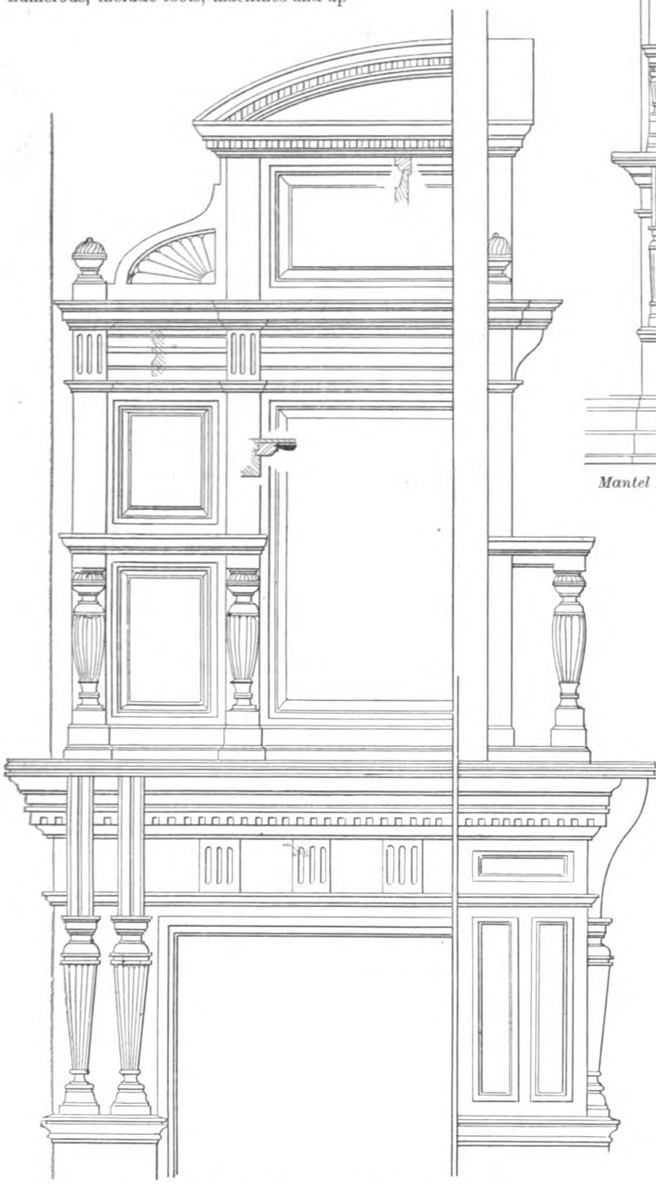
Fig. 116.—Let 1 3 equal U V, 1 2 and 3 4 equal T W, 1 4 and 3 2 equal T V, and connect 2 4. Let 4 5 6 equal J 7, 0 0, P P. From 4 draw the parallel line equal to the distance from G to the tangent E F; in this instance it is over the line 1 3; or in other words, the line 1 3 is the required line. Let 4 8 equal 4 7, then the angle at 8 will be the bevel for the level end. Let 4 12 equal 4 9, then the angle at 12 will be the bevel for the end at 3. Add the required straight wood from 1, find the width of the mold for the ends by the bevel in the usual way, and complete the mold by drawing the curve.

**Fret Sawing.** The Art of Fret Sawing and Marquetry Cutting. By David Adamson. 60 Illustrations: 158 pages: bound in cloth. Publishedby Ward, Lock & Co.

Amateurs who make use of scroll or fret saws experience the need of a manual of instruction. The little pamphlet which Mr. Adamson has compiled, and which the well-known house of Ward, Lock & Co. have published, is a complete guide for the amateur and professional, and contains full and practical directions for reproducing and making up marquetry inlays and other descriptions of fret-work. The chapters refer to tools and appliances, materials and lessons in cutting. The illustrations, which are carefully selected and numerous, include tools, machines and appliances, as well as designs. The volume is attractively arranged and printed in clear type on good paper.



*Mantel Designed by C. W. Sumner, Buffalo, N. Y.—Scale, ½ Inch to the Foot.*



*Details of Mantel.—Scale, 1 Inch to the Foot.*

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**Modern Architectural Designs and Details.** Vol. II. New Series, Nos. 1 to 6 inclusive. 36 Plates. Published by William T. Comstock. Price, $4.

This work consists of the six parts issued monthly under the above title during the period from October, 1888, to March, 1889, inclusive, and bound in one volume in a very neat and substantial manner. The 36 plates, with accompanying explanatory text, of which the work is composed, give details of exterior and interior woodwork drawn to scale, together with a variety of designs and details which are likely to prove useful in the practical work of the architect and builder. Interspersed through the publication are a number of gelatine plates of comparatively recent work by prominent architects. The opening pages are devoted to a general explanation of the drawings embraced within the covers, while the body of the work consists of the plates referred to. The book is bound in a durable manner and is a valuable contribution to architectural literature.

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Report of the Supervising Architect.

We have received from Mr. Will A. Freret a copy of the annual report of the Supervising Architect to the Secretary of the Treasury for the calendar year ending December 31, 1888. The report covers the operations under the control of the office named, and presents a full statement of the acts of appropriation approved, the expenditures made and the balances remaining available October 10, 1888, on account of the construction of public buildings, repairs and preservation, heating apparatus, vaults, safes and locks and plans for public buildings. An examination of the pages of the report indicates in a very comprehensive manner the progress that has been made in the methods of work, more particularly in the artistic character of the post-offices, hospitals, court-houses, custom-houses and other federal buildings of recent construction. The work contains 51 large plates, showing perspective views and floor plans of the structures contemplated, in progress or completed in 30 States and Territories, including the District of Columbia. The designs of the buildings are varied and interesting, and much good taste has been displayed in adapting many of them to the architecture most characteristic in the sections in which the buildings are located, besides being suggestive of history. The variety of design is a happy change from the monotonous similarity in external appearance which has characterized public buildings erected under previous administrations of the office of Supervising Architect. The report, considered as a whole, will be found to contain many suggestions in the way of external finish of interest and value to architects and builders in all sections of the country.

### How a Court-House was Heated.

Architects and builders have constantly to do with steam heating. It is in a measure, however, a sealed art, and it is not often that they have the opportunity of inspecting drawings showing just how the lines of pipe are run; how the connections are made; how the radiators are located—save only as they do the work themselves. Steam-fitters very seldom lay down their work on paper, and often they proceed by rule of thumb. If the apparatus works when installed, well and good; if it does not, make changes in it until it is all right. We have pleasure in presenting in our plate pages this month a study in heating which we think cannot fail to be of interest to a large number of our readers. It shows in detail how a prominent court-house was heated, and gives the particulars in a way that will enable architects and builders to study them at their leisure. The following particulars are from *The Metal Worker* of March 2 last:

Among the many rising and progressive cities of the West, St. Joseph, Buchanan County, Mo., is noted for its rapidity of growth in numbers of inhabitants as well as in accumulation of wealth. It keeps pace with all the improvements of the age, having fourteen railroads, nearly five hundred acres of stockyards, electric street-car lines, several theaters, upward of a dozen newspapers, numerous handsome wholesale business houses and bank buildings, and an annual trade of nearly $200,000,000. In the center of the city, on a prominence, stands its court-house, a handsome building covering an entire block. The court-house was built some ten years ago and cost $350,000. It is of brick with stone trimmings. The county jail and sheriff's residence are of stone, and were built some years before the court-house. In January, 1888, the Circuit Judge, O. M. Spencer, the members of the bar and several citizens attending court appeared before the Judges of the County Court, Messrs. Dougherty, Farrell and Kelly, and reported that it was impossible to hold court in the court-house during the cold weather. The method of heating up to this time was by stoves, and large and numerous they were, so much so that it was found impracticable to keep them supplied with coal. The county clerk, who had had the question of satisfactorily heating the building some time under consideration, assured the delegation that before the fall of 1888 the entire building would be heated by steam.

The judges had now undertaken the responsibility of heating in a satisfactory manner a very large building, and they lost no time in advertising for bids for a steam-heating plant. They also requested estimates for lighting the building by incandescent electric lights. Each contractor was invited to prepare his own plan and specification at his own expense and deliver same by the 14th of May, 1888. After a careful examination of all the estimates, plans and specifications, of which there were about ten in number, it was decided that none of them was entirely satisfactory. The greater number of the competitors appeared to make their specifications and plans as close as possible, so as to enable them to be the lowest bidder. These estimates were therefore all rejected. The judges then decided to visit Kansas City, St. Louis and Chicago in quest of information and the experiences of others in the letting of heating contracts of large buildings. They were surprised at the dissatisfaction which so often occurred in the completion of large heating plants, and decided to secure the services of an engineer making the plans and specifications of such work a specialty. They had some difficulty in securing such services, as those competent to give them were usually contractors, and interested more or less in certain appliances. It was apparent to the judges that what they required was a complete plan and an adequate specification of a heating plant to suit the court-house prepared by an independent engineer who was not a contractor.

Without going further into particulars which, however interesting, are more lengthy than we have room for, it may be stated that the judges finally selected John J. Hogan, of New York, to prepare the drawings. The ground plan is reproduced from the drawings he made. The sketches showing lines of pipe are reproduced from the specification. The contract was executed by N. E. Herbert, of St. Joseph, Mo. With reference to the advantages of carefully prepared drawings and specifications, it may be stated that the estimates in the competition based upon Mr. Hogan's work varied only 5 per cent., while in ordinary instances they frequently vary as much as 30 per cent. The work was completed to the satisfaction of all concerned, and Mr. Hogan received a gratifying testimonial from the judges with reference to the efficiency of his work. The annexed table shows the dimensions of some of the rooms and other particulars.

| | Lineal feet of exposed wall. | Square feet of exposed wall. | Square feet of glass. | Square feet of exposed wall less glass. | Radiating surface in square feet. | Average cubic feet of space to one square foot of radiating surface. | Square feet of radiating surface per lineal foot of exposed wall. |
|---|---|---|---|---|---|---|---|
| Sheriff's Residence: | | | | | | | |
| 1st floor................. | 79 | 780 | 232 | 548 | 195 | 46 | 2.46 |
| 2d floor................. | 71 | 639 | 180 | 459 | 160 | | 2.25 |
| County Jail: | | | | | | | |
| 1st floor................. | 192 | 3,648 | 320 | 3,328 | 640 | 71 | 3.33 |
| Courthouse: | | | | | | | |
| 1st floor—Halls......... | 88½ | 1,593 | 600 | 993 | 750 | 181 | 8.46 |
| " Apartments.. | 989 | 17,006 | 5,352 | 11,654 | 4,615 | 55 | 4.66 |
| 2d floor—Halls......... | 40 | 1,040 | 192 | 848 | 565 | 289 | 14.00 |
| " Apartments.. | 103 | 26,258 | 5,914 | 20,344 | 5,700 | 78 | 5.5 |
| Totals.................. | 2,896½ | 50,964 | 12,790 | 38,174 | 12,625 | | |

The length of the court-house from east to west is 220 feet by 200 feet wide, north to south. In addition to this there are the jail and sheriff's residence, the latter being 176 feet from the boilers. The location is on a high hill, all the walls being fully exposed, without any shelter from surrounding buildings or other hills. The space in the apartments heated is 1,059,205 cubic feet; of this, 16,500 cubic feet are in the sheriff's residence, 45,952 cubic feet in the jail, 135,969 cubic feet in the halls on first floor, 254,135 cubic feet in the rooms on first floor, 163,618 cubic feet in halls on second floor and 443,031 cubic feet in the rooms on second floor of court-house. The buildings are substantially built and in good condition throughout, with the exception of the weather doors to the entrances, which might be better arranged to keep out the wind, especially on the western exposure. The basement is 11 feet high, except that part of it in the north wing in which the boilers are located, which is 8 feet high, and the floor of county jail and first floor of sheriff's residence is 20 feet above the floor of this part of the basement. The first floor is 18 feet high and the second floor is 26 feet, except the central hall beneath dome, which is some 50 feet high.

The first floor of court-house has 27 rooms in addition to the halls, the contents of the smallest being 2000 cubic feet, while the largest contains 36,000 cubic feet, and on the second floor besides the halls there are 29 rooms, the smallest having 3000 and the largest 81,000 cubic feet of space. In this building rooms having every variety of exposure and contents exist, and with the assistance of the plan a good general idea of it can be formed. The plan illustrated is an exact reduction of the plan furnished, and, with the specification and the numerous sketches it contains, similar to those shown in the Plates, gives most minute particulars of every detail.

The ventilation of this building has not been mentioned, because it was decided that nothing would be done until the heating and electric light plants were complete. It is, however, intended to use the numerous flues which were connected with the stoves for ventilation, and as it is possible that a new jail will soon be built, the ventilation of this building will be accommodated by means of window-openings for the present.

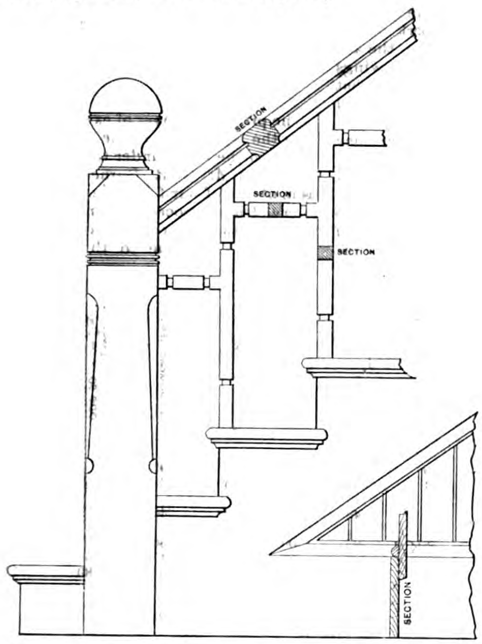
### The Effect of Frost on Stone.

The principal danger of exfoliation arises from the expansion of the moisture contained in the stone under the influence of frost, says Mr. G. R. Burnell in a recent issue of one of our foreign exchanges, and a very elegant process was invented by M. Brard for the purpose of ascertaining the probable extent due to this cause. M. Brard, in his experiments upon the resistance of stones, caused them to be boiled for half an hour in a saturated solution of the sulphate of soda. They were then withdrawn and allowed to stand in a flat vessel, at the bottom of which was a small quantity of the same solution, the first efflorescences were washed off, and the degradation of the stones during the next five or six days, under the effects of the continued efflorescence, was taken as an indication of the probable extent to which they would be affected by frost. In the first volume of Rondelet's "Art de Bâtir," page 307 (edition 1842, Paris), M. Brard's process is described in detail; but some very curious experiments recorded in Vol. 7, "Ire serie des Annales des Ponts et Chaussées," by M. Minard, together with an article by M. Vicat, inserted in the same volume, throw very considerable doubts upon the exact amount of dependence to be placed on its indications. M. Vicat, indeed, very properly observes that it still remains to be proved that the expansive action of water in freezing is identical with that of crystallization, which can only produce energetic effect at temperatures between 68° and 86° F. According to this very accurate observer, stones which are exposed to a southerly aspect, on the north of the equator, are more affected by frost than those exposed to the north; and the most efficient protection to materials of this description of a porous nature is a coating of oil paint or any other fatty pigment which prevents moisture from being driven or absorbed into the stone. M. Minard recommends that stone should be quarried in the spring, and not employed in a building until it has been exposed to the effects of one winter.

# Building Association Competitions.

In our last issue we announced the decision in the XIXth Competition, having for a subject $2000 houses. We now have pleasure in announcing the results of the contest in the XVIIIth Competition, the subject of which was $1000 houses. The decision of the committee is to award the first prize to William Kerr, Grand Rapids, Mich. The second prize goes to John N. Sherwood, Syracuse, N. Y. The first prize design is presented in this issue, together with the specifications and estimate. We have no doubt that our readers will find much interest in examining them. The second prize design will be given at an early date.

We take this occasion to give the names of the authors of the designs published in our issue for March belonging to this same contest. The study by presented on page 50 and Plate IX is by Edward A. Crane, 13 Exchange street, Boston, Mass. The study by "Economy," specifications and estimates of which were on page 51, and the elevations and details presented on Plates X and XI, were by John L. Wells, 829 North Fourth street, St. Louis, Mo.




*Details of First Prize Design for $1,000 House.—Stairs.—Scale, ¾ Inch to the Foot. (For Elevations, &c., see Plates XVII and XX.)*

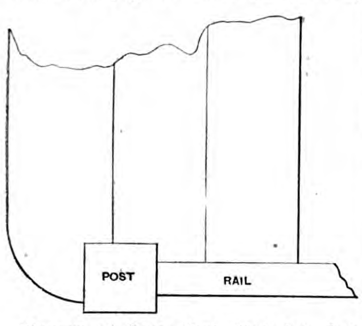



***Diagram of Steps.—Scale, ¾ Inch to Foot.***

## Specifications with William Kerr's Design.

### MASONRY.

*Excavation.*—Do all the necessary excavating for cellar and all piers and other foundations, as shown and required by drawings, to firm and solid ground, and all to be in depth so that foundations will be clear of frost.

*Footings.*—Lay down footings under all brick walls of flat stones not less than 12 inches thick, and projecting 6 inches on each side of wall above.

*Foundations.*—Properly lay up cellar wall 1 foot 6 inches thick with good flat building stone of flat bed, firm build and well bonded. Lay down in like manner substantial foundations under all chimneys and piers.

*Brickwork.*—Brickwork to be of good, sound, hard, well-burned brick, and laid in good, strong mortar.

*Chimneys.*—Chimneys to be built to correspond with drawings, with outside walls 6 inches thick, and partitions 2 inch, flues 8 x 8 inches in size. Use select, even-colored brick for topping out chimney.

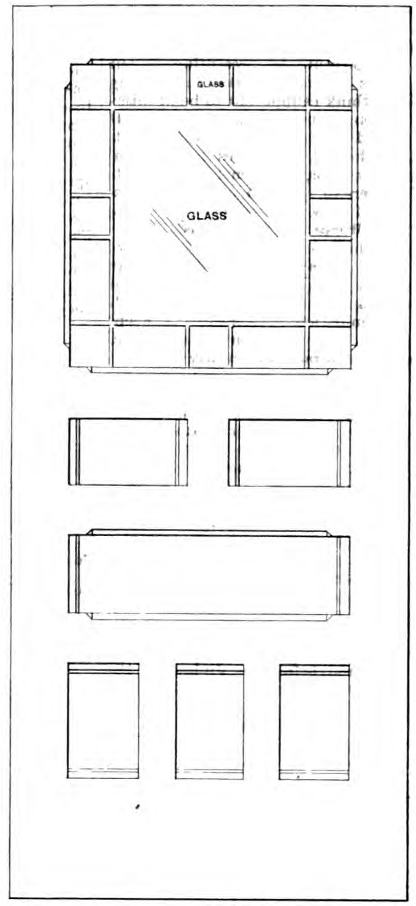
*Cellar Bottom.*—Bottom of cellar to be leveled and settled thoroughly, and cover it flush and smooth with cement concrete 2 inches thick.

*Lathing.*—All walls, partitions and ceilings throughout the building to be latbed with good, sound lath.

*Plastering.*—All the walls, partitions and ceilings to be plastered one coat of good brown well-haired mortar and wall finished with a good coat of stucco hard finish.

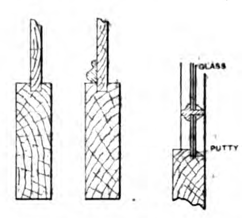
### CARPENTRY.

*Timbers.*—The whole of the timbers used in this building to be of the best of their several kinds, well seasoned, and free from shakes and other imperfections impairing its durability and strength. The timbers not exposed to be of hemlock or pine; exposed timbers—that is, exposed when finished—to be second-quality pine.




*Front Door.—Scale, ¾ Inch to the Foot.*

*Framing.*—To be a balloon frame, with all studs, floor joist and rafters to be placed 16 inches on centers. Studs are: 2 x 4 inches; floor joist, 2 x 8 inches; ceiling joist, second floor, 2 x 6 inches; rafters, 2 x 4 inches; sills, 6 x 8 inches; girders, 8 x 8 inches.

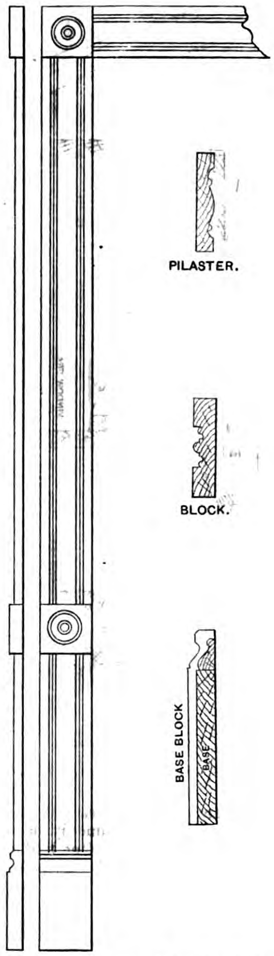



***Sections of Door.—Styles and Panels. Scale, 1½ Inches to the Foot.***

*Lumber.*—The lumber to be white pine. For the outside of the building to be second quality, except clapboarding, which will be second clear pine 4 inches wide. Outside of frame to be covered with ⅞ inch square-edged boards.

*Roofing.*—Cover the roof with $\frac{7}{8}$-inch boards in like manner to sides of frame. Shingles to be the best 16-inch sawed pine shingles.

*Flooring.*—Floors to be of good $\frac{7}{8}$-inch matched boards. Select the best for porch floor.




*Door Trim.—Elevation, ¾ Inch to the Foot. Sections, 1½ Inches to the Foot.*

*Inside Work.*—Grounds to be put on for the finish of all windows, doors, bases and casings. Grounds to be $\frac{7}{8}$ x 2 inches.

*Doors.*—All doors to be of clear, dry white pine.

*Finish.*—Principal rooms on first floor to have a pilaster finish, with base, center and head blocks. Second story and rest of first floor to be plain beveled casings.

*Inside Finish.*—Hangings.—All doors to be hung with loose-joint butts of sufficient size. Sliding door to be hung at the top with a good hanger. Locks.—The main entrance door to have a 4-inch mortise lock, with three keys, same keys to pass vestibule doors; all other doors to have $3\frac{1}{2}$-inch mortise locks, except closet doors, which are to have 2-inch mortise latches. Knobs and Trimmings.—Front door to have electro-bronze trimmings throughout; all the rest of house to have dark trimmings and jet knobs.

*Glass.*—Glass to be the first-quality double-thick American glass.

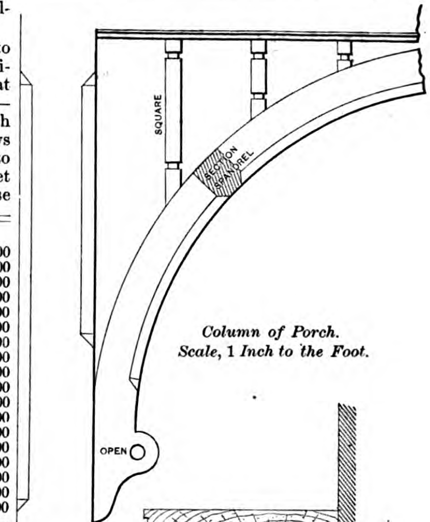
*Stairs.*—Stairs to be built as shown on plans, with $\frac{7}{8}$-inch riser and $1\frac{1}{8}$-inch tread. Treads to have nosing with fillet and cove under; stairs to be of clear, dry pine. Newel to be $5\frac{3}{4}$ x $5\frac{3}{4}$ inches in size, and made as per detail. Inclosed stair to have a 2-inch round hand-rail on one side, firmly secured with iron holders to wall.

**Bill of Material.**

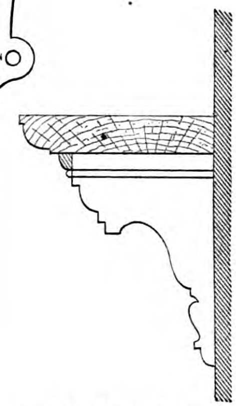
| | |
|---|---|
| Stonework, 54 perch | $106.00 |
| Sills, 750 feet | 9.00 |
| 2 x 8 inches, 2000 feet | 24.00 |
| 2 x 6 inches, 700 feet | 7.00 |
| 2 x 4 inches, 2700 feet | 32.00 |
| 2 x 4 inches, 600 feet rafters | 6.00 |
| Culled boards, 4000 feet | 40.00 |
| Siding, 2000 feet | 32.00 |
| Flooring, 1800 feet | 34.00 |
| 14 windows | 28.00 |
| 14 doors | 32.00 |
| 1 slide-door | 10.00 |
| 10,000 shingles | 25.00 |
| Finishing lumber, 2500 feet | 65.00 |
| 600 yards plastering | 108.00 |
| Painting | 75.00 |
| Brickwork and chimneys | 65.00 |
| Carpenter work | 300.00 |
| Total | $998.00 |

I, the undersigned, will build above house according to plans and specifications for the sum of $998.

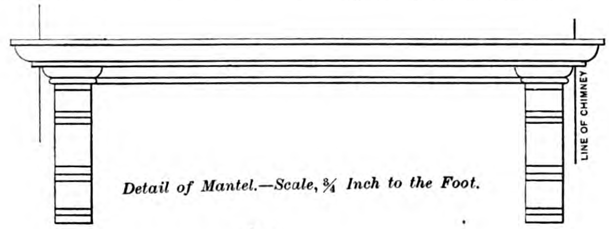
I. W. Kerr, contractor and builder.



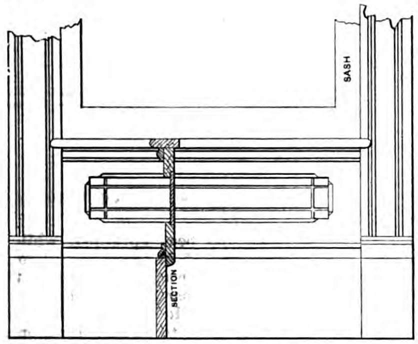

*Column of Porch. Scale, 1 Inch to the Foot.*



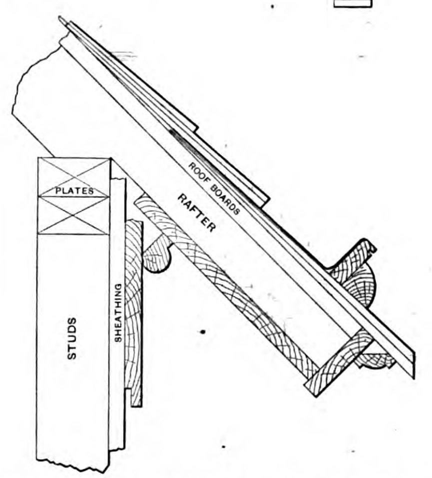
*Section of Mantel.—Scale, 1½ Inches to the Foot.*




*Detail of Mantel.—Scale, ¾ Inch to the Foot.*




*Panel Under Windows.—Scale, ¾ Inch to the Foot.*




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

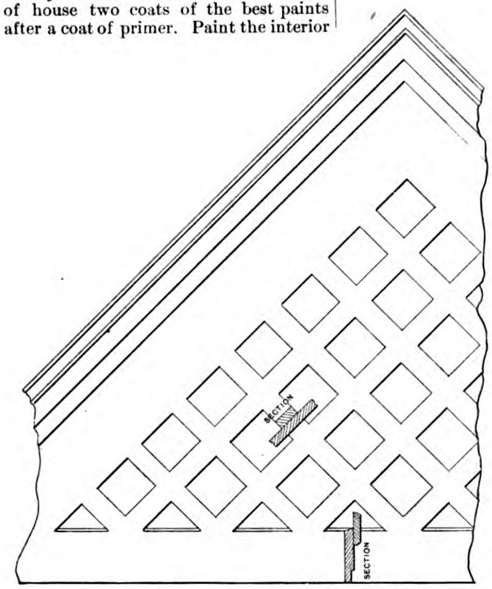
*Pantry.*—To have a counter-shelf 2 feet 6 inches high and 20 inches wide, with five shelves on side; to have drawers and closets under counter-shelf; to have a tip-forward flour-bin under wide shelf at window; fittings in pantry to be of pine.

*Mantel.*—Construct a wood mantel of pine as shown on details.

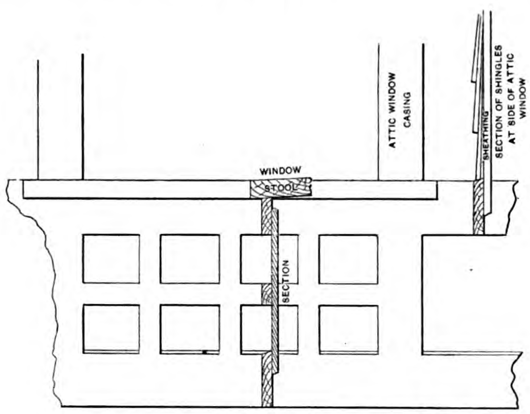
PAINTING.

Use ocher and oil for priming, and putty all woodwork smoothly after priming.

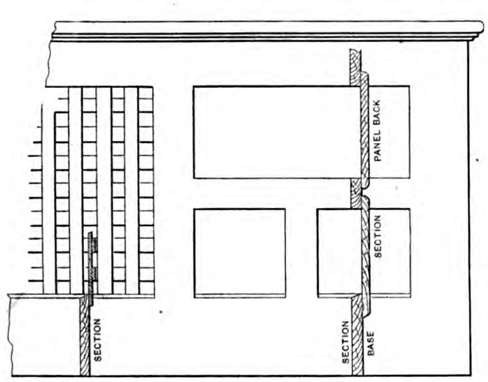
*Painting.*—Paint the exterior woodwork of house two coats of the best paints after a coat of primer. Paint the interior




*Paneling in Side Gable.—Scale, ¾ Inch to the Foot.*




*Paneling Under Attic Windows.—Scale, ¾ Inch to the Foot.*




*Finish Under Porch.—Scale, ¾ Inch to the Foot.*

three coats of the best ground-in-oil paint after a good coat of shellac.

TINNING.

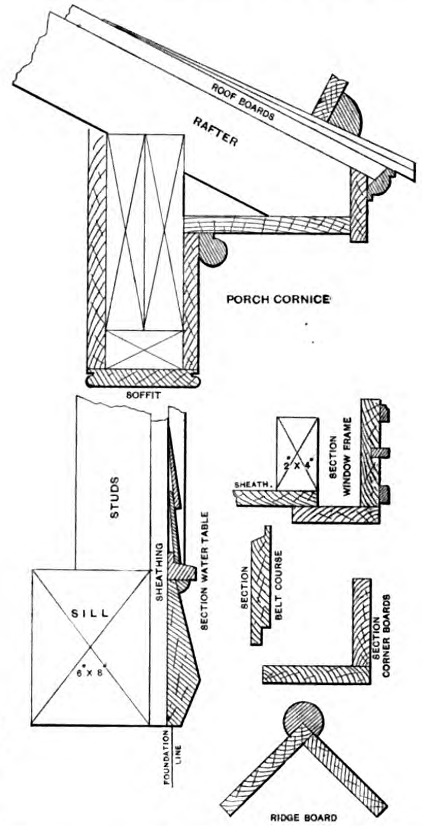
*Gutters.*—Line all gutters properly and run the tin up under the shingles 6 inches.

*Valleys.*—Use 14-inch valley tin, soldered into the proper lengths.

*Leaders.*—To be of tin, 3 inches in size for all large roofs and 2 inches for small ones.

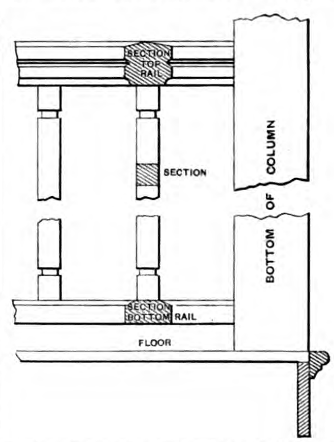
*Chimneys.*—Step-flash all chimneys and turn in tin at joints of brick.

A FORM OF ROOFING CLEAT patented by L. L. Sagendorph, a short time since, consists of a square piece of metal so formed that when in use it has a double



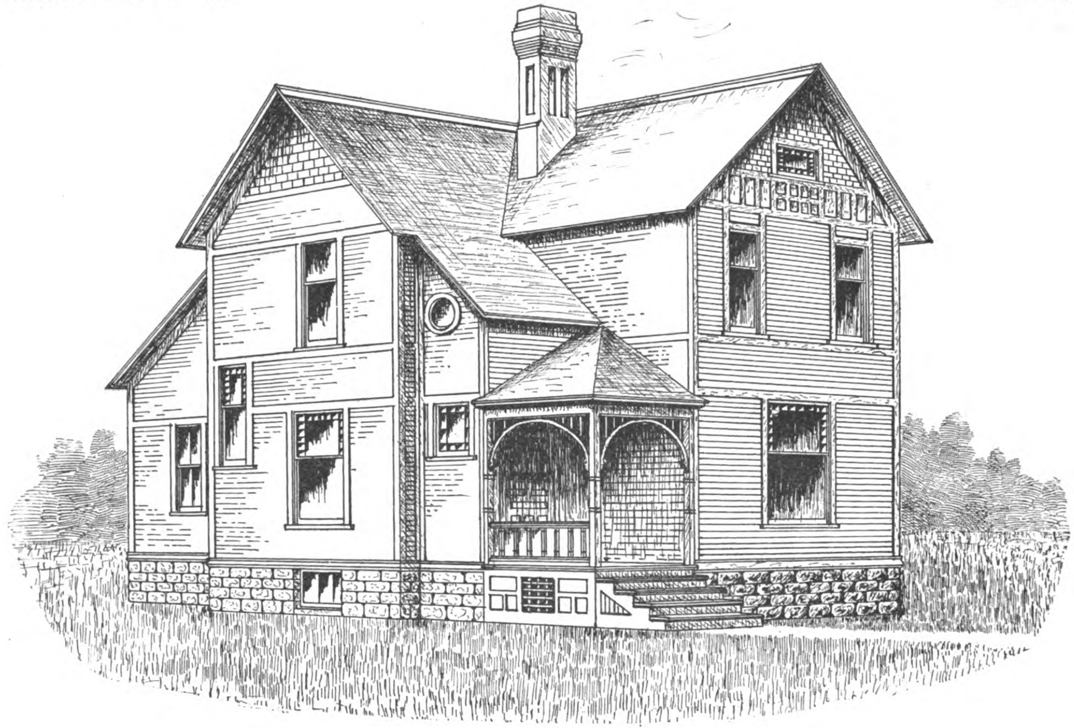

*Miscellaneous Details.—Scale, 1½ Inches to the Foot.*

base to stand upon instead of a single base, as with cleats commonly employed in standing-seam roofs. One-half of the base extends under the sheet, the edge of




*Porch Balustrade.—Scale, 1 Inch to the Foot.*

which has been upturned, while the remaining half in the form of two tongues projects outwardly to receive the nails. The upper part of the cleat is similarly arranged in double form so as to permit several parts to be bent down on opposite sides of the two edges of sheets which are brought against it for fastening. The cleat is useful in that kind of roofing in which the cap is a separate piece.

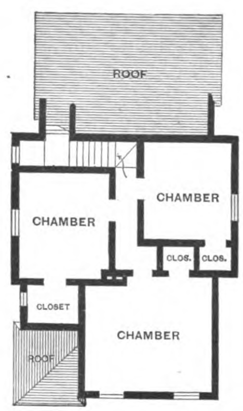


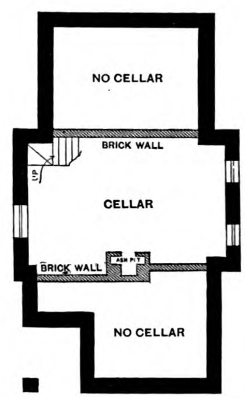
PERSPECTIVE VIEW.

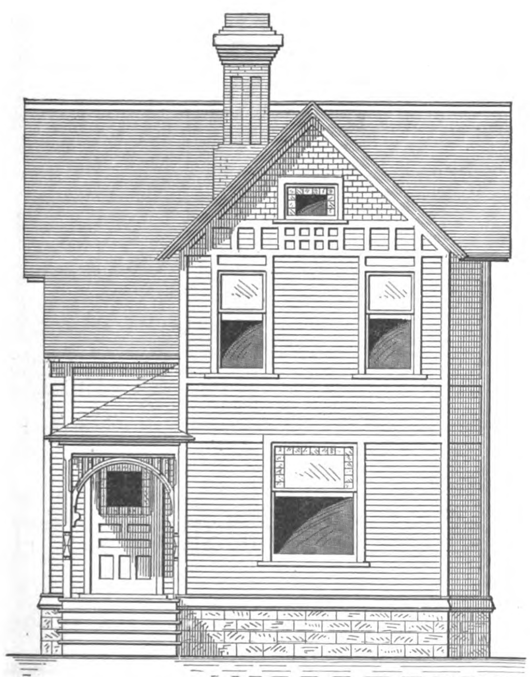
# FIRST PRIZE DESIGN

IN XVIIIth COMPETITION.

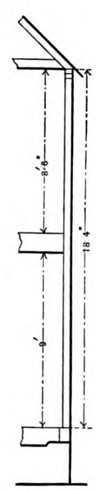
WILLIAM KERR, GRAND RAPIDS, MICH., ARCHITECT.

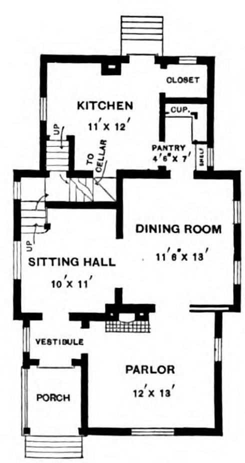


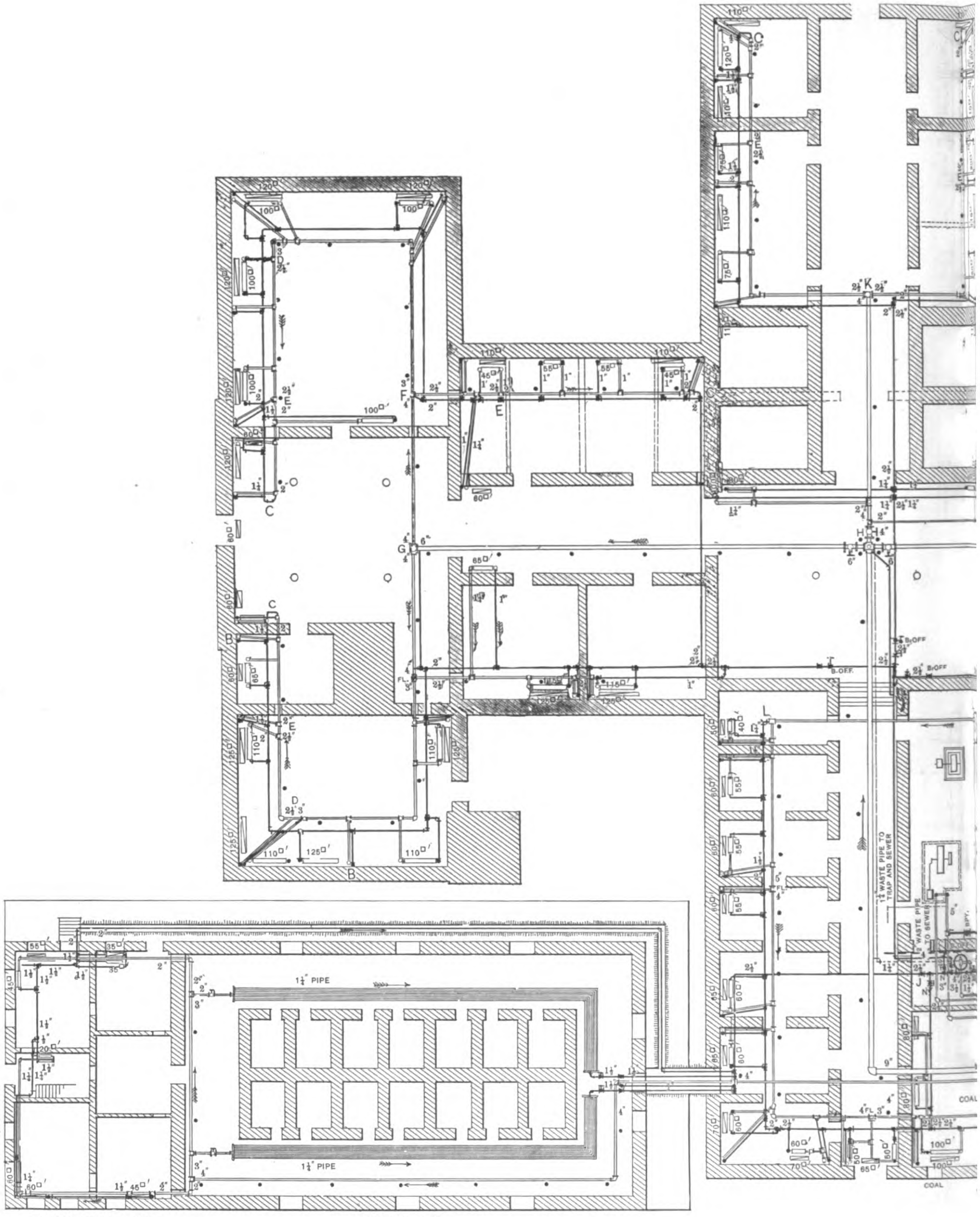
FRONT ELEVATION. Scale, 1-8 Inch to the Foot,




FLOOR PLANS.

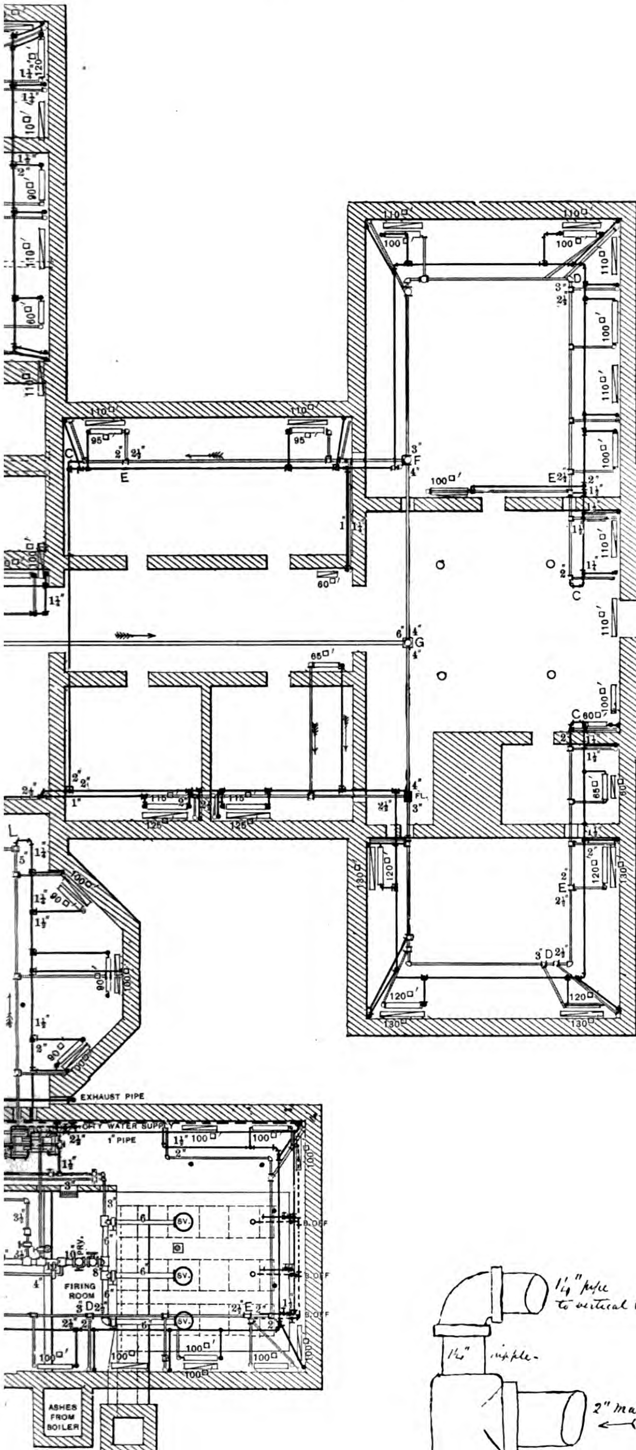
Scale, 1-16 Inch to the Foot.




# HOW A COURT-HOUSE WAS HEATED.

Floor Plan of the St. Joseph (Mo.) Court-House, with Lines of Pipe, I

as Prepared by JOHN J. HOGAN, Engineer.



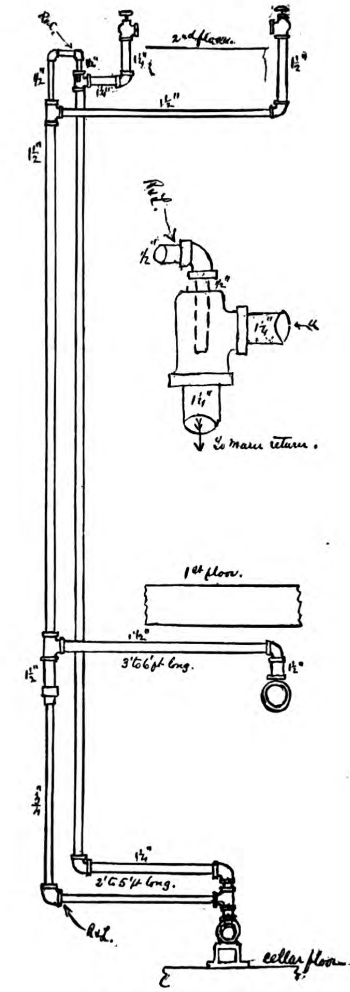
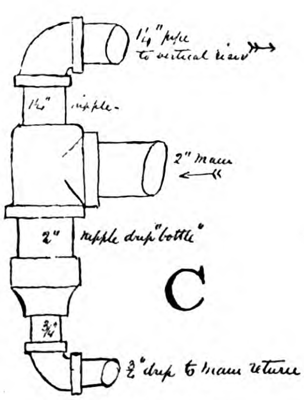
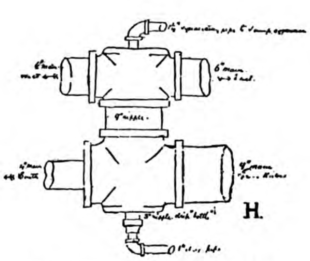




Diagram of Vertical Lines.




Drip-Bottle Connection.

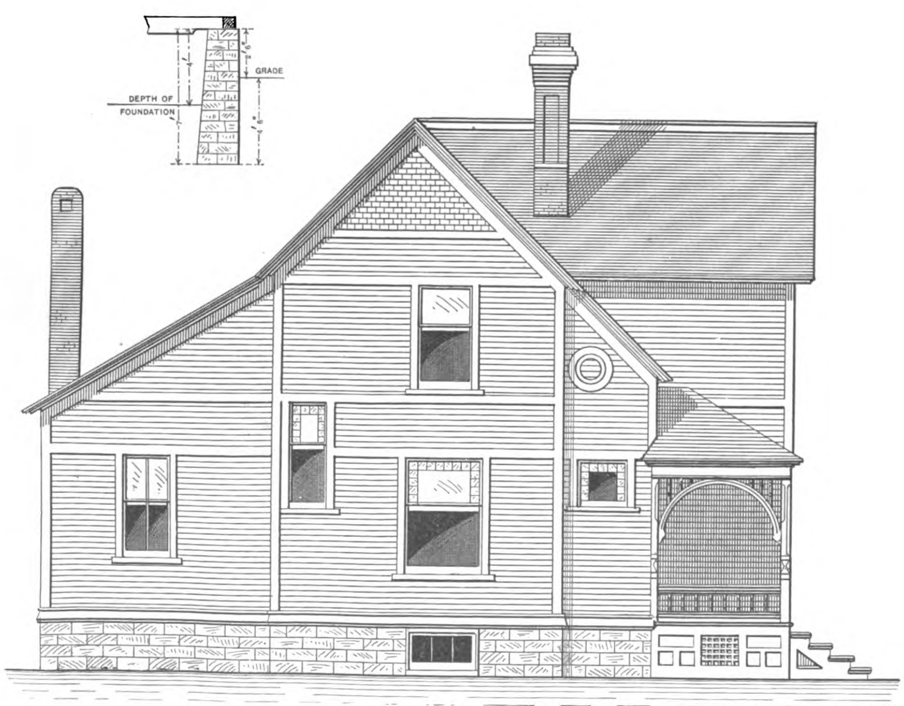



Central Cross on Distributing Main.

adiators, &c.,

SIDE ELEVATION (RIGHT) HOUSE RECEIVING FIRST PRIZE IN XVIIIth COMPETITION.

Scale, 1-8 Inch to the Foot.



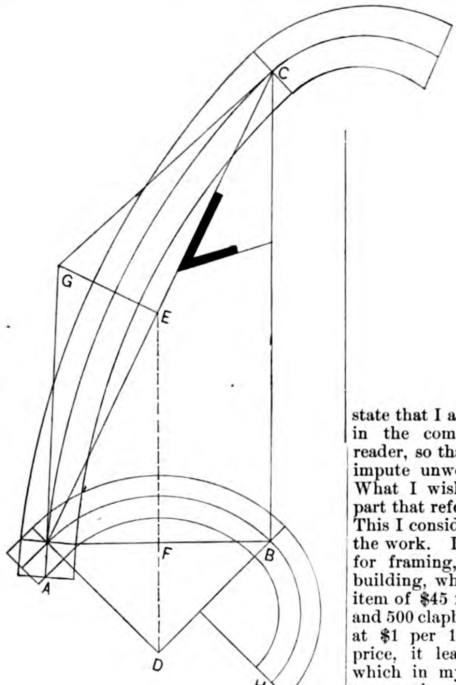

SIDE ELEVATION (LEFT). Scale, 1-8 Inch to the Foot.

# CORRESPONDENCE.

### Problems in Hand-Railing.

*From* CHIPS, *California* —In one of the issues of *Carpentry and Building* for last year a correspondent asks the question how to get out a rail under certain conditions. Now, in the first place I have put up hand-rails for the past 15 years by the system I have endeavored to show in the sketches inclosed herewith. The steps are planned in the worst possible way. There should be three or four of the winders taken out to the segment and worked into the straight steps. Your correspondent says to make the balusters Nos. 19, 20, 21, 23 and 24 the same length as on the straight flight. I don't know whether he overlooked No. 22 or not, but if he has not, I would tell him it must be the same length as the others, whatever they are. The reason for this is the winders are all in the segment and of one width in the ends. The development of the rail, therefore, must be a straight line.

Referring to Fig. 1 of the sketches, let A B be the plan, B C the hight. Make the dotted line from D to E square from the line A B, bisecting the line from A to C. Take the distance F D and set up from E to G square from the line A C. Connect G A and G C, and we have the tangents. This is a sure way of getting out a face mold for any size of segment or segments placed together, and one angle is sufficient in all cases for squaring both ends of the wreath. The segment B H is obtained as above. I have not laid out the balusters, but if they are marked on the plan of rail and squared up to the line A C (the place of the balusters being marked on the steps) we may take the different hights from Fig. 1 and set them up from the line A B, Fig. 2, which will give the hight of each one. I may say that this system is original with me. I have seen many books on the subject, but I like my own way best. I have not indicated the manner of getting the angle for squaring the wreath, but if any of the readers think it worth asking for I will be glad to send it for publication.




*Problems in Hand-Railing.—Fig. 1.—Developing a Face Mold for Segment.*

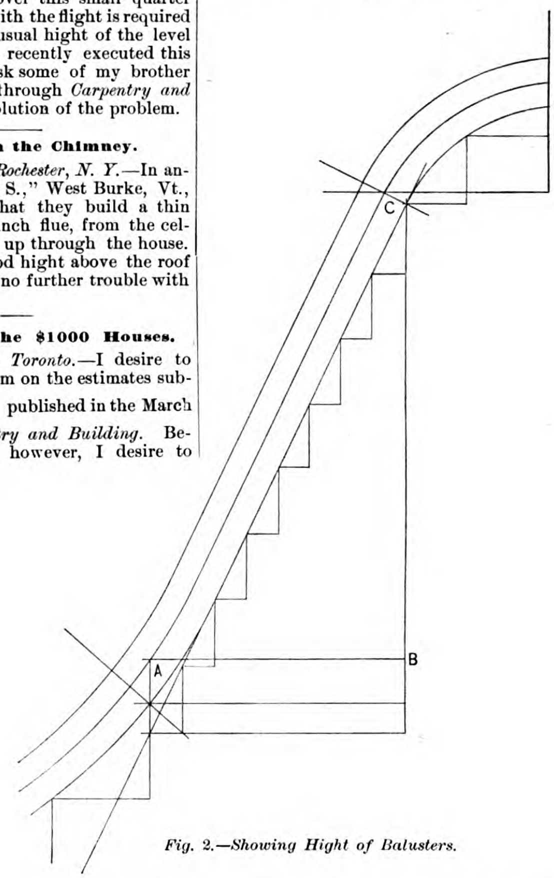



*Fig. 2.—Showing Hight of Balusters.*

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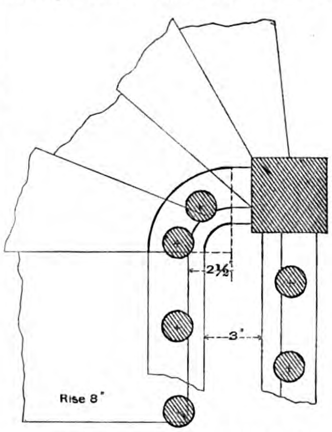
*From* C. G. H., *Tonawanda, Erie Co., N. Y.*—I send you a sketch of a plan of stairs made difficult by winders in connection with a small quarter turn and a newel at the top landing. The hand-rail makes a quarter turn, finishing against the newel in a space of 3 inches between the level hand-rail and that of the flight; also the wreath-piece over this small quarter circle connecting with the flight is required to continue to the usual hight of the level hand-rail. I have recently executed this work, but would ask some of my brother carpenters to give through *Carpentry and Building* an easy solution of the problem.




*Plan of Stairs Submitted by C. G. H.*

### Creosote in the Chimney.

*From* A. N. H., *Rochester, N. Y.*—In answer to "E. W. & S.," West Burke, Vt., I would suggest that they build a thin chimney, an 8 x 8-inch flue, from the cellar bottom straight up through the house. Let it extend a good hight above the roof and they will have no further trouble with creosote.

### Criticisms of the $1000 Houses.

*From* F. I. G., *Toronto.*—I desire to offer a mild criticism on the estimates submitted by published in the March number of *Carpentry and Building*. Before I commence, however, I desire to state that I am not in any way interested in the competitions, other than as a reader, so that my brother Chips will not impute unworthy motives to my action. What I wish to call attention to is the part that refers to the estimate for labor. This I consider as out of all proportion to the work. In the first place, he has $55 for framing, raising and boarding the building, while immediately below is an item of $45 for putting on 15,000 shingles and 500 clapboards. Counting the shingles at $1 per 1000, which is a very good price, it leaves $30 for the clapboards, which in my opinion is about four times too much. Next is the cornice, 136 feet up; material $61.20, which is 45 cents per foot. Well, as to that I would like to furnish any one with the same cornice as shown on the plan at 10 cents per foot, and I would soon make a fortune at that. The next item to which I desire to direct attention is $30.80 for 1400 feet of flooring and $15 for laying. Mr. Editor, I would like to work where they pay those prices—three days' work for an ordinary man for $15. But it is useless to criticise further, as any practical man can see at a glance that it is nothing but guesswork. I notice in nearly every item the labor is put at about half the price of material, which looks rather suspicious. As to "Economy," I would like to say he should be a little more careful in making out his bill of material, which mentions 2 x 8 joists only, while in his specifications he calls for 2 x 10 joists, but I guess I have said enough. My intention in this is not to offend, but simply to try and prevent these things from misleading persons who may read them.

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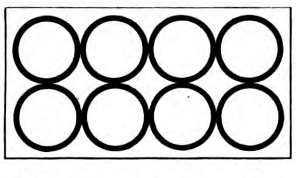
*From* S. B. S., *Litchfield, Conn.*—I am very much inclined to think that "Economy" would have to go to the lumber-yard more than once if he attempted to put up the building he shows to the size specified for the amount named. I feel certain that other practical carpenters have the same criticism to make, and I shall be glad to hear what they have to say.

### Draft of Fireplace.

*From* J. T. H., *Washington, D. C.*—There is a fireplace and chimney in a very fine residence of this city, the draft of which is not as good as the owner desires it to be. There is a large portable grate about 16 by 28 inches in size, which sets in the fireplace and in which burns a wood fire. The chimney does not smoke into the room or give trouble otherwise, only the owner seems desirous that the draft should be strong enough to obtain a brisk, roaring fire, and wants a draft to the chimney strong enough to carry up a feather should one be held in front of the fireplace and released. My idea is that a draft thus



*Draft of Fireplaee.—Fig. 1.—Cross Section of Chimney.*

strong would take up all the radiant heat and would allow but little warmth to remain in the room. The chimney in question is one of a cluster of eight flues, each being entirely independent of the other; they are about 50 feet high, and laid with terra-cotta pipes 9 inches in diameter. The house is built upon a corner, and there is no other building within 90 feet of it. The diagram, Fig. 1, shows a transverse section of the chimney, the eight circles representing the terra-cotta pipes, which are built in with brick fitting the circles of the pipes. The fireplace, of which a sectional view is shown in Fig. 2, is 18 inches deep, 3 feet 6 inches wide, and 2 feet 3 inches high. The back of the fireplace is about 10 inches narrower than the front, and inclines forward about 6 inches in a space of 2 feet, leaving the throat of the chimney about 8 inches wide by 30 inches

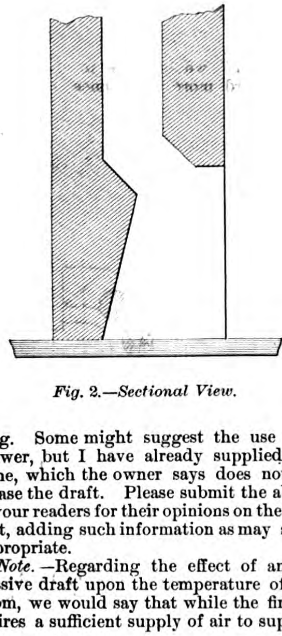


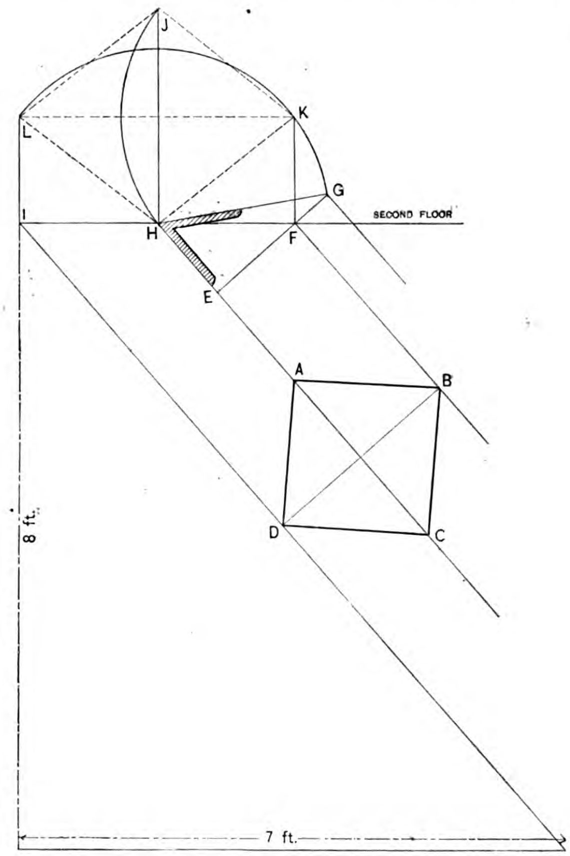
*Fig. 2.—Sectional View.*

long. Some might suggest the use of a blower, but I have already supplied the same, which the owner says does not increase the draft. Please submit the above to your readers for their opinions on the subject, adding such information as may seem appropriate.

*Note.*—Regarding the effect of an excessive draft upon the temperature of the room, we would say that while the fire requires a sufficient supply of air to support combustion, any excess of air drawn up the chimney not only removes this air from the room, but, being drawn over the fire, cools it, and thus takes large quantities of heat up the chimney. It would appear from the description given that the chimney draws as well as it can under the present circumstances; and from the fact that the application of a blower does not increase the draft it would appear that the chimney was taking up all of the air supplied, or, if there is an abundant air supply, all it had capacity for. In order to test the matter of air supply, the experiment could be tried of opening a door or window gradually until it would appear that the chimney had a sufficient supply of air to produce the desired result. As the subject appears to be an interesting one, we should be pleased to have an expression of views from our readers.

### Grain-Spout Problem.

*From* J. V. H. S., *New York.*—In the problem in bevels submitted by "J. H. D.," from New Point, Ind., he says: "I would like to know how to find the bevels—that is, the bevels to fit against the second floor and also down against the first floor." In his diagram he shows the inclination of the grain spout, as he calls it, and set diagonally with the room. In answering his questions I will use his diagram and by drawing a few lines solve the problem. Let A B C D be the size of the spout and diagonal position, I D the incline, I H F the floor line. From E square over to F, extend to G, make E G equal to one side of the spout, as at A B, connect G H; then the angle at H is the bevel to cut all the sides at both ends, and H K I L will be the end of the spout after it is cut, also the opening in the floor. At the points I H F along the floor line draw perpendiculars. Let H J equal A C; with one foot of the compasses in H, extend to

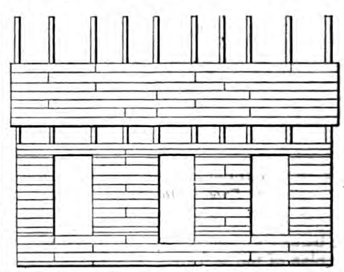



*Grain-Spout Problem.—Solution Contributed by J. V. H.S.*

G, draw the curve line cutting the perpendiculars at K, connect H K, making one side of the opening. From H K as centers draw all sides equal, as shown by the dotted curved lines.

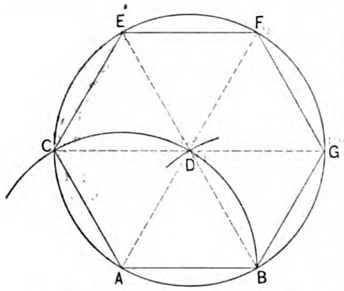
### Boarding a Building.

*From* G. S., *Pine Hill, Pa.*—I notice in the February issue of *Carpentry and Building* a sketch from "J. D.," Win-



*Plan of Boarding a Building Suggested by G. S.*

chester, N. H., showing what he considers the right and wrong way of boarding a building. Permit me to offer the inclosed sketch, which shows, according to my opinion, the right way. Never make a running joint, as it can easily be avoided. Through this part of the country the planing mills run out a number of boards of one width, and then follow with other widths, marking each width differently.




*Laying Down Polygons.—Fig 1.—Polygon of Six Sides Submitted by C. S. N.*

Now, it is no difficult matter to sort out a number, say of the widest first, and run the entire length of the building as often as possible. In doing this use boards of the same width on one side of the windows and doors as are used on the other side, and when the tops of the windows and doors are reached the boards can run across without any trouble. If any pieces are left and there are not enough of the same width to run the entire length, lay them to one side for use in the gable ends where short pieces are required. By following this plan it will be found that there is little or no waste. If a man were to begin to board a building in this country according to the plan suggested by "J. D." he would run a good chance of being immediately discharged. What I have tried to explain as the right way of boarding a building makes a much better appearance than the wrong way.

### Laying Down Polygons.

*From* C. S. N., *Clinton, Iowa.*—Acting on the suggestion of "L. W. T." in the January number of *Carpentry and Building*, I submit the following: On a given line to erect a polygon of six sides whose sides shall equal a given length. Referring to

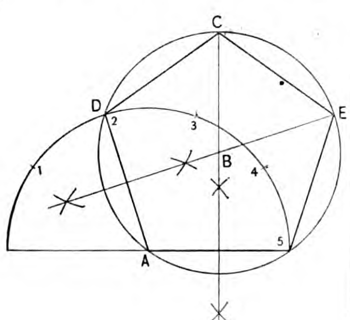


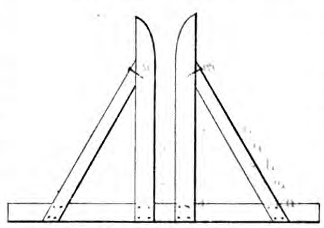

*Fig. 2.—Polygon of Five Sides Submitted by C. S. N.*

Fig. 1 of the accompanying sketches: With A as a center and radius equal to the sides of the required polygon describe the arc B C. With B as a center and the same radius describe an arc intersecting B C in D. With D as a center and the same radius describe the arc C F B. Draw from A B and C through D, cutting the large arc in the points E F and G. Connect the points A C, C E, E F, F G and G B.

Referring now to Fig. 2: On a given line to erect a polygon of five sides whose sides shall equal a given length. With A as a center and radius equal to the sides of the required polygon describe a semicircle as shown. Divide it into five equal parts by trial. Draw from A through D, D being the second division of the semicircle. Now, A D and A 5 are two sides of the required polygon. Lines which bisect and are perpendicular to the sides of the regular polygon meet in one point, the center. Erect perpendiculars at the centers of A D and A 5, intersecting in the point B, extending them indefinitely. With B as a center and B D the radius describe a circle about the point B. Connect the points D C, C E and E 5. In the matter of their angles, the sum of the interior angles of any polygon is equal to twice as many right angles, less 4, as the figure has sides. The sides of a regular inscribed hexagon subtends an arc of 60°, a duodecagon 30°, a pentagon 72°. The length of the arc subtended by the sides of the figures vary inversely with the number of the sides. The angle at the center of any regular polygon is equal to four right angles divided by the number of sides of the polygon.

### Convenient Door-Holder.

*From* M. F. B., *Waterloo, N. Y.*—I am called upon to handle a great many doors, and have been much bothered holding them when they were being planed. In order to overcome the difficulty I made up my mind I would manufacture something which would hold the door in a convenient

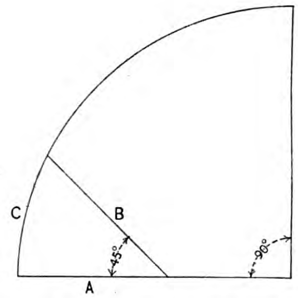


*Convenient Door-Holder Suggested by M. F. B.*

position for accomplishing my purpose. I took a piece of 2 x 8 stuff, about 4 feet long, and nailed pieces to it as represented in the sketch which I inclose herewith. This device is very convenient, as it holds the door in place and at the same time can be moved about. The holder is made of 2 x 8 or 2 x 6 inch stuff, whichever is most convenient, the two uprights being sufficiently far apart to admit the thickness of a door. The device is very simple for the purpose and is not patented.

### Area of Triangular Figures.

*From* C. S. N., *Clinton, Iowa.*—Will some of the practical readers of *Carpentry and Building* kindly write a formula for determining the area of the triangular

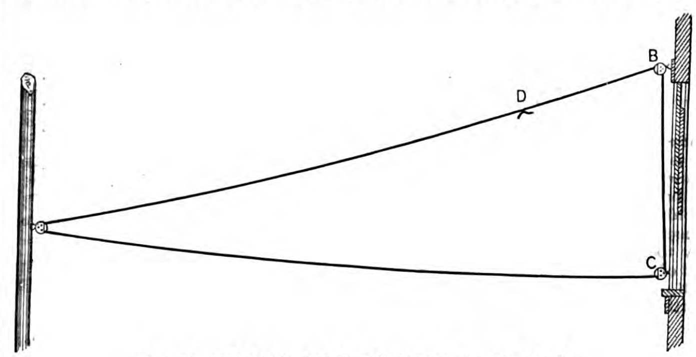



*Area of Triangular Figures, from Sketch by C. S. N.*

figure whose sides are marked A B C in the sketch which I inclose herewith?

### Arrangement of Clothes-Line.

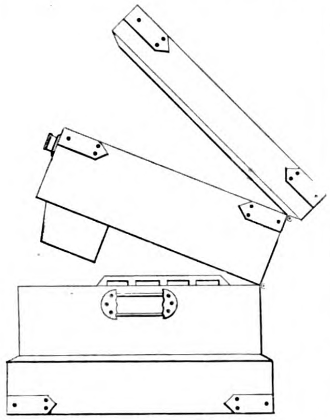
*From* W. G. R., *Rochester, N. Y.*—I would like to call the reader's attention to an arrangement of clothes-line, working over pulleys, which I have recently constructed. It operates so nicely and is so satisfactory to my tenants that it may solve the problem for some one else who wishes to arrange for hanging clothes out of the windows of a four-story building. The same plan, which prevents the clothes from twisting over the line and thus causing any amount of trouble, may be in use in other places, but if so I never observed it. In order to put up the line as shown in the accompanying sketch, a pole is placed at a suitable distance from the building, and extending nearly to the top of the upper window from which the clothes are to be hung. This pole should be guyed back if possible, so as to prevent the weight of the clothes from springing it over and causing the line to sag. Near the top of the pole at A is placed a 3-inch incased screw pulley, and near the top of the window, as shown at B, and below the center at C, are two swing pulleys that can be attached to the window-frame by means of No. 1 screw hooks, or if they are not to be had, screw eyes can be cut open so as to allow of the pulleys being hooked on. The line should not be too tight when first put up, as it will shrink when wet; the ends are to be joined by a sailor-knot so as to be easily unloosened for the purpose of taking up the slack as the line becomes weather-worn. The knot should be made in the top line as shown at D. Lines can be run from the different windows in the building to this pole, as circumstances may require.




*Arrangement of Clothes-Line Suggested by W. G. R.*

### Convenient Tool Chests.

*From* G. W., *Antwerp, Ohio.*—I notice in the January number of *Carpentry and Building* a call for plans of tool chests, and take the liberty of presenting a sketch of a chest I built about two years ago. I find it very convenient and useful, as my



*Convenient Tool Chests.—Fig. 1.—End View of Chest Built by G. W.*

tools are not scratched and marred as I have often seen them. In the sketch which I send herewith the outside box is 22 x 36 inches, inside measurement; it is made of light lumber, $\frac{7}{8}$ inch thick, with two raised panels on the lid. Three leather handles are provided, one at each end and one in the front for the purpose of lifting the second lid. By reference to Fig. 1 of the sketches my "Brother Chips" will be able to get a very good idea of an end view of the chest, with the two lids partially raised. In Fig. 2 the lid over the tills A A A is fastened with a lock to hold it shut when the second lid is open; B B is a chisel case and will hold one set of firmer chisels and one set of framing

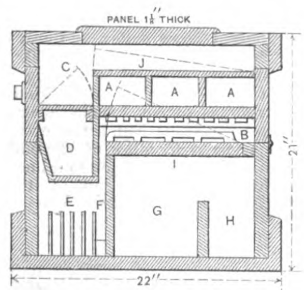



*Fig. 2.—Sectional View of G. W.'s Chest.*

chisels; C is a till to hold odds and ends; D is a till to carry large or odd tools; E shows a number of saw tills, the space at F being designed for a level; H is for molding planes, G for planes, &c. By the construction employed I am able to get at my tools without throwing half of them out of the chest in order to reach the other half, and I also save trouble and time in putting them away.

*From* C. C., *Sturgeon Bay, Wis.*—I have a tool chest that your correspondent may consider of interest, and I will therefore present a brief description of its principal features: In the first place, I took my longest saw and made the chest of a length to contain it. It is 15 inches lengthwise, so that a square will go into it when placed in the manner shown in Fig. 3 of the sketches. Of course the chest could be made any shape desired so long as the tools were conveniently arranged, but I will describe how I made mine. I constructed tills 2 feet 9 inches by 15 inches inside and had $\frac{7}{8}$-inch sides and $\frac{3}{8}$-inch bottom rabbeted in about half way of the side pieces. An idea of what I mean will be gained from an inspection of the sketch marked Fig. 4. The first till I made $1\frac{1}{2}$ inches deep. I used this for bits and small tools, and by partitioning it off I kept

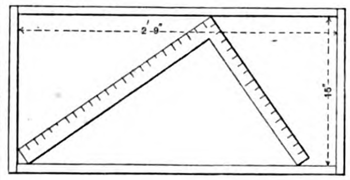



*Fig. 3.—Position of Square in Chest Built by C. C.*

each tool separate, and so with the next one. This I made 2 inches deep, and by letting my chisels run lengthwise had room left at the end for screw-drivers and gouges. The next till I also made 2 inches deep inside, and used it for my saws by running a partition as indicated in Fig. 5 of the sketches By this means I get in 8 saws and still have some room left in the middle. The till below this I made 3 inches inside, and used it for braces, gauges and other tools of about the same size, and partitioned this till off to suit my requirements. The fifth till I made the depth of my jointer laid on its side,

*Fig. 4.—Sectional View of Till of C. C.'s. Chest.*

and by laying jack and smoothing planes in found in which way they would occupy the smallest space. I then put in a thin piece lengthwise so as to make a partition, and thus keep the tools in place. Back of these there was room for my level and whatever would best fit the space. The sixth till I made 4 inches deep, and as this was the bottom I used it for my saw clamp and such other tools as were not often used. I have made six or seven tool chests for myself, but like this one the best. I find that I can get more tools in less space, and by putting in a partition between the tools, say $\frac{3}{16}$ or $\frac{1}{4}$ inch thick, it is only necessary to place the tools in their proper positions in the chest and lock it, and it may be shipped anywhere and turned bottom side up, or end for end, without mixing up the tools. It is a good plan to put the heavy tools at the bottom; then there will be less to lift when the chest is opened. I had another chest that was very handy, and will endeavor at some future time to give the readers of *Carpentry and Building* an idea of its construction.

*From* C. B. M., *Findlay, Ohio.*—In reply to "R. G. M.," of Atchison, Kan., I will endeavor to describe a tool chest I once had, but which unfortunately was destroyed by fire last May, together with all my tools. It was 18 inches wide, 19 inches deep and 36 inches long, inside measurement. It was provided with a double lid, dovetailed corners and iron handles. Across the end at the left were three tills, one being placed on the top of the other to lift out. The top one was

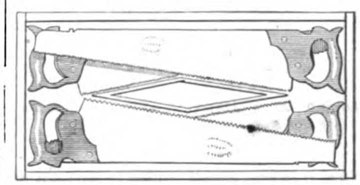


*Fig. 5.—Arrangement of Saw-Till in C. C.'s Chest.*

2 inches deep and was intended for wrenches, files, &c. The center one was $1\frac{3}{4}$ inches deep, for bits, screws, brads, &c., while the third one was $3\frac{1}{2}$ inches deep and used for bit brace. At the back and one end was a rack for chisels. On the front was a rack for square and tri-square. On the inside lower lid was a rack for saws. The center was used for planes, &c. In the upper lid was a partition for level. The balance of the space was for drawings and details. I do not like drawers, as they catch more or less dirt, which has to be cleaned out. I expect to soon make another chest just like the one described. I have seen a great many tool chests, but I have not observed any that I like as well as I did mine. I am a reader of *Carpentry and Building* and think a great deal of it.

*From* X. Y. Z.—I send herewith, in answer to the correspondent who asks for a convenient tool chest, a sketch of what I consider a very useful article for the purpose. It is 35 inches long, 17 inches wide and 20 inches high, outside measurement. The projecting strips indicated in the sketch are hardwood, $\frac{1}{2}$ inch thick and $1\frac{3}{4}$ inches wide, put on with round-headed screws and lap over the seam $\frac{3}{8}$ inch. I secured strap hinges and had them welded together the right distance apart for each till and then riveted them on the outside of the strips. By taking short pieces and putting them up and down between the others I made a very solid job.

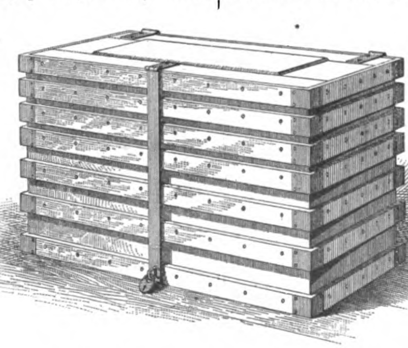
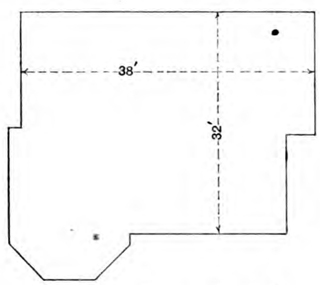


*Fig. 6.—Style of Chest Suggested by X. Y. Z.*

The front of the chest can be fixed in two ways. One is to take a hasp made like one of the back hinges, so that there will be a hinge for every till. By cutting a slot in this so as to put in a staple at each till, you can raise the tills one or more at a time, as may be preferred. On the bottom one a lock can be placed. Another way is to make some spring catches and put one on each till; then by having a straight hasp and a staple at the bottom the chest can be locked. I would suggest that the staple be made in such a way that a nut will go on the long leg, so that it may be fastened on the inside. In each till I put one of those things which are used to hold up trunk covers. It is made out of band iron, and when I raise the till it stays where I want it. The corners of the chest I made of galvanized iron and put them on with round-headed screws.



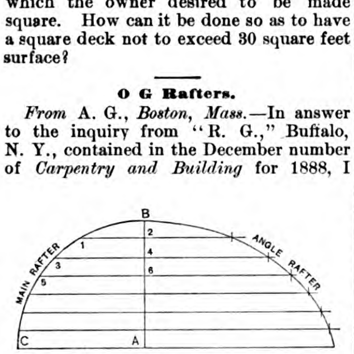

*Hip Roofs.—Diagram by J. M.*

#### Problem in Hip Roofs.

*From* J. M., *Germantown Ohio.*—By what method could there be a hip roof put on the house, plan of which is sent herewith? I had just such a roof to put on, and I made the deck an irregular square which the owner desired to be made square. How can it be done so as to have a square deck not to exceed 30 square feet surface?

#### O G Rafters.

*From* A. G., *Boston, Mass.*—In answer to the inquiry from "R. G.," Buffalo, N. Y., contained in the December number of *Carpentry and Building* for 1888, I would suggest the following method of getting a curved angle rafter: Take a piece of wood, Fig. 2, 17 inches long and divide it into 12 equal parts. Divide these in turn into eight or 16 parts and we have an angle rafter rule. Now lay down the form of the main rafter C B, Fig. 1, and divide the hight A B into any number of parts from the main rafter. Through the points of division draw lines and produce them indefinitely. With a common rule, Fig. 2, measure the distance from 1 to 2 in Fig. 1, from 3 to 4, from 4 to 5, &c., and transfer with the 17-inch rule on the lines produced to the right and mark the points. Through these points make the form of the hip rafter.




*O G Rafters.—Fig. 1.—Plan Submitted by A. G.*

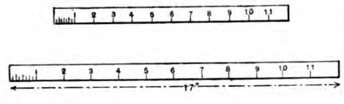
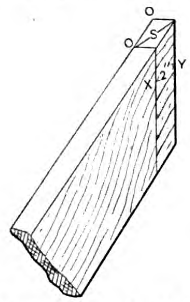



*Fig. 2.—Common and Single Rafter Rules.*

#### Side Bevels for Jack Rafters.

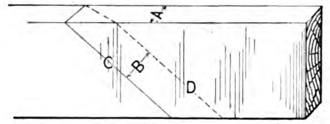
*From* A. D. L., *Marlboro', Mass.*—In reply to the communication of "J. D.," Winchester, N. H., which appeared in the March number of *Carpentry and Building*, I desire to present the following, which I think will answer his question and apply as well to many other cuts of the same nature: We will suppose the rafter is 2 inches thick, it making no difference whether it is straight or an O G and of any pitch. The only essential thing to have is the plumb cut. Measure back 2 inches or the thickness of the stuff used square with the plumb cut on the face of the rafter X Y, square over the top O O. Mark the diagonal or side bevel S as required. This, according to my mind, is a very simple and practical method of solving the problem.




*Obtaining Side Bevel for Jack Rafter Submitted by A. D. L.*

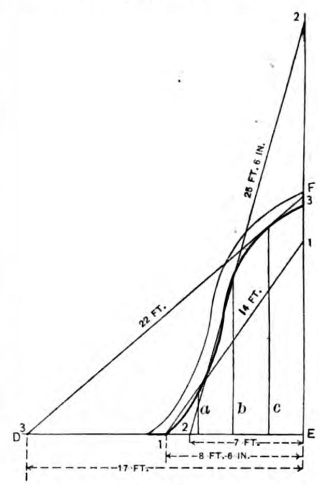
*From* G. W. B., *Navesink, N. Y.*—In answer to your correspondent "J. D.," whose letter was published in the March issue, I would say that if he will observe the following rules he will not have any trouble in making a fit with jack rafters on the tower roof in question. First, for each jack rafter take a separate piece of stuff of sufficient length to mark it out. Lay a pattern of the common rafter on it, beginning at the bottom of the pattern each time, and while the piece is still square or straight on the edges mark the bevels and cut them before shaping the jack. Second, take one-half the width of the building of the tongue and the length of the common rafter on the blade of the square; then the blade will give the side cut, while the down bevel is the same as that of the common rafter.

*From* A. T. S., *New Albany, Ind.*—In reply to "J. D.," Winchester, N. H., I send a small sketch showing my method of getting the side bevel or miter. In the sketch C represents the plumb or top cut without bevel. For the purpose of obtaining the bevel take the thickness of the stuff as at A and apply to the line C, which gives D. For example: take a 2 x 4 inch piece and lay off the plumb or top cut square across the edge as shown at C. Now, the stuff being 2 inches thick, take 2 inches on the blade of the square and apply to the line C; draw D. I think this is sufficient to make my meaning clear. This will work on any pitch or give the solution of the great hopper problem.




*Method of Obtaining Side Bevel Proposed by A. T. S.*

*From* C. H., *Toronto, Ohio.*—"J. D.," of Winchester, N. H., wants to know how to get the bevel for his jack rafters. Permit me to offer a solution which I trust he will find useful. Extend the run and rise indefinitely, as shown by D E and E F in the accompanying sketch. Lay out the center rafter as shown. Space off the jack rafters A B C; then draw the lines 1 1, 2 2 and 3 3 as nearly parallel as possible, and through the points of intersection until they meet the run and rise. Then take the distance from 1''' to 1 on the blade of the square, and from 1''' to *e* on the tongue; the blade will be the side cut. That is, 14 inches on the blade and $8\frac{1}{2}$ inches on the tongue, and $25\frac{1}{2}$ and 7, and 22 and 17, and so on. The angles 1 E and 1, 2 E and 2 and 3 E and 3 will also be the plumb cut.




*Solution of Side Bevel by C. H.*

#### Stair-Building Question.

*From* A. Y. M., *Ætna, Wy. Ter.*—I desire to learn, through the columns of *Carpentry and Building*, a practical way of connecting an open or miter string to the trimmer. Likewise the manner of placing a small cylinder or well piece between the string and trimmer.

#### Balloon Framing.

*From* J. D., *Winchester, N. H.*—I would like to see published in *Carpentry and Building* a series of lessons on the proper construction of balloon frames. I think architects, carpenters and builders need information in this direction, and think that those who have good ideas on this subject can benefit the trade by making them known.

*Note.*—We shall be glad to welcome from our readers anything they can give us on this subject. Photographs or sketches will answer in conveying the ideas. We can work up almost any kind of material into readable shape.

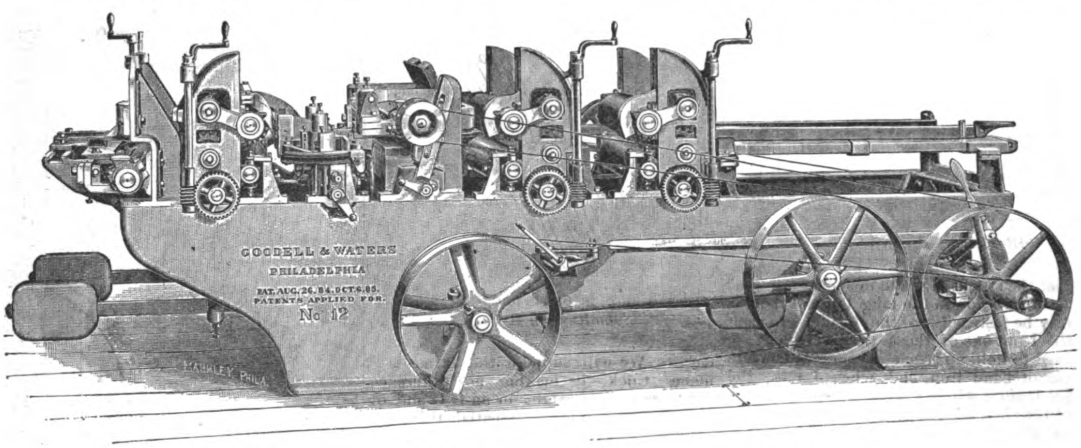
#### Roof Plans.

*From* D. M. C., *Junction City, Kan.*—My attention has been called to the house plan presented in the January issue of *Carpentry and Building*, drawn by "D. F. J.," and I would like to see the roof framing for this building. If your correspondent will present the roof plan I think it would interest many readers.

# NOVELTIES.

### Six-Roll Surfacer and Matcher.

Goodell & Waters, of No. 3101 Chestnut street, Philadelphia, Pa., have placed upon the market a combined planer and matcher, a general view of which is afforded by Fig. 1 of the accompanying illustrations. This machine is known as their No. 12, and is regarded as something of a departure in the line of constructions of its class. It embodies a number of valuable features and is calculated to meet the demands of the general jobbing shop, working flooring, ceiling, novelty and German siding, moldings, &c. The manufacturers state that this machine will plane all single surfaces 24 inches wide up to 6 inches diameter and match 19 inches wide. The top and under cutter-heads are four-sided, slotted on two sides and run in long babbitted bearings. Its feed rolls are each 6 inches in diameter and driven by a patented system of expansion gearing, which is said to be very simple and durable. The gears are fastened to shafts that run in long boxes provided with excellent facilities for oiling. The rolls under all conditions are said to remain parallel. The arrangement of the machine is such as to admit ample light to all parts which are not boxed in, as is the case with many machines of this class. The arrangement adopted by the manufacturers of this machine enables the operator to have a clear and comprehensive view of all the various adjustments, a fact which tends to greatly facilitate his work. Special attention is directed to the improved method of arranging the matchers, each head being adjusted independently, and when set to the required position firmly held in place. The end of the long guide is attached to the matcher, travels with it and has an adjustable screw to regulate the depth of cut of the side-head. The guide, together with the table, may be removed, allowing free access to the under cutter-head.




*Novelties.—Fig. 1.—Six-Roll Surfacer and Matcher, Made by Goodell & Waters.*

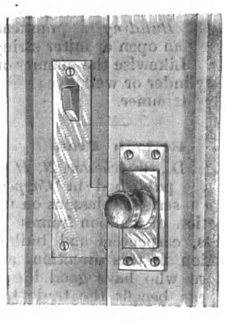


*Fig. 2.—Single Sash Lock and Ventilator.*

### Single Sash Lock and Ventilator.

Some time since we presented to our readers several views of a sash lock and ventilator designed to work in connection with a double sash and to hold either or both in any position desired. The very common practice of constructing modern buildings, however, with one large sash instead of two has induced the manufacturers, Jenkins & Timby, Oswego, N. Y., and 102 Chambers street, New York City, to put upon the market a sash lock and ventilator specially intended to meet this requirement. In the engraving presented, Fig. 2, we show a section of window frame with the lock attached, an inspection of which will show its general arrangement. One of the peculiar features of construction to which the manufacturers direct special attention is the mechanism for releasing the sash after it has been automatically locked in place. The spindle of the knob is pivoted at its upper end in such a manner as to allow of a little play within the knob. The opposite end of the spindle is bifurcated for the purpose of receiving the flat bar which actuates the lock shown in the sash groove at the right of the cut. When the device is operated, it is only necessary to move the thumb-nut upward, which gives to the flat bar above referred to a rocking motion, causing the bolt to be depressed, releasing the window sash. The construction is such that the device locks automatically, and when the window is once secured in place it cannot be opened except from the inside. The lock is made in three sizes, the smallest being intended for ordinary windows and dumb-waiter doors. It is carefully constructed of brass, and during the period it has been before the trade, met with a gratifying reception.

### The Brown Radiators.

The R. F. Brown & Taylor Heating Company, of 2129 Wabash avenue, Chicago, Ill., have placed upon the market several styles of the Brown radiator, a broken view of one of which is shown in Fig. 3 of the engravings, the top being removed for the purpose of indicating the general arrangement of the loops of which it is composed. From the cut it will be seen that the radiator is built up of cast-iron sections, connected together at top and bottom in such a way that the surface may be varied at will by the addition or subtraction of loops. The loops have serrated sides, thus largely increasing the heating surface. It will be seen that the side walls are parallel in every part, so that there is no undue thickness of iron to reduce the radiating efficiency. When the radiators are built up the sections are kept $\frac{3}{4}$ inch apart, measuring from the tops of the serrations, while the depressions between form diamond-shaped channels, through which the air will circulate rapidly and at the same time be exposed to a large surface of heated iron. The thickness of the loops is 2 inches. A

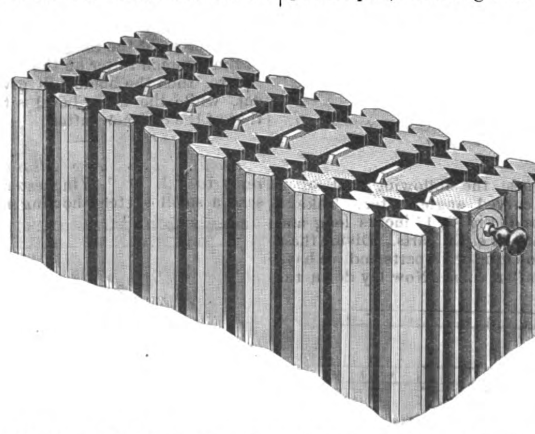
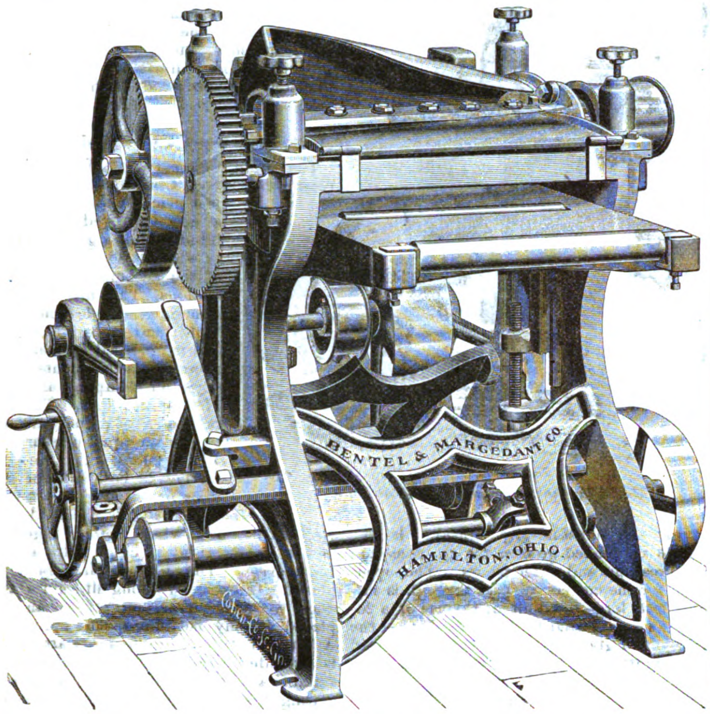


*Fig. 3.—Radiator with Top Removed, Made by the R. F. Brown & Taylor Company.*

special merit of the radiator is the large amount of heating surface to the floor space and room space occupied, the standard wall radiator, here illustrated, being 8 x 24 x 36 inches, and containing 14½ square feet of surface per cubic foot of room space occupied. The company also make radiators adapted for use in connection with circular windows, together with a variety of wall radiators. Another specialty is the Brown water-heater, designed for use in warming buildings. It is made in two sizes, the smaller having a capacity to heat from 15,000 to 25,000 cubic feet, and the larger one from 25,000 to 75,000 cubic feet.

**Diagonal Surface Planer.**

In Fig. 4 of the accompanying illustra tions we present a front elevation of a new and novel machine for planing wood which has just been placed on the market by the Bentel & Margedant Company, of Hamilton, Ohio. This machine is constructed with the cutter-head placed diagonally across the machine frame and center line of feed rollers, an arrangement which differs somewhat radically from the plan adopted in other machines designed for a similar purpose. In Fig. 5 is shown a view of the triangular shear knife-head, which the company employ in connection with this machine. It is constructed with three knives placed on the head at such an angle as to produce a shearing cut. The manufacturers state that the peculiar construction of this head, together with its diagonal position across the path of planing, makes the machine one especially adapted for executing very smooth work; also for planing cross-grained and knotty material, and for planing work that is joined together crosswise or that consists of various woods with different grains or hardness. As will be seen from an inspection of Fig. 4, the machine is strongly framed and braced and is made very durable in all its parts. The heavy bed is cast in one piece and provided with four feeding or idler rolls, which are adjustable for hight. The two upper feed-rolls are strongly geared with solid cast gear-wheels, and are adjustable for light and heavy pressure by means of the hand-wheels, clearly shown in the engraving. The adjustable pressure bar fits close up to the cutter-head on one side, while the heavy chip-bonnet forms an effective pressure bar on its lower side, yielding to the irregularities of the material before being acted upon by the cutter-head. The feed is driven from the countershaft and operated by a convenient clutch, with easy action for starting and stopping. This machine will plane material up to 24 inches in width and from zero up to 5 inches in thickness. The tight and loose pulleys are of the company's patent differential pattern, the loose pulley being of smaller diameter than the tight. The weight of the machine complete is 1300 pounds.




*Novelties.—Fig. 4.—Diagonal Surface Planer, Built by the Bentel & Margedant Company.*

*Fig. 5.—View of Triangular Shear Knife-Head*

**The Rochester Sash-Balance.**

In Fig. 6 of the accompanying illustrations we present a sectional view of the Rochester Sash-Balance, which is being introduced to the trade by the Rochester Sash Balance Company, corner of Frank and Centre streets, Rochester, N. Y. This device consists essentially of a hollow pulley containing a steel coil spring. Attached to the pulley is a braided sash cord, one end of which is fastened to the sash in the same general manner as when hung with weights. The cord is so arranged as to wind upon the pulley in such a manner that the weight of the sash automatically regulates the tension or lifting power of the balance, an arrangement which is said to give much more satisfactory results than when weights are employed. The balance is placed in the window frame in the same manner as an ordinary sash pulley, and, as it requires no weight, boxes or pockets, the work of putting it in place can be very quickly accomplished. In the manufacture of these goods only the best braided sash cord is employed, and in all respects the device is said to be first-class in workmanship and operation. One set of four balances is said to be sufficient to hang two sash, or one complete window. The device is made in three sizes, known as light, medium and heavy.

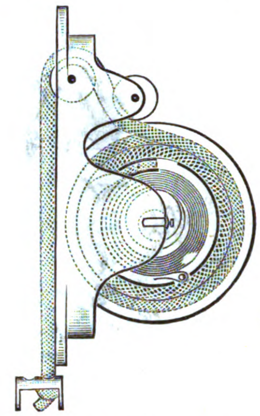


*Fig. 6.—The Rochester Sash-Balanee.*

**New House-Heating Boiler.**

In Fig. 7 of the accompanying engravings we present a sectional view of the new heater recently put upon the market by the Gurney Hot Water Heater Company, of Boston, Mass. This heater is so constructed that any section may be removed without disturbing any others, the sections being fastened together by short bolts passing through lugs. By reference

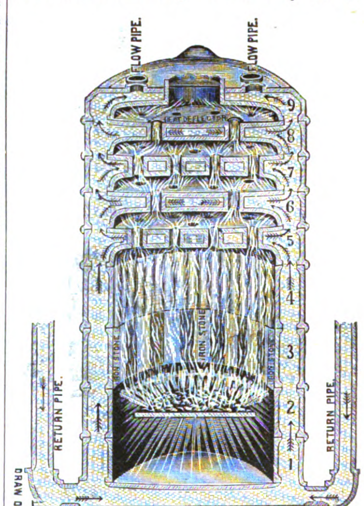
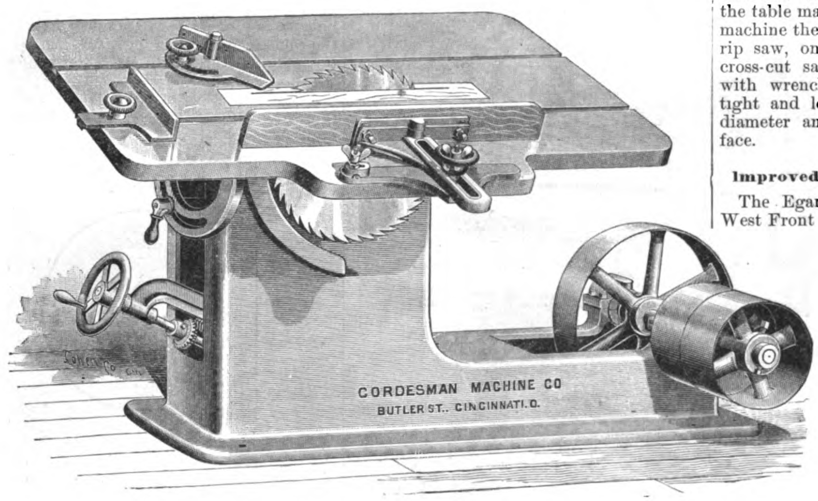



*Fig. 7.—Sectional View of Boiler Made by Gurney Hot Water Heating Company.*

to the engraving it will be seen that the water extends all around the grate and ash-pit, so that all the heat radiating below the grate is utilized. Another feature of the new construction is the position of the return-pipes, which enter the boiler much lower than in the old form, and thus tend to promote a better circulation. The combustion chamber has also been increased in size. By removing the ash-pit front the grates and grate rests may easily be taken out without disturbing the upper structure. The manufacturers claim that this heater gives a maximum efficiency with a minimum of fuel; that the arrangement of parts is such as to offer little resistance to a free circulation, and that the device is in all respects highly satisfactory.




*Novelties.—Fig. 8.—Dimension Saw, Built by the Cordesman Machine Co.*

### Dimension Saw.

In Fig. 8 of the illustrations presented herewith we show a perspective of the No. 2 dimension saw, with iron tilting table, which has recently been placed upon the market by the Cordesman Machine Company, of Cincinnati, Ohio. The manufacturers inform us that they have brought out this machine in order to meet the demand for a woodworking tool that would rip, cross-cut and make miters, and the machine shown herewith has been designed especially for these purposes. The frame is large and cast in one piece to give it great strength and rigidity. An extension to carry the countershaft is cast in it, thus requiring but a single alignment in setting the machine. In order to prevent accidents a saw-guard is provided. The table is 4 feet long, 3 feet wide and substantially ribbed. In the table are planed grooves for the reception of cross-cut and miter fences. The opening for the cutters to pass through is sufficiently large to admit of the use of a 20-inch saw. Fitted to the under side of the table and giving it a tilting movement and substantial bearing are two turned dovetailed radii. In the front radius degree marks are cut, indicating the angle of the table while being tilted. The arbor is of large diameter, revolves in long self-oiling boxes and is made of refined machinery steel. The boxes are fitted and connected to a dovetailed inclined frame, gibs being provided to take up the wear. By means of the hand-wheel and screw, clearly indicated in the cut, the saw may be adjusted to suit the various thicknesses of material and at such an angle that there will be no variation in the length of the belt. The patent ripping fence is clamped to the table, and the manufacturers state that it may be rapidly adjusted to allow material up to 18 inches wide to pass between it and the saw. It has a rack and pinion movement, operated by a small hand-wheel, and when placed in proper position is firmly held by a thumb-nut. The statement is made that this fence is so constructed that it can always be kept in line with the saw, or, if desired, may be swayed a little one way or the other. The saw has a vertical adjustment, while the table may be tilted to 45°. With each machine the company furnish one 18-inch rip saw, one ripping fence, one square cross-cut saw, one miter fence, together with wrenches and countershaft. The tight and loose pulleys are 10 inches in diameter and provided with a 4½-inch face.

### Improved Door and Blind Clamp.

The Egan Company, of Nos. 221-241 West Front street, Cincinnati, Ohio, have just placed upon the market a new improved door and blind clamp, a general view of which is shown in Fig. 9 of the accompanying illustrations. This machine has been especially designed for rapid and accurate work, and is provided with all the necessary adjustments and dogs for clamping any size of door or blind. The arrangement of parts is such as to give an equal pressure on all the joints, which are perfectly true both sides of the door or blind. The frame is made of iron planed perfectly true, and when bolted together makes a very rigid machine, with ample floor space. The top of the frame is planed to receive two long slides for the dogs to move upon, and they can be placed in any position to suit the work. A long bar, with clamping-screw attached, is provided for clamping the ends, and suitable arrangements are provided for operating the slides for different widths of doors. When the machine is ready for use and the door or blind is in position, the treadle is forced down, giving a uniform pressure on all sides of the work. By releasing the treadle the clamp is forced open ready for another door or blind. The manufacturers direct the special attention of the trade to this clamp as being very simple and reliable, while at the same time it is very powerful. It is constructed to take in doors or blinds from 6 inches to 4 feet 3 inches in width, and from 6 inches up to 8 feet 8 inches in length. Each machine is furnished with 12 door dogs and 16 blind dogs.

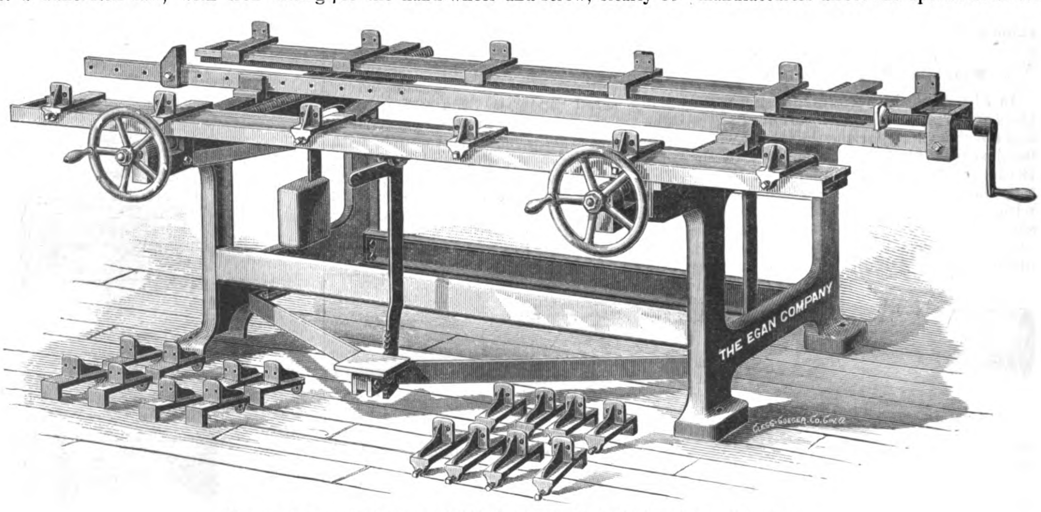
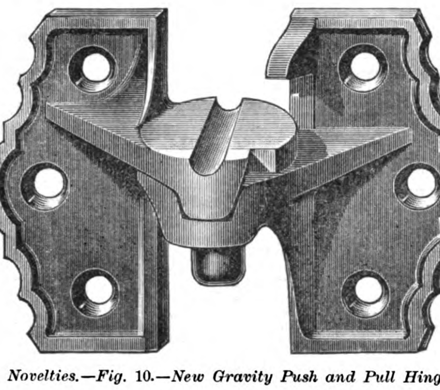



*Fig. 9.—Improved Door and Blind Clamp, Made by the Egan Company.*

### New Gravity Push and Pull Hinge.

This article is put on the market by William P. Kellogg, Troy, N. Y., for whom Fuller Bros., 33 Chambers street, New York, are agents. It is represented in the accompanying illustration, from which it will be seen that it embodies new features. The points claimed for it are: That it is operated by pushing and pulling, and not lifting a dead weight, as in other hinges; that there is no danger of lifting the blind off the pintles and dropping it, as sometimes occurs with those in use; that it locks the blinds open, and also locks them when closed, and that for this reason no inside fasteners are required; and that they are provided with a back stop that positively prevents rattling of the blinds. Having these features, the point is also made that in their use there is a saving of fully one-fourth of the labor and one-fifth of the screws required in putting up blinds with the ordinary hinges. The manufacturer also calls attention to the fact that there is no loss of security in dispensing with inside fastenings, such as are used with other hinges, inasmuch as the function of such fasteners is to keep the blind in place when closed, they not being a protection against burglars, as they are easily opened by inserting the fingers between the bottom rail and the first slat of the shutter. The upper and the lower hinges are alike, and any width of blind may be used.



*Novelties.—Fig. 10.—New Gravity Push and Pull Hinge.*

### Chandler & Washburn's Quick-Action Vises.

A vise embodying new features, intended for the use of pattern-makers and wood-workers in general, is represented in Fig. 11 of the illustrations. It is manufactured by Chandler & Washburn, 30 Kilby street, Boston, Mass. In this vise the nut is whole, drilled and tapped to fit a long screw. When the handle is in an upright position and carried as far to the left as possible, this nut is released from the back jaw, or, more strictly, released from the long flat rod fastened to the back jaw. The front jaw is then free to slide, and the nut and screw move with it. When it has been brought up to the work by turning the handle to the right about a quarter turn the nut is clamped to the rod, and if the handle is still turned to the right the nut remains stationary, and the screw works through it until the desired amount of compression is obtained. With this construction it will be seen that in any position the jaws can be brought together by means of the screw if desired. In ordinary work, however, the front jaw is slid against the wood and the handle turned a part of a turn to the right, thus giving a secure grip, and when a new piece is to be inserted the handle is turned back to its first position, when the jaws may be adjusted to the new work, and by means of the handle the requisite pressure be again applied. If extra compression should be required it is simply necessary to continue the operation of clamping until the desired result is obtained. The manufacturers call attention to the advantages possessed by these vises in the convenience and rapidity of their action, their finish, strength, simplicity of construction and durability. They are made in two sizes, with a width of jaw 10 and 14 inches, weighing respectively 53 and 60 pounds. Their machinists' vise represented in Fig. 12 is made on the same principle, and has the same general construction as the woodworkers', the shape of the parts being changed to correspond with the different uses for which it is intended.

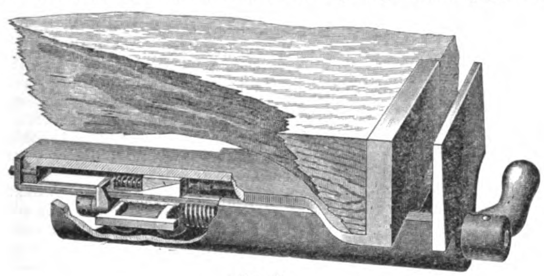


Fig. 11.

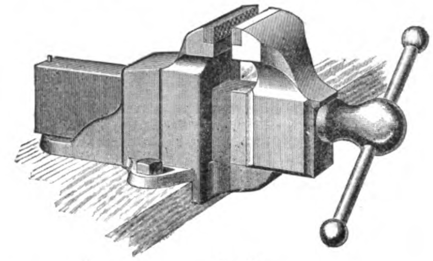


Fig. 12.

*Figs. 11 and 12.—Chandler & Washburn's Quick-Action Vises.*

### Logan's Patent Stall Drain.

The accompanying illustration represents a stall flooring patented and manufactured by Martin Logan, 164 East Seventy-seventh street, New York. The lower part of the cut given represents the drain as placed in the stall, and the upper part shows the bed plate and slats, which are sold for the use indicated. The bed plate is 19 inches wide, 5 feet long, with gutters 1 inch wide, and is made of cast iron, the wood slats, inserted as indicated, being made of hard oak. The channels between each wooden slat act as independent gutters to carry the refuse off to the main gutter. It will be observed that it is constructed without the use of nails or screws to injure horses, and when the wood slats are worn they can readily be removed and replaced without the aid of a carpenter by lifting up the bed plate and sliding slats in place from the forward end of the plate. The manufacturer also points out the advantage it possesses in having the bed plate of iron, as promoting cleanliness in the stable and preventing soaking and disagreeable smells, and it is claimed that it will afford health and comfort to the horse, and prevent the rise of ammonia from injuring carriages. The slats are 2 inches wide and 2 inches deep, and the depth of plate and slat is 2½ inches.

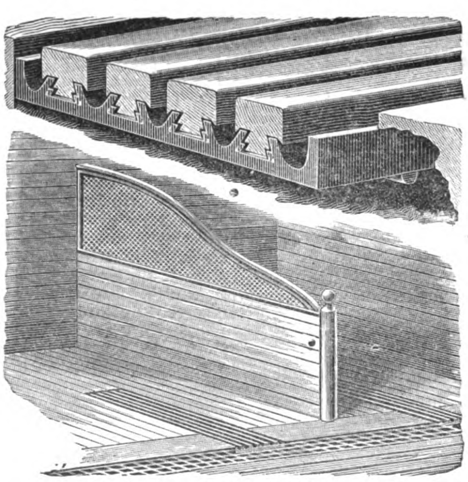


*Fig. 13.—Logan's Patent Stall Drain.*

## TRADE NOTES.

THE SCOTT & BITTING PAPER COMPANY, of Philadelphia, Pa., are meeting with gratifying success in the sale of their building paper, and from the number of letters which they receive from time to time it is evident that their goods are rapidly increasing in popularity. A gentleman who has used somewhat extensively the building paper put upon the market by them states that it is very satisfactory for use where good work is desired, and that he has several jobs under way in which it is specified.

THE CALUMET IRON AND STEEL COMPANY, of Chicago, are meeting with gratifying succes in the sale of their parallel chisel-pointed steel nails, which they claim are of such shape as to secure a very strong hold upon the wood. These nails are light in weight and easily driven.

EBERT BROS., of Detroit, Mich., manufacture corrugated iron and steel roofing which is meeting with a great deal of success. They are offering the trade a variety of styles of roof covering, and are in a position to sharply compete with others engaged in the same general line of business.

THE DEMAND for economical sawing is on the increase. Splitting lumber almost from the log is the latest scheme, and its merit consists of increased production and the saving of lumber, time and expense. Infinitely better sawed lumber is had also. The Egan Company, of Cincinnati, Ohio, will be glad to give further information to interested parties.

IN ANOTHER PART of this issue the Pike Mfg. Company, of Pike Station, N. H., compare sharp tools to sharp wits in a way to command the attention of our readers. The company named manufacture a very extensive line of Whetstones with which many of our readers are already familiar.

DEWEES & CO., of No. 9 North Thirteenth street, Philadelphia, Pa., are offering for sale to carpenters the right to build refrigerators and cold storage warehouses under the Hughes patents in localities where it has not already been disposed of. It is stated that the Hughes system of refrigeration has been in use since 1879, and has given very satisfactory results.

THE CANTON MFG. COMPANY, of Canton, Ohio, are offering the trade a steam heating or hot-water boiler, made under Poorman's patent, for heating residences, hotels, stores, schools, churches and similar structures. It is made under the name of the Columbia, and embodies features which cannot fail to attract attention.

CONSTABLE BROTHERS, of 151 Broadway, New York City, have recently finished plans for a large residence at Milton Point, N. Y. The structure will be 55 x 62 feet in size, and finished in the old colonial style of architecture. The trimmings will be of mahogany and ash. This firm removed to their new office at 151 Broadway on April 15.

THE FOLDING AND ADJUSTABLE DRAWknife, manufactured by A. J. Wilkinson & Co., of Boston, Mass., is meeting with much favor at the hands of carpenters and builders. This knife is placed before the trade in three sizes, ranging from 6 to 8 inches, and in all cases the blade is warranted to do all that is claimed for it.

THE BERGER MFG. COMPANY, Canton, Ohio, direct the attention of the building trade to Berger's patent simplified steel roofing, which they claim to be a very superior covering for buildings of all descriptions.

A. J. CORCORAN, 72 John street, New York, is directing attention to a line of wooden tanks for house-water pumps, which he is prepared to supply.

E. MAGEE & CO., of Allegheny, Pa., announce to the trade that they have added several specialties to their line of business, and have largely increased their facilities for handling goods. This enables them to make deliveries promptly, and in any quantity desired. They carry in stock large quantities of the best brands of American and imported cement, plaster, lime, sand, mortar, colors, fire-brick and clay, sewer-pipe, flue linings, English and American enameled brick, wire lathing, &c.

WE HAVE RECEIVED from W. A. Heath, of Nos. 23 and 24 Wall street, Binghamton, N. Y., a catalogue devoted to illustrated descriptions of some of the wood-working machinery manufactured by him. The pamphlet consists of something over 50 pages of letterpress, profusely illustrated and arranged in a form which cannot fail to prove interesting to the trade. Attention is given to molding machines, matchers, planers, resawing machines, wood frame slitting saw-tables, shapers, bandsawing machines, pony planers, automatic back-knife lathes, knife grinders and combined boring and bit mortising machines.

ANNOUNCEMENT IS MADE that J. B. Delbridge, N. Cameron and F. J. Dingeman have recently formed a copartnership under the style and title of Delbridge, Cameron & Dingeman, of Detroit, Mich. The mill and factory of the new firm is located on the corner of Eighth and Plum streets, near Michigan avenue, of that city. Attention will be given to the manufacture of sash, doors, blinds and all kinds of general house-finishing material in hard or soft wood; also planing, turning and band, scroll and resawing, stair building, &c.

THE IXL PUMP, LUMBER AND MFG. Company, of Goshen, Ind., are circulating an attractive little catalogue of a size convenient to carry in the pocket, devoted to what are known as the IXL wood and chain pumps. These goods are carefully illustrated and described, and numerous tables are presented giving dimensions and prices of the various styles and sizes. In addition to the goods shown in the catalogue, the company manufacture sash, doors, blinds, window and door frames, moldings, corner beads, ornaments, store fronts, counters and fixtures, balusters and stair-work, veranda posts, flooring, pickets, battens, &c. They also carry in stock a full line of various kinds of wood.

IN ANOTHER PART of this issue we present the card of William H. Cole, electrical engineer, 502 West Fifty-third street, New York. Mr. Cole has had exceptional experience in the construction and management of electric light, railroad and power plants, electrical machinery and appliances, and has made a specialty of house-bell and annunciator work.

HENRY S. NORTHROP, who has recently removed to 18 Rose street, New York, invites carpenters to send for circulars of his paneled and embossed metal ceilings, which are easily put up by carpenters in either new or old buildings.

IN THE LAST ISSUE of *Carpentry and Building*, in referring to the little book entitled "Cottage Souvenir," issued by George F. Barber, we gave his address as Nashville, Tenn. It should have been Knoxville, Tenn., as those of our readers who referred to his advertisement noticed at the time. Since the date named we understand that Mr. Barber has returned to his old home, De Kalb, Ill.

WALBRIDGE & CO., Buffalo, N. Y., send us a handsome catalogue illustrating and describing the iron reservoir vases which they manufacture. In an accompanying circular letter they direct the attention of the trade to the new styles of vases which they have recently added to their line, and also refer to the increased sale of their patent reservoir vases. All of their vases are painted with two coats of white paint unless otherwise ordered. The catalogue comprises 40 pages, each of the first 35 of which contains illustrations of one or more different styles of vases. Some of the designs are exceedingly attractive, being very elaborate and tastefully gotten up. Less expensive designs are, of necessity, plainer, but all of them are pleasing examples of cast work. At the close of the catalogue a few pages are devoted to lawn chairs, settees and other specialties made by Walbridge & Co.

GEORGE M. CLARK & CO., Chicago, Ill., are manufacturing 12 different styles of the Jewel gas stove, which is a very convenient device for use during the hot summer months. The flames of this construction are operated by direct needles, which it is claimed give better combustion and great economy in operation. Requests for catalogues are solicited.

WE HAVE RECEIVED from the Garry Iron Roofing Company, 152 Merwin street, Cleveland, Ohio, a copy of their little pamphlet, envelope size, which is being sent to the trade. It contains a very complete description of the different roofing specialties which this company supply. Near the close of the book are several pages devoted to iron magazines, fire-proof doors and shutters, cement and paint and roofing brushes. Two specialties outside of the roofing line are also included—namely, the Woods Corn Sheller and the Anti-Shaft Rattler.

THE CINCINNATI CORRUGATING COMPANY, Cincinnati, Ohio, direct attention in another part of this issue to their corrugated iron lath, designed for use in buildings possessing fire-proof qualities. It is claimed that this style of lathing is more rigid than wire lathing, and is so constructed as to provide ample openings for the plaster.

### Methods of Reproducing Drawings.

In a recent issue of one of our English contemporaries there was described a new device for reproducing drawings, which seems likely to commend itself to all who are called upon to make duplicates of an original drawing. It appears that the drawing is made with lithographic ink or crayon in much the same manner as employed in the autotype process, but instead of transferring it to stone it is worked directly upon a prepared plate of zinc. This plate is covered with a "fixing" solution, which is allowed to dry, and is then washed off with water. The next step is to transfer the drawing to the printing pad, which is done by applying ink with a roller, and placing the plate and pad in contact under pressure. The paper for printing is then pressed on the pad, and receives an impression exactly like the original drawing. If several copies are desired, a corresponding number of pads may be treated, or successive transfers may be made on a single pad, either washing it with cold water after each appplication, or trusting to the accuracy of the register formed by bars provided for the purpose. The original plate is cleaned with a special solution, and can be used for other drawings for an indefinite period.

Another device of considerable interest to architects who may possess only small frames is designed for making blue prints of large drawings. Instead of a frame a cylinder is employed, made of any suitable material and covered with felt. This cylinder should be of sufficient size, both as regards length and diameter, to allow the drawing to be wrapped around it without overlapping. The first step is to draw the sensitive paper around this cylinder and place the bracing over it. Clamps or double hooks provided with springs may be employed to stretch the cloth smoothly in place. The cylinder is then placed in a frame which will allow it to be easily revolved. The printing resulting is said to be accomplished fully as fast as under glass, while the impressions are sharper.

### Old Method of Ventilation.

The science of ventilation may have made some gigantic strides in the past century, but for all that there are thousands of houses put up every year that do not have a ventilator in them, and a house is supposed by many to be quite modern if there is a ventilator in the kitchen. The following account of an invention in the ventilating line may be of interest to those who are up with the latest improvements. Cavallo, in his "Treatise on the Nature and Properties of Air" (London, 1781), quotes from an older work a method of ventilating a room by means of a small tube opening into it, or near the ceiling, which might either be carried to the top of the building or made to communicate with the external air by a small perforation through the wall at the roof of the room, by which means a proper circulation would be established and the foul air be carried off. In order to admit fresh air into the room, another opening was made in the ceiling, having a communication with a small pipe that led from thence to the outside of the wall, where it was bent and conducted downward till it reached nearly to the ground, being left open to communicate with the external air. The cool air would thus be forced in at the lower opening of the tube, and made to ascend into the apartment in proportion to the quantity that escaped toward the higher regions by means of the ventilator. Here we have a system of ventilation over 100 years old, and yet, at the present day, ventilation is still discussed and quarreled over as if it were some new thing. The proper supply of fresh air is denied to the great mass of the population, because builders, who ought to be perfectly acquainted with these things, too often neglect to study the natural laws which chemists and physiologists have placed on a sure basis. We are told that the native porters of Canton are accustomed to balance the load which they carry on a pole upon their shoulders by means of a large stone at the other extremity of the pole, and that they deemed the suggestion of an Englishman an impertinent interference who wished them to balance one package by means of another. "Our ancesters," they said, "were very wise men, and they never carried more than one package at a time, and this they balanced by means of a stone; shall we be wiser than our ancestors?" So may a large proportion of our builders exclaim, "Our ancestors were very wise men, and they never thought of providing special means for ventilating rooms; shall we be wiser than our ancestors?"

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



VOLUME XI. NEW YORK, JUNE, 1889. NUMBER 6

## OUR CHICAGO OFFICE.

### CHANGE OF ADDRESS.

The Chicago editorial and business offices of *Carpentry and Building* have been removed from 95 and 97 Washington street to 59 Dearborn street.

IF IT WERE POSSIBLE to determine the money value of business courtesy the majority of people would be wonderfully surprised to find at how high a figure it was rated; and stranger yet, if this same quality could be gathered up or manufactured into a marketable form, we believe that it would find very few purchasers. In other words, courtesy is a something the worth of which is little appreciated, and most people would not care to take it even as a gift. How important a factor it is in the general affairs of life is not a question to be discussed in a trade paper, but on the other hand, it is eminently proper to point out the influence of this personal ingredient in the business world. Furthermore, the subject is especially pertinent just now, when the celebration of the centennial anniversary of General Washington's inauguration is turning men's thoughts back to the customs of the last century. To be sure, the chief attention is given to the military ways of our ancestors, but along with this there is a good deal of investigating into the every-day habits a hundred years, more or less, ago. Whoever looks up the history of business and reads old correspondence and papers relating to past methods of trading cannot but be struck by the more dignified and courteous tone that pervaded the dealings of the merchants then, and if the written records they have left are marked by an old-fashioned courtesy we can depend upon it that the manners of the day possessed the same charm. Is is no excuse to say that business men of the present are subject to such fierce competition and are so driven in their work that they have no time to waste in being courteous, for a gentlemanly manner will facilitate rather than delay a trade, even if it is but swapping jack-knives. Furthermore, as there is little prospect of the hurry of business life abating yet awhile, we should be all the more careful to guard against the consequences that come from fret and worry, lest our future behavior become intolerably rough.

LOOKING AT the matter simply from a mercenary stand-point, it will require but little reflection on the part of sensible people to discover that courtesy in business brings an actual money reward. There is no one but can recall instances in his experience where the manner of a salesman had as much to do with a bargain as the quality of the goods. It would seem to be true, however, that this personal element enters with greater force in small transactions than in large ones, for where considerable money is involved we are less influenced by our feelings in the matter. A pleasant address will win a fortune for a book agent, while the president of a big corporation can be as crotchety as he pleases without coming to bankruptcy. Nevertheless, the amount of business lost through the offensive behavior of a company's agents is an indeterminable factor, and very likely it is the difficulty of estimating the losses from this cause that makes us undervalue it. If, as not infrequently happens, we are kept from purchasing a lot of goods or from awarding a contract by a disagreeable manner, we are not apt to tell the person the reason why we do not trade with him, and such people are seldom modest enough to divine our motives. But if it is the price of the work or quality of the goods that deter us, we have no hesitation in letting our reasons be known. In the first instance, the man injures his interests without knowing how, and we will likely repeat the folly many times over, while in the second case we have cited the obstacle to the trade is understood and can readily be removed. As we intimated above, the influence of courtesy increases as we approach the last division in the distributing trade, and is greatest with the retail salesman, but in every department of business it is too important a factor to be ignored. It is extremely difficult to write about this subject in a general way, and it would require an infinite number of practical illustrations to cover the whole field. The best we can hope to do is to direct attention to it, and let each one reason out for himself the money value of business courtesy. After all, courtesy is much like advertising; we know that it is a good thing, but cannot tell exactly how many dollars it is worth to us.

IN THE *Century* for May there is some account of mechanical work, house-building, &c., in Samoa. Contractors, carpenters and builders who think that they have a hard time to get along in this country may perhaps obtain some solid comfort from reading the article referred to. We suggest that carpenters refrain from emigrating to Samoa until more explicit information is received regarding the value of the presents which go for pay for work performed. An extract from the article in question is as follows: "The negotiations between the skilled and wily carpenter and the prospective Samoan house owner would amuse but hardly meet the approval of the business man of to-day. Under the propitiating influences of kava, the necessary presents are produced to induce the carpenter to undertake the construction of a house. It is begun at once, without any terms of agreement, and the work advances until the carpenter thinks more presents necessary, and he ceases work. Additional gifts being made, the carpenter continues the construction until he deems it necessary to demand another contribution, when he again stops work. If the contribution is not forthcoming, labor is suspended on the incompleted house, never to be undertaken for completion by another of the craft, and forever afterward it remains unfinished and a public reproach to the good name of the unfortunate owner, who, at the time of its beginning, not knowing what may be the ideas of the carpenter as to the cost of its construction, must either call upon the community for aid, which is generally freely extended, or suffer the humiliation of this unfinished monument."

THE SOLUBILITY of lead in certain drinking-waters is a chemical fact that has been established by oft-repeated investigation, and the bearing of this fact upon health makes it one of great importance. We do not wish to enlarge upon the danger of lead-poisoning from this source, or give it a prominence it does not deserve, and if it were not that many "practical" sanitarians are continually trying to persuade people that lead pipes are, under all circumstances, safe water conduits, we would not care to say anything on the subject. But, so far as we are able, we would like to offset the teachings of these pseudo-experts, so that the public could, with unbiased minds, read the results of scientific investigation and draw their own conclusions. We have not the least sympathy with those alarmists who would discover a source of disease and death in almost everything that is eaten, drank or handled, but many cases of lead-poisoning from drinking water are too well authenticated to admit of doubt as to the possibility of this danger. It is true that much of the testimony comes to us from England, but this may be explained by the fact that in the older countries more attention is necessarily given to all questions affecting public health. But lead and water are much the same the world over, and a drinking water that will act on lead in England would be apt to do the same thing here. The majority of waters will undoubtedly form a protective coating on lead pipe, but it is because of the very infrequency of a dangerous corrosive action that so many people regard it as mythical. It is impracticable to give a safe rule regarding the quality of water that may be safely conveyed and stored in lead, for the possible impurities are many and their action depends not only on the actual amounts present, but also upon their combinations. Generally speaking, the purer the water the greater will be its corrosive action, but where impurities are of an organic nature they are the very reverse of safeguards. This point was well brought out by the investigation following certain cases of lead-poisoning at Bradford, England. It was found that the impurities, which were of a vegetable nature, exercised a strong solvent action upon lead. Another instance that may be cited is the case of the water-supply of Sheffield, England, where last year several persons suffered from lead-poisoning. The water when analyzed was found to contain free carbonic acid, silica and salts of magnesium and lime, but nevertheless it dissolved lead to a dangerous degree. Mr. W. H. Power has recently made an elaborate report on this subject in which he devotes considerable space to Sheffield water. In this report Mr. Power shows that although most soft waters act upon lead, and that hard waters are least likely so to act, yet some soft waters do not act upon lead and some hard waters act upon it vigorously. This indicates that the safety of suspected waters should be proved by testing with lead rather than by chemical analysis.

AT THE last meeting of the Electro-Technical Society, held in Berlin, Dr. Werner Siemens read a paper on "Underground Electric Light Mains," making special reference to the efficiency and durability of lead-incased cables. A very interesting portion of the paper was that in which he dealt with the probable future extensions of systems for underground distribution of electricity for light and power purposes. He pointed out that the rapid increase in the number of pipes, cables and conduits of various kinds will soon render it impossible to accommodate them all in the space beneath the streets. He also showed that the surface of city streets had about reached the limit of capacity as thoroughfares, and that something must be done to relieve this over-crowding above and below ground. He anticipates that the solution of the problem will be to have two streets, one above the other, the second street being either an elevated one or a tunnel of some sort. The second street, whether above or below, will be used exclusively for express service by means of electric motors and for the accommodation of electric wires and compressed air, steam, water and gas pipes. This scheme would relieve the congested condition of many streets of large cities. It would do away with the obstructions incident to the laying and repairing of underground conduits, and would also provide rapid local transportation. New York probably suffers as much from overcrowded streets as any city, and it is imperative that some means of relief be devised. If the German cities will be good enough to experiment with the systems proposed by Dr. Siemens, New York will be very glad to profit by their experience.

FROM the number of building permits which have been granted in St. Paul and Minneapolis during the past few weeks it is evident that building operations in that locality are likely to assume considerable proportions. The permits referred to cover constructions for both business and dwelling purposes, and while the cost individually is not great for any of them, the aggregate foots up a large total. While the condition of business throughout the country, generally speaking, is not altogether flattering, the present time is considered all the more favorable to those desiring to erect buildings, for the reason that material of all descriptions can be had at reasonable rates. The outlook in the Northwest may be said to be fairly satisfactory, and the prospects warrant the belief that the year 1889 will compare very favorably, so far as building operations are concerned, with 1888.

THROUGH the courtesy of Mr. William H. Sayward, secretary of the National Association of Builders, we are in receipt of a copy of the official report of their third annual convention, held at Philadelphia last February. There is little more for us to do at this time than simply to acknowledge the receipt of the volume, for, as our readers know, we presented at the time an account of the convention. The report is especially valuable, as in addition to the discussions and printed records of the views held by the members on the many important and interesting topics that came up for discussion, it also gives in full the papers read at the convention, notable among which were Mr. Sayward's on "Builders' Exchanges: Their Advantages and Opportunities," and Colonel Auchmuty's address on "Trade Schools." The former address, it will be remembered, was to be printed in separate form and to be sent out as a proselyting tract, and as we noted at the time, it would be difficult to get together in small space so much argument for the establishment of local builders' exchanges. The success of the last annual convention strongly testifies to the interest felt in the national organization, which already is doing excellent work; this work, however, can be made much more far-reaching by the multiplication of local associations. The report has evidently been carefully edited and is published in an attractive and serviceable shape.

## NEW PUBLICATIONS.

HOT-WATER HEATING AND FITTING OR WARMING BUILDINGS BY HOT-WATER HEATING APPARATUS, THE METHODS OF THEIR CONSTRUCTION AND THE PRINCIPLES INVOLVED. By William J. Baldwin; 385 pages; over 200 illustrations and diagrams, and 15 tables. Published by the *Engineering and Building Record*. Price, $4.

The subject of warming buildings by hot water is attracting so much attention upon the part of the public at large at the present time, and is having such special study upon the part of all who are engaged in any branch whatsoever of the business of heating and ventilation, that the appearance of a manual or compendium devoted to it is of great importance. That the book should come from the pen of a writer so well known to steam engineers and to the readers of the technical press in general as William J. Baldwin gives it still further claims to examination, and demands for it careful scrutiny and intelligent criticism. The work has been prepared not alone for purely professional readers, but rather for the mechanic and hot-water heating fitter, as the amount of new matter which it contains relates chiefly to fittings rather than to the principles of heating. The greater portion of the matter contained in this book first appeared in the pages of the *Engineering and Building Record* in a series of articles. Since their appearance in that periodical they have been revised, and considerable new matter has been added pertaining to the subject above indicated.

Considering the work as a whole, it can only be regarded as a small original contribution to hot-water heating literature. The greater part of it is taken up with reiteration of experiments of some of the earlier investigators. Much time has been given to the calculations based on the accepted hydraulic formulas, but the space occupied in the explanation of how these calculations were made is of small importance to the practical reader. The results of this figuring are of use, and the methods proposed for proportioning and grading the sizes and areas of pipes might, with great advantage, receive more elaboration. Tables, in addition to the diagrams, giving the actual sizes of pipes and surfaces would have been very desirable. The information regarding the proportions of pipes is of benefit to the practical man, and for this alone the book becomes a useful addition to the engineer's library. The effort is more the work of a student of engineering authors than that of a practical mind, as an illustration of which we would cite the assumption of the temperature of the water in the radiatars when calculating the heating surface. In the radiators in the greater number of buildings it is not common to get the temperature of the water entering the radiators to 210° F., the outside atmosphere being zero or 10° below zero. If, however, this high temperature is practicable, it is to be regretted that no case was shown where it occurs, and that no idea of the relative size and proportion of boiler and heating surface was given to attain such results. In the only practical experiment made by the author, and referred to on page 166, he states that the highest temperatures attained in two tests of the water entering coils were 195° and 206° F., while the outside air was 85° and 78°. Here was a case of one boiler supplying 122 square feet of surface so that 210° might, if possible, be attained. It being the first literary contribution to hot-water heating in the United States, it is worthy of all the attention it will attract, and it is surely the precursor of many practical American additions to the library of hot-water heating literature.

## THE PLATES.

In Plate XXI we show an ingle nook chimney-piece, made by Arrowsmith & Son, of England. The study is interesting in more ways than one, showing as it does the tendency of modern design in artistic mantel construction. The two positions in which the chimney-piece is presented offer an opportunity for choice according to the requirements of the case.

Plates XXII and XXIII show perspective view, floor plans and elevations of the design to which was awarded the second prize in the XIXth competition. The details will be found elsewhere in the reading columns.

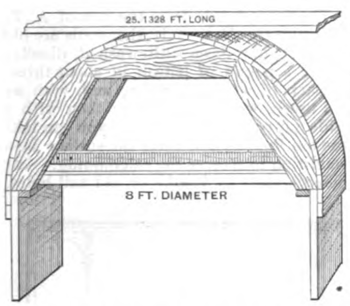
Plate XXIV presents the perspective view, floor plans and an elevation of the set of drawings taking the second prize in the XVIIIth competition.

The collapse of the Panama Canal scheme is complete, the last contractor having ceased on the 7th ult. The most impressive spectacle in surveying the grounds is the immense quantity of abandoned machinery in various stages of corrosion. Merchants are vacating their warehouses.

## Sweep-Work.

BY OWEN B. MAGINNIS.

The absence of any published methods of the art of bending wood for use in house trim and joinery is sufficient warrant, I think, for the following remarks upon the subject, which I have endeavored to make as comprehensive to carpenters and builders as possible: At the outset I desire to say that when the work to be performed is of too large a sweep to admit of its being cut from the solid plank the method preferred by mechanics of the




*Sweep Work.—Fig. 1.—General View of Drum.*

present day for the purpose of obtaining a piece of semicircular material, so that it will remain permanently in that shape, is to bend it over a drum of the sweep desired. This drum is put together in the same manner as the center for an arch, and is made up of two frames joined together by battens, whose length is greater than the width of the stuff to be bent. The joints are made close and the convex surface carefully smoothed over to reduce all possible projections and to insure a smooth, even curvature to the board to be bent. The drum is raised from the floor by means of legs, in order to permit the over length, which is necessary to make the joints, to pass down on either side of the drum, as shown in Fig. 1 of the illustrations. When the material has been made ready for bending it is placed on the drum, bent around so that its surface presses against the drum at every point, and is secured firmly in position by fastening hand-screws from the bottom edges of the frame-pieces on curved blocks, placed on the outside of the piece being bent. If it be necessary when the sweep is quick notches can be cut out of the bottom edges

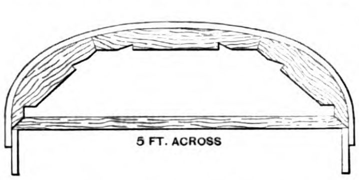


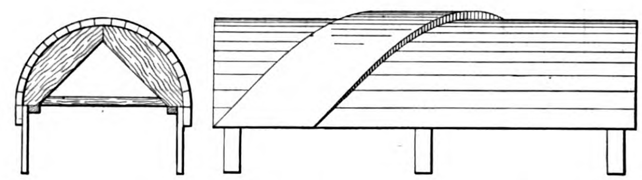

*Fig. 2.—An Elliptical Drum.*

of the frames, so as to bring the power to bear directly on the spot desired, as shown in the sketch of an elliptical drum, Fig. 2 of the illustrations.

A very ingenious and at the same time satisfactory method of forcing the material on the drum is shown in Fig. 3. A number of 1 and 1¼ inch yellow pine or hard wood pieces of sufficient length to allow for fastening on the frames are mortised with an inch chisel, making an opening 3 inches in length, as shown in the sketch. These pieces are screwed fast on both sides of the drum, the various parts being opposite each other. Double wedges are then passed through the mortises, and when driven down press the material firmly against the curved face of the drum and insure a perfect concave surface. It is obvious that the more mortised pieces there are employed the more certain will be the result accomplished. This method is undoubtedly one of the best in existence for curves of small or even those of large radius, as it is almost certain in its results. If the wedging be commenced in the center and continued down each side, wedging piece after piece until the bottom is reached, the result will be very satisfactory. In all cases the stuff should be carefully watched to see that it touches the drum at every point.

Bending sweep-work on the pitch for stair-builders' strings, or for wainscoting on stairs, is also performed on drums or molds sufficiently long to take in the whole pitch. This work is done as indicated in Figs. 4 and 5 of the illustrations. The bent piece can be held in position by strong strips screwed lengthwise across it into the drum, or they can reach to the ends of the drum and be fastened by means of hand-screws. After a little experience in executing work of this description carpenters will find that it is always well to strike the desired sweep slightly longer than that shown in the plan by moving the center up after the manner indicated in Fig. 6. This is done in order to allow for the tendency of the wood to spring back into its natural position, due to the elasticity of the wood, which is always manifest to a greater or less extent.

One of the commonest and most easily-arranged methods for obtaining curved segments or arcs of circles is clearly represented in Fig. 7, which shows a segmental



*Figs. 4 and 5.—Drums for Bending Stair-Work.*

door-head bent to a radius of 5 feet 3 inches. The sweep line is first struck out on the floor, and to it brackets the width of the piece to be bent are firmly nailed to the floor. Around these brackets the mold is bent, being held against them by other brackets, which are so nailed to the floor as to press against them. The stuff is allowed to remain in this position until the workman is satisfied that it is ready to be taken out. When all the appliances necessary for bending are ready, the first thing is to find the exact length of the stuff which will go around the entire curve. This can be determined exactly by working out the following simple arithmetical formula:

For a semicircle multiply half the diameter (or spring line) by 3.1416 or 3⅐, or multiply the entire spring line by 3.1416 and divide the result by 2. Either process will give the length required.

For an arc or segment take a span from eight times the cord (or spring line) of half the arc, and one-third the remainder will be the length of arc required.

For an ellipse multiply the mean of span and rise by 3.1416. This will give the exact length to go around a semi-elliptical drum.

These formulæ are taken from Spon's "Engineer's Pocket-Book," and will be found reliable in practice. To this length, however, must be added the extra length necessary to make joints, &c.

Concerning the preparation for bending, we will start from the well-known method of softening wood by steaming. The following methods of rendering it sufficiently pliable to bend, however, are in existence, any one of which may be adopted according to the requirements of the workmen: For example, if it is required to form a circular stile or rail for a circular paneled window soffit, a round piece of wainscoting or a circular paneled door frame head, the method shown in Fig. 8 is preferable. The reason for this is that the whole piece is built up in three thin pieces, each of

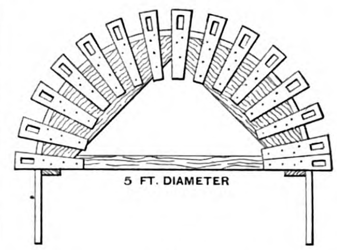



*Fig. 3.—Arrangement for Forcing Material Upon the Drum.*

which is bent around the drum in succession and then glued together. When the glue hardens the whole makes a solid curved piece, which can safely be mortised, tenoned, &c., without danger of breaking under the operation. This is perhaps the best way to obtain a solid hard-wood rail, as it can be built up in strips of veneer to any desired thickness, as indicated in Fig. 9. This is simply to dado out the back of the piece at regular intervals to a sufficient depth to form, as it were, a thickness of veneer and after the piece has been stretched on the drum to fill up the dados with keys gued in. These keys should always be sawn out slightly thicker than the width of the dado in order to permit of their being planed to a wedge shape. This has to be done in order that they may fit into the dados, which are necessarily made wedge-shape in bending the piece on the drum. The last and in my mind the worst method is the comparatively old one of kerfing, which might be used to advantage in an ellipical curve, as it contains curves of different radii. After

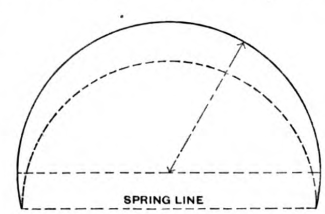



*Fig. 6.—Striking the Sweep From a Raised Center.*

spacing out the kerfs, which can be done in any of the various excellent ways described in previous issues of *Carpentry and Building*, the piece may be placed on the drum, but as there is no way of key-ing, the best plan is to kerf another piece reversely, and, keeping the kerfs down, to glue it fast to the convex surface of the bottom piece. If possible the kerfs should be spaced so as to come on top of those in the bottom piece for the purpose of equalizing the strain and preventing the entire structure changing its shape when released from the drum. The back piece is absolutely necessary when the soffit or face is veneered, as the elasticity of the hard wood is much greater than the pine backing, and a counterpiece can be added to resist the extra force. In conclusion I might say that work of this kind requires a great deal of care and attention combined with accuracy and dispatch. If any of the readers of *Carpentry and Building* should ever in building practice find it necessary to make use of any of the foregoing methods, the work should be very carefully considered, and the plan adopted which it is decided will give the best result.

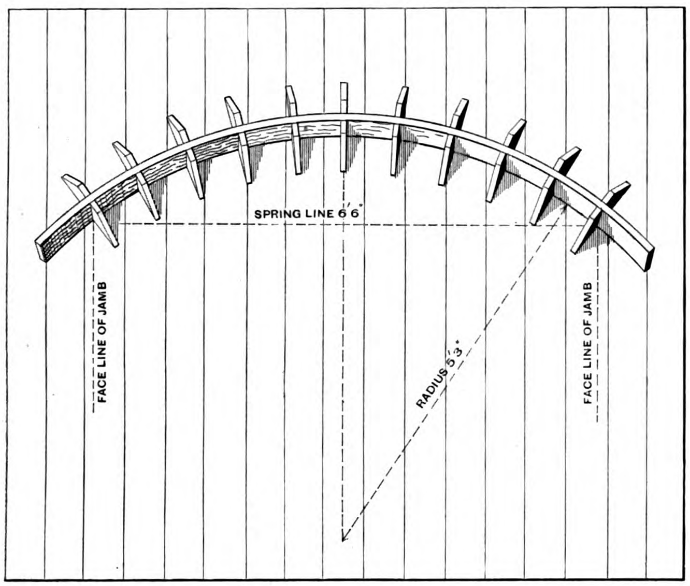



*Fig. 7.—Bending Wood to an Arc of a Circle.*

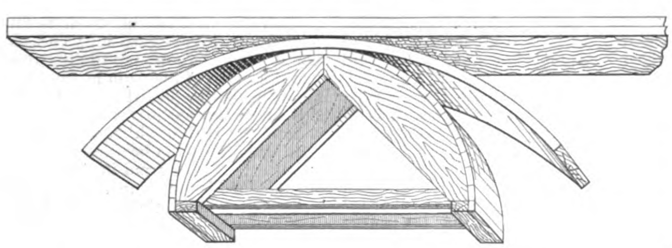


*Fig. 8.—Method of Obtaining Circular Paneled Door Frame Head.*

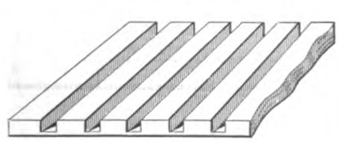


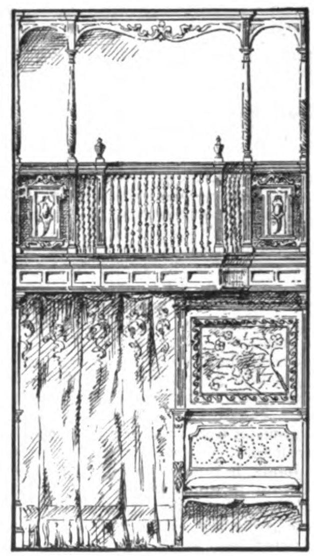
*Fig. 9.—Method of Obtaining Solid Hard Wood Rail.*

## Calcimining.

We frequently have inquiries on the subject of calcimining. The following collection of remarks on this subject, from various sources, may prove of interest and advantage to our readers. Calcimining, which is sometimes written "kalsomining," is a term meaning painting walls in distemper. Distemper is a corruption of a French word which, in plain English, may be translated "soaked." Our contemporary, *House Painting and Decorating*, says:

Distemper painting produces very beautiful effects on walls and ceilings, the tones having a certain peculiar softness that it is impossible to imitate with oil colors even when flatted. Wall paper owes its principal beauty to the fact that it is printed in water-colors or distemper. To do a good job in calcimining the wall must be in good condition to receive the application of the water-paint. Few walls are generally in the right condition. Finger-marks or grease will show through the work when finished if they are not killed out. Fly-specks likewise prove troublesome unless removed. Old calcimine must be removed by washing. To do this is easy enough if you follow the method mentioned below: Take a pail of warm water and a sponge; soak the latter, squeezing out most of the water, then proceed to wipe the wall down to the plaster-of-paris finish. By keeping your sponge rather dry you need never drop any water on the floor. Have another pail in which you can occasionally clean your sponge. Always commence by wiping off the ceiling first, then the top of side walls, and last the bottom of these. Those trying this method of cleaning off old work will never return to the old, dirty, dusty scraping so much in vogue in many places. If there be any cracks or breaks in the walls they should be carefully stopped with a mixture of plaster-of-paris and lime. By adding a little glue-water to the mortar it will not set so quickly, and will give the workman more time to properly finish his patching. We would urge the necessity of using the best brushes obtainable, as it is impossible to properly do a job with poor tools.

The following is from the pen of A. F. Daire, in the *Hub:* "If the walls are old ones that have been whitewashed, dissolve about 1 pound of potash in about three-quarters of a pail of water, and, with an old brush, wet the old lime; then with a wide putty-knife or scraper you can take the old lime off and leave the surface in a condition to receive the calcimining. Any defects, such as breaks or old nail-holes,



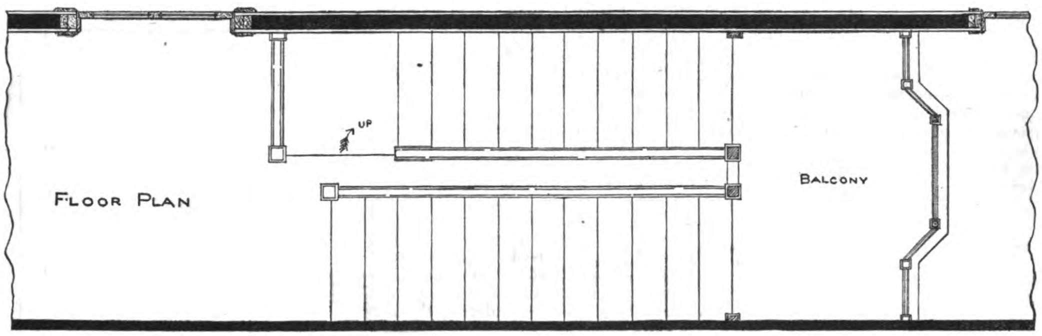
*Stair-Way Hall.—End Elevation, Showing Balcony.*

must be repaired with freshly mixed plaster-of-paris and a little slaked lime. For a first-class job in white or hard-finished walls use French zinc, or for common work Spanish whiting. The quantity of sizing to be used is as follows: 1 pound of the best white fish glue, well cooked, to 20 pounds of material. A good method of preparing the calcimine is to slake or soak it over night, after having well stirred it; the next morning, or when needed, add to it the glue, first dissolved in warm water, bringing it to the appearance of milk, and so that when applied to the wall it does not clot or appear as if oily. If the former effect is noticed there is not enough water; if the latter there is too much water. When of the proper consistency dissolve through a rag bag some ultramarine blue. This only when using whiting; the zinc does not need it. For a pure white wall the French zinc is the best. If put on the walls properly it will have a gloss that cannot be secured with any other material. For calcimining in tints use distemper colors. They can be bought already ground. Distemper colors are colors ground in water, without any size. It is best to try your mixture on a shingle, and after it is dry you will know if it has just enough size and is of the proper shade. When applying, begin by doing the outside of the molding on the ceiling, if there is any, then the centerpiece, and proceed by applying the mixture with a regular calcimining brush. Do not allow your calcimine to dry on you, but go quickly from one end of the ceiling to the other, working with the tips of the hair of the brush, and always working up with the new what has already been done on the lap."

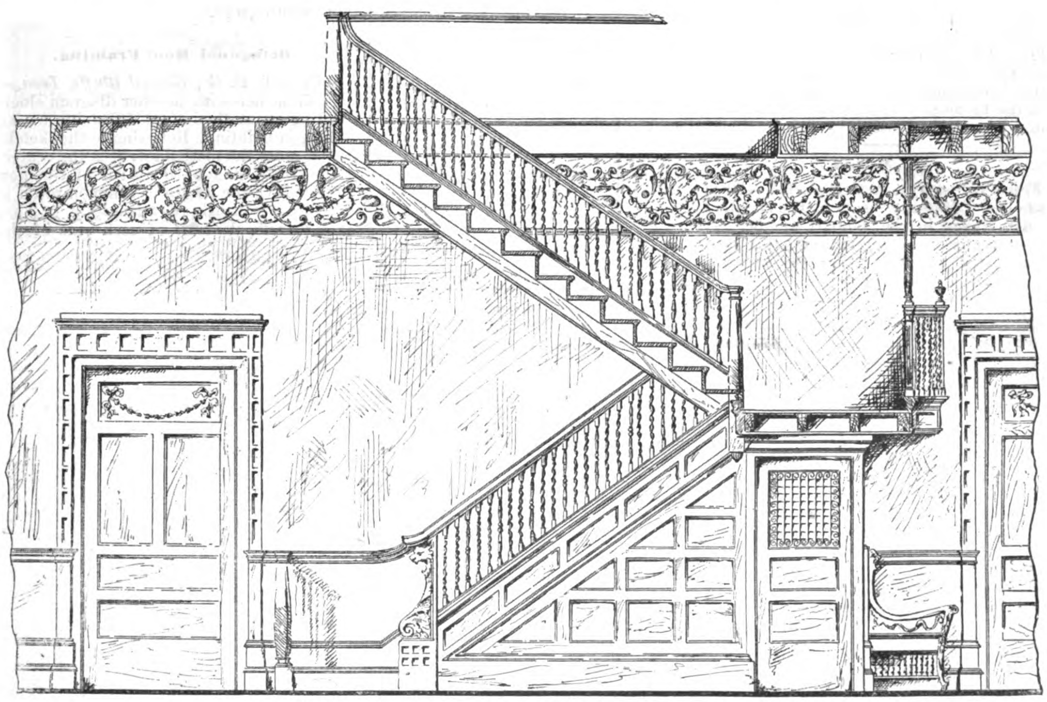
The *Household* supplements what precedes by the following directions for the handling of materials with respect to colors: "Soak 1 pound of white glue over night; then dissolve it in boiling water and add 20 pounds of Paris white, diluting with water until the mixture is of the consistency of rich milk. To this any tint can be given that is desired. [The addition of milk instead of all water, and even of common cheese, is recommended by good authority.] Lilac—Add to the calcimine 2 parts of Prussian blue and 1 of vermilion, stirring the mixture thoroughly, and taking care to avoid too high a color. Brown—Burnt umber. Gray—Raw umber, with a trifling amount of lampblack. Rose—3 parts of vermilion and 1 of red lead, added in very small quantities until a delicate shade is produced. Lavender—Make a light blue and tint it slightly with vermilion. Straw—Chrome yellow, with a touch of Spanish brown. Buff—2 parts of spruce, or Indian yellow, and 1 part of burnt sienna. Blue—A small quantity of Prussian blue will give a soft azure tint. Dark blue is never desirable. Delicate tints in three varieties of colors are always agreeable and tasteful, and so great care must be taken that they are not too vivid. The tints will always appear brighter than in the calcimine pot, and the workman or workwoman must keep this fact in mind when adding the coloring powders. It is a good idea to give the ceiling a calcimine two or three shades lighter than that of the walls, so that it may seem merely a delicate reflection of their deeper tones. First the ceiling can be calcimined with the lighter tint, and then more coloring added for the walls."

## Stair-Way Hall.

The interesting study in stair-way designing which we present in this issue is a specimen of amateur work turned out in the free drawing class of the Mechanics and Tradesmen's school, located at No. 18 East Sixteenth street, New York City. The study in question was prepared by James C. Brundage, a member of the evening class of the society mentioned, and is a very creditable piece of work. The society was organized many years ago, and the school has recently celebrated the sixty-ninth anniversary of its foundation. The instructor in mechanical drawing is Mr. James H. Monckton, a gentleman well known to the readers of *Carpentry and Building*.




*Stair-Way Hall.—Plan View.*

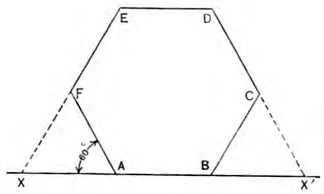


*Side Elevation and Section.*

# CORRESPONDENCE.

### Laying Down Polygons.

*From* L. G. R., *Aspen, Col.*—In the January issue of *Carpentry and Building* "L. W. T.," of Alton, Ill., laid down some polygons, and asked for figures which might be used on the square. I venture to present a few, together with a rough sketch showing how they may be applied. The whole number of degrees in a circle divided by the number of sides of the figure in question will give the angle formed at the center, or, referring to the sketch, angle F A X—that is, 360° divided by 6—equals 60°. Now, the natural tangent

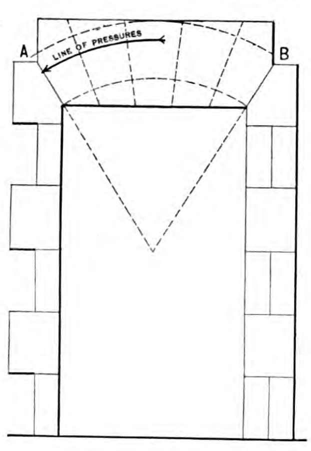



*Method of Laying down Polygons Suggested by L. G. R.*

of 60° is about 20.78, say 20¾ inches to 12 inches; therefore, take 12 inches on the tongue and 20¾ inches on the blade, and apply the 12-inch mark to the point A on the base line of the sketch, and bring the 20¾-inch mark to the line at the left, which gives the side A F. Turn the square over with the 12-inch mark at X. Bring the 20¾-inch mark to line at the right, which gives the side F E. Repeat the operation at B and X′. Then connect D E to complete the figure. Two adjoining sides of the polygon form an angle of 120°. A bevel might be used after finding two sides with the square. The 30° pitch is 6.9-inch rise to the 12-inch run, and the 15° slope 3.21-inch rise to the foot run.

### Flat Arches.

*From* Inquisitive, *Little Rock, Ark.*—The author of "Masonry" says in the chapter on flat arches, in the January number of *Carpentry and Building* for 1888, that the ends of the voussoirs below the arc de-




*Flat Arches.—Fig. 1.—Arch Carrying Less Useless Weight than Fig. 2.*

scribed in Fig. 9 are really only a load and not a help to the safety of the arch. Figs. 1, 2 and 3 represent three flat arches, the convergence of the joints being different in each one. According to the author's statement the arch Fig. 2 carries more useless weight than the arch Fig. 1, and the arch Fig. 3 carries less useless weight than the arch Fig. 1. If the theory is correct, would it not add to the strength of the arch to place the center of convergence for the joints at a greater distance even than in Fig. 3, thereby lessening the useless weight that the arch is compelled to carry?

*Note.*—The drawings submitted by our correspondent have been engraved as received with the single exception of the dotted lines A B, which have been added to show where the true extrados of each arch is located. The part of each arch above the dotted line A B is a surcharge, and not properly a part of the voussoir arch. In Fig. 1 the left half of the arch has been treated by the graphic method and the line of pressures shown. The thrust of the arch at the crown is 13.5495 of whatever the unit of load taken; of Fig. 2 the thrust is 9.7344 units; and of Fig. 3 it is 17.153. A study of these figures will show that this question of useless load cannot be satisfactorily determined without considering the thrust of the arches, and the thrust of arch determines to a large extent the size and character of the abutments. Generally, the flatter the arch the greater the thrust. This is proven in the case of the above arch, Fig. 3, which is the flattest of all, and for the same surcharge load produces the greatest thrust. This thrust in its

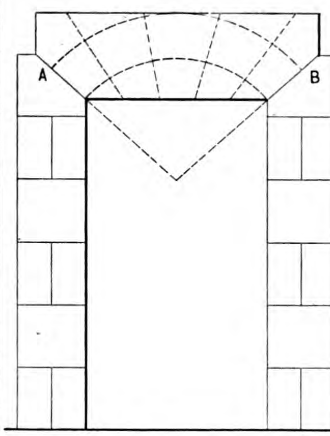



*Fig. 2.—Arch Carrying More Useless Weight than Fig. 1.*

turn is determined largely by the ratio between the radius of the intrados to the radius of the extrados. This ratio in Fig. 1 is 1.34, in Fig. 2 is 1.35 and in Fig. 3 is 1.223. The only effect that the material below the true intrados line would have would slightly lower the line of pressures. In an arch like that of Fig. 2 it might carry the line of pressures below the middle third space, which would cause the arch to fail by rotation, and it has been proved by experiment that when an arch failed by rotation, in every case the line of pressures corresponded to both the maximum and the minimum of the thrust. Our correspondent tacitly implies that in any case for the same span Fig. 3 would be the best form of arch to use. This would depend on the thickness of the abutment at his command, because, as we have shown, for the same load the horizontal thrust transmitted to the abutments is in its case the greatest. On the other hand, the surcharge to Fig. 2 is in excess both above and below, and the tendency of the extraneous load below would be to carry the line of pressures below the middle third space, which would tend to produce instability. No general rule can be laid down as to what form of arch is best, for without precise data as to the weight or load to be borne, thickness of abutment possible, character of foundation and quality of material and workman-

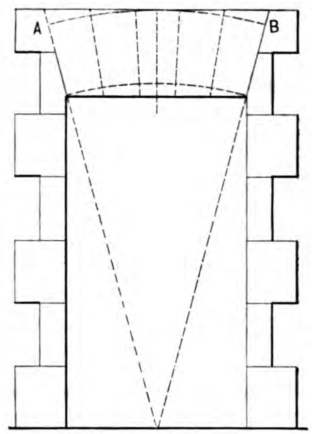
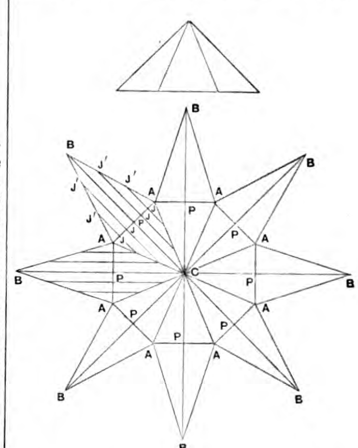



*Fig 3.—Arch Carrying Less Useless Weight than Fig. 1.*

ship intended, it would be misleading. Each case must therefore be studied and decided upon the conditions which are imposed. From this it will be seen that we not only agree with the author referred to that the material below the true intrados is a useless load, but that the material above the extrados is not *per se* a part of the arch, but is in effect a part of its load, or, as we say technically, a part of its surcharge.

### Octagonal Roof Framing.

*From* T. D. G., *Council Bluffs, Iowa.*—I inclose herewith another diagram elucidating my method of roof framing for an octagon building. Referring to the sketch, A A A are the plate lines; C is the center. The rise of the roof equals run of common rafter D C, the length of common rafter is D B, consequently the triangles A A B are the superficial shape of each side of the

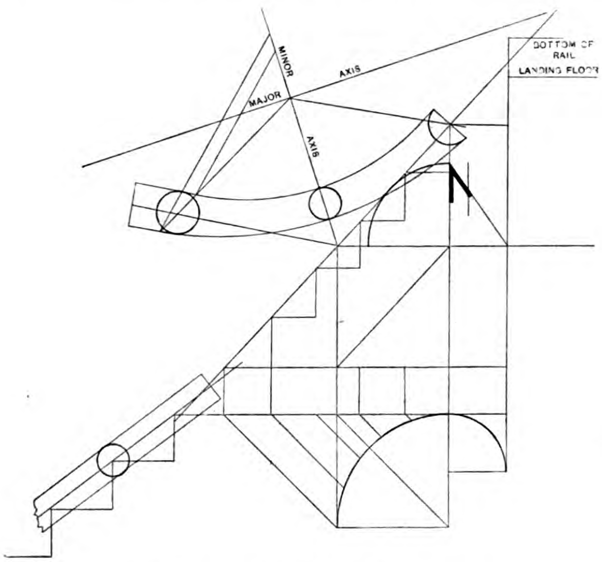


*Plan and Elevation of Octagon Roof Submitted by T. D. G.*

roof, which, if the points were turned right over to the center without changing their position, would form the roof as indicated by the elevation; J J are jack rafters, and at J′ is the bevel to fit the hip, and, of course, the proper length from the line A A to J′. The lines A B are the actual length of the hips. I think when the practical readers of *Carpentry and Building* have studied this sketch a moment they will fully understand it. The plumb cuts require no explanation here.

### Problem in Hand-Railing.

*From* M. W., *Scranton, Pa.*—I beg to submit for the consideration of "J. H.," of London, England, the inclosed diagrams. The plan differs from the one given by him and resembles the one given




*Problem in Hand-Railing.—Fig. 1.—Elevation.*

by Mr. Monckton in the December number of *Carpentry and Building*, the only difference being in the placement of the risers in the well. I have so placed them that every step will follow the falling line, and consequently the balusters will be of the same length.

*Note.*—We present the above communication and accompaning diagrams from our correspondent as another contribution

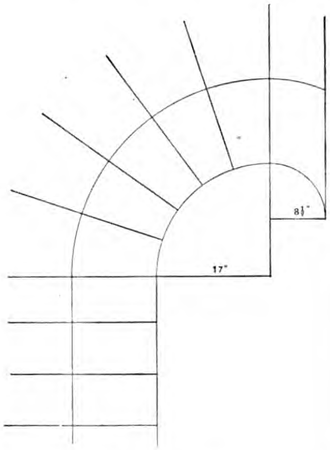



*Fig 2.—Plan.*

intended to assist "J. H.," of London, in answer to his questions and drawings published in the August and October numbers. Looking over the communication and diagrams of our correspondent, we note first a want of sufficient explanation. The regular flyers of the plan are 9 inches, but two treads next below the cylinder are made 7 and 8 inches each, and of a parallel width. The landing riser is run straight to the chord line of the cylinder instead of being curved at the front end, which would properly permit a suitable portion of the cylinder to finish with the floor, beside doing away with an angular corner at that point. That part of the hand-rail connecting with the lower end of the wreath, which is usually curved and known as a ramp, is drawn straight and seems to have forced a joint. Whether the writer intends to produce the curve in the adjoining wreath-piece he does not say. On further examination we find the plan he has given, including the number and width of treads around the center line of wreath, not only, as he says, resembles but is exactly the same as the plan given by Mr. Monckton, with the exceptions to which we have called attention. These exceptions affect the plan of stairs only in stepping-room and curve of landing riser and not at all the wreath. Then, again, at

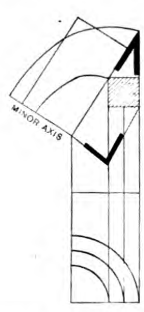
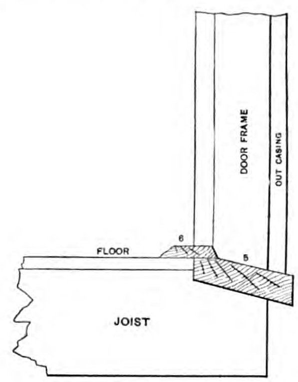



*Fig. 3.—Landing Quarter and Face Mold.*

the elevation set up the plan tangents are extended in one straight line, and by a method shown in the diagram are divided into five unequal parts. These parts are made use of in this elevation as treads, wholly regardless of the treads as given by the plan, or their stretchout, and measuring altogether 7 inches more than they do when unfolded. They are also of various widths; and this falling line, as our correspondent calls it, is simply the pitch line of tangents, which, when examined at the landing, is found to fall low by about 4 inches. However, this lack of proper hight appears to be amended by altering a joint and by forcing the landing quarter-wreath upon a steeper pitch, as shown by the face-mold of the landing quarter. From this partial examination and attention to the suggestions and diagrams of our correspondent—who has certainly shown in his contribution a laudable effort to help his fellow-workmen—we leave "J. H.," of London, and our readers to decide their value. We may be permitted a few words more to our correspondent—and other writers may take the hint—when seeking to help or instruct others through the medium of geometrical drawings the diagrams should be numbered and reference letters used to aid in explaining in full detail what it is desired to impart.

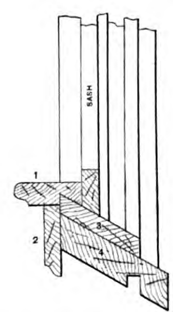
### Proper Names of Door and Window Frames.

*From* F., M. M., *Ukiah, Cal.*—I send herewith rough sketches of the lower parts of plain window and door frames, and desire to know the proper names of the




*Lower Part of Door Frame.*

various pieces which are numbered. It appears to me that there are nearly as many names for some of these pieces as there are workmen.

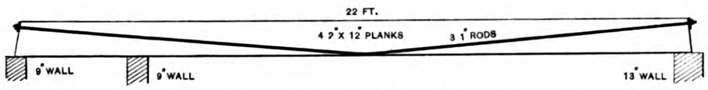



*Lower Part of Window Frame.*

### A Trussed Beam.

*From* S. B. C., *Litchfield, Ill.*—Will the Editor of *Carpentry and Building* kindly give his opinion as to the safety of the trussed lintel shown in the sketch which I inclose herewith. The lintel is to carry a 9-inch wall 13 feet high, with three window openings 28 x 36 inches. What I desire to know is if four pieces of oak 2 x 12 inches trussed with three 1-inch rods, as shown in the second sketch, will be sufficient to carry the load. I propose to cover the end of the lintel with $\frac{3}{4}$-inch iron plate and use washers.

*Answer*.—In the accompanying illustrations Figs. 1 and 2 show the sketches submitted by our correspondent, Fig. 1 being the side view of the beam, while Fig. 2 represents the end. The total load on the beam is 21,004 pounds, estimating a cubic foot of brick-work at 118 pounds.




*A Trussed Beam.—Fig. 1.—Sketch Submitted by S. B. S.*

It is assumed in the calculation that the total depth of this trussed beam, including the strut at the center, is 16 inches, as shown by Fig. 3 of the cuts. The strut is 4 inches, and the effective depth

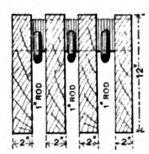


*Fig. 2.—End Section of Beam.*

of the beam 10 inches. The total tension on the rods is 166,346 pounds. The diameter of each of the three rods, allowing a strain of 12,000 pounds per square inch, would be 1.72 inches, or, say, $1\frac{3}{4}$

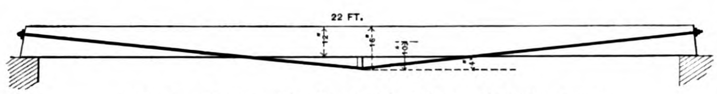


*Fig. 3.—Diagram Showing Depth of Truss, Including Strut.*

inches as the nearest commercial approximation. The total compression on the compound beam would be 166,346 pounds, or allowing a working stress of 1000 pounds per square inch for oak, and remembering that there are four such beams, the area required would amount to 166 square inches; as each beam is to be 12 inches deep, the width of each beam required would be $\frac{166}{12 \times 4} = 3.45$ inches, or, say, $3\frac{1}{2}$ inches. Therefore the beam proposed by our correspondent would not be sufficient for the purpose he names. It would require four oak beams, $3\frac{1}{2}$ x 12 inches, trussed over 4-inch cast-iron struts by three iron rods, each $1\frac{3}{4}$ inches in diameter. A point not considered by our correspondent is of too serious import to be 1 is 9 inches. A calculation of the reactions at each support show a load on this over looked The middle wall shown in Fig. wall of 9.8 tons per square foot, when it should not exceed 8 tons. The actual load on 1 foot of the wall in length, 9 inches wide, amounts to 6.56 tons, which equals a ratio of over 9 tons per square foot. The other supports are sufficiently strong. It would be advisable wherever the trussed beams come to support them by a pier at least 12 x 12 inches in cross section. A better solution of this problem might have been to use a flitch-plate girder consisting of three wrought-iron plates $\frac{3}{8}$-inch thick each and two 3-inch oak planks, bolted together in a section similar to that shown in Fig. 4. Such a beam, 22 feet long, will sustain a load of 11.04 tons with safety, whereas the load to be supported is 10.5 tons. Our correspondent also might use two 9-inch steel I beams, with flanges 4.75 inches wide, weighing 27 pounds per foot. These would sustain a safe load of 11.92 tons. We think our correspondent will be perfectly safe in adopting either of the plans we have suggested.

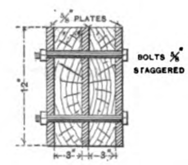



*Fig. 4.— Cross Section of Flitch-Plate Girder.*

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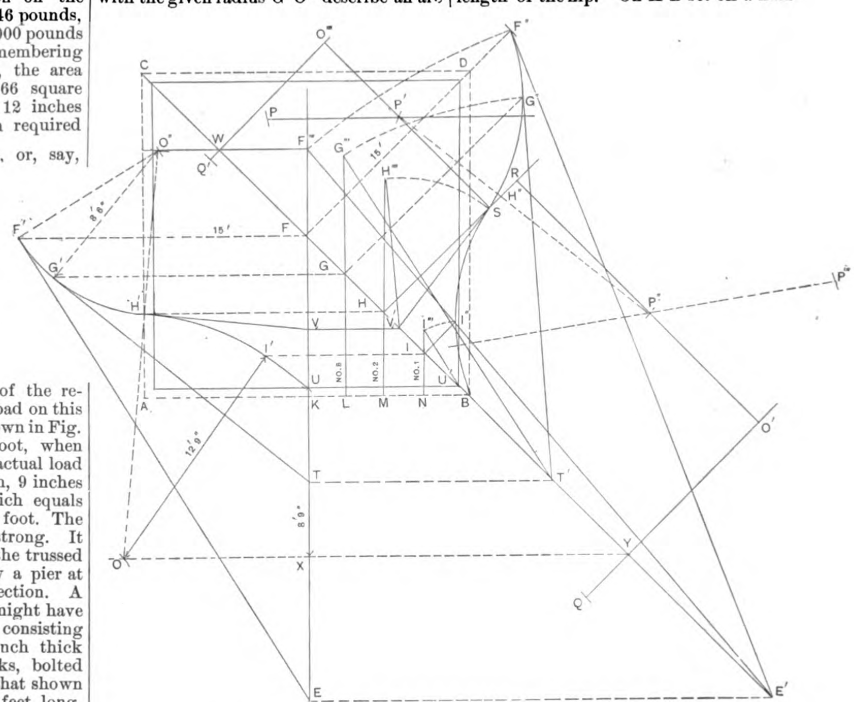
**Side Bevels of Jack Rafters.**

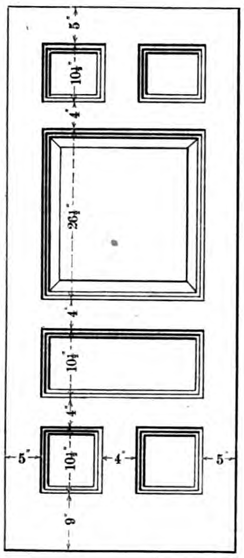
*From* W. S., *Toronto, Canada*.—In the March issue of *Carpentry and Building* I notice the tower-roof problem presented by "J. D.," of Winchester, N. H., and desire to offer a solution thereto. By means of the description presented herewith, read in connection with the sketch inclosed, I think "J. D." will have no difficulty in understanding my explanation. Let A B C D be the plan of the tower. Draw the diagonal C B and produce it indefinitely toward E′. Draw the semi-diagonal F D and produce it indefinitely toward F‴. Through the point F draw F‴ E parallel to A C, cutting A B in U. From the center U with the given distance U X describe an arc, cutting F E in X. Through X draw X O perpendicular to E F. From the center K with the given radius O I′ describe an arc, cutting O X in O. Through F draw F F′ perpendicular to E F. From the center F with the given distance F F′ describe an arc cutting F F′ in the point F′. From the center F′ with the given radius G′ O″ describe an arc at O″, and from the center O with a radius O I′ + G′ O″ describe an arc, cutting the arc at O″ in the point O″. Join O O″. From the center O with the radius O I′ describe the arc K H′, cutting O O″ in H′. From the center O″ with the radius O″ G′ describe the arc H′ F′, and the curve F′ H′ K will be the curve and F′ K the length of a common rafter. From the point H′ draw H′ H parallel to A B, cutting C E′ in H. Through H draw H R perpendicular to C E′. Produce O X toward Y, cutting C E′ in Y. Through Y draw Q O′ perpendicular to C E′. From the center Y with a radius O X describe an arc, cutting Q O′ in O′. From the center O′ with a radius O I′ describe an arc, cutting O′ Q in Q. Through O′ draw O′ R parallel to C E′, cutting H R in R. The point O′ will be the point where the axis major and the axis minor intersect and bisect each the other, and the distance O′ R will be the axis major and the distance O′ Q will be the axis minor of the ellipse of which the curve H″ B is a part.

From this data the centers P″ P‴ can readily be determined, and from the centers P″ P‴ the curve B I″ H″ can be described. By performing a similar process we will obtain O‴ S and O‴ Q′, the axes of the ellipse of which the curve H″ F″ is a part, and from this data the centers P P′ are determined, and from the centers P P′ the curve H″ F″ can be described, cutting F F″ in F″; then the curve B H″ F″ will be the curve and B F″ the length of the hip. On K B set off a number of equal parts, L, M, N, corresponding to the number of jack rafters required be-



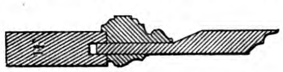
*Method of Obtaining Side Bevel of Jack Rafters Suggested by W. S.*

tween K and B. From the point L draw L G‴ parallel to A C, cutting F E′ in the point G. Through G draw G G″ perpendicular to C E′, cutting the curve F″ G″ in G″. Through G draw G G′ parallel to A B, cutting the curve H′ F′ in G′. Join G′ O″. Through G′ draw G′ T perpendicular to G′ O″, cutting E F in T. Through T draw T T′, cutting C E′ in T′. Join T′ G″.



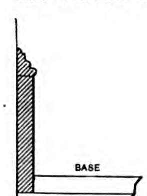
*Details Second Prize Designs for $2,000 House, XIXth Competition.—Front Door. —Scale, ½ Inch to the Foot. (For Elevations, &c., See Plates.)*

From the center T′ with the radius T′ G′ describe an arc G″ G‴, cutting L G‴ in G‴. Join G‴ T′, and the angle L G‴ T′ will be the "side bevel," the angle T G″ G will be the "down bevel" and K G′ will be the length of jack rafter No. 3. Take the distance G G″ on the tongue and the distance G″ T on the blade of the



*Section Through Door.*

steel square, and the tongue will give the "backing" at the point G″. From the points K M N repeat operations similar to that which has been performed from the point L, and each performance will give a similar result. The angle K F‴ E′ will be the "side" and E F′ F will be the




*Section through Baseboard—Scale, 1½ Inches to the Foot.*

"down bevel" of the common rafter K F′, and with F F′ on the tongue and F″ E′ on the blade the tongue will give the "backing" at F″. M H‴ V′ will be the "side" and H H′ V will be the "down bevel" and K H′ will be the length of jack No. 2. H H″ on tongue and V′ H″ on blade, tongue gives "backing" at H″. N I‴ U′ is "side" and U I′ I the "down bevel" and K I′ is the length of jack No. 1. I I″ on tongue and U′ I″ on blade, tongue gives "backing" at I″. Unless the stock of the bevel is placed tangental to the curve of the jack the blade will not give the "down bevel" correctly.

## Second Prize Design in the Nineteenth Competition.

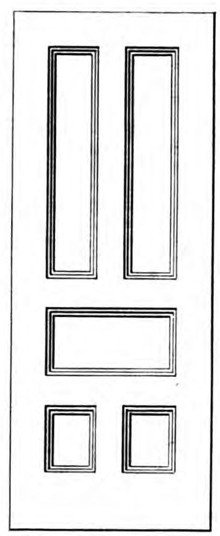
In Plates XXII and XXIII of this issue will be found the perspective view, floor plans and elevations of the set of drawings receiving the second prize in the XIXth competition. The author of the study is Mr. Edward W. Smith, of Jamaica Plain, Mass. We present below the specifications and estimate accompanying the drawings:

### Specification.

The hight of stories, as follows: First story, 9 feet; second story, 8 feet 6 inches; cellar, 6 feet 6 inches.

#### MASON-WORK.

*Excavations.*—Dig out the full depth of the soil where the building shall stand, and stack away in heaps, as far away from the building as may be desired. Excavate for the cellar to a sufficient depth to show 2 feet 6 inches of underpinning when the grade is finished at the highest point to firm and solid ground, and clear of frost. Excavate for the cesspool as hereafter specified and all drains to the same.



*Inside Door.—Scale, ½ Inch to the Foot.*

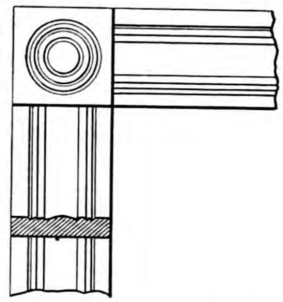
*Grading.*—Fill in around and pack the earth against the cellar walls, and level it with the bottom of the underpinning. Grade the excavated earth about the building as may be directed, and replace the top soil over the graded surface at completion.

*Footings.*—Lay down footings under all the walls of the building—both stone and brick—of flat stones not less than 6 inches thick, and projecting 6 inches on each side of the walls above, to be com-

*Section Through Inside Door.*

posed of large stones, each stone filling the course in width and hight, close fitted and flushed up with spawls and cement mortar; these stones to be laid on the natural undisturbed earth.

*Foundations.*—Properly lay up the foundation walls of local ledge stone, laid in cement mortar by and full to a line on inner face, and flush and point at completion; these walls to average 10 inches in thickness, and to be 4 feet 6 inches in hight above the cellar bottom. Lay down in like manner substantial foundations under all chimneys, piers, &c.-



*Inside Trim.—Scale, 1½ Inches to Foot.*

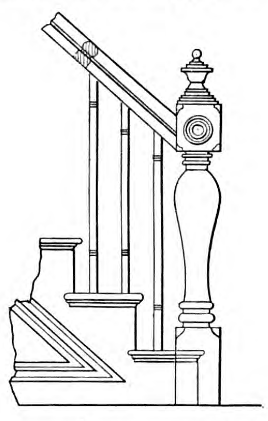
and all clear of frost. Leave all openings in walls for drain, gas and water pipes, as directed, or as shown on plans.

*Underpinning.*—From the top of foundation walls at grade level lay up the underpinning 16 inches in thickness, of good local ledge stone. The whole of the cellar wall and underpinning to be 6 feet 6 inches above the cellar bottom, and to be accurately leveled to receive the sills; the measurements on top to correspond with figures on drawings. Carefully point and fill under the sills, after they are laid, with cement.

*Bulkhead.*—Build the bulkhead as shown on plan, properly walled in on each end, the jambs to be of same material and work as cellar walls.

*Piers.*—Build brick piers where shown, 12 x 12 inches, and cap with flat stone the size of pier.

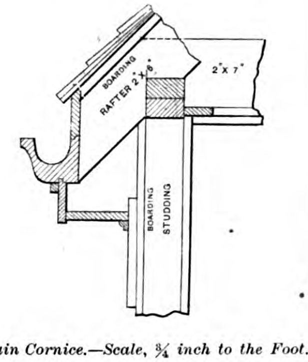
*Cesspool.*—Stone up cesspool 7 feet in diameter and 9 feet deep; lay the walls



*Hall Stairs.—Scale, ½ Inch to the Foot.*

dry, of rough stone, and draw in on top in a substantial manner; cover with flag-stone and 20-inch iron man-hole; connect through cellar-wall with 6-inch vitrified drain-pipe, the pipe to terminate in cesspool with a quarter bend, to form a trap. The cesspool will be not more than 30 feet from the house.

*Chimneys.*—Build the chimneys to correspond with the drawings, using light hard bricks, and in no case allow less than 2 inches in thickness for brick-work between timbers or any wood-work and the smoke-flues. All flues to be straight and true and of uniform size throughout, and smooth on the inside. All partitions between flues to be 4 inches thick and to go to the top of each chimney; outside walls of each chimney to be 4 inches in thickness, and built as shown by the drawings. Top out above the roofing, using even-colored hard-burned brick for facing, laid in red cement mortar, in accordance with the



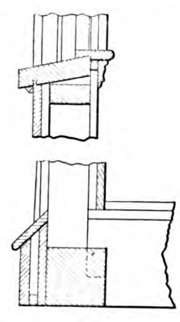

*Main Cornice.—Scale, ¾ inch to the Foot.*

drawings, and properly cleaned down at completion. Furnish and set in the brick-work of flues for stove-pipes proper stove-collars and ventilating-covers where required, and protect wood-work around collars with brick when running through stud and lathed partitions; also provide the necessary bricks, mortar, &c., for setting the mantel-pieces.

*Furnace-Flue.*—Construct a flue for furnace where shown, the opening to same to be made 12 inches below under side of floor joists, and plastered inside and out. Carry this flue to the top of the chimney independently of all other flues, and to be not less than 8 x 8 inches in size at any point.

*Cold-Air Duct.*—Build cold-air duct from opening in wall to furnace in cellar, where shown, walls of brick, bottom cement and top of plank, all made perfectly tight.

*Cellar Bottom.*—Level off the cellar bottom, settle it thoroughly, and cover it flush and smooth throughout with cement concrete, in three parts of clean, coarse, sharp gravel and one part of

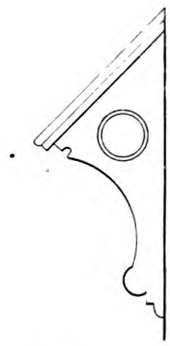


*Section Through Window-Sill and Foundation.—Scale, ¾ Inch to the Foot.*

good cement, 2½ inches deep, and finished with a true and even surface. This cement concreting to be put down before any interior finish is put on.

*Lathing.*—All walls, partitions, ceilings, and work that is furred off throughout the first and second stories to be lathed with sound lath.

*Plastering.*—All walls, partitions and ceilings throughout the first and second stories to be plastered one good coat of brown well-haired mortar, made of pure unslacked lime, and clean, sharp bank sand, free from loam, and salt, and best cattle or goat hair, to be thoroughly mixed by continued working, and stacked in the rough for at least ten days before putting it on. Level and float up the brown coat, and make it true at all points. Cover all the brown mortar with a good coat of clean sharp sand and lime putty, thoroughly mixed, so as to secure a good, handsome and workmanlike job. All lathing and plastering to extend clear down to the floor on the outside walls; do all necessary



*Finish over Back Door.—Scale, ⅜ Inch to the Foot*

mending and patching after other workmen, and leave everything in a perfect and complete state.

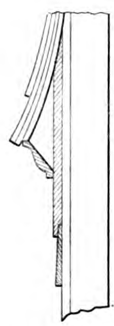
CARPENTRY.

The carpenter to do all necessary wood-work, cutting, &c , for other craftsmen on the building; to provide and set centers on which to turn arches; also to furnish suitable protection to all openings to keep out the cold and rain and hang doors so that the building can be locked up as soon as inclosed by putting in temporary doors and locks; to provide suitable cases in which to keep the plans and drawings during the progress of the works.

*Timber.*—The whole of the timber used in and throughout this building to be the best of the kind and quality specified, well seasoned, and free from black sap, large and loose knots, shakes and other imperfections impairing its durability and strength.

*Framing.*—The frame to be

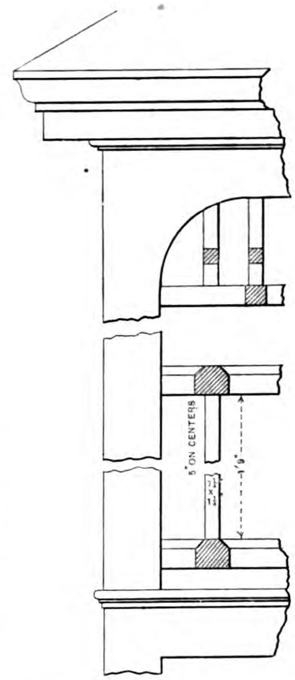
Do all necessary framing around stairways and chimneys, all properly mortised and tenoned together, and all to be done



*Belt Course.—Scale, ¾ Inch to the Foot.*

in a thoroughly workmanlike and substantial manner.

*Frame Timbers* to be of spruce, in the following dimensions: Sills, 6 x 6 inches; girders, 6 x 8 inches; posts, 4 x 6 inches; girts, 1 x 6 inches; plates, 2 x 4 inches, double; first floor joists, 2 x 9 inches; second floor, 2 x 8 inches; attic, 2 x 7 inches, all 16 inches on centers; head and trimmer joists 3 inches thick; all joists coming under partitions to be double; roof rafters, 2 x 6 inches, 16 inches on centers; door and window studs, 2 x 4 inches; intermediate studding, 2 x 4 inches, 16-inch centers; long braces, 2 x 4 inches. All main partitions to be set with 2 x 4 inch studding, 16-inch centers, to be set as the frame is raised, and foot on girders to have 2 x 4 inch plates, on which to foot second-story partitions and carry floor timbers; other partitions set with 2 x 3 inch studs, 16-inch centers; and all partitions that are directly over each other to be set in like manner to above, all to be well braced and spiked; all angles to be formed solid, and all partitions to be




*Detail of Porch.—Scale, ¾ Inch to Foot.*

bridged once in their hight; all openings exceeding 3 feet in width to be properly trussed. Piazza sills, 4 x 6 inches; joists, 2 x 6 inches, 18 inches on centers; plates, 3 x 4 inches; rafters, 2 x 4 inches, 24 inches on centers.

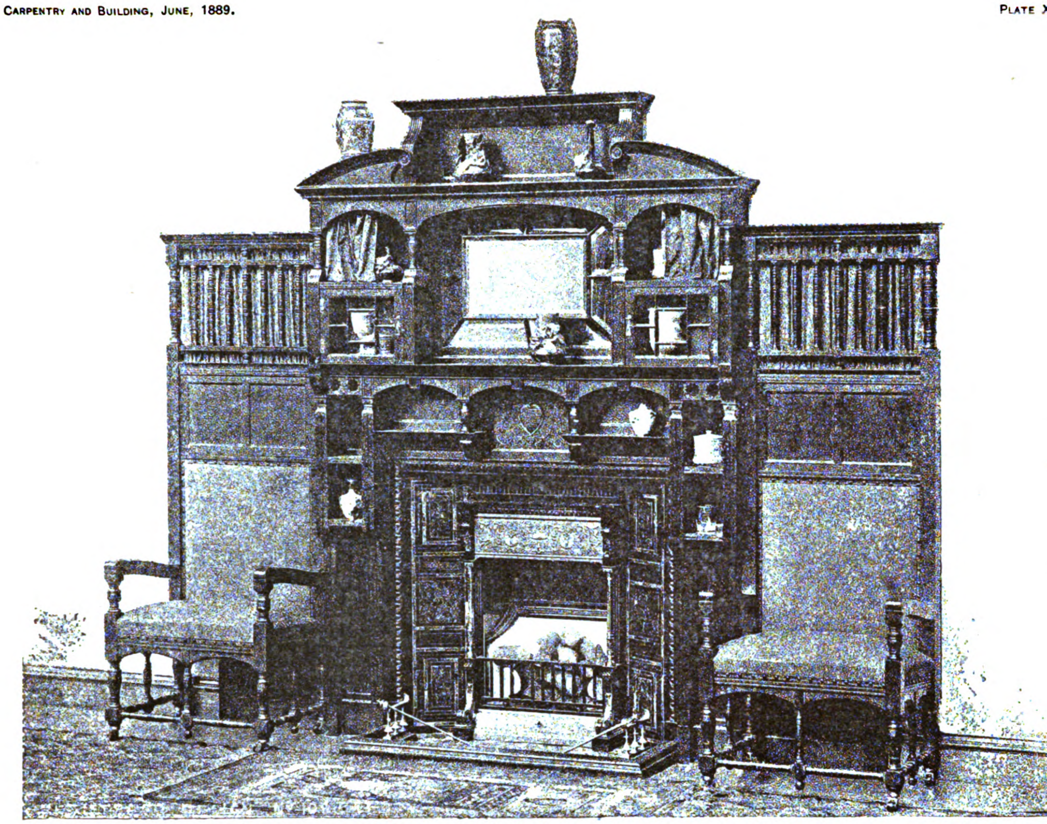
*Bridging.*—All the floor timbers to be bridged through centers with 1 x 3 inch cross-bridging properly cut in between timbers and nailed with two nails at each end; also furnish any other timber of the required size and necessary to fully complete the works.

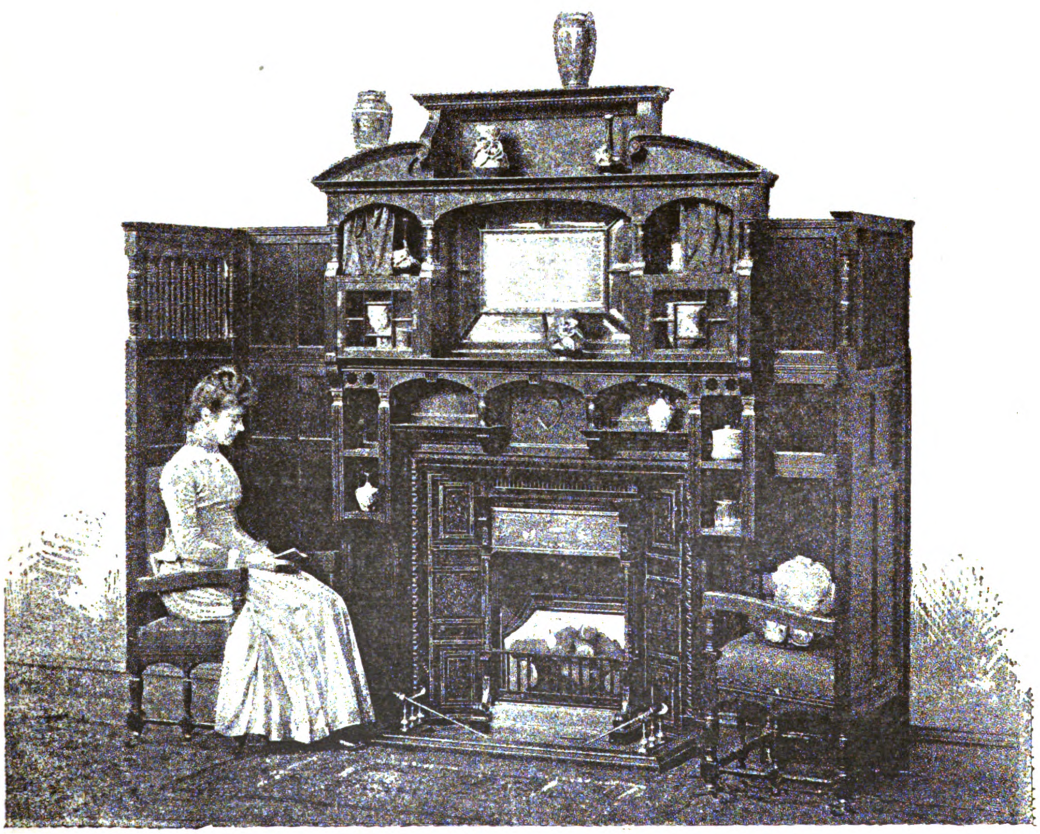
*Cedar Posts.*—Place cedar posts where shown, to be not less than 6 inches in diameter.

*Rat-Proofing.*—Fill in with joists between all floor timbers on the sills to stop all crevices that may afford harbor for rats.

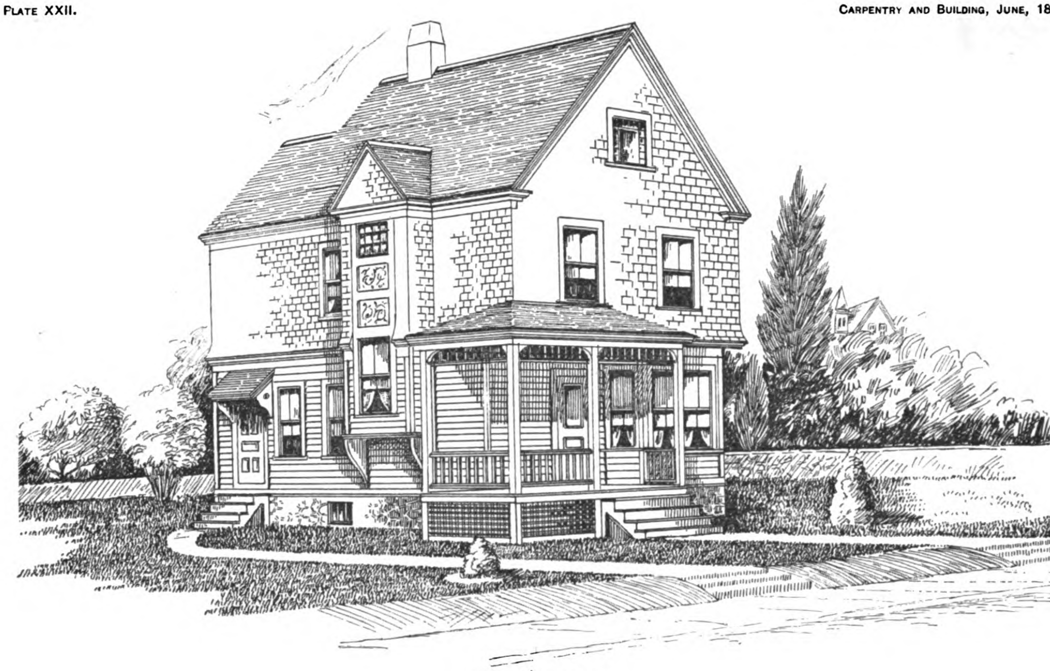
*Furring.*—Cross-fur the ceilings of the first and second stories with 1 x 2 inch spruce placed 12 inches from centers and well nailed to under side of every floor joist. Properly support and fur under stairs, fur for arches and do any other furring required by the design.

*Shingles.*—Cover the entire frame, including roofs, with sound hemlock or spruce boards, well nailed to each bearing. Where the boards exceed 10 inches in





AN INGLE NOOK CHIMNEY PIECE, SHOWN IN TWO POSITIONS.

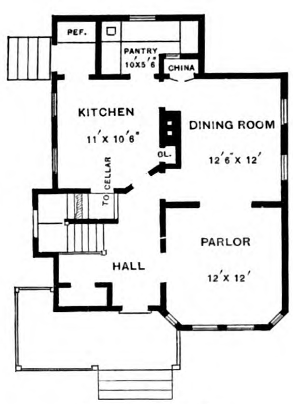


PERSPECTIVE VIEW.

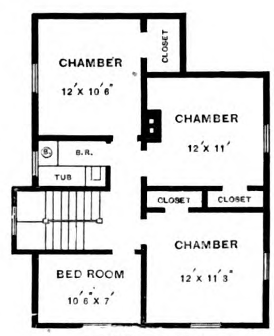
# SECOND PRIZE DESIGN, XIXTH COMPETITION.

**EDWARD W. SMITH, ARCHITECT, JAMAICA PLAIN, MASS.**

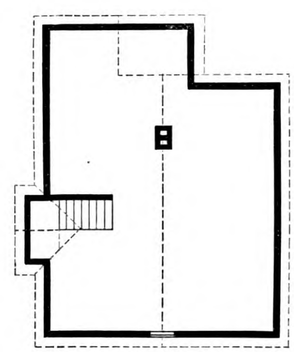
Scale of Plans, 1-16 Inch to the Foot.



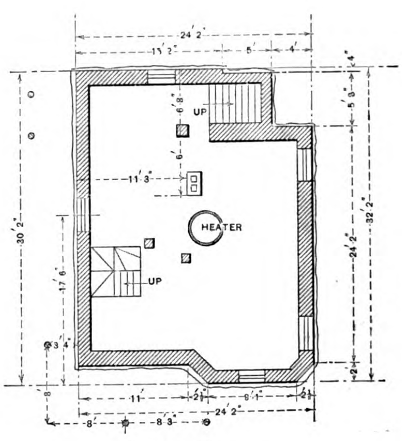

FIRST FLOOR PLAN.



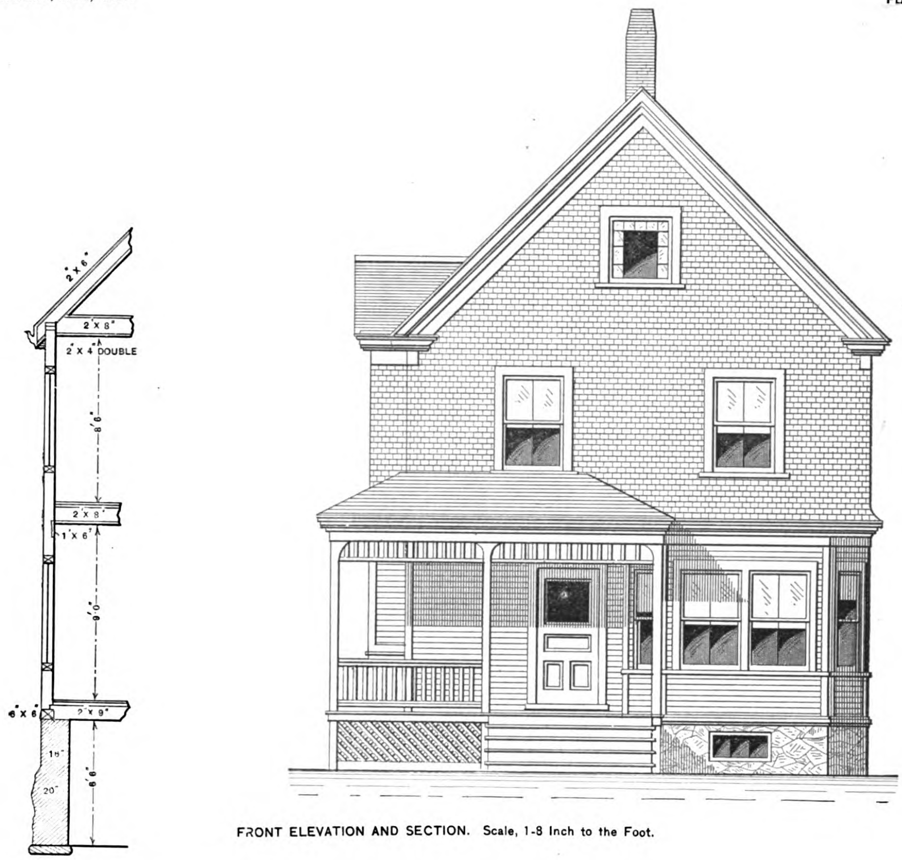

SECOND FLOOR PLAN.



ATTIC AND ROOF PLAN.

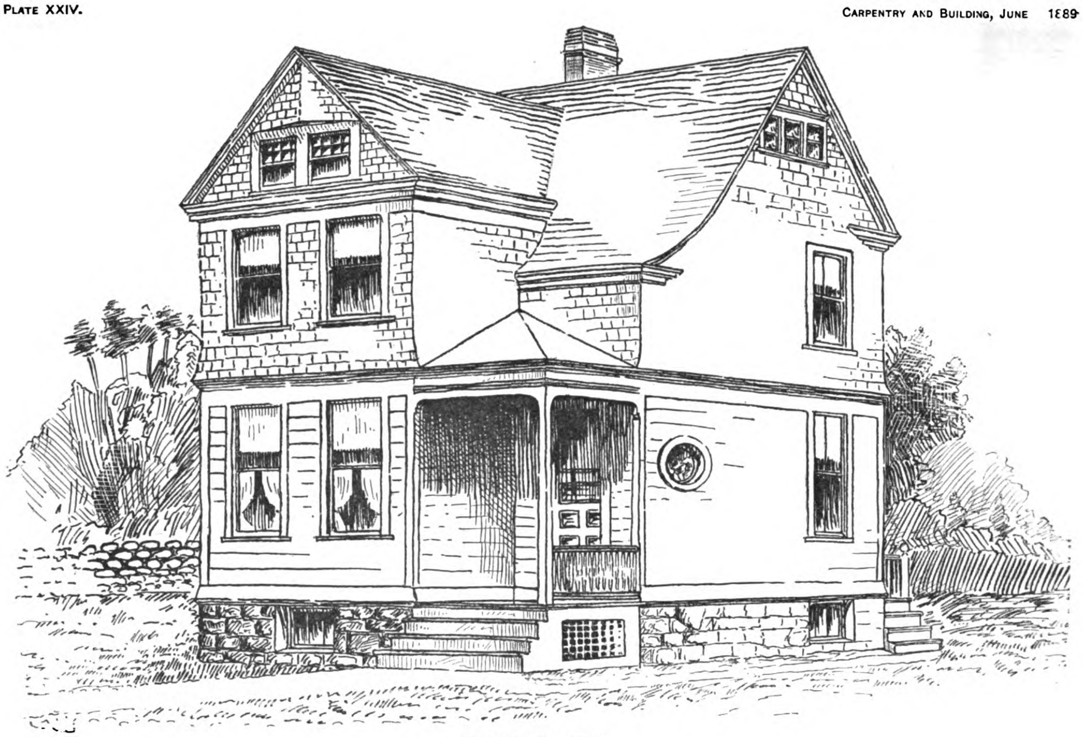



PLAN OF CELLAR.




FRONT ELEVATION AND SECTION. Scale, 1-8 Inch to the Foot.

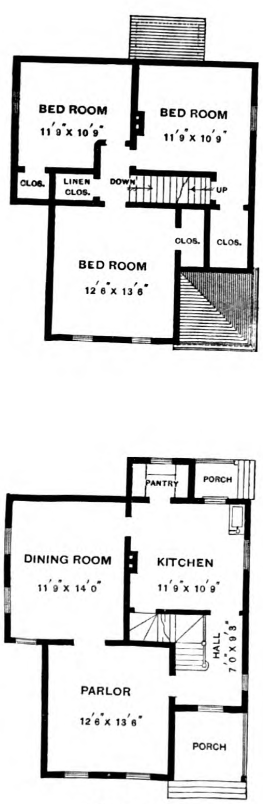
SIDE (LEFT) ELEVATION. Scale, 1-8 Inch to the Foot.



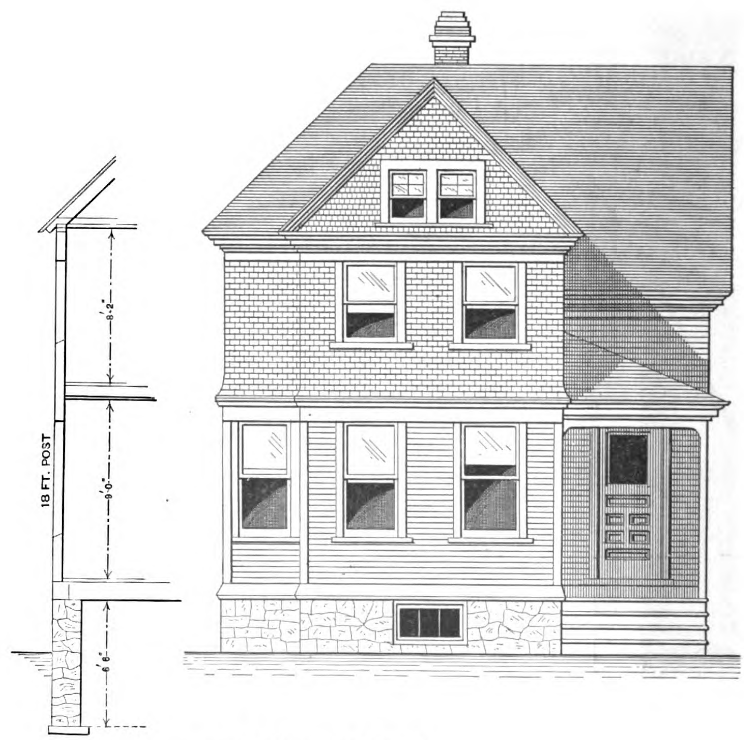
PERSPECTIVE VIEW.

JOHN N. SHERWOOD, ARCHITECT,

SYRACUSE, N. Y.




FLOOR PLANS.
Scale, 1-16 Inch to the Foot.




FRONT ELEVATION AND SECTION.
Scale, 1-8 Inch to the Foot.

SECOND PRIZE DESIGN IN XVIIITH COMPETITION.

width to have extra nail in center. This is imperative.

*Sheathing-Paper.* — Put I X L brand sheathing-paper under all clapboards, side shingles, &c., and same paper under all casings, corner-boards, &c., properly lapped to make tight job.

*Clapboards.*—Cover all sides with good quality clear spruce clapboards 4 to 4½ inches to weather.

*Shingles.*—Cover the side, gable ends, &c., where shown, and all roofs with choice cedar shingles 4½ inches to weather. May be 5½ inches to weather on sides. Fancy shingles as shown.

*Lumber.*—All exterior finish to be of good-quality white pine. All interior finish best kiln-dried whitewood.

*Corner-Boards, Casings, &c.*—To be ⅞ x 5 inches; bands to be rabbeted at bottom to receive clapboards.

*Cornices.*—Cornices to be as shown by the drawings, and also the rake, verge-board, brackets, &c.

*Gutters.*—To be 4 x 6 inches, of cypress.

*Conductors.*—To be of corrugated galvanized iron 3 inches in diameter inside, connected to gutter by 2-inch lead pipe goose-neck. To have wooden shoes, if required, to carry away water from the building.

*Window-Frames.*—Windows and window-frames of the several stories to be of the form, style and dimensions, all to correspond with the drawings or as hereafter described. All frames for insertion in wood or framed work to be made with outside casings ⅞ x 4¾ inches; pulley-stiles ⅞ inch thick, properly housed at head and sills; bottom sill 2 inches thick, to have parting strips and blind-stops, and the whole put together in a proper manner; to have the necessary rebates on head casings, &c., to make perfectly tight. All double-hung sash-frames to have 1¾-inch noiseless axle pulleys, with iron faces, and all to have suitable pocket caps, secured with screws at lower end of pulley-stiles. Cellar-window frames to be made out of 2-inch planks, rebated for sash; frames to be properly walled in with underpinning, and painted one coat before being walled in place. All sash to be 1½ inches in thickness, except cellar sash, which are to be 1¼ inches thick.

*Sash and Windows, &c.*—To be made of the best clear, dry, white pine, with acorn mold sash-bar, weather-lipped meeting rails, to be double hung with Samson braided sash cord and cast-iron weights. For style of sash, number of lights, &c., see elevations. Single sash of cellar windows to be hung to top of frame with 2¼ x 2¼ inch fast butts, and to have the necessary fixtures to secure shut or keep open.

*Glass.*—The glass in cellar windows to be American sheet glass, of third quality. Glass in first and second story to be second quality American sheet glass. The glass in staircase windows to be American sheet glass, cut up as shown. The glass to be well bedded, tacked and puttied.

*Outside Blinds.*—All the windows of the building, except cellar and windows in hall, to have outside blinds in two or four folds, 1¼ inch in thickness, with ½-inch rolling slats to be properly hung with wrought-iron hinges, and secured with best wire fastenings to keep open or shut. To be painted two good coats of oil and lead paint, color to be as selected.

*Sash Locks.*—Every double-hung window in the building to have one of the Ives' patent burglar-proof sash locks on meeting rails, No. 407.

*Door Frames.*—Outside door frames to be of plank, rabbeted, and to have 2½ inch hard pine sills. Inside doors in the usual manner.

*Verandas.*—Construct piazza as shown by the drawings: stefs, ⅞-inch thick, risers, ⅞ inch, to have cove under nosings; lay the floors with ⅞ x 3½ inch hard pine flooring, with loose joints. Columns, rails and brackets to be as shown; ceiling to be sheathed with beaded spruce battens, and to have quarter round in angles.

*Grounds.*—Put up grounds for the finish of all windows, doors, bases, casings, jambs, wainscots, &c., before plastering; those on wood partitions to be ⅞ inch thick. All these grounds to be set perfectly straight, true to a line and plumb. All plastering to be finished, cellar cemented and all mason-work done and thoroughly dried before any of the interior finished joinery is brought into the building or put in position.

*Floors.*—All floors to be double throughout, except attic. Lay all underfloors of good, square-edged spruce boards. Lay the kitchen floor with ⅞ x 3½ inch hard pine flooring nailed to every beam. All other floors, except as specified above, to be laid with kiln-dried spruce flooring, except attic, which lay with good spruce boards. All flooring must be laid close to the outside walls, closing up all spaces completely. All flooring to be well laid, joints broken and nailed in a thorough manner; the best to be selected and laid on principal floor. All joints to be leveled off smooth.

*Wainscoting.*—Walls of bath-room and kitchen to be wainscoted 3 feet high, with beaded battens ⅞ x 3 inches, and to have neat beveled molded cap.

*Casings.*—Case all doors and windows in rooms throughout, except attic, with ⅞ x 5 inch molded casings, and finish with plinth and turned corner-blocks 1 x 5 x 5 inches; case doors and windows in all other rooms with ⅞ x 4¾ inch plain casings, with plain corner block finish, in dimensions to correspond. Plain casings in closets. All windows to have neat stool and apron finish; apron, molded in principal rooms, to be 4 inches wide; elsewhere, plain beveled.

*Base.*—Put down after plastering 10-inch base in principal rooms on first floor, with neat molded cap; elsewhere, except in the closets and where wainscoted, plain beveled base. Closets to have 6-inch base, beveled inward, and to be put down before plastering. All interior wood-work to be left in natural wood, to be finished up perfectly clean, to be hand-smoothed, scraped and sand-papered, and at completion to be properly cleaned, and all stains and finger-marks removed on such work as requires finishing in natural manner.

*Doors.*—To be in size as shown on plans. Those on first floor to be 1½ inches thick; on second floor 1⅜ inches thick. All outside doors to be 1¾ inches thick. All doors to be of best kiln-dried whitewood; outside doors to be of the best kiln-dried whitewood; front door to have plate-glass in large panels; back door to have ground glass in the top panels; all doors except outside doors to be four panel; all doors marked "G" to have glass in top panels. Doors to swing as shown on plans unless otherwise directed.

*Saddles.*—Put down hard pine saddles to all doors.

*Hatchway Doors to Cellars.*—To be made out of ⅞ x 6 inch matched boards, to be twice cross-battened on the under side with ⅞ x 6 inch stuff, beveled all round on edges; these battens to be screwed on. The head of the door to be properly constructed, also at meeting of doors, so that no leak shall occur, and all properly and strongly framed. Hang the doors to frame-work with two heavy wrought-iron hinges to each fold.

*Stairs.*—Main staircase to be built as shown by the floor plans, in the best and most substantial manner; to be properly supported and rough-bracketed; to have ⅞-inch riser, ⅞-inch tread, tongued and grooved together, and both housed into wall-string; rise and tread to be as per figures on floor plan, fractions and variations in building excepted; treads to have nosing with fillet and cove under, and the finished work of main stairs to be put up after plastering is finished and dry. Wall-strings to be 10-inch, top edge molded to correspond with adjoining base; front string and landing facias to be finished as per drawings. Stairs to be of clear, best kiln-dried whitewood. Newel posts to be whitewood, 8 x 8 inches, as per detail; landing posts, 4 x 4 inches; rail, 2½ x 3¾ inches; balusters, 1¾ x 1¾ inches; all to be of best kiln-dried whitewood. Attic staircase to be built as shown, of best quality clear stock, housed together and properly supported and furred under. All staircases to be lathed and plastered underneath, and the treads to be properly protected during the progress of the work. Put a 2-inch round hand side-wall rail, firmly secured to side wall with iron holders, on one side of all box stairs. Cellar stairs to be strong plank stairs, planed stuff, ⅞-inch tread, with nose and riser, to have slat rail on one side.

*Bath-Room.*—To be fitted up with best clear, kiln-dried whitewood. Wainscot walls 3 feet high, with battens 3 inches wide, and cap with neat beveled and molded cap; ceil up over bath-tub and water-closet in like manner, 20 inches high. Bath-tub to be cased in the most approved manner, and molded. Fit up water-closet with riser, cover and seat, and hang the seat and cover with brass butts; hollow out the front edges by which to raise the lid; put the whole together in such a manner that it can be readily taken apart at any time and returned to its place easily, and without marring the wood-work. Wash-bowl to be fitted up under slab with paneled work and closet, with hinged door properly secured, &c. Also, put up six ornamental wardrobe hooks on neat molded strips in bath-room, where directed.

*Sink.*—Ceil up under sink to form closet, and hang door to same, with catch complete; put up row of pot-hooks on strip underneath; ceil up splash-back 16 inches high, and cap same as wainscoting; put drip-shelf as shown.

*Pantry.*—Put case of three drawers in end, as shown, and cover with counter shelf 20 inches wide; construct flour-barrel closet, 22 inches by 22 inches inside, with removable front and hinged lid; put four shelves 12 inches wide over, where wanted, and inclose with batten doors, with catches, &c., complete; place shelves 12 inches wide. Construct slide between china-closet and pantry, 12 inches by 16 inches, to slide sidewise.

*China-Closet.*—Fit up china-closet with three drawers to fill the opening and cover with counter shelf to fill the closet. Place five shelves over on strips at adjustable distances; hang neat doors, glass panels, with snap fasts, complete. Drawers to have bronzed drop-pulls; drawers and doors to have locks.

*Closets.*—All clothes-presses and closets to bedrooms to have two rows of large double black-japanned iron wardrobe hooks, placed 9 inches apart, breaking joint with each other; these hooks to be secured on 1 x 3 inch molded strips, passed all around the closets, the upper strip to be 5 feet 6 inches and the lower one 4 feet 6 inches from the floor; each closet to have a shelf secured on a neat cleat on top of wardrobe strips.

*Cold-Air Duct.*—Construct a frame of ⅞-inch boards, to be built in underpinning, to admit the cold air, and cover with coarse wire netting; construct cold-air passage from this opening to furnace, and make it air tight and to suit the requirements; put a wooden slide damper inside of cellar wall, and make the whole complete, to suit the requirements of the furnaceman.

*Coal-Bins.*—Construct coal-bins in cellar where shown, or in any other place desired, of rough hemlock boards, with slide, complete.

*Mantels.*—The contractor will furnish mantels for dining-room and parlor, to cost $10, which the owner shall have privilege of selecting, and the contractor will furnish labor and other materials for setting the same. The contractor will furnish and put up on neat iron brackets molded edge mantel shelves, 1¼ inch thick in all other rooms, to be of whitewood.

*Swing Shelves.*—In cellar.

HARDWARE.

Furniture to front door to be of bronze metal. All doors to have hemacite knobs, No. 1776, with bronze rose and escutcheon. Back door to have bronzed knobs with bronzed rose and escutcheon. All small closets to have bronze catches; all drawers to have suitable pulls, complete.

*Locks.*—Front door to have 6-inch lock of good manufacture; vestibule door to have lock; back door to have lock. All others throughout the building to be 4-inch locks All door locks throughout to be of good serviceable manufacture; all doors to have a key.

*Sliding Bolts.*—Double doors to have flush sliding bolts at top and bottom and to correspond with other furniture.

*Bulkhead.*—To have padlock, staple, hasp, &c., complete.

*Stops.*—Put rubber-tipped stops in base where required.

*Hanging.*—Hang all doors with loose-joint acorn-tipped butts; front door, 5 x 5 inches; Boston finish. All doors on first story 3½ x 3½ inches; all other doors 3¾ x 3¾ inches in size. Doors over 7 feet in hight to have three hinges. All small doors to have suitable butts.

*Bells.*—Front door to have gong-bell with suitable pull to match front-door furniture. Hang jingle-bell in back entry with pull, &c., complete, at back door. Also furnish any other hardware necessary to fully complete the works.

PAINTER.

Furnish all materials and perform all labor for the full completion and proper painting of the building. The material and labor to be of the best description. Cover all sap, knots, &c., of wood-work with a good coat of strong shellac before priming; putty up all the wood-work smoothly after priming.

EXTERIOR.

*Priming.*—All exterior finish and wood-work that is not to be stained to be treated with one coat of priming as soon as put up, to consist of pure linseed oil and yellow ocher.

*Staining.*—Stain all shingles on roof, dipping them into the stain before being laid. After priming is thoroughly seasoned paint the exterior wood and iron work one coat of pure white lead and linseed oil.

*Tin.*—Paint all tin-work two coats of best metallic paint.

INTERIOR.

Properly oil hard-pine floors, stain all wood-work in first story. All hard wood finish to be filled with Wheeler's patent filler. All hard wood, stained wood or wood that is to be left in its natural color to be treated with one coat of orange shellac and two coats of Elastica finish (Rosenburg's), the last coat to be rubbed down to a smooth surface.

Cover all knots and sap with shellac, carefully putty and paint all interior wood-work of second story three coats of lead and oil paint, tinted to taste of owner.

The painter must see that all wood-work is perfectly clean before filling; putty up all nail heads and other defects, using care to thoroughly match the putty in all hard wood and natural wood finish, and to sand-paper smooth and properly prepare all work before applying the second coat. All graining work to be of the best kind, and the whole of the painter's work to be done in the best and most thorough workman-like manner known in the painting and finishing trade, and all paint and varnish spots to be cleaned off glass, walls and floors at completion of the work, and all left in a perfect and complete state, without exception.

TINNING.

*Leaders.*—Put up the necessary number of corrugated galvanized-iron conductor-pipes, with all necessary curves, bends, breaks, &c., to convey water from the gutters to the grade level, and there connect them with drain-pipe in the ground; and where there is no sewer connection to have suitable shoes on the bottom to throw away water from the building. All joints to be lapped and soldered tightly together. Secure leaders to the building with galvanized-iron hold-fasts, and place a wire screen over openings in gutters. All breaks and bends to be made and curved on a proper, neat and close sweep around set-offs and breaks of the building; and all elbows to be made in like manner. The size of leaders to be 3 inches in diameter inside.

*Flashings.* — Furnish the carpenter all necessary 9-ounce zinc or 3-pound sheet-lead to enable him to flash all outside wood-work, casings, shingle-work, wood cant-boards, caps, &c., to make perfect and thoroughly tight work. Where tin-work of roofs comes against building the tin must be run up at least 6 inches behind the clapboarding; also do all tinning requisite to make all places water-tight, whether specified or not. Go over the work and stop all leaks after other craftsmen, and leave everything tight.

*Furnace.*—Furnish and set complete a portable hot-air furnace in cellar, where the furnace people may direct, in such size as the manufacturer will warrant to heat the house. Build the cold-air box as directed, also the pit for the furnace. Furnish complete all registers, hot-air pipe, smoke-pipes, &c., to make perfect job.

PLUMBING.

Furnish all materials and perform all labor requisite and necessary for putting up and completing all the plumbing-work in a good and thoroughly workmanlike manner, according to the drawings and these specifications, and their full intent and meaning. The whole work to be left in complete working order at completion.

All water-service pipes must be put up on 1-inch thick stripping. No pipes to run on outside wall unless absolutely necessary. Neither must the plumber cut any timbers—this will be done by the carpenter, and he shall not cut any to weaken them.

All lead pipes to be secured with hard metal tacks and screws, and all lead wastes and ventilating connections with soil-pipe to be made through brass ferrules, which must be soldered to the lead pipe, and calked with oakum into the iron hub, and the joint run with molten lead.

*Supply.*—Tap and pay for tapping main in street and connect, and from this point lay ¾-inch lead pipe to supply the house. Leave out the necessary branches for the different works, and place a stop-cock on front, inside cellar wall, to shut off the water from the entire building when necessary. Care must be taken in grading this and all other pipes, so that when the water is turned off they will drain perfectly dry. There is to be a sill-cock on the front where required, and put one draw-cock in the cellar where required, to accommodate furnace.

*Iron Soil and Wastes.*—Connect with drain a 4-inch cast-iron pipe, carry along the cellar bottom to a point under bath-room, and from there carry up to the bath-room and extend up above the roof and cap with ventilating hood. Place a running trap in main in the front of the house and ventilate. All horizontal or vertical pipe connections to be made with Y-branches and one-eighth bends. All cast-iron pipes to be properly supported and secured with large iron hooks, braces or hangers. All cast-iron soil and waste pipes to have one good coat of coal tar inside and out.

*Boiler.*—Furnish and set up a 30-gallon copper boiler, set on a single cast-iron standard, supplied with water through a ⅝-inch lead pipe, and connect with water-back of range through brass tubes and couplings, to have ¾-inch sediment-pipe and cock, this pipe connected with soil-pipe and trapped; also place a stop-cock on supply-pipe. Run a ⅝-inch lead pipe from top of boiler up to the highest point of hot-water supply, and return the pipe to the top of the boiler, to keep up a continuous circulation of hot water, and all fixtures must be supplied with hot water by tapping this circulation-pipe. Run a ½-inch lead pipe from the highest point of hot-water supply, and up to and over top of tank, leaving end open for steam escape.

*Tank.*—Put up in bath-room a tank to hold 15 gallons, to be lined with 4-pound sheet lead, with carefully-soldered joints, to supply boiler solely.

*Sink.*—Put up cast-iron sink in kitchen, 6 x 20 x 36 inches, to be supplied with hot and cold water through a ⅝-inch lead pipe and ⅝-inch thimble, and bibb-cocks of brass. Cold-water bibb to have hose screw for filter. To waste through 2-inch lead pipe, properly trapped and connected with soil-pipe.

*Wash-Basins.*—To be 16 inches diameter, of Wedgewood-ware, with overflow connections; each set in a best Italian marble countersunk slab with molded edges; back and sides to have plated bibbs, plug, chain and chain stay, and to be supplied with hot and cold water through ½-inch lead pipe, and to waste through 1¼-inch lead pipe, properly trapped and connected to soil-pipe.

*Water-Closets.* — Provide and fit up a good, serviceable short hopper water-closet in bath-room connected with soil-pipe; to have tank to hold 20 gallons of water, supplied through ⅝-inch lead pipe, to have cistern-valve and ball-cock complete; to have overflow, and to be fitted up in the most approved manner.

*Slop Safes.*—Over water-closet in bath-room.

*Bath-Tub.*—Furnish and fit up a 5-foot 6-inch 14-ounce copper bath-tub, Steger pattern; to be well tinned and planished; supply with hot and cold water through ⅝-inch lead pipe, and to have a double hot and cold water compression bath-bibb; supply rubber tube and sprinkler to same; to be emptied through 2-inch lead waste; properly trapped and connected; to have plated plug and chain, and overflow connection.

*Ventilation.*—All traps to be ventilated.

*Traps.*—All baths, sinks, water-closets, tubs and other appliances having wastes to have a separate trap. All traps that can be so supplied are to be of the bottle or jug form.

*Bibbs.*—All bibbs throughout to be of the best quality of their several kinds; all shut-off cocks to be of brass, and one of the best make and kind.

*Weights of Lead Pipe.*—All lead pipe used in and throughout the building to weigh per lineal foot as follows: Supply, $\frac{1}{2}$ inch, 2 pounds; $\frac{5}{8}$ inch, $2\frac{1}{2}$ pounds; $\frac{3}{4}$ inch, $3\frac{1}{2}$ pounds; 1 inch, 5 pounds. Waste and ventilation, 1 inch, $2\frac{1}{2}$ pounds; $1\frac{1}{4}$ inches, 3 pounds; $1\frac{1}{2}$ inches, $3\frac{1}{2}$ pounds; 2 inches, 5 pounds; 3 inches, $5\frac{1}{2}$ pounds.

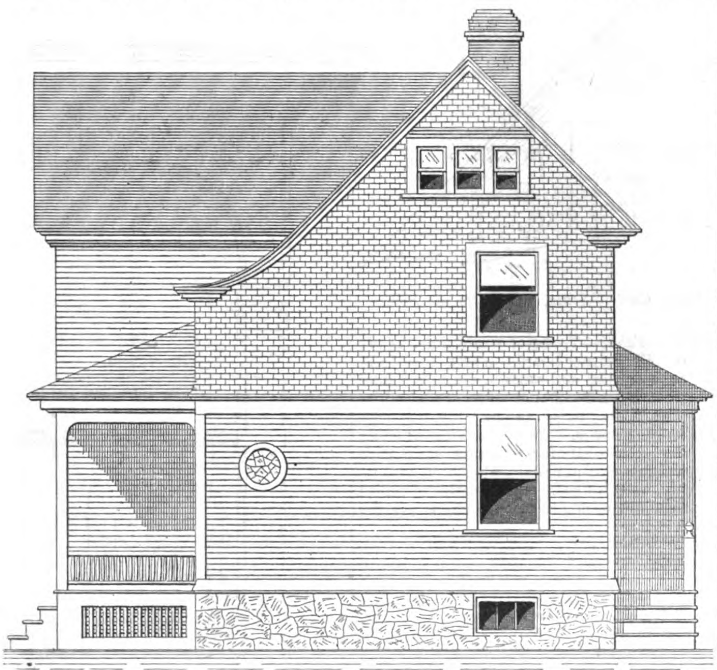
*Joints.*—All soldered joints to be wiped.

DETAILED ESTIMATE OF COST.

| | |
|---|---|
| Cellar | $239 |
| Boards, 6000 | 90 |
| Framing and studding, 7500 | 128 |
| Furring, 1300; grounds, 1000; corner-boards, 100 | 10 |
| Doors, 22 complete | 110 |
| Windows, 19 complete | 76 |
| Outside finish, 1000 feet | 45 |
| Gutters and conductors (wood) | 10 |
| Inside finish, 1000 feet whitewood | 40 |
| Base, 300 feet | 12 |
| Shingles, 19 M, choice cedar | 62 |
| Clapboards, 600 choice spruce | 18 |
| Flooring, kitchen hard pine, rest second spruce | 36 |
| Stairs | 50 |
| Sheathing, kitchen and bath-room | 10 |
| Bath-room, stock whitewood | 5 |
| Paper sheathing, I X L | 8 |
| Flashing, zinc and lead | 5 |
| Hardware | 25 |
| Brick-work, chimneys and piers | 70 |
| Plastering | 120 |
| Plumbing | 175 |
| Mantels | 10 |
| Two brackets, back door | 3 |
| Piazza, porch and rail and floor | 15 |
| Painting | 125 |
| Outside steps | 15 |
| Cellar windows | 8 |
| Furnace | 110 |
| Panels in bay for stairs | 5 |
| Labor | 406 |
| **Total** | **$2,041** |

## Second Prize Design in Eighteenth Competition.

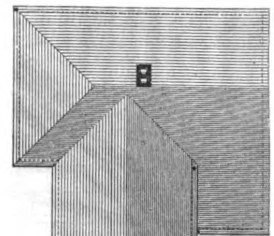
We present in plate XXIV and the text pages following the second prize design in the XVIIIth competition, the author of which, as announced in our last number is Mr. John N. Sherwood of Syracuse N. Y. We also lay before our readers the specification and estimate. The following letter addressed to the committee of award calls attention to some of the leading features of the design and will be found of interest in this connection:



*Second Prize Design in XVIIIth Competition.—Side Elevation.—Scale, $\frac{1}{8}$ Inch to the Foot.*

DESCRIPTION.

In presenting my plans for Competition XVIII, I wish to draw your attention to some parts of same. I have sent you four sheets, viz.: A perspective view drawn large for photo-engraving; on second sheet, front and side elevations; on third sheet, cellar plan, first and second stories and attic and roof plan; on fourth sheet, details. By looking at floor plans you will see that a room or two can easily be added without any change of present house. The front, though plain, is good enough for a house costing at least $2000. The house, being but 25 feet wide, would go well on a city lot or look good in the country. In my plans I have a cistern specified, but in the vicinity of New York and some other locations this would not be needed. As you call for plans to cost $1000 in locations where designed I would be obliged to include it in estimate, but as most material and labor are cheaper here it about evens prices. There is a large cellar under whole of house, with stairs leading up to kitchen. On first floor we have a hall with neat white-wood (stained cherry) staircase, with doors leading into parlor and kitchen. The parlor and dining-room and kitchen are good-size rooms. All painted in two tints, as directed; kitchen is wainscoted. On second floor we have three chambers with closets off each, fitted up with wardrobe hooks, &c., and a spare closet for linens, &c. There is a large attic over all, with stairs leading to it; the attic is lighted by two good-size gable windows. (Front and side gables.) The first story and entire rear is narrow-coved siding with corner boards. The second story, gables and roof are all shingled. This makes a plain and very stylish house. The exterior and all tinwork to be painted two coats in two tints, as directed; roof is not painted. The chimney is started 2 feet below kitchen ceiling on a bracket, giving a chance for closet below.

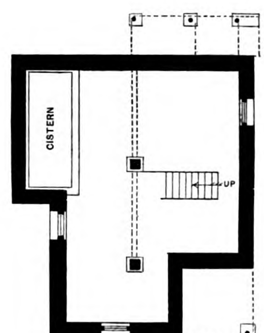


*Roof Plan.—Scale, 1-16 Inch to the Foot.*

### Specifications.

MASON WORK.

*Foundation.*—Excavate the cellar to the clear depth of 6 feet and 6 inches, lay some large flat stone on bottom of wall for footings, then commence cellar wall, which is to be of common mixed work except the front, which is to be rock-faced, broken joints, ashlar work. Cellar to be rolled down smooth.




*Cellar Plan.—Scale, 1-16 Inch to Foot.*

*Cistern.*—To be built of brick, as shown by plans, 12-inch wall, and line outside walls with 4 inches of brickwork and plastered with water-lime cement, and place a draw-off cock in front and all left water-tight.

*Chimney.*—To be started on a bracket 2 feet below kitchen ceiling, and built up, as shown by plans, of common hard-burned brick.

*Piers.*—In cellar to be of hard-burned brick, built on a large flat footing-stone. Outside piers for porches to be started at least $3\frac{1}{2}$ feet below grade; of stone.

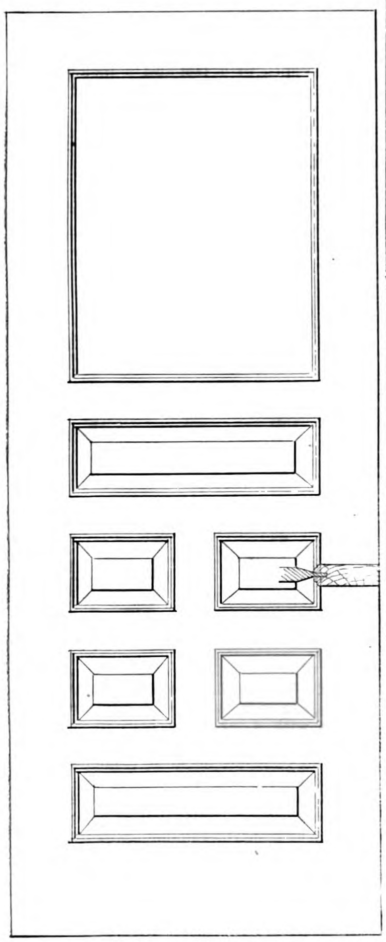
*Plastering.*—House to be lathed with good pine laths and plastered two good coats on all side walls except attic and cellar. Stairway ceiling three good coats; brown finish.

CARPENTER WORK.

*Timbering.*—Girder, 8 x 10 inches, hemlock; first and second story joist, 2 x 10, 16 inches on center, hemlock; ceiling joist, 2 x 6, 16 inches on center, hemlock; rafters, 2 x 6, 16 inches on center, hemlock; sills, 6 x 10 inches, hemlock.

*Second Prize Design, XVIIIth Competition.—Front Gable.—Scale, ⅜ Inch to the Foot.*

*Exterior Finish.*—Roof to be covered with hemlock board, laid open joints, then all covered with rosin-sized sheathing-paper; then shingled with clear butt shingles, laid 6 inches to the weather. Second story and gables covered with hemlock boarding, building paper and clear butt shingles laid 6 inches to weather, except rear, which is to be covered with narrow-coved siding. First story to have building paper, and covered with narrow-coved siding free from large, loose and black knots.



*Front Door—Scale, ¾ Inch to the Foot.*

*Water Table.*—To be of white pine, as per details; corner boards on first story (rear both stories) and outside window frames to be 4½ x 1¼ inches good sound white pine.

*Window Frames.*—As per details, of clear dry pine, all for hanging sash with weights, except cellar sash, which hang at top with hinges. Door jambs of pine; sash and blinds to be of pine, as per details; sash 1½ inches thick. All windows except cellar windows to have outside blinds properly hung and trimmed.

*Doors.*—Front doors as per details, 2 inches thick, molded and raised panels. Glass, double-thick American. First-story doors, first quality o. g., six panels, 2 feet 8 inches by 7 feet. Second-story doors, second quality o. g., six panels, 2 feet 6 inches by 6 feet 6 inches. All inside doors 1⅛ inches thick except small closet doors, which will be 1¼ inches thick. All of pine.

*Inside Finish.*—Interior to be properly finished in white wood, as per details. Stairs to be of white wood. Stained cherry treads and risers of pine. Kitchen to be wainscoted to the hight of 3 feet, of good, sound narrow-beaded white wood. Pantry to have a flour-bin on

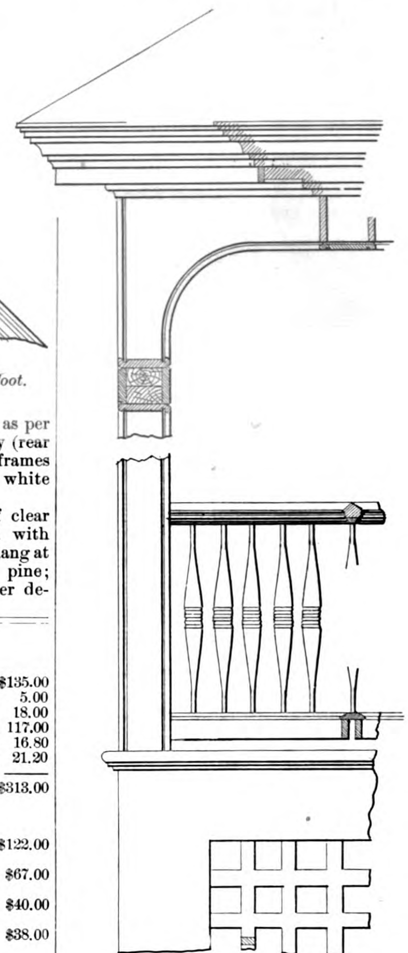
**Estimate.**

MASON WORK.

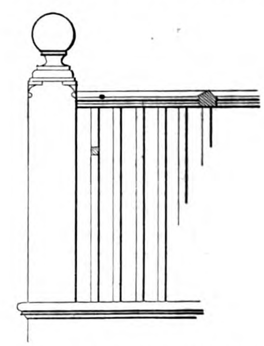
| | |
|---|---|
| 10 cords of stone laid @ $13.50 | $135.00 |
| 2 brick piers @ $2.50 each | 5.00 |
| Chimney built for $18 | 18.00 |
| 585 yards of plastering @ 20¢ per yd | 117.00 |
| 84 yards of excavating @ 20¢ per cu. yd. | 16.80 |
| Cistern, built @ $21.20 | 21.20 |
| Total mason work | $313.00 |

CARPENTER WORK.

| | | |
|---|---|---|
| 8000 feet hemlock @ $11 | $88.00 | |
| Carpenter work @ | 34.00 | = $122.00 |
| Shingles 12,500 @ $3.50 | 43.75 | |
| Laid for | 23.25 | = $67.00 |
| Coved siding, 1300 @ $24 | 30.00 | |
| Laid for | 10.00 | = $40.00 |
| Flooring, 1600 @ $20 | 32.00 | |
| Laid for | 6.00 | = $38.00 |
| Cornice, corner boards, belt course and water-table, 585 feet @ $25 | 22.13 | |
| Carpenter work | 12.87 | = $35.00 |
| Base board, 325 feet @ $25 | 8.12 | |
| Laid for | 5.88 | = $14.00 |
| 10 windows, blinds, trimming, frames, casing and labor @ $6 per window | | $60.00 |
| 3 cellar windows @ $2.50 | | 7.50 |
| 2 attic windows @ $5 | | 10.00 |
| Circular window in hall, including leaded glass (stained glass) | | 5.00 |
| Front door, trimming, glass and labor | | 15.00 |
| 14 inside doors, trimming, frames, casing and labor @ $5.75 each | | 80.50 |
| Wainscoting kitchen, 230 feet @ $25 | | 5.75 |
| Front stairs, complete, $25; attic stairs, $6, and cellar stairs $6 | | 37.00 |
| Pantry finished for | | 15.00 |
| Porches complete | | 38.00 |
| Conductors and tinning | | 11.50 |
| Nails | | 10.00 |
| Building paper | | 5.00 |
| Painting | | 55.00 |
| Total | | $984.25 |
| Wardrobe hooks, 4 doz., put up @ 30¢ | | 1.20 |
| Total | | $985.45 |

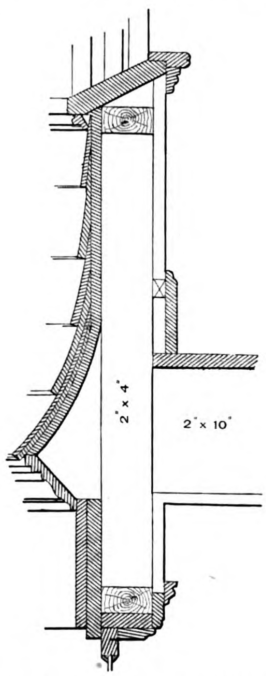


*Detail of Front Porch.—Scale, ¾ Inch to the Foot.*

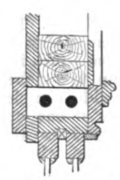


*Rear Porch.—Scale, ¾ inch to the Foot.*

hinges to swing out and four drawers and shelving, as directed. All of pine.

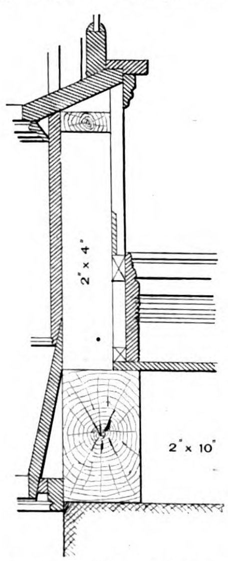



*Detail of Belt Course.—Scale, ¾ Inch to the Foot.*



*Section through Window Jamb.—Scale, ¾ Inch to the Foot.*

*Cornice Tinning.*—Cornice to be as per details, of good sound pine. Gutters




*Detail of Window-Sill and Water-Table. —Scale, ¾ Inch to the Foot.*

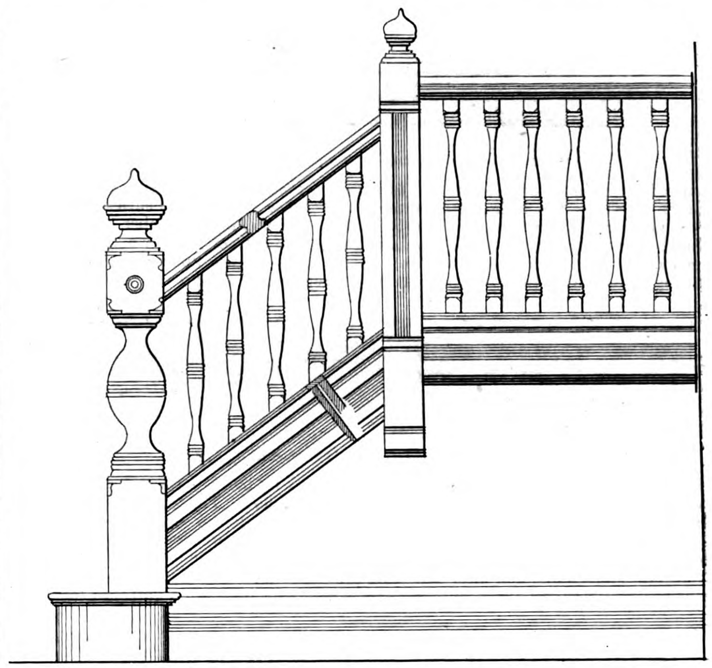
as per details, all properly tinned; also all valleys, &c., and necessary flashing.

Run three conductors as shown on roof plan, two into cistern and the other to ground.

*Belts and Porches.*—Second-story belt course as per details, of pine. Porches of pine except all turned work, which will be of whitewood.

*Stairs.*—Cellar and attic stairs of pine treads and riser, and also lay a rough hemlock board walk in attic from stairs to front gable window.

of very beautiful anatomical preparations, and thus it happens, in natural as well as artificial processes, that vegetable substances keep perfectly dry or immersed in menstrua in which their peculiar matters are insoluble, or which, instead of favoring, check their proximate principles from undergoing decomposition, and producing new compounds, will last unhurt, or but little changed, for ages; but if the matter be soluble in the menstruum applied or



*Elevation of Hall Stairs.—Scale, ¾ Inch to the Foot.*

*Hardware.*—All windows and doors properly trimmed and hung. Front door to have Berlin bronze butts, knobs, roses and escutcheon and night key attachment; and all other principal doors to have locks and keys.

*Glass.*—Front and sides to be glazed with double-thick American; the rest common glass.

*Flooring.*—To be of good sound narrow matched pine ⅞ inch thick.

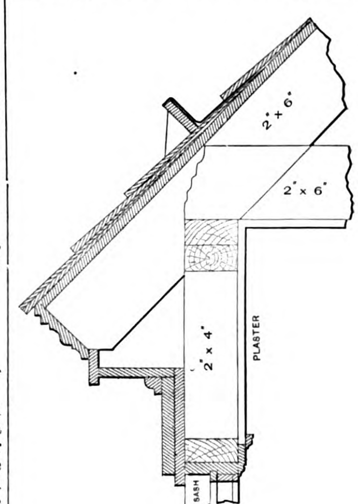
*Painting.*—House to be properly painted in two shades, as directed, of pure lead and oil. Interior in two tints, as directed, except front stairs, which are to be stained cherry and oiled finish, well rubbed down to a good finish. All tinwork to be painted two good coats. Shingled roof is not to be painted.

*In General.*—All work to be done in a thorough, workmanlike manner, and house to be left broom-clean.

## Decay of Timber.

In writing upon the subject of timber decay, Gilbert Burnett says:

Ordinary decay in timber, and indeed in most vegetable substances, consists in a change occurring in the contents of their intimate cellular structures, by which the matter therein contained is either dissolved and carried away, leaving the cells more or less empty; or decomposition and the formation of new chemical combinations is favored, by which the quality of the wood, or whatever it may be, becomes essentially altered. By maceration in different menstrua the matter deposited may be dissolved, and the cellular structures thus exhibited afford a number the reverse of the former circumstances occurs, then solution and decomposition—that is, decay—will more or less rapidly ensue. Timber exposed to atmospheric changes is subject, more or less, to all these influences, and those woods the ligneous



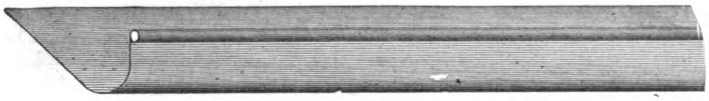

*Detail of Cornice.—Scale, ¾ Inch to Foot.*

matter of which is the most soluble in water will, *cæteris paribus*, the most speedily decay; but it often happens that the decomposition (as in fossil timber) produces a matter less corruptible than the original, at least on the outer surface, and thus defends the internal parts; sometimes the whole becomes thus changed. More frequently, however, the decompositions that take place generate various gases, *e. g.*, carbonic acid, carbureted hydrogen, &c., in abundance, the elasticity of which cannot fail to rupture the delicate tissues of which the cells are formed, and these fissures, minute and almost inappreciable as they may be thought, in fact are potential capillary tubes. Moisture is again applied, is again absorbed, and by these means pervades the intimate structures, even more readily and more extensively than before. By sea-water salts are also carried in, which often crystallize; or during cold weather the water freezes, and either of these processes will sufficiently account for many of those cracks and fissures which do not occur from violent exsiccation. The solution and deposit is sometimes so complete and general as to transform a block of wood into stone, as may be seen in almost every museum; and the fissures just noted, which are always occurring in their slighter forms in very severe winters, such as that just passed, produce much more notable effects. In this country, as well as in the south of France, many large and hollow trees, especially cork-trees, have been split and their trunks rent in pieces by the congelation of water contained within them, and this has taken place with so sudden and so great a force that the noise produced has been said to have been heard at a considerable distance, resembling the discharge of a musket.

# NOVELTIES.

### New Roofing Specialties.

The well-known firm of Hatten, Galpin & Co., Binghamton, N. Y., have recently issued a new catalogue of gutters, eave-troughs, miters, ridging, hangers and other roofing specialties. The catalogue contains a number of new designs, and from these we have selected the cuts shown upon this page. Fig. 1 represents a form of gutter often demanded by builders for slipping up under the shingles. The gutter is beaded, presents a half-round front and has a flange so wide at the back as to extend up under the shingles or slate to a point higher than the bead in front. Fig. 2 represents a front support for use with a gutter of this kind, while Fig. 3 shows the manner of putting it in place and strengthening it with brackets, which are bolted in place to the upright piece near the head and fastened to the roof with screws. The heads of the screws are soldered over, making the gutter complete and the roof water-tight without exposed nail or screw heads. The brackets shown are of malleable iron. Fig. 4 is a section through a roof, illustrating in detail how this style of gutter is put in place. The improvement is one that will be appreciated by builders generally. The gutters are made of IX terne and galvanized iron, in 8-foot lengths, without soldered joints. In the catalogue of the company mentioned the statement is made that these gutters do away entirely with wood fronts and wood brackets; accordingly there is no danger from splitting. Figs. 5 to 8, inclusive, represent a line of malleable iron hangers for gutters which this firm are also putting upon the market. These hangers are made for $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5, 6, 7 and 8 inch gutters. They grip the bead in front and also the straight edge of the gutter at the back. The gutter is adjusted vertically by means of holes in the hanger, as clearly shown in Fig. 6. Fig. 7 shows three sizes of roof irons which are supplied with these hangers, and Fig. 8 shows three sizes of rafter irons.



*Novelties.—Fig. 1.—New Style of Beaded Roof Gutter.*

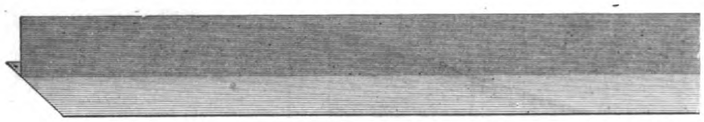


*Fig. 2.—Flanged Gutter, Front and Support.*

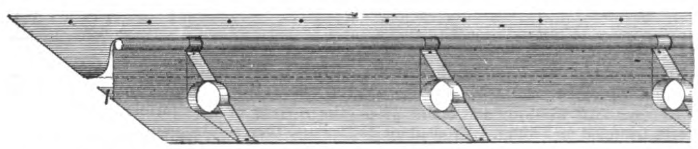


*Fig. 3.—Gutter and Front Support and Malleable Iron Brackets Combined.*

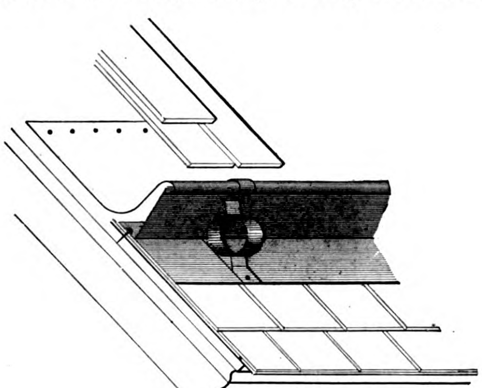


*Fig. 4.—Section through Roof, Illustrating the Use of the Gutter and Support Shown in Previous Figures.*

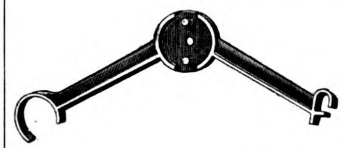


*Fig. 5.—New Malleable Iron Gutter Hanger.*

### Combined Double Surfacer and Matcher.

In Fig. 9 of the accompanying illustrations we present a perspective view of a new combined double surfacing, sizing and matching machine manufactured by the Glen Cove Machine Company, Limited, Brooklyn, N. Y. This machine is designed for very heavy work, and will finish lumber from $\frac{1}{4}$ inch in thickness and 2 inches wide up to 8 inches in thickness and 24 inches wide, completing the work on all four sides at one operation. The carrying-in rolls and also the chip-breaker are what are termed "broken" or "sectional," by which arrangement timber of different or uneven widths or thicknesses may be fed at the same time. Each side of the sectional rolls is mounted in a yoke or frame, which is free to rise and fall, carrying the rolls with it. The rolls themselves have a separate movement up and down with the frame, each section being driven independently of the other, and all controlled by the company's patent parallel hoisting device. The end rolls are eight in number and are double geared. The under cutter-head is placed at the extreme delivery end of the machine, which, combined with the method of opening that end, gives quick and ready access to the parts when setting or sharpening the

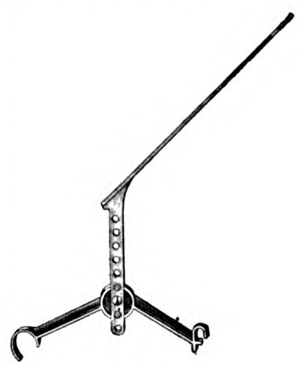


*Fig. 6.—Gutter Hanger and Roof Iron Combined.*

knives is necessary. The carrying-out table, with guides and mouth-piece attached, is dropped down by simply loosening two hand-nuts, while by loosening still another the pressure-bar is raised to a vertical position. This exposes the head in a manner which is considered the

*Novelties.—Fig. 7.—Three Sizes of Roof Irons Going with Hanger Shown in Fi . 5.*

most convenient for the operator. The manufacturers direct special attention to this feature, stating that it is valuable where grooving, beading or other

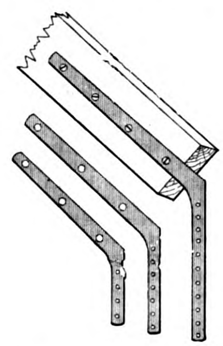


*Fig. 8.—Three Sizes of Rafter Irons Supplied for Hanger Shown in Fig. 5.*

accurate work is required, or where tine in setting up the machine is a consideration. The upper cutter-head journals are long, large in diameter and run in improved self-oiling boxes. The head is square and slotted on four sides, so that all kinds of solid and sectional knives may be employed. It is belted at both ends. The cutter-head pulleys are large in diameter, giving great cutting power to the knives. The under cutter-head is made exactly like the top one, both being forged solid from hard steel. For convenience and accuracy in setting to thickness the upper head is raised or lowered $\frac{1}{8}$ inch by turning the crank or handle for adjusting the pressure-bar. The hand-screw and check-nut project sufficiently far from the cutter-head to allow the shavings-hood to go between them and the knives. This, the makers claim, permits adjustment of the pressure-bar while the machine is in motion without endangering the hands of the operator. The side-heads are provided with the company's patent weighted chip-breaker, the piece on the ends of which is adjustable for either long or short knives. The side-head spindle-frames are moved crosswise the machine $\frac{1}{8}$ inch by each turn of the crank-wrench, and are fitted with a patent gripping device for holding them securely in position when set. The side-head spindles have new patent self-oiling taper bearings and solid boxes without caps or screws. The center guide is so arranged that two pieces may be fed in at the same time for sizing. The cutter-head boxes are yoked together by an improved method, which prevents springing of the boxes and pinching of the journals, and does not weaken the bed under the cutter-head by passing through it. The yoke is made very heavy and strong, and the cutter-head bed is thick and solid, insuring satisfactory work. The bars on each side of the under cutter-head are supported in housings cast solidly together, and made adjustable to and from the cutting circle of the head, in order to permit the use of molding, beading and rabbeting cutters. All bolts, screws and nuts are made United States standard sizes, and all parts or pieces are numbered for convenience in ordering duplicates.

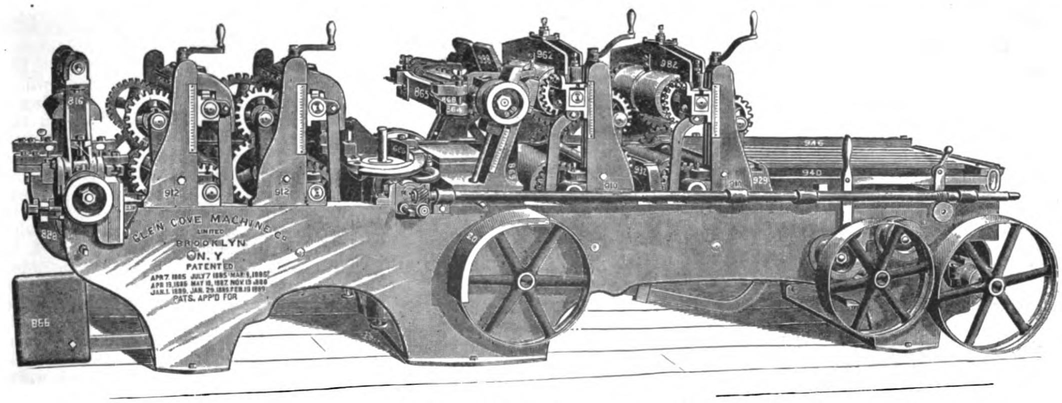
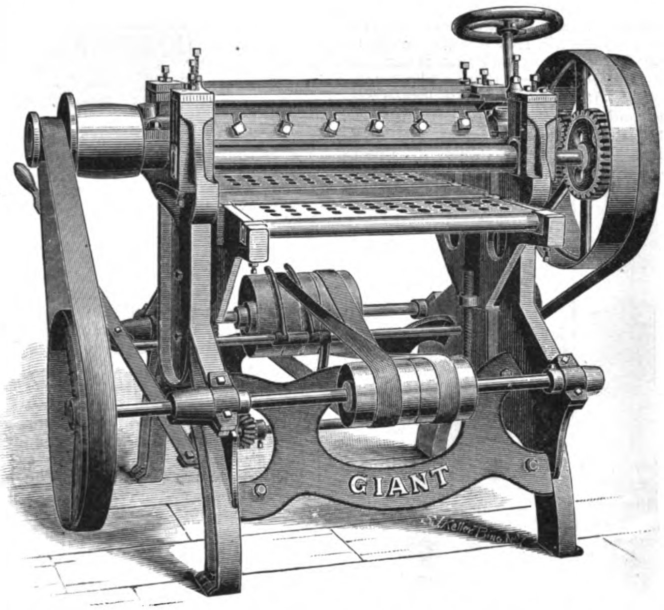


*Fig. 9.—Combined Double Surfacer and Matcher, Made by the Glen Cove Machine Co., Limited, Brooklyn, N. Y.*



*Novelties.—Fig. 10.—Little Giant Planer, Built by W. A. Heath, Binghampton, N. Y.*

**Little Giant Planer.**

W. A. Heath, Binghamton, N. Y., is introducing to the trade the Little Giant planer, a general view of which is shown in Fig. 10 of the accompanying illustrations. This planer is manufactured especially for cabinet-work, or for shops requiring a fine quality of finish, and is offered to the trade with the latest improvements. The machine, as will be noticed from the illustration, presents a solid and durable appearance and is carefully made in all its parts. The bed rises and lowers in dovetailed slides and all wear can be readily taken up. It is provided with a self-adjusting pressure-bar that rides upon the board and adjusts itself to the thick as well as the thin edge. The other, on the opposite side of the cylinder, is arranged in such a way as to press the lumber at the nearest possible line to cut of the cylinder, and retains the same relative position to it. The machine will plane material from $\frac{1}{16}$ inch in thickness up to 8 inches. It is provided with two changes of feed. By operating the shifting lever, clearly shown in the engraving, the feed stops and reverse motion is obtained. The manufacturer states that this machine will feed stock from 1000 to 2000 feet per hour and that it can plane one-third more work than a planer twice its size. It is provided with 8-inch bearings and three knife-cylinders. It is well fitted to operate upon short pieces and thin stock and also for planing columns.

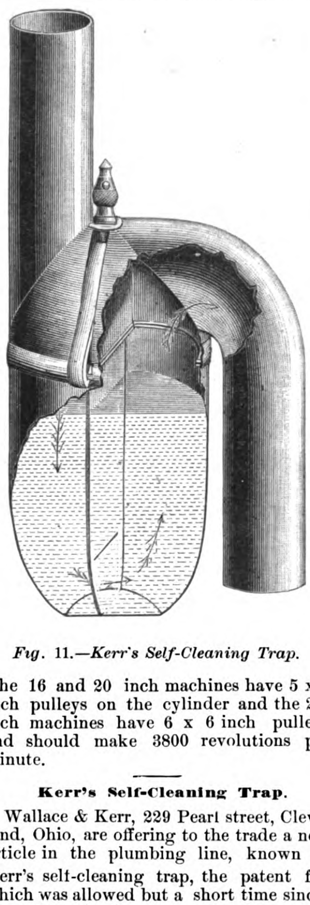
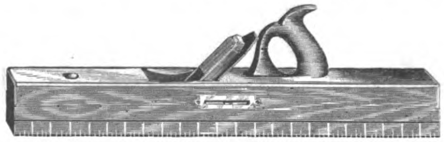


*Fig. 11.—Kerr's Self-Cleaning Trap.*

The 16 and 20 inch machines have 5 x 5 inch pulleys on the cylinder and the 24-inch machines have 6 x 6 inch pulleys and should make 3800 revolutions per minute.

### Kerr's Self-Cleaning Trap.

Wallace & Kerr, 229 Pearl street, Cleveland, Ohio, are offering to the trade a new article in the plumbing line, known as Kerr's self-cleaning trap, the patent for which was allowed but a short time since. Fig. 11 of the cuts presents a sectional view of the device, from which its features of construction will be readily



*Novelties.—Fig. 12.—The Phelps Combination Plane.*

understood. The Kerr trap, which is intended for use under sinks, bathtubs and in other places ordinarily difficult of access, is constructed so that it can be easily taken apart for cleaning and replaced with little trouble. Referring to the illustration, it will be noticed that the trap proper consists of two parts, the lower part, or cup, with a central diaphragm extending from the top down about three-fourths of the depth, but leaving an ample passage for the water underneath. The top of this diaphragm, which is even with the top of the cup, is widened out so that it may be the more easily packed. Around the top of the cup, which is of lead, is soldered a brass

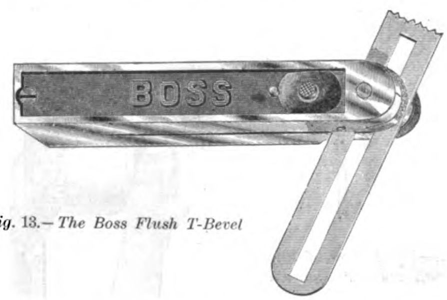



*Fig. 13.—The Boss Flush T-Bevel*

band, making a shallow socket into which fits the upper section of the trap. This band serves the further purpose of preventing the contents of the cup from spilling when it is removed for emptying and cleaning. To complete the separation of the trap the upper section, as shown, is also fitted with a diaphragm, but made with double walls joined at the bottom, which form an extension of the cup diaphragm. The joint between the two diaphragms, as well as between the two sections of the trap, is made with a rubber packing, which forms a tight seal against the escape of water or sewer gas. The two sections of the trap are held together by means of a yoke occupying a slot formed by the walls of the diaphragm in the upper part. Both ends of the yoke arms are provided with catches which fit over projections on the brass band of the cup. After adjusting the yoke it is secured, and the two parts of the trap brought firmly together, by means of the milled nut shown on the top. The advantages claimed for the Kerr trap are its simplicity of construction, the large water-way, which is twice the area of the inlet, and the ease with which it can be taken apart. The trap is of lead, with nickel-plated trimmings, and is made in several sizes in the forms of full S, half S and running.

### The Phelps Combination Plane.

This article, illustrated in Fig. 12, is put on the market by the Auburn Tool Company, Auburn, N. Y. It will be seen that the tool may be used as a plane, level and rule. It is described as made of straight-grained white beech, which is not liable to warp or break where the bit is inserted. The levels are set in plaster-of-paris on the side of the plane, as shown. The plane is made in two lengths, P. C. jack plane, 16 inches long, 2, $2\frac{1}{8}$ or $2\frac{1}{4}$ inch iron, and P. C. fore plane, 22 inches long, $2\frac{1}{4}$, $2\frac{3}{8}$ or $2\frac{1}{2}$ inch iron. The jack planes are packed 24 in a case, the fore planes being packed 12 in a case. The manufacturers allude to the convenience of this tool for use in odd jobs, avoiding, as it does, the necessity for carrying a level, and also about the house and farm. They refer also to the low price at which it is sold, its cost being but a trifle more than the ordinary plane.

### The Boss Flush T-Bevel.

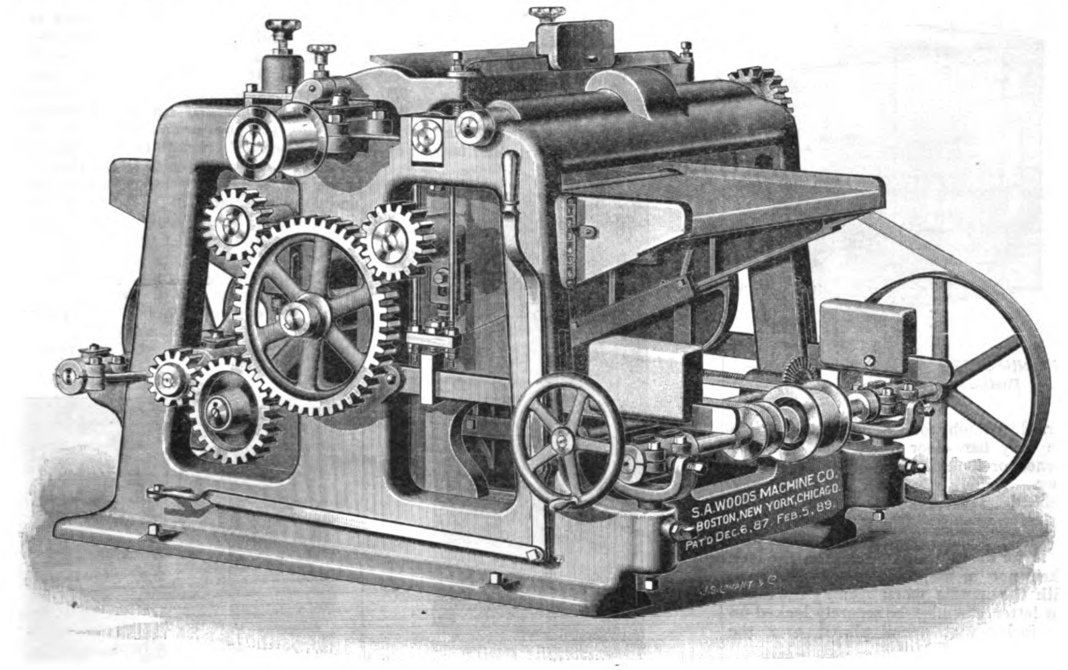
The Hill Bevel Company, North Manchester, Conn., are putting on the market the flush T-bevel illustrated in Fig. 13, which they designate as the Boss. As shown in the cut, the disk in the end of the frame attached to the blade is divided by lines marked with the characters S, W, 8, 6, M, which indicate the following angles: S for square; W for window or sill pitch, or angle of 9°; 8 for octagon or "8-square," or angle of $22\frac{1}{2}$°; 6 for hexagon or "6-square," or angle of 30°; M for miter, or 45°. To obtain any of these angles the blade is to be moved until the mark on the disk is in line with the center mark on the end of the frame, when the bolt on the side of the frame may be engaged with the blade and lock it in the proper position, when it can be further fastened by screwing down the thumb-nut. When the pressure of the thumb or finger is removed from the bolt, it is brought back to its original position by means of a spring, and the bevel can then be used the same as common bevels.

### The Ehman & Simon Wood Mantels.

Wood mantels are now regularly carried in stock by many hardware merchants all over the country. Prominent among the establishments giving special attention to this branch of trade are the Ehman & Simon Mfg. Company, whose factory is at the corner of Elizabeth and Fulton streets, Chicago. They make a very large line of mantels and over-mantels in either stock patterns or special designs. They occupy a brick building whose dimensions are 50 x 140 feet, four stories high, devoted entirely to their own purposes. The lumber in the rough is received on the first floor, where it is dressed and cut to size. Carving is done on the second floor, joining on the third floor, and finishing on the fourth floor. The second floor also contains a drafting-room and a sample-room. In the latter a large line of samples is carried, ranging from the most exquisite work in carving and fancy paneling, gorgeous with beveled mirrors and delicate fretwork, to plain and simple over-mantels intended for less pretentious adornment. New styles are being continually added to the stock, active brains and skillful hands being employed in the work of anticipating the demands of the people whose æsthetic tastes have been found worth cultivating in this line as well as in others. From 80 to 100 hands are employed in this establishment and shipments of goods are made all over the country, from Portland, Me., to Portland, Ore., to points in Florida, and to Galveston, Tex. No catalogue is issued, as the designs are constantly changing, but photographs are made whenever deemed necessary or desirable.

### Cabinet Surface-Planer.

The S. A. Woods Machine Company, of 91 Liberty street, New York, and branch offices in Boston and Chicago, are offering the trade a new cabinet surface-planer, designed for fine surfacing on hard or soft woods. From an inspection of Fig. 14 of the engravings it will be seen that the machine is compactly built, the feed pulleys and belts being located inside. The construction of parts is such as to permit of two changes of feed without cones. The pressure-bars of improved construction are applied close to the cut on both sides of the cylinder, so that long or short stock can be planed without clipping the ends. The cylinder is lipped or capped for executing smooth work on cross-grained lumber, and is belted at both ends. The cylinder-shafts are 2 inches in diameter, with 8-inch bearings, and are made of crucible cast steel. The cylinder-boxes are cast solid in the frame, and cannot therefore get out of line. The bed is supported by extra-heavy inclines firmly gibbed to the frame, and is raised and lowered by means of two screws. One revolution of the hand-wheel, conveniently placed, gives $\frac{1}{16}$ rise or fall, as may be desired. The four feed-rolls are of 6 inches diameter, the top and bottom ones being adjustable, and can at all times be kept in line with the bed. Under the company's patent the top carrying-in roll is geared in the center, thus permitting of a heavier cut than when geared at the end. All shafts are provided with self-oiling boxes, with a special system for oiling stud-gears. The machine will work stuff 27, 30 or 36 inches wide and from $\frac{1}{64}$ inch to 6 inches in thickness. The cylinder-pulleys are $4\frac{5}{8}$ inches diameter and allow the use of a 4-inch belt. The machine is so constructed that it may be belted from above or below, or from countershaft on the floor. The weight of the machine varies from 3800 to 4000 pounds.




*Novelties.—Fig. 14.—Cabinet Surface-Planer, Made by the S. A. Woods Machine Company.*

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### Combined Disk and Drum Sander.

The Egan Company, of Cincinnati, Ohio, have recently introduced to the trade a new sand-paper machine, designed for general use in wood-working establishments. Fig. 15 of the accompanying illustrations presents a general view of the machine. The frame is made of hardwood mortised and tenoned and bolted throughout in such a manner as to make it very substantial. The journal boxes are self-oiling, of extra length and large diameter, and are lined with genuine babbitt metal. The sand drum is of large diameter and 24 inches in length. It is covered in such a way as to insure fine finish on the work, the sand-paper being attached to the drum in a way to allow the entire surface of the paper to be used. If it is desired two drums can be employed, thus providing for different grades of sand-paper. The disk is of large diameter, made perfectly true on its face and provided with an arrangement for fastening the paper in such a way as to insure a perfectly true and even surface. An adjustable table is attached to the frame, being placed at right angles to the disk, allowing the shortest kind of stock to be squared up and giving a fine finish. The tight and loose pulleys on the countershaft are 12 x $5\frac{1}{2}$ inches and should make 350 revolutions per minute.

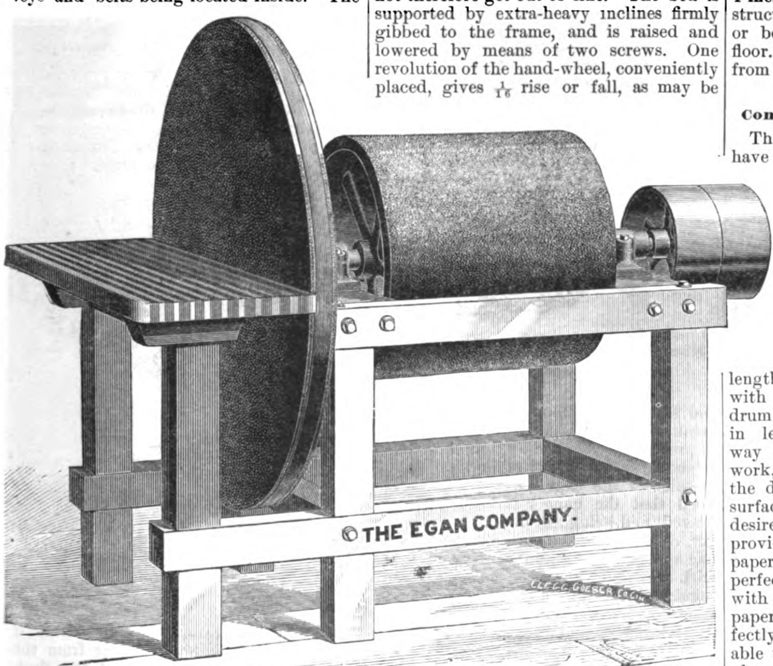
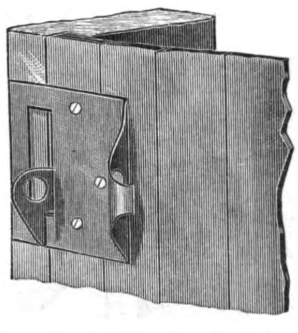



*Fig. 15.—Combined Disk and Drum Sander, Built by the Egan Co.*

### Barn-Door Latch.

Johnson & Co., Marysville, Ohio, are inviting the attention of the hardware trade to what they designate as the Steel-Plate



*Novelties.—Fig. 16.—Barn-Door Latch.—Position When Door is Closed.*

barn-door latch, for which they claim it is the only barn-door latch that can be opened or locked from either side of the door. Among the other advantages also claimed is that it will allow the door to shrink or sway ⅜ inch and still perform its function. The round hole shown in Fig. 16 is for the purpose of hanging the lock when not in use, and does not interfere with the handle when opening the door; the latter can also be securely locked on the inside with a nail placed over the

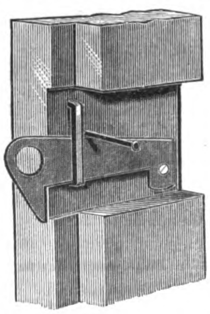


*Fig. 17.—Position of Catch on Post.*

catch as shown in Fig. 17, and the outside by means of a padlock inserted though the hole in the catch. It is claimed that when locked from the inside it cannot be opened from the outside by any device, thereby affording absolute security and protection. The material used is described as the best steel plate procurable, giving great strength and durability.

### Wire Sash Lift.

Fig. 18 of the accompanying cuts represents the Climax wire sash lift, which is put on the market by the Van Wagoner

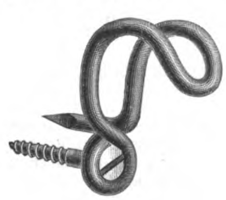


*Fig. 18.— Wire Sash Lift.*

& Williams Company, 82 Beekman street, New York. It has, it will be observed, a single loop, and thus differs from the Gem, which is made with a double loop. It is especially adapted for window screens and as a pull for screen doors. It is furnished coppered, walnut bronzed, nickel-plated on brass, or in brass.

### Metallic Hanger for Venetian Blinds.

In Figs. 19 and 20 of the illustrations presented herewith we show a metallic hanger for Venetian blinds which has been placed upon the market by James G. Wilson, 907 Broadway, New York City. This hanger is designed as a permanent substitute for the linen tape ladder now in use,

*Wilson's Metallic Hanger.—Fig. 19.—Front View.*

and being constructed of metal will not break nor wear out. In Fig. 19 a front view is presented, while in Fig. 20 the hanger is shown in perspective. From an inspection of the engravings it will be noticed that the hanger is beautifully engraved, and being finished in oxidized silver, old brass or ormolu, presents a very fine appearance. Blinds which are fitted with these ladders fold up, it is said, more regularly and into a smaller space than would otherwise result.

### The Tip Sanitary Closet.

The Tip Sanitary Company, 19 East Twenty-eighth street, New York, are putting on the market the Tip Sanitary Closet, the construction and principal features of which are shown in the accompaning engravings. Fig. 22 shows a sectional view, and, by referring to it, it will be noticed that the Tip closet is simply a small hopper, A, set upon a trap of iron or lead and safely connected with soil-pipe. The receiving bowl D is merely a temporary receptacle in which the matter to be disposed of is dropped in water E. At the back of the closet is a flushing reservoir, always kept full of water by the cock and float P, both receiving bowl and reservoir being balanced on trunnions, as shown in Fig. 21. It is pointed out by the manufacturers that all matter dropped into the bowl is submerged in water without touching the sides or any dry parts. The bowl is perfectly smooth and free from all traps, valves or openings, so that the water cannot possibly leak out or escape, and always remains at the desired level. Furthermore, there are no mechanical parts to get out of order or to retain fragments of the escaping matter. The action of the closet is very simple, for, when it is tilted by means of the foot lever, the whole contents of the bowl are poured through the spout L into the center of the pipe at the bottom of the hopper A,

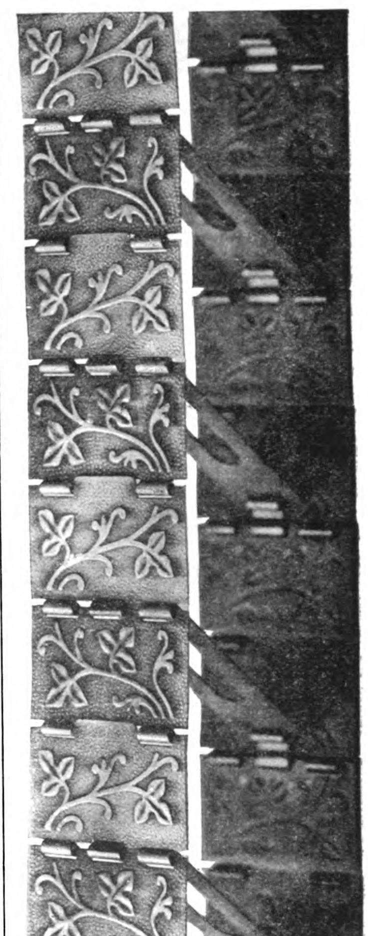
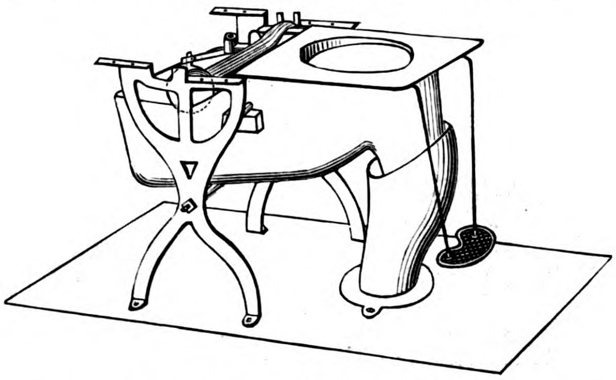


*Fig. 20.—Perspective View.*

thence into the trap, through which it is forced by the flush of water from the reservoir E. It is stated that the flush is exceptionally perfect, cleaning the bowl, spout and trap, and leaving the latter filled with absolutely pure water. A principal advantage to which the manufacturers refer is the economy of water, as but 2 gallons are amply sufficient for each flushing. Furthermore, there is no chance of leakage. The closet is described as perfectly noiseless in operation, and the only mechanical part is the simple ball cock which regulates the water level in the flushing reservior. The closet may be readily taken apart and put together again without skill or special tools, and there is no necessity of a special ladder and the taking down of woodwork. As regards ventilation, it is pointed out that with the Tip closet, the open spout and the open space between the bowl and seat allow a free circulation of air, and a ventilating flue may be set in the wall and partition and to open under the seat of the closet, thus, carrying a constant current of air down through the seat opening and up to the roof. No further description of this appliance is necessary, as the engravings fully show its construction and working.



*Novelties.—Fig. 21.—The Tip Sanitary Closet.—Cabinet Work Removed.*

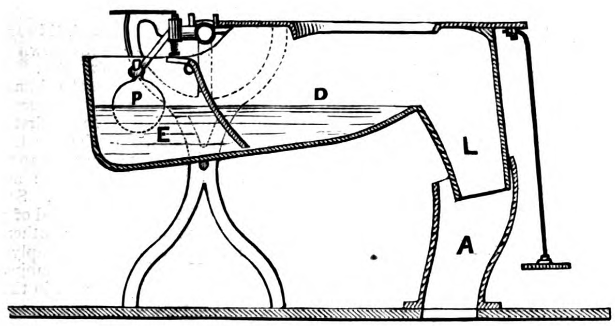



*Fig. 22.—Sectional View through the Tip Sanitary Closet.*

### The Perfect Filing Machine.

The saw-filing machine of which we herewith present an engraving is made by the Ambler Saw Mfg. Company, of Natick, Mass. The saw is held in a vise, as shown, and is raised and lowered by means of a back gauge placed inside the vise and controlled by a thumb-screw from the bottom. The file mechanism consists of two arms, one with a long straight cam-slot and the other with a curved one, both being in connection with a cam-roll on the face-plate. Each rotation of the face-plate, therefore, gives the file-carriers a reciprocating motion, and, by means of the curved cam-slot, the file is raised at the end of its stroke to free it from the tooth and resumes its position at the proper time to move forward on its cutting stroke. The saw is fed by a pawl cam-follower, all in one piece. The cam-follower being in contact with the cam on the back of the face-plate, as shown in the engraving, each rotation gives it a movement which may be graduated for different lengths of teeth by means of thumb-screws, as shown. The adjustments are quickly made, the time necessary being no more than is always required to put a saw upon ordinary filing-wheels, after which the work is entirely automatic and much more perfect than that done by hand.

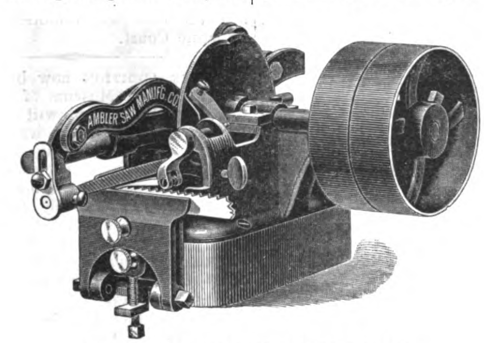


*Fig. 23.—The Perfect Saw-Filing Machine.*

### Chicago Incased Screen-Door Hinge.

The Chicago Spring Butt Company, Union and Lake streets, Chicago, have brought out a new hinge for screen doors. It has an incased spring. The accompanying illustration shows a face of the spring-hinge and a blank hinge which goes with it, the two constituting a pair of hinges. This hinge has a powerful spring, from the fact that the spring or power is attached to one hinge-leaf and an extended bearing-plate or lever to the other leaf. As the hinge is closed the spring itself travels toward the outer end of the bearing-plate or lever, increasing its power to operate the door many times over a hinge with a stationary spring and a long arm reaching to the end of the lever or bearing-plate. The illustration above is a back view of the spring-hinge showing the case for the spring. As most screen doors are hung direct to the casing with no intermediate strips, this hinge is made so that it can be applied by cutting a notch from the door only. It has a plain surface, which can be polished in bronze metal or iron and plated for fine screen doors.

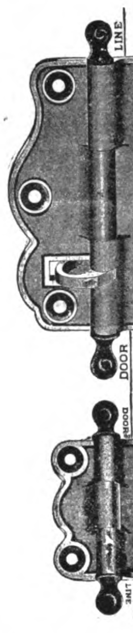



*Fig. 24.—Chicago Incased Hold-Back Screen-Door Spring Hinge.*

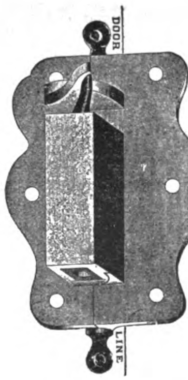



*Fig. 25.—Back of Hinge.*

# TRADE NOTES.

HENRY S. NORTHROP, New York, has recently removed his office and factory to No. 18 Rose street, where he has better facilities than ever before for the production of his specialty—sheet-metal ceiling. We understand that he is very busy, having 30 men employed, and is doing work in various parts of the country.

THE SCRANTON IRON AND BRASS COMPANY, of Scranton, Pa., are distributing among the building trade a neat little pamphlet of six pages, devoted to an illustrated description of the Wilson Sliding Door Hanger, adapted for use in residences, hotels, churches, public buildings, elevators, warehouses, and the like. The device is claimed to be absolutely noiseless in action, does not require either rail or track, and there are no pulleys or wheels above or below the door. The statement is made that it can be applied after the wall is lathed and plastered. The catalogue shows the hanger as variously applied, and presents a price-list of the different sizes.

"HOT-WATER HEATING ILLUSTRATED," is the title of a very attractive pamphlet recently put out by the Hopson & Chapin Mfg. Company, New London, Ct. It is a reprint from *The Metal Worker* of April 20, 1889, and contains the essay of John Hopson, Jr., president and treasurer of the corporation above named, submitted in *The Metal Worker* Heating Competitions. The essay in question was a prize-winner, and is entitled to attention not only on that account, but also because it embodies the construction most approved by the company. The pamphlet is attractively gotten up, and is something that should be examined by all who are contemplating heating work.

P. H. JACKSON, of P. H. Jackson & Co., San Francisco, Cal., manufacturers of iron constructions for buildings, has devised a wrought-iron shoe for connecting iron beams and girders. The shoe consists of two heavy wrought-iron plates of a combined thickness of 1¾ inches, which are clamped to the end of a beam, and to the beams of the girder by heavy bolts and nuts, holding all the beams as if in a vise. By this construction none of the beams require drilling, punching or other working, but may be delivered direct from the rolling-mill to the building or structure, and set in place, and the wrought-iron plates and bolts are then readily adjusted.

THE GOODS of the well-known firm of Henry Disston & Sons, Philadelphia, Pa., manufacturers of saws, &c., have a reputation that is world-wide, and the appearance of their trade-mark on any article of trade is accepted as a sufficient guarantee of quality and worth. In their advertisement in another part of this issue they present illustrations and brief descriptions of some of their specialties in the way of saws. They offer to send free, on receipt of name and post-office address, a pamphlet entitled, "The Saw: How to Choose it, and How to Keep in Order," together with a book of their tools. Our readers, undoubtedly, will be glad to avail themselves of this offer.

FRANK E. WITTER, Willimantic, Conn., in his card elsewhere in this issue offers to send a description and prices of Witter's Newly Improved Flush Bevel to all mechanics making application for the same.

THE ATHOL MACHINE COMPANY, Althol, Mass., in their advertising space in another part of this issue present an illustration and description of what they characterize as being the best carpenters' vise in the world. It is stated to be quick in adjusting, with the jaws always parallel. It can be carried in a tool-chest, and set up by any one in three minutes. Applications for catalogues and prices are solicited.

THE AMERICAN BIT BRACE COMPANY, 122-126 Washington street, Buffalo, N. Y., present in their card elsewhere in this issue an illustration and description of Pedersen's Patent Ratchet Bit-Brace, which is stated to be an indispensable tool to every practical carpenter, mechanic or builder. If unable to obtain them at the nearest hardware store, the mechanics are invited to send direct to the manufacturers.

THE CINCINNATI CORRUGATING COMPANY, No. 147 Eggleston avenue, Cincinnati, Ohio, in their space in another part of this issue keep the public in mind of the fact that they are the sole manufacturers of the celebrated patent edge corrugated iron, which is said to be the only form thoroughly effective for roofing. They also produce an improved form of plain and corrugated iron and steel roofing, sidings, ceilings, metallic lath, &c., and they claim to have the largest and most complete stocks to be found anywhere.

JAMES G. WILSON, of rolling-shutter fame, has an exhibition of his goods, including recent novelties, at Paris. We understand that Mr. Wilson is going abroad in a short time, and expects to start a factory in England.

HAND AND POWER machinery always possesses more or less interest for our readers. In the advertisement of J. M. Marston & Co., No. 85 Lenox street, Boston, Mass., which appears elsewhere in this issue, will be found an illustration and brief description of their circular saw, which is made with iron frame 36 inches high. The center part of top is of iron, accurately planed, with grooves on each side of saw for gauges to slide in. Steel shafts and best babbitt metal boxes are provided and the gears are all machine cut from solid iron. They also state that they furnish boring table and side treadle with two 6-inch saws and two cranks with each machine, the apparatus weighing 350 pounds. A description and illustration of their band saw is also presented. They invite the trade to send for their price-lists and offer to send machines on trial.

IN THEIR CARD in another part of this issue the J. F. Pease Furnace Co., Syracuse, N. Y., present an illustration of their Economy Warm-Air Furnaces, which are said to be specially adapted for warming residences, churches, schools, &c. Catalogues are mailed free on application.

THE SUBJECT of burglar alarms and all devices intended for the protection of life and property is one of special interest to house-owners. In another part of this issue the Vassar Burglar Alarm Mfg. Company, No. 56 Warren street, New York, present a view of their Mechanical Burglar Alarm Lock, of which they make a specialty. These locks are described as being mechanical in action, handsome in style and finish, simple in construction and permanent and durable.

THE WELL-KNOWN FIRM of Charles S. Strelinger & Co., Detroit, Mich., in another part of this issue direct attention to a change of location, removing their business to the large and commodious stores which have been built for them at the corner of Bates and Congress streets. They offer to send catalogue of wood-workers' tools, entitled No. 12, to any address on the receipt of 8 cents in stamps for mailing expenses.

JAMES G. WILSON, 907 Broadway, New York City, manufacturer of rolling blinds, has just issued an interesting catalogue devoted to his specialties. The statement is made that since the publication of his catalogue in 1887 important improvements have been made in all his rolling blinds, and he has added to the list of his manufactures many other blinds and shutters, for which he makes strong claims. Mr. Wilson has an extensive and thoroughly-equipped factory and a well-organized corps of skilled workmen, which enable him to execute orders promptly and satisfactorily. The catalogue consists of over 60 pages of letter-press, profusely illustrated with cuts showing the various uses to which Wilson's rolling blinds may be adapted.

A PHOTOGRAPH which Henry S. Northrop, No. 18 Rose street, New York, is distributing, represents a portion of the ceiling in the First National Bank, Elizabeth, N. J. The ceiling is composed of 20 x 20 inch embossed plates in the center, about which is a panelled border of what is described as twilled iron. The frieze is composed of 14 x 14 embossed plates, while a reeded cove cornice makes the finish against the side walls. The work in place shows to most excellent advantage. It is painted in several shades of brown, buff and yellow, and that it has given most excellent satisfaction is attested by a letter signed by W. T. Thompson, cashier. The work was put in place against an old plaster ceiling, and was so skillfully managed that the banking business was not seriously disturbed during the time of putting up the ceiling. The photograph is one that will interest many of our readers, especially those who are contemplating work of this kind.

IN ANOTHER PART of this issue J. B. King & Co., 24 State street, New York, call attention to King's Windsor Cement. They make some strong statements concerning the value of this material for building purposes, and conclude with an offer which will interest our readers particularly—namely, to send a sample of the plastering to each applicant. We have seen specimens ourselves, and have every reason to be pleased with the material.

CHARLES A. SCHIREN & CO., No. 45 Ferry street, New York, have put out a pamphlet illustrative of their leather belting and laced leather which cannot fail to command attention wherever it may go. Instead of the pages being cut, as is usual in articles of this kind, the circular is in the form of a folder. One side is devoted to large engravings showing the general processes of manufacturing leather belting and leather products, while the opposite side is devoted to smaller engravings showing various interesting details. The cuts have been carefully prepared and the accompanying text, while brief, is interesting.

WE NOTICED a short time since the commencement of a serial entitled *Artistic Japan*, published simultaneously in New York, London, &c. We are now in receipt of additional copies, which fully bear out the most favorable impression which the first numbers created. The work is choice, to say the least, and is something that will be carefully preserved wherever examined.

IN OUR NOTICE last month of the Single Sash Automatic Lock made by T. F. Timby, New York City, a slight mistake occurred with reference to the engraving. A careful perusal of the text shows that it does not agree with the cut, which is explained by the fact that the cut was printed bottom side up. We call the attention of our readers to this matter in order to make the description intelligent.

A CIRCULAR which has recently been issued by Auld & Conger, 100 Euclid avenue, Cleveland, Ohio, relates to slate blackboards. It is gotten up in attractive style, and has material in it which is of interest to every architect and builder who has anything to do with school work. Three diagrams are presented, showing how the blackboards may be put in place. The first indicates construction where the building is arranged for boards, and built with a furring strip at the top and no plastering behind the board. The second shows the manner of putting up the boards on old walls or any wall after the plastering is finished, and a third shows the same general features in combination with a wainscoting. The blackboards which this company are supplying are described as genuine hand-shaved Bangor slate, and come from the large beds of the celebrated Bangor Union Quarry.

A NEW CATALOGUE of galvanized iron-work for builders, issued by Mesker & Bro., 421 South Sixth street, St. Louis, Mo., has features which are of vital interest to builders everywhere. This firm, with improved machinery, are making a specialty of builders' light and ornamental iron and sheet-metal work, and are producing trimmings and fittings which are in active demand throughout the growing portions of the country. The catalogue before us contains a large number of designs of fronts of business buildings, constructed in whole or in part of sheet metal. There are also designs of steel columns, of which the firm make a specialty; likewise of builders' trimmings, such as anchors and cramps, balustrades, crestings, &c. At the conclusion of the book there is a large display of cornices, pediments, sign-blocks, skylights, gutters, ridge rolls, &c. Special attention is also given to ceiling-work, of which this firm make a specialty. The catalogue has been issued in the interest of builders exclusively.

THE COMMENCEMENT exercises of the evening classes at the Young Mens' Institute, 202 and 204 Bowery, New York, were held Monday evening, May 6. The feature of the occasion was music by the Mendelssohn Male Quartet. After the exercises there was an exhibit of the work of the art classes in the class-room.

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THE EVIDENT TENDENCY of the sheet-metal trade to deviate from paths and established lines and to take on specialties, and also to make improvements in different directions in matters intimately connected with the cornice trade, is evidenced by a series of patents granted a short time since to F. Mesker and H. F. Edwards, of St. Louis, Mo., of the well-known establishment of Mesker & Bro. These patents relate to plate metal columns and show various features of construction of columns intended for use in first story fronts of buildings. By the construction of columns in this manner cheapness is secured, combined with a large amount of ornamentation and strength. Some of the columns shown are composed of platet combined with angle irons; others use timbers; while still others use simply plate-iron shells. Many ingenious combinations of simple elements are shown in the constructions referred to.

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THE BERLIN BRIDGE COMPANY contracted to build a bridge over the river at Sheldon, and they in turn contracted with the Vermont Construction Company to build the abutments and piers. Subsequently the bridge was carried away by high water and ice, and the Berlin Company brought suit to recover from the Vermont Construction Company, alleging defective workmanship by the latter in connection with the bridge masonry. The jury, at St. Albans, brought in a verdict on the 15th ult. for the plaintiffs in the sum of $5875. Numerous exceptions were taken and the case will doubtless go to the Supreme Court.

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IN THE ADDITION now being made to the American Museum of Natural History, New York, there will be the largest box or riveted girders ever used in the construction of a building. These girders were designed by J. Cleveland Cady, the architect, to support the floors and partitions, the object being to give unobstructed floor space. There are 28 of these girders, measuring about 62 feet in length, and weighing 40,000 pounds each. They were landed on the North River front of the city, in the neighborhood of Fiftieth street. Ordinary trucks having been taxed in vain to transport them to their destination, the contractors found it necessary to construct a tramway across the square from Ninth avenue to the building.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



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## NOTES AND COMMENTS.

AS WE GO TO PRESS with this issue the national convention of the master plumbers is in progress at Pittsburgh. There are between 200 and 300 delegates assembled, and many questions of importance to the trade and of general interest to the building fraternity are being discussed. Master plumbers' associations exist in nearly all the larger cities of the country, and from these local organizations delegates are sent to the national convention. The prime object of the organizations, both local and national, is to control and regulate prices and to secure a better profit to the plumber than would otherwise be possible. A special object is to restrain dealers in and manufacturers of plumbing supplies from selling to builders and others outside of the regular plumbing trade. In this the organization in the past has been quite successful, although in some sections large builders are still able to contract for their material and hire their own plumbers to put the same in place. It is also significant that large corporations like railroads are excepted in the regulations which the plumbers have adopted and which they have been solicitous for manufacturers and dealers to sign. While builders have in some cases been obliged to pay more for plumbing-work since the organization has been effected than before it came into existence, the rates have not been carried to an unreasonable point, and the quality of work has been improved to a much greater degree than prices have been raised. Builders are favorable to everything which tends to stability in the trades which contribute to a building, and therefore builders at large do not consider the National Association of Master Plumbers as being opposed to their interests.

AMONG THE SUBJECTS selected for essays to be read at the convention are the following: "The best method of obtaining for country houses an abundant supply of pure water." "Would it be advisable, where supply of water for cities is limited, to encourage the use of water-meters; that is, under what circumstances should they be adopted with a view to economy and equitable distribution?" "Taking into account the wonderful progress of electrical science and invention, what prospect is there in the near future of its application to plumbing?" "As a measure of practical utility and economy, should the circulation-pipe ever be omitted in fitting up the hot-water supply to bath-rooms or basins?" "Should not plumbers from their stand-point as mechanics adopt and stimulate the hot-water system of heating dwellings or other buildings?" "Is it injurious or otherwise that boards of health fail to recognize the experience and mechanical knowledge of the plumber where accurate inspection of intricate details of work is required?" "In view of the fact that the sanitary regulations of municipal bodies are requiring the cast-iron soil, waste and ventilation pipes to be air-tight, is it advisable to resort to the use of wrought-iron pipe and fittings?" "The best methods of putting in pipes in buildings with a view to protection against freezing; also desirable precautions against such pipes being affected injuriously during extremely cold weather. Incidentally, the danger of water-backs of ranges being frozen up." "The best method of putting cast-iron pipes together to insure duration and non-liability to separation under any and all circumstances." "What are the conditions under which success in the plumbing business can be best attained?" "The necessity of plumbers' associations taking an active interest in promoting beneficial legislation in favor of sanitary regulations within their respective localities." "Upon what grounds do plumbers base their claim to recognition as authorities on sanitary rules and practice, and why is their advice indispensable?" "The ethics of plumbing; why should not the plumber establish a code similar to that of the profession and thereby enhance his social and moral status?"

ONE OF THE most prominent business structures in New York known as the Equitable Building is located at the corner of Cedar street and Broadway. The oldest part of the building was built in 1869, and in 1874 what is known as the Cedar street extension was added. Some cracks appeared in the front of the Cedar street side some time since, which have recently been repaired, and the efforts of the workmen to shore up the building so as to be able to remove the fractured parts and replace them with whole material have naturally attracted marked attention. The cracks extend through the granite lintels, cap-stone and cornice of the basement and first story. According to James F. Wilson, superintendent of the building, the cracks referred to are of no special significance, and have been in existence for ten years past, attracting no attention until the preparations were made for replacing the broken stones. The explanation is what would occur to any practical builder. The building naturally settled directly after its completion, as heavy buildings always do. When the extension was added it was built on the same lines as the original building, which had already settled. Sufficient allowance for its subsequent settlement, it would seem, was not made, but settle it must by natural laws, and the consequence was that the long granite blocks which joined the new to the old building broke under the strain. Some of the daily papers have seemed disposed to magnify this affair into something of unusual importance.

THE OPINION is growing that boys, American boys in particular, should have the right to learn trades. The right to earn a living by honest labor is unquestionably as fundamental as any right can be. But when the trades are hedged about with rules which limit the number of apprentices, and when the lists are complete and when the ranks of unskilled labor are full, then the surplus boys are ordered off the earth. There is no place for them, and the only possible chance for existence is in begging or crime. Speaking upon the point, the St. Paul *Pioneer Press* thinks the apprentice question will not wait much longer for a hearing. When the trades unions set up their rules limiting the number of apprentices to be taught their trades in any shop, they did it for the purpose of preventing the market being overstocked with skilled labor and the consequent reduction of wages from an oversupply. But the rule has had no such effects. It has not lessened a whit the number of skilled workingmen. What it has done and all it has done has been to prevent the sons of Americans, both native and adopted, from learning their fathers' trades. It has had the inevitable result of forcing our men, who might be earning from $15 to $30 per week as skilled artisans, to accept salaries of from $5 to $10 as clerks or salesmen or book-keepers, or, worse than that, to compel them to live a hand-to-mouth sort of life, doing anything or nothing, as their lack of training to any sort of work rendered imperative. Our workshops have not fewer mechanics in them than if there had never been a rule against apprentices. There was the demand for skilled workmen, and there being not a sufficient supply here, our employers readily got it from abroad. They are constantly getting skilled workmen from over the sea, who come here and take the places which the sons of our workmen should be permitted to take—should, indeed, be welcome to. That our streets are so full of idle, vicious young and middle-aged men is chiefly due to the extinction of the apprentices in our workshops.

WHILE DISCUSSING the question of apprentices we should not overlook what is being done in the way of practical education for the youth of the land in the trade schools. It was only a short time since when the apprentice system, poor and insufficient though it was, afforded the only chance for a boy to become at all acquainted with tools or with a mechanical pursuit of any kind. In the interval, however, trade schools have been established, and now it is possible, to a limited extent, at least, for a boy to be taught in a school all the simpler portions of a trade. In this way carpentry, blacksmithing, plastering, frescoing, plumbing, molding, wood-carving, pattern-making, the machinist's trade and some others can be in part acquired. The arrogance of the trades-unions made schools of this kind a necessity, and while they do not entirely supply the place of the apprentice system, they are in position to greatly assist a young man in acquiring a trade whenever the apprentice system has been restored, as it may be. Trade schools have come to stay. Their utility has been demonstrated. They are justly the pride of their projectors and the present hope of the young men of the country. And a fact to be noted with great satisfaction in this connection is that it has become popular for rich men in disposing of their wealth to endow trade schools. Peter Cooper set a most excellent example, which has been followed by many others, to the advantage of the nation at large, and it is to be hoped that the good work will go on until, through the combined advantages of a thorough trade-school system and a judicious system of apprenticeship, the youth of the land shall have advantages to be found in no other country in the world.

A GENERAL survey of trade and building operations at this season of the year cannot fail to be of interest to a large class among our readers. Builders in many parts of the country are very busy. In a few sections dullness prevails. In some localities repairs monopolize attention, to the exclusion of new work. In still other sections very large operations are being conducted, while buildings of an ordinary character are not as abundant as usual. Take it all in all, the building business the present year is not very unlike that of other years, and the aggregate figures, when the statistics are made up, will, we think, compare favorably with those of any recent year. Quite lately writers on trade matters have reached the conclusion that the volume of traffic over the railroads has begun to increase, and that margins in several lines of trade are more satisfactory than they were a short time since; that the crop reports are promising; that the distribution of merchandise throughout the interior country has improved, and that money is easier both in financial centers in the East and in distributing centers in the West. Altogether the conclusion reached is more favorable than that proclaimed by the same authorities only a short time since.

ALL THIS MUST have its effect upon the building trades, and is likely to increase the amount of work to be done as the season advances rather than diminish it. In the lumber trade the demand has improved, but not as much as timber speculators anticipated a short time since. Building operations are absorbing quite as much timber as was expected they would, and wholesalers and retailers are catering to this trade almost exclusively. Stocks of lumber in the large cities, accordingly, are declining. As a rule, throughout the country labor circles at the present time are quiet. There is less agitation than has been current in some years past. There seems to be a determination, however, upon the part of labor organizations to precipitate eight-hour legislation in the near future. At the same time it is noticeable that a reactionary tendency is at work among certain organizations. The radical element is made up largely of foreign workmen, who believe that the present opportunity is quite promising for the establishment of an eight-hour working day. The American element, on the other hand, is not contributing very largely to such revolution, but is undoubtedly willing to profit by it, and would perhaps join in a general strike if such were to be decided upon.

MANY OF OUR READERS have turned their eyes toward Paris the past few months with anxious longing. The exposition, inaugurated some weeks since, has in the interval been attended with prosperity. The weather has been favorable; the surroundings have proved delightfully attractive and the attendance large. Those who have visited the exposition, however, have been greatly disappointed at the meager display made by our own nation, and not a few who have returned talk in severe terms of the niggardly way in which we are there represented. An insufficient sum was appropriated by the Government in the first place, and what we show at Paris is for this reason anything but creditable. This is to be said notwithstanding some very notable private exhibits, among which may be mentioned that of the Edison Company. America is not alone in the class designated, for other nations have been correspondingly derelict. The exhibits of the British people, for example, are pronounced by no less an authority than the Lord Mayor of London as utterly inferior. It is notorious that the German nation and some others of the Continental Powers have frowned upon the exhibition simply because it was French. Nevertheless the exposition is a success and as such is a triumph of French genius. It shows what the French nation can do, and is well worthy of study. We have no space to reproduce accounts of what is to be seen at the exposition, and therefore must content ourselves with the words of one who has recently returned from Paris, which are to the effect that the marvels of genius there displayed give one a better conception of the genius of the French nation than could otherwise be obtained.

ELECTRIC APPLIANCES about buildings, tending greatly to the comfort and convenience of those who occupy them, are constantly multiplying. Our buildings are lighted by electricity; our servants are summoned by electricity; our doors are opened and closed by electricity, and we communicate with our neighbors by an electric telephone. The list might be greatly lengthened, and every day brings forward some new idea based upon the utilization of the electric force. The story reaches us of a house in Scotland that has been provided with a private electric railway to convey its inmates to and from the railway station, which is something over a mile away. According to the account, power is obtained from a water-fall some three miles off by means of a turbine wheel attached to a dynamo and giving a current of 40 ampères at 400 volts pressure. The conductors are bare copper wires, making a complete metallic circuit. The conductors along the line consist of soft-iron rods, supported above the sleepers, and insulated. The line is of 30 inches gauge, and a handsome car is provided which can be run at the rate of 35 miles an hour. Although the railway is principally used for communication with the station, sidings have been arranged so that it can be used for the purposes of the farm. One would think, says the *American Architect*, that a line of this kind might be advantageously employed as an addition to the conveniences of our own mountain hotels. There are many places where the transit from the station to the hotel is made by crowded and uncomfortable vehicles which could be replaced by an electric car driven by water-power at a great saving of expense and with increased satisfaction to the public.

## THE PLATES.

In Plates XXV, XXVI and XXVII we present the front and two side elevations, together with the floor plans, of a Canadian house erected from designs prepared by Mr. George E. Wilson, of Ogdensburg, N. Y. In another part of this issue will be found a general description of the designs, to which our readers are referred.

In Plate XXVIII we present an interesting study in decorative panel-work, the author of which is Mr. J. Aldam Heaton. The design gives evidence of much thoughtful consideration in its conception and will serve as an excellent model for some of the enterprising readers of *Carpentry and Building*.

### Removing Snow from Roofs.

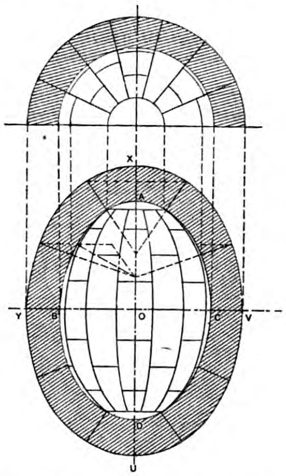
Roofs are often damaged by removing the snow that falls on their surface, since it is customary to use wooden snow-shovels with iron points. If the snow has melted and then frozen, as is apt to occur at the eaves, a dam is formed that causes the water that may subsequently form to back up and find its way through any openings there may be in the flashings or roof. While the necessity of removing snow from roofs cannot be doubted, it would be well to provide wooden shovels for the purpose, without iron points; then the work could be done without so much injury to the roof. For removing the ice that may form at the eaves of flat roofs there is nothing better than a heavy stick of wood, which can be pointed at the end so as to break the ice without damage to the roof. The warmth of the roof is generally sufficient to keep the ice from adhering, so a blow strong enough to break the ice is enough to free it from the roof. The metal of which the trough is composed should extend up in such a manner that under no circumstances could the water flow back of the trough and down the brick wall. The conductor leading from the trough should be straight, and not obstructed by any kind of crooks. While it may be that a curved line is one of beauty, there is no doubting that the straight one offers many advantages that the curved one does not when applied to conductor-pipes.

# MASONRY.

## Masonry and Stone-Cutting.

(*Continued from page 75, April.*)

In Italy one often meets with elliptical vaults, the simplest of which is the elliptical vault of revolution. This is a vault with an elliptical surface formed by the revolution of an ellipse round a horizontal axis. For instance, in Fig. 60 the soffit of the vault is engendered by the revolution of the ellipse A B D C round its major axis, and the cross-section of the vault will be a circle. The extrados may be produced by the revolution of a larger ellipse round the same axis; in this case



*Masonry and Stone-Cutting.—Fig. 60.—Elliptical Vault of Revolution.*

the ellipse is selected with its axis proportional to the axis of the interior ellipse. We may construct this vault exactly on the same principle as the semi-dome in Fig. 55, with bed-joints radiating from the axis, and with conical cross joints, in which case the cutting of the voussoirs is identically the same as for a cupola or a dome. The only point to be remembered is that the conical cross joints are normal to the ellipse, instead of all radiating from one point, as in a spherical cupola. This arrangement of the joints is not usually employed, because, although practical, the joint lines do not work harmoniously with the joint lines of the various cupolas which

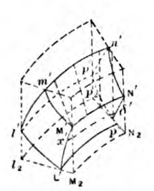


*Fig. 64.—Working the Stone from a Prism.*

are usually used in the same buildings in conjunction with elliptical vaults. Usually the bed-joints, especially in large vaults, are made horizontal, and this entails several difficulties.

(Fig. 61.) Let the dotted line A B be the elliptical springing line of our vault, the soffit of which is produced by the revolution of that ellipse round its major axis. To form the extrados, we draw its section as in any ordinary arch by taking its center in O² below the center of the soffit. The circular section we have given to the extrados of the vault is that of a surface produced by the revolution of an ellipse of axes O *a* and O *d* proportional to the axes of the interior springing-line. This is done by drawing the line a d parallel to the line A B. By this arrangement the sections of the extrados and the soffit of the vault by horizontal planes will all be similar ellipses—that is, ellipses with proportional axes. Then we divide the circular section of the vault in an odd number of arch-stones. The bed-joints will be horizontal lines on the section and ellipses on plan; the axes of these ellipses will be found by getting from the section the extremities of the minor axis, such as E and F, and drawing E G and F H parallel to B A.

According to rule, the surface of the bed-joints should be in every point normal to the soffit of the arch; but as this is difficult to produce, masons are content to work the beds conical. Each bed is then part of a cone, the base of which is the elliptical joint line, and the apex of which is some point taken on the vertical center line of the vault, that is, the vertical erected over the point O on plan. That point should not be the one in O′ on the section, for the ray starting from that point to the point G at the extremity of the major axis of the joint-line would be very oblique, instead of normal to the surface. The point to be selected as apex of the cone should be some intermediary point between O′ and the point where the normal in G would meet the center line. To find the best point we operate as follows: As all vertical planes drawn through the vertical center line on O cut the vault along ellipses which have all one axis in common, the tangent Z′ E′ to the circle cuts the center line in the same point as the tangent to the elliptical section in G. We rotate G to $G_2$ on the plane of the section, and in that position $G'_2$ Z′ is the tangent to the major section. Now we bisect the angle $G'_2$ Z′ E′ by the line Z′ $P_2$,

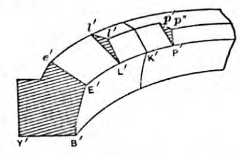


*Fig. 65.—Bed Formed of Several Conic Surfaces.*

to which we draw the perpendicular $P_2$ S′; the point S′, on the center line, should be selected as the apex of the cone for forming the surface of the bed E G, for the greatest obliquity of the ray will then only be equal to half the angle $G_2$ Z′ E′. The least obliquity will then be when the ray passes in P, found by rotating back the point $P_2$. The apices $S'_2$, $S'_3$ for the cones forming the other beds will be found in the same way.

This conical formation of the beds offers the important practical advantage that each bed will cut the extrados of the vault along a horizontal curve, which will be an ellipse similar to the one forming the inside springing-line. This is easily proved:

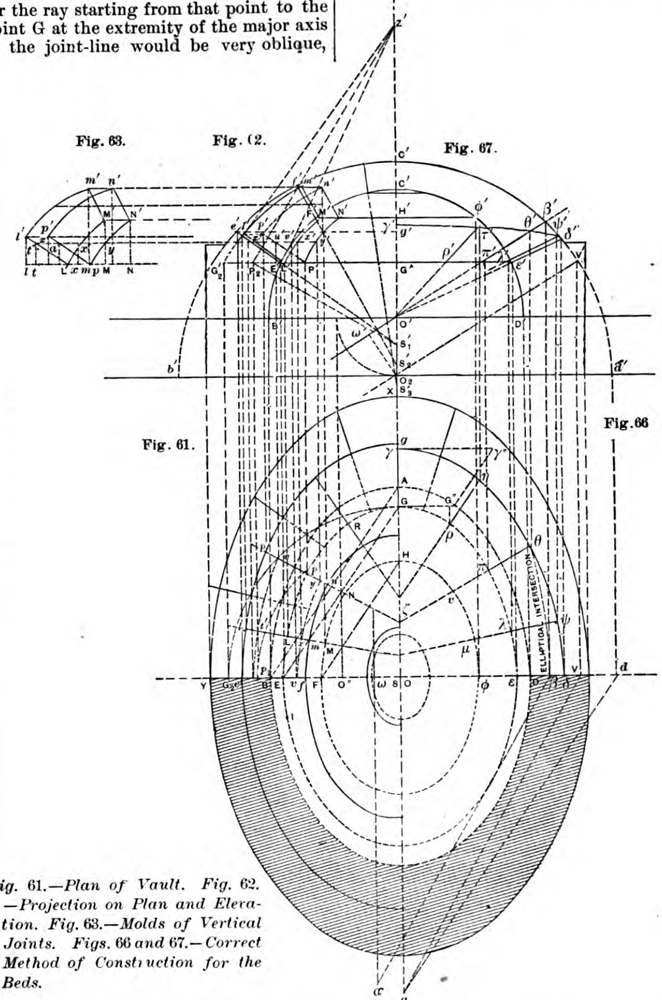



*Fig. 61.—Plan of Vault. Fig. 62.—Projection on Plan and Elevation. Fig. 63.—Molds of Vertical Joints. Figs. 66 and 67.—Correct Method of Construction for the Beds.*

If through the point $e'$ a horizontal plane be produced it will cut the extrados of the vault along an ellipse similar to that of the springing-line; on the other hand, that same plane will cut the surface of the conical bed along an ellipse similar to the elliptical joint E G, but the latter is similar to the ellipse of the springing-line, and therefore the intersections of the extrados of the vault and the surface of the bed by the horizontal plane are identically the same line. This allows us to draw rapidly the several joint lines on the extrados. The vertical joints L M, P N which separate the several stones of the same course are planes which are taken normal either to the lower joint E G or to a medium horizontal section $v\ x\ y$, taken between the upper and lower joint lines.

The intersections of the vertical joints with the soffit of the vault are portions of ellipses of which three points may be determined by the intersections of the lines L M, P N with the ellipses E L P, $v\ x\ y$, F M N. The intersections of the same vertical joints with the beds are portions of hyperbola L′ $t'$ $l'$, P′ $u'$ $p'$ (Fig. 62), the points of which are found by using a horizontal section of the cone between the upper and lower edges of the bed. Thereby we get the stone in projection on plan and elevation. We next get (Fig. 63) the molds of the vertical joints, by marking from the plan (Fig. 61) the abcissæ M$m$, M$x$, ML, M$t$, M$l$, and erecting the ordinates of the points taken from the elevation. The two molds drawn are perfectly independent figures, and might have been placed further apart.

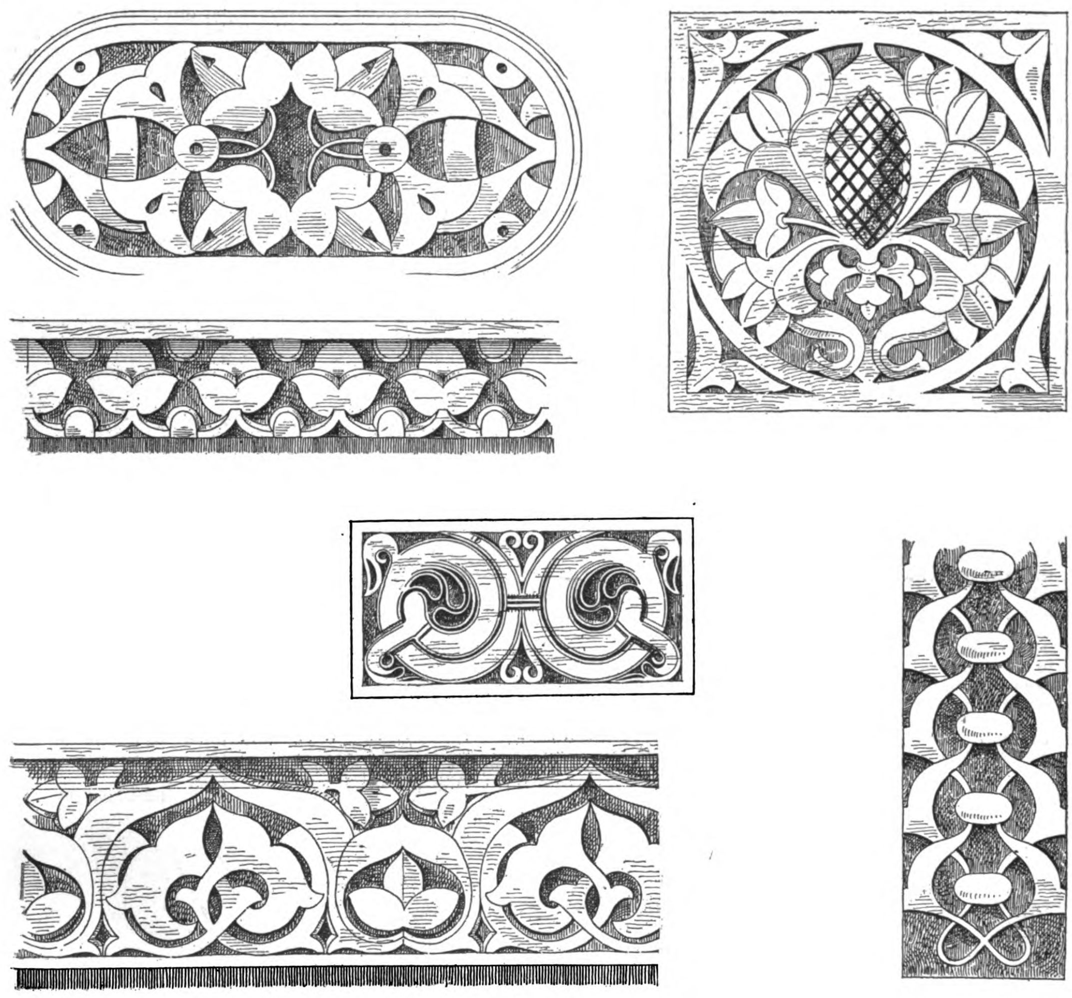
To work the stone (Fig. 64) a prism is first produced, the base $l_2$ $M_2$ $N_2$ $p_2$ of which is equal to the horizontal projection of the stone in Fig. 61, and the hight of which is equal to the difference of level of lines E′ L′ P′ and $f'$ $m'$ $n'$ (Fig. 62). Then, on the sides of the prism, the vertical joint molds are placed, and the lines M′ N′ and $l'$ $p'$ are trammeled on the cylindrical sides. The lines L′ P′ and $m'$ $n'$ are marked with templets on the top and bottom of the prism. This done the soffit will be cut with the help of three templets, giving the elliptical curves L P, $x\ y$, M N, taken from Fig. 61. The soffit could be cut with one templet only, as it is a surface of revolution; the datum points for placing the templet would be found by drawing rays from O′ (Fig. 62) but care would have to be taken to us, always the right portion of the templet, which would vary in every position. The beds, being conical, are cut in the usual way with a straight-edge. The extrados would be worked by the same method as the soffit, but it is usually only roughened out. For the soffit of the key-stone usually three templets are used, one of section B′ C D′, one giving the major elliptical section and the third an intermediary section. It may also be done with only the second templet

*Second System of Construction for the Beds.*—If the lengths of the axes O A and O B of the springing-line differ very much, then the cone of center S′$_1$ would still give us very oblique joints at the extremities of the axes. To avoid this, masons form the one bed of several conic surfaces, as shown in Fig. 65. The centers for the several portions of the bed are found by drawing perpendiculars to the tangents Z′ E′, Z′ P$_2$, Z′ G$_2$ (Fig. 62).

(*To be continued.*)

## Suggestive Ornament for Wood-Carving.

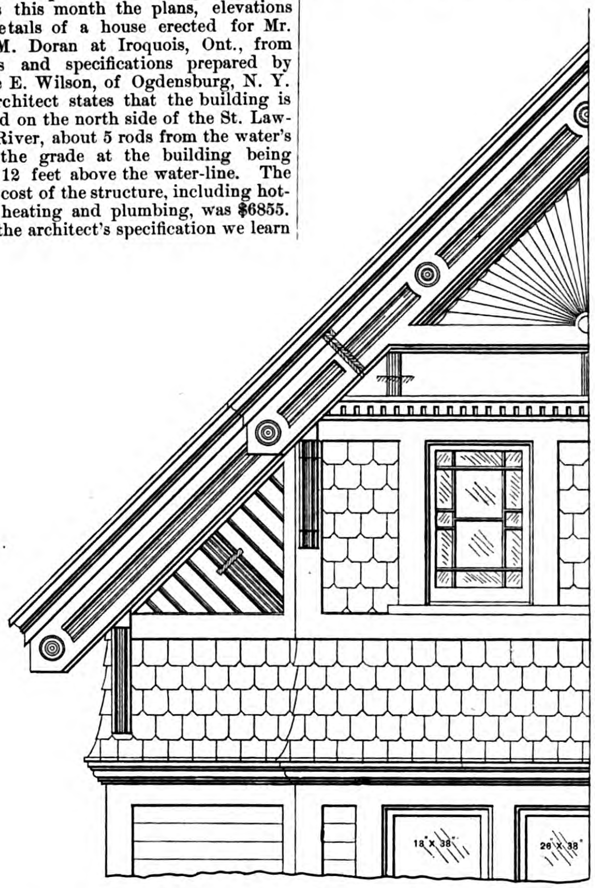
On this page we present, by means of several illustrations, a number of designs which will be found useful to wood-carvers. They need not, however, be confined strictly to wood-carving, but may readily be adapted to use in almost any material, whether terra-cotta, brick-work or *faience*. The details are also of such a character as to afford useful suggestions to those operating in *repoussé* metal-work. The designs, as will be seen from an inspection of the engravings, are very clever, and we present them to our readers for such interest as they may possess.



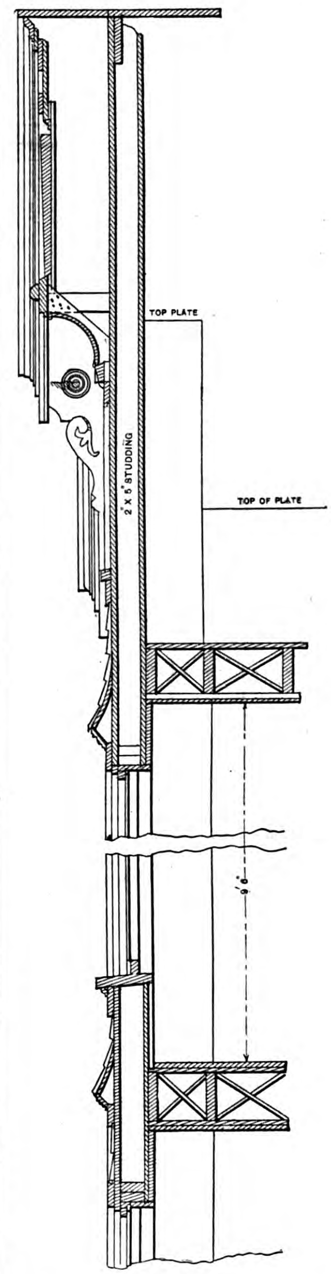
*Suggestive Ornament for Wood-Carving.*

## Study in House Design.

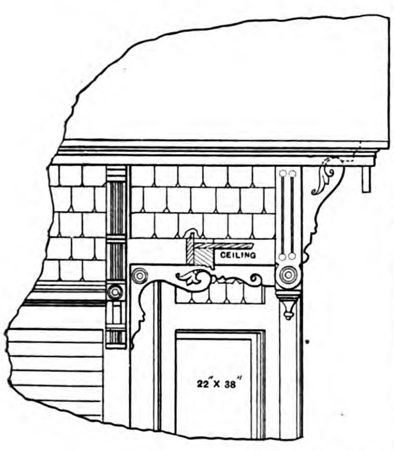
We take pleasure in laying before our readers this month the plans, elevations and details of a house erected for Mr. Wm. M. Doran at Iroquois, Ont., from designs and specifications prepared by George E. Wilson, of Ogdensburg, N. Y. The architect states that the building is situated on the north side of the St. Lawrence River, about 5 rods from the water's edge, the grade at the building being about 12 feet above the water-line. The actual cost of the structure, including hot-water heating and plumbing, was $6855. From the architect's specification we learn the following particulars relative to its constructive features: The sills are 2 x 10 inches, doubled and bedded in mortar. The first-floor joist is $2\frac{1}{2}$ x 10 inches; the second-floor joist 2 x 10 inches; the attic-floor joist 2 x 9 inches, and all at 16-inch centers. The studding for all outside walls and main-hall partitions is 2 x 5 inches, while that for all other partitions is 2 x 4 inches. The outside studding has 1 x 5 inch ribbons set into it to carry the joist. The roof is covered with good seasoned boards, well planed and matched and well nailed to every rafter. Upon these are placed best quality cedar shingles, laid $4\frac{1}{2}$ inches to the weather. All valleys are flashed with No. 24 galvanized iron, the flashing around chimneys being with sheet-lead. The outside sheathing is $\frac{7}{8}$-inch boards matched and planed, while the inside sheathing consists of same material, used in connection with heavy vermin-proof paper. Between the first and second floors heavy paper is used for deadening purposes. All windows except the bays and triplet windows are hung with blinds. The dining-room, library and first and second story halls are finished in red oak, with drawing-room and music-room in cherry, all of the best selected stock. The bath-room is ceiled throughout with narrow beaded and matched birch and maple, blind-nailed. The remaining wood-work is pine. The main stairs are built of kiln-dried material. The treads are $1\frac{3}{8}$ inches, with risers $\frac{7}{8}$ inch, oak, housed into strings and with cherry cove mold under nosing. Newel post is 8 x 8 inches, while other posts are 6 x 6 inches and have cherry turned tops. The wood-work in the main part of the first and second stories is finished in hard oil,



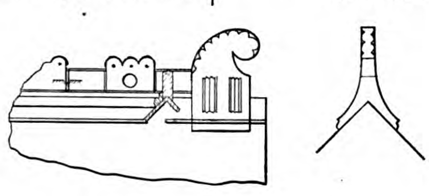

*Study in House Design.—Details West Side Gable.—Scale, ⅜ Inch to the Foot.*




*Section Through West Gable.—Scale, ⅜ Inch to the Foot.*

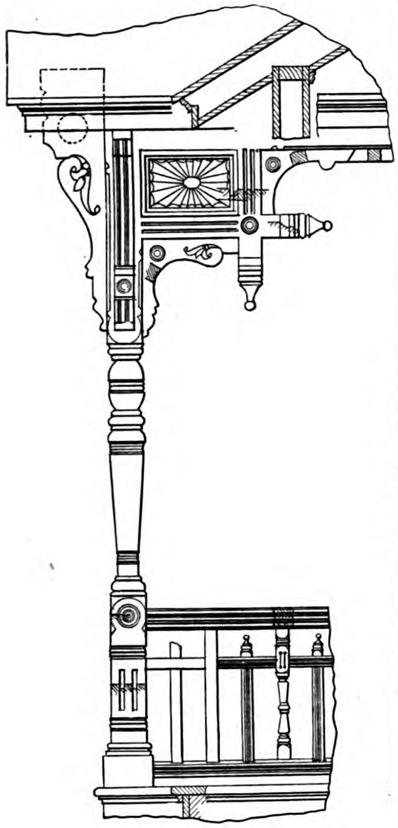



*Front Gable.—Scale, ⅜ Inch to the Foot.*

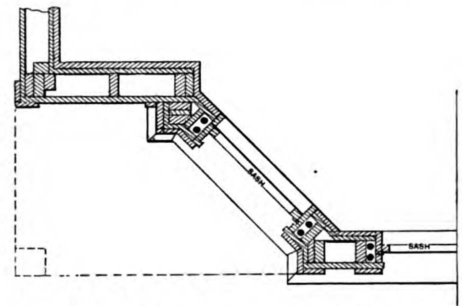


*Details Cresting.—Scale, ⅜ Inch to the Foot.*

as is also the kitchen. The pantries and closets are finished with shelves, drawers and necessary hooks. In the dining-room is a mantel built of oak and cherry. All exterior wood-work is painted three coats best lead and oil. Shingles in the gables are finished in natural color. In the exterior painting there are six colors employed. In the attic is a tank built of 2 x 4 inch scantling and having a capacity of ten barrels. The plumbing is executed in the best possible manner, the house being provided with hot and cold water, bath-room and tank, the latter for general soft-water supply. Connections are made with public water-main to supply the house with river water. The house is heated by hot-water circulation, with coils and screens, the latter being bronzed and decorated in an artistic manner.



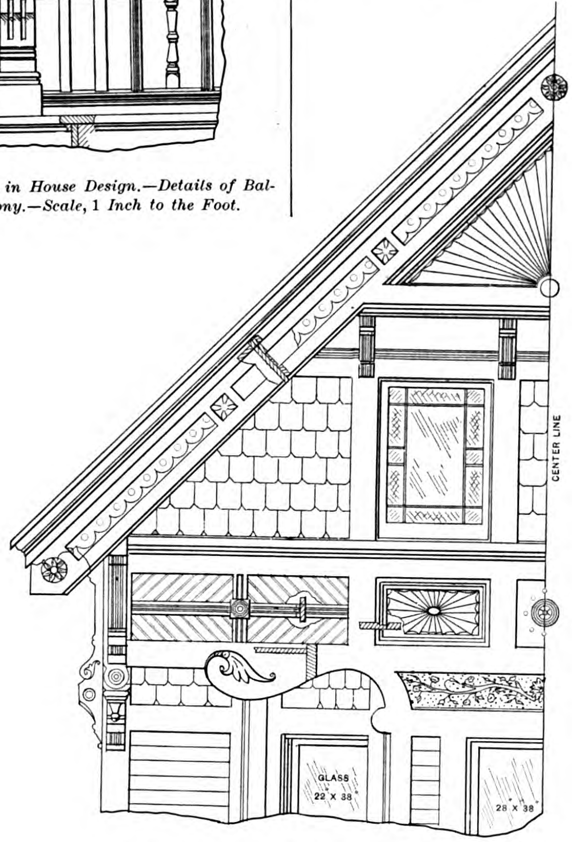
*Study in House Design.—Details of Balcony.—Scale, 1 Inch to the Foot.*



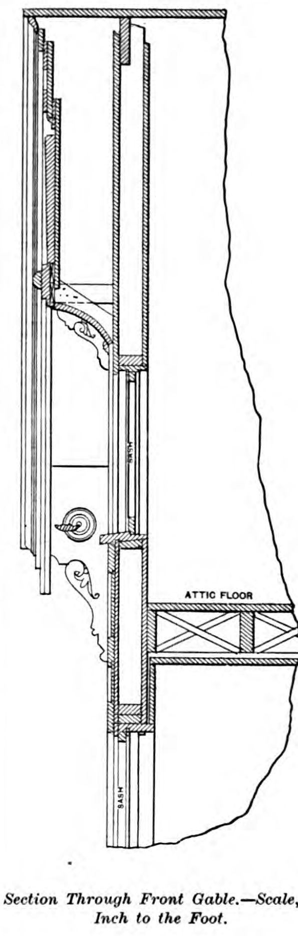

*Plan of Bay-Window.—Scale, ⅜ Inch to the Foot.*

## Estimating by Quantities.

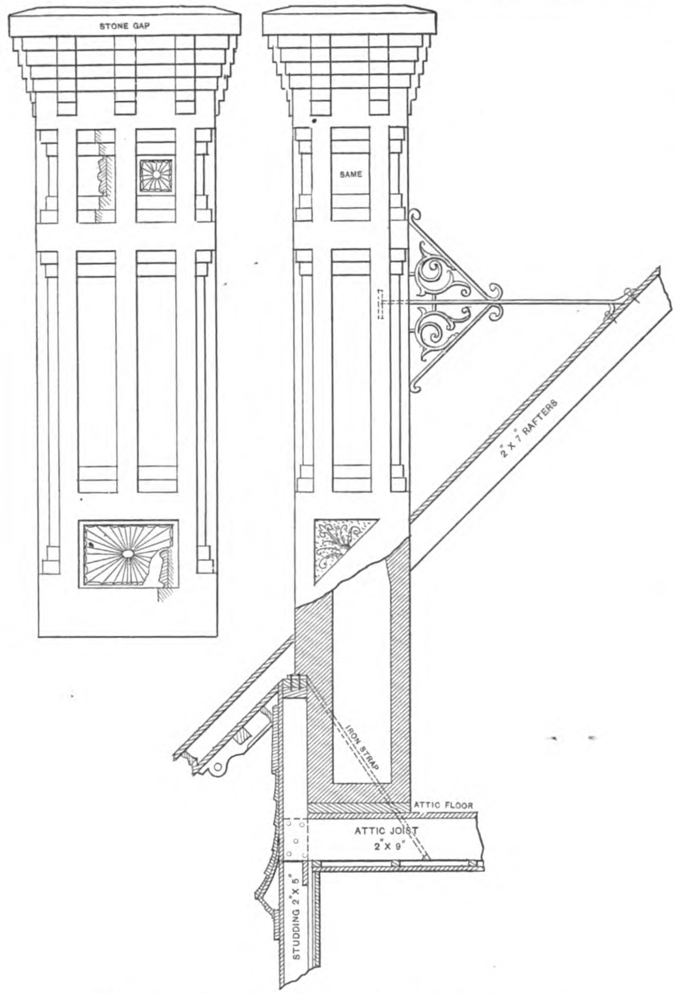
Everything that concerns the management of building work and which tends to promote the accuracy of estimates on buildings is of special interest to our readers. Just at present the question of the "clerk of the works" is being considered, with the probability that an improvement in our building practice in this regard will be instituted at no very distant date. In the meantime attention is also being given to estimating in various directions, and as bearing upon this general subject, and as showing a kind of practice which is in vogue in France, and, to a certain extent, in England, we present below the substance of an article by Joseph A. Stark, which appeared in our contemporary, the *American Architect*, some time since. After asserting that estimating by quantities was generally introduced into London some 20 years since, and met at once with so much support from architects and builders that it speedily found its way into the provincial towns and is now the recognized




*Front Gable.—Scale, ⅜ Inch to the Foot.*




*Section Through Front Gable.—Scale, ⅜ Inch to the Foot.*

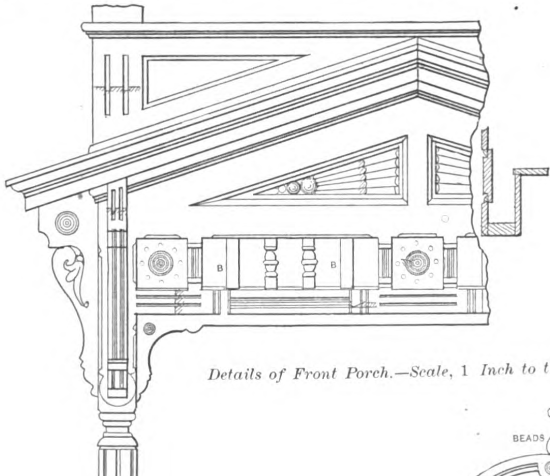



*Study in House Design.—Details of False Chimney.—Scale, ⅜ Inch to the Foot.*

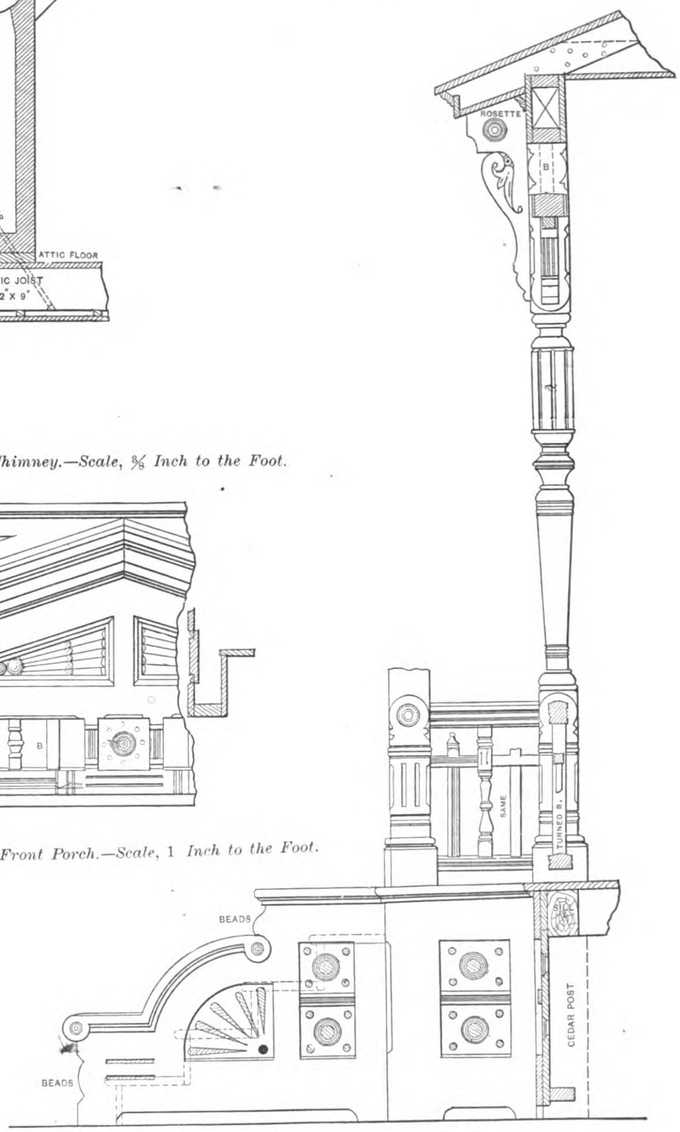
with the drawings. Estimating under such conditions is reduced to a kind of rough-and-ready guesswork, and builders have to trust to "arranging matters somehow," should they find that they made a mistake in their price. Should such arrangements not be possible the builder may land himself in bankruptcy, the architect will reap much trouble and discredit, and the owner will have to bear the loss. It was therefore thought desirable and just that builders should be furnished with more complete data than drawings and specifications alone upon which to base their estimates, and that they should have a bill-of-quantities of all materials and labor required for a contract. This had long been the practice in Paris, where, in addition, all estimates are based upon the official price-book of the City of Paris for public works, generally called "Prisée de la Ville," and where builders hand in their estimates upon a percentage discount on the prices of the above book. The frequent intercourse of English architects with their Parisian brethren no doubt influenced the adoption of quantity surveying in England.

The surveyors were drawn from the ranks of builders' account and prime-cost practice even for the smallest contracts, Mr. Stark continues :

The building business is a precarious one at any rate, full of risks and uncertainties. A builder would often be asked to give a figure for a contract in so short a time that he could hardly familiarize himself




*Details of Front Porch.—Scale, 1 Inch to the Foot.*

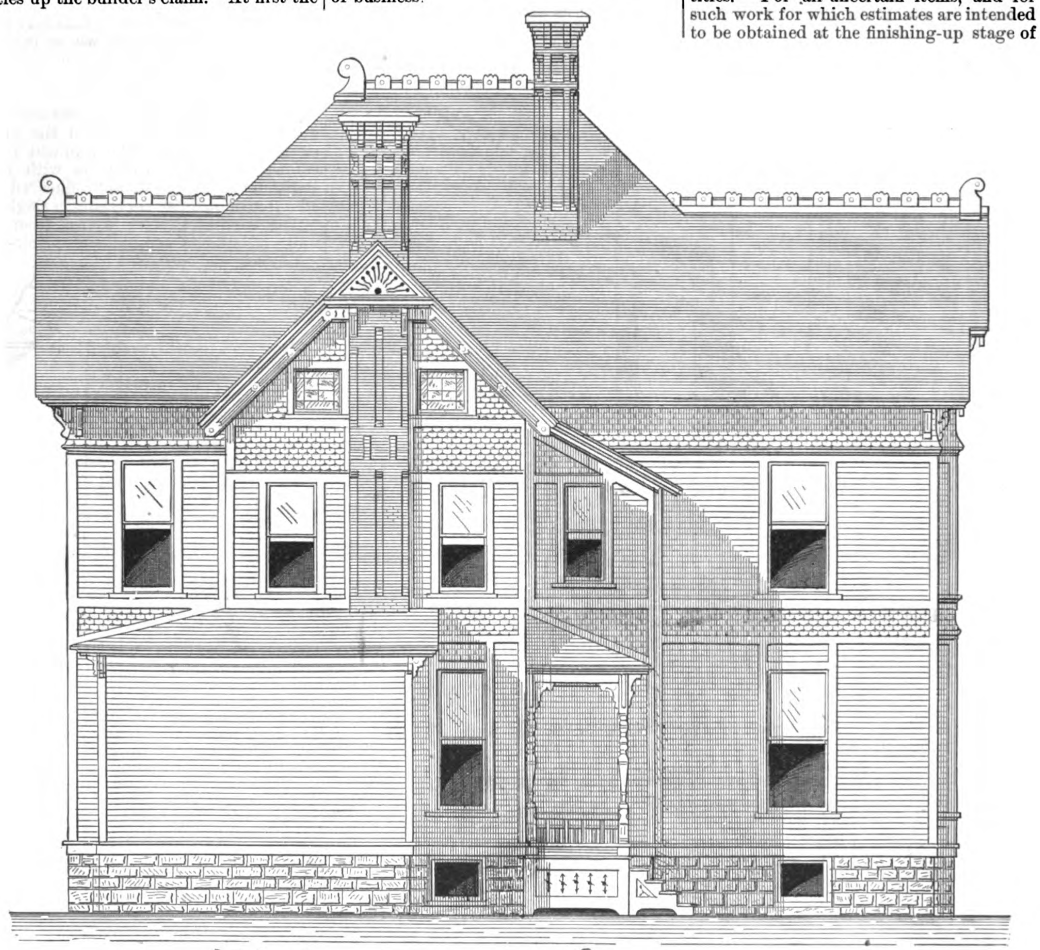



*Details of Veranda.—Scale, 1 Inch to the Foot.*

clerks, where they had already acquired something of the proficiency which this new status called for, and before long clever and experienced men took up the line, and marked out a reliable and scientific system of measuring for every building trade. To-day quantity-taking in London is a most minute and precise operation down to the smallest detail of builders' work. The quantity surveyor writes the specification, having previously settled all items with the architect; he takes notes of all extra work or deviations and deductions occurring during the progress of a building, and finally measures up, and settles up the builder's claim. At first the surveyors were employed in the architects' offices as a part of the general staff. It was, however, soon found that this arrangement complicated the business of large offices too much, and the surveyors were given an independent professional standing, with offices of their own, separate from the architects. The institute had already formally sanctioned the new practice, and settled the rate of payment as follows: The surveyor to receive $2\frac{1}{2}$ per cent. on the contract price, to charge for the lithographed specifications and the bills-of-quantities extra, the whole to be added by the builder to his estimate, and to be paid by him to the surveyor out of his first certificate. These rates to which the members of the Institute of Architects agreed to hold themselves were so favorable that many architects and draftsmen left their calling and turned quantity surveyors, and many years had not passed before it had, through competition, become the general practice for the surveyors to hand over 1 per cent. of their $2\frac{1}{2}$ per cent. to the architect who employed them, for it is in nearly all cases the architect who selects the quantity surveyor. This practice caused some bad feeling, as may be readily supposed. Architects were soon compelled for the sake of their good name to sever all connection with or interest in the quantities, and thus the surveyor's commission has gradually become reduced to $1\frac{1}{2}$ per cent., and a good deal of work is now done at 1 per cent. It is very profitable at that if there is a steady flow of business.

In course of time an important change was made in the position the quantities occupy toward the contract. At first the surveyor was made responsible for the correctness of his quantities, and they became part of the contract. The builder was bound to carry out the work as drawn and specified, and if, to do this, he found himself called upon to give more material and labor than he had estimated for per bill of quantities the architect allowed him a claim for all over against the surveyor, who had to pay. I know personally of several cases where the surveyor was made to pay heavy sums for mistakes or omissions. The unfairness of this system became, however, soon apparent. Surveyors are often called upon to take off the quantities for a building in a very short time. They have to rely upon assistants, and the most careful man can make a mistake in multiplication or apply a wrong scale to a drawing. Moreover, there are many building items, as in plumbing, gas-piping and interior finish, that cannot be measured with perfect accuracy. For these reasons surveyors are now rarely made responsible for their quantities, and these latter do not constitute part of the contract. The builder hands in his estimate upon the bill of quantities supplied, and if his tender is accepted the quantities are sealed and kept by the architect until the final measuring up, when all extras or deductions are made upon the prices affixed by the builder himself to the bill of quantities. For all uncertain items, and for such work for which estimates are intended to be obtained at the finishing-up stage of the quantities liberal provisional sums settled between the architect and surveyor, and which are accounted for separately.

The economical soundness of the quantity system is proved by the fact that the builders are in its favor with one voice; that building has become a more safe and more profitable business, and that owners obtain better and more economical work for their money. And much arduous labor is taken from the shoulders of architects who enjoy a large practice, and the moral status of the profession has undoubtedly been raised. It would be very desirable that some system of quantity surveying be introduced here, perhaps with certain modifications and less minuteness than practiced in England, but of sufficient thoroughness to place estimating upon a sounder footing. Builders, architects and owners would soon appreciate its many advantages.

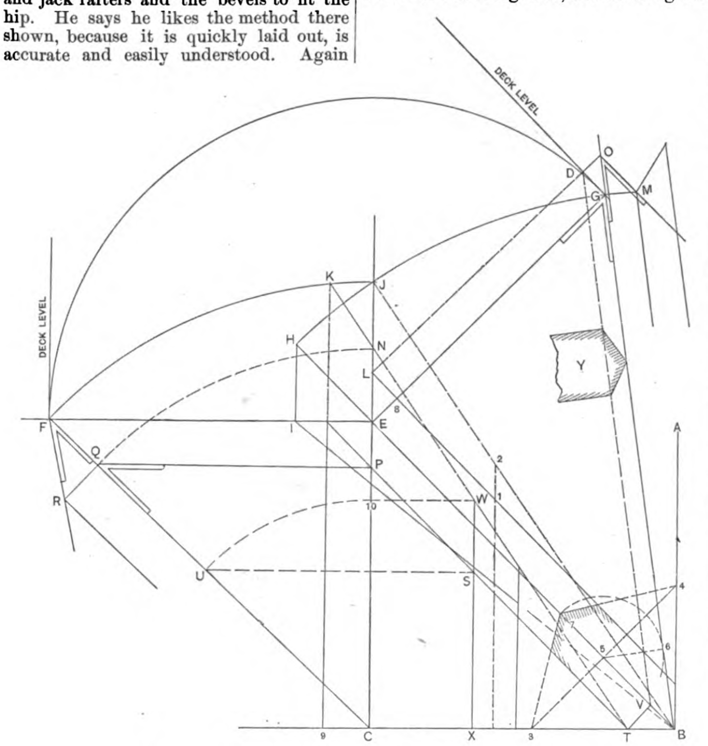


*Rear Elevation.—Scale, ⅛ Inch to the Foot. (See Plate Pages.)*

# CORRESPONDENCE.

### Problem in Hip Roofing.

*From* J. V. H. Secor, *New York City.*—I have been very much interested in the problems in hip roofing. but they nearly all come short in some way. In the November number *Carpentry and Building* for 1887 is one from "F. D. G.," Council Bluffs, Iowa, giving the length of hip and jack rafters and the bevels to fit the hip. He says he likes the method there shown, because it is quickly laid out, is accurate and easily understood. Again he says: "I shall not attempt to tell how to back the hip, or to get the bevels for the same, for I have nothing new or novel in that connection." Now, as I understand roofing, a jack-rafter is of no use until the hip has been cut to fit over the corner of the deck or ridge timber and properly backed to line with the common rafters. This he does not show. The lengths for jacks are given by a single line running to the center line of the hip. Now, as I understand it, they would not fit in the spaces, for nothing is shown as to the face thickness of either one. There is to be taken into consideration that half the diagonal face thickness of the hip and half the face thickness of the jack would have to be taken from the length as shown by "F. D. G." In the February number for 1888 is another Council Bluffs (Iowa) man, "T. D. G.," who starts off with a criticism on "L. M. S.," of Germantown, as published in the July number, Vol. VII, page 135. In referring to his bevels he says they are shaky, and that his backing problem is a disastrous failure. Now, "T. D. G." says: "I have repeatedly asked for information on framing octagonal roofs, but have never obtained anything of this kind. Of myself, I have developed the following method for obtaining lengths and bevels of rafters for any form of roof." In his diagram in the February number for 1888 is a plan of roof with one right angle, one obtuse and two acute angles. The deck or ridge does not run parallel with either side and is not level. He shows his method of finding lengths of hip and jacks, and, by the way, it is the same as "F. D G." has shown in the November number. At this point he leaves us to get at the rest the best we can. I would like to ask "T. D. G." if he considered the various bevels required, and the singular lines in backing the above roof would require. I have prepared two problems, one a right angle and one acute angle, showing two methods in each case for getting lengths, bevels and backing lines, and in doing this I must use quite a number of lines. Perhaps some of the many readers will object to this, but it is better to make all the points clear by using sufficient lines to show it, rather than to abbreviate and still leave the readers in the dark at the end. Abbreviation may be adopted by any one, as he thinks fit, after he thoroughly understands a thing.




*Problem in Hip Roofing.—Fig. 1.—Right-Angle Plan.*

#### RIGHT-ANGLE PLAN.

Referring to Fig. 1, let A B C be the face line of the plate, G E F the face of the deck or ridge. From B to E draw the center line of the hip, extended to H; from E to G set up the hight or rise; with E as a center and E G as the radius describe the curve line to F; from G and F draw the deck line; connect G and B for the length of the hip; connect C and F for the length of the common rafter; from C as a center draw the curve from F to J; from B take the length of the hip at G and draw the curve, which will pass through J until it intersects with the center line of the hip in plan at H.

*To Find the Level for the Hip to Straddle the Deck.*—From H draw to I at right angles to the face of deck; from I draw to B; then the angle at I will be the level sought.

*Second Method.*—From the side of the hip at L draw L O, square from G and let G M equal E 8. Connect O M for the level. The plumb level is shown at G.

*To Find the Backing Line for the Hip.*—From the face hip and line of plate at T draw square to the center of the hip in plan at V; draw the dotted line from V to D, giving the line to back as shown at the section.

*Second Method.*—At any convenient point along the center of hip in plan draw 3 4, touching the face of plate; from 5 as a center extend to hip line in elevation at 6, and draw the curve to the center of hip in plan as at 7. Draw from 3 4 as shown, giving the line for backing.

*To Find the Level for the Top of Jack-Rafters.*—The first common rafter in this case is drawn for a jack, as it will join to the hip. Let C 9 be the top face; extend to K; connect at T K for the face of the hip, and from this line the lengths of the jacks must be taken; draw P Q parallel to E F; square over from Q, and let Q R equal the width of a rafter, as at 9 C; connect F R, giving the level, as shown at F.

*Second Method* is shown at K and W; by drawing the curve Q N gives the exact

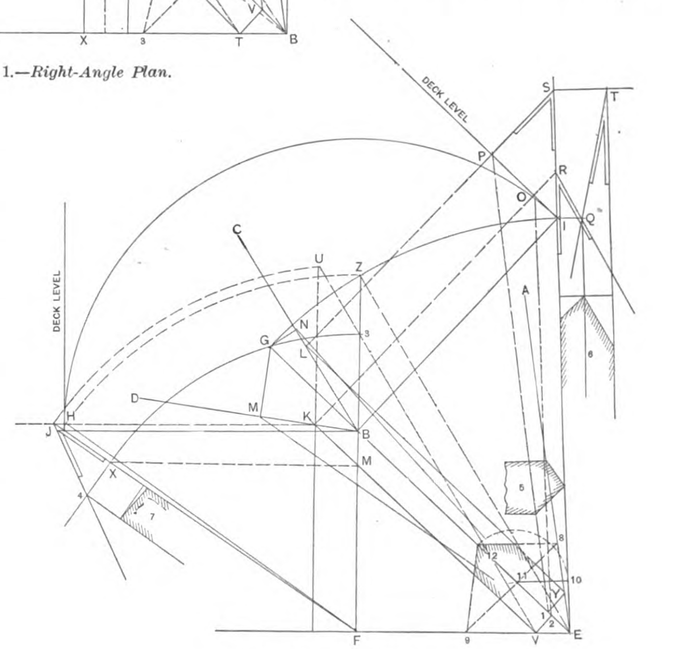



*Fig. 2.—Acute-Angle Plan.*

line to get the lengths of jacks, as is further shown at X W. Let X S be the place in plan for a jack; S is the point it will join at the hip. From S draw to the common rafter; then C U is the length of the jack. Draw the curve line U 10 and connect 10 W, giving the exact length and the place it will fit when up. W 1 and 1 2 show the error in taking the length to the center, as at 2.


*Boarding a Building.—Fig. 1.—Elevation Showing Bad Construction.*

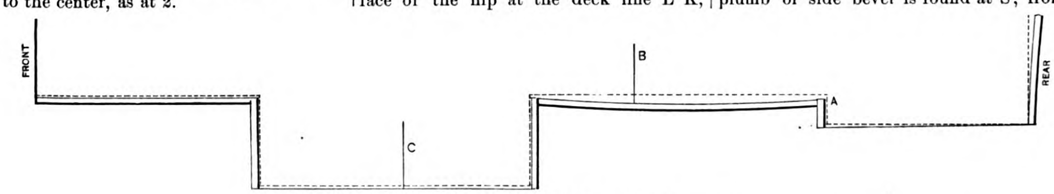



*Fig. 2.—Plan of Side Plate Showing Displacement.*

THE ACUTE-ANGLE PLAN.

Let A E F be the face line of the plate and C B D the face line of the deck or ridge. It will be seen that the angle of the deck is more acute than the angle of the plate and will develop some singular

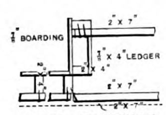



*Fig. 3.—Section of Corner Studs at A, Fig. 2.*

lines which "T. D. G." had not considered. Draw E B G as the center line of the hip

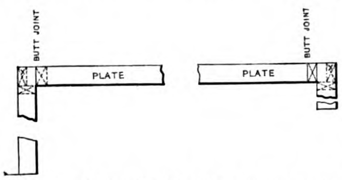



*Fig. 4.—View of Side Plate (wrong way), Showing Joint and Position of Corner or Angle Studs.*

in plan. From B to J set up the hight of deck or rise. Draw the curve line to H. At right angles to the plate line E F draw F B extended to Z. Draw the dotted line Z E and connect I and E for the length of the hip. Connect J and F for the common rafter. This is to be cut the same as a jack, as the location in plan will show.

*To Find the Bevels for the Top of Hip to Fit Over the Corner of the Deck.*—From the face of the hip at the deck line L K, draw perpendiculars touching the elevation at R and S. Square over from I and let

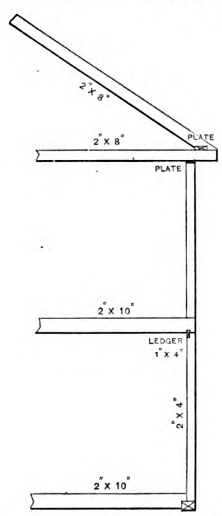



*Fig. 5.—Section Through Building at D, Fig. 7. (right way).*

I Q equal half the thickness of the hip. Connect R Q for the bevel that will fit the deck at K B. Let S I equal the width of hip. Connect I Q, giving the bevel to fit the deck at L B.

*Second Method.*—Let G E equal the length of the hip, as shown by the curved line I G; from G draw M N at right angles to the face of the deck. From M draw to E; the angle formed at M will be the same as at R; draw from N to E; the angle at N will be the same as shown at I. The plumb or side bevel is found at S; from I and H draw the deck for the bevel at the top of jack. Draw W X parallel to K H.

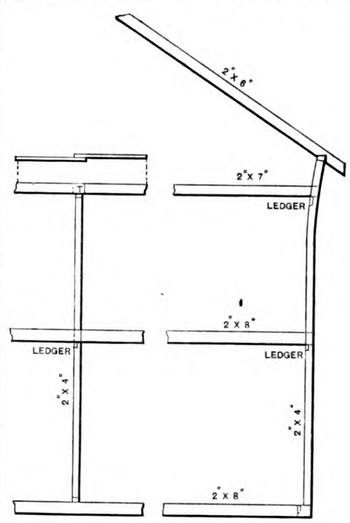
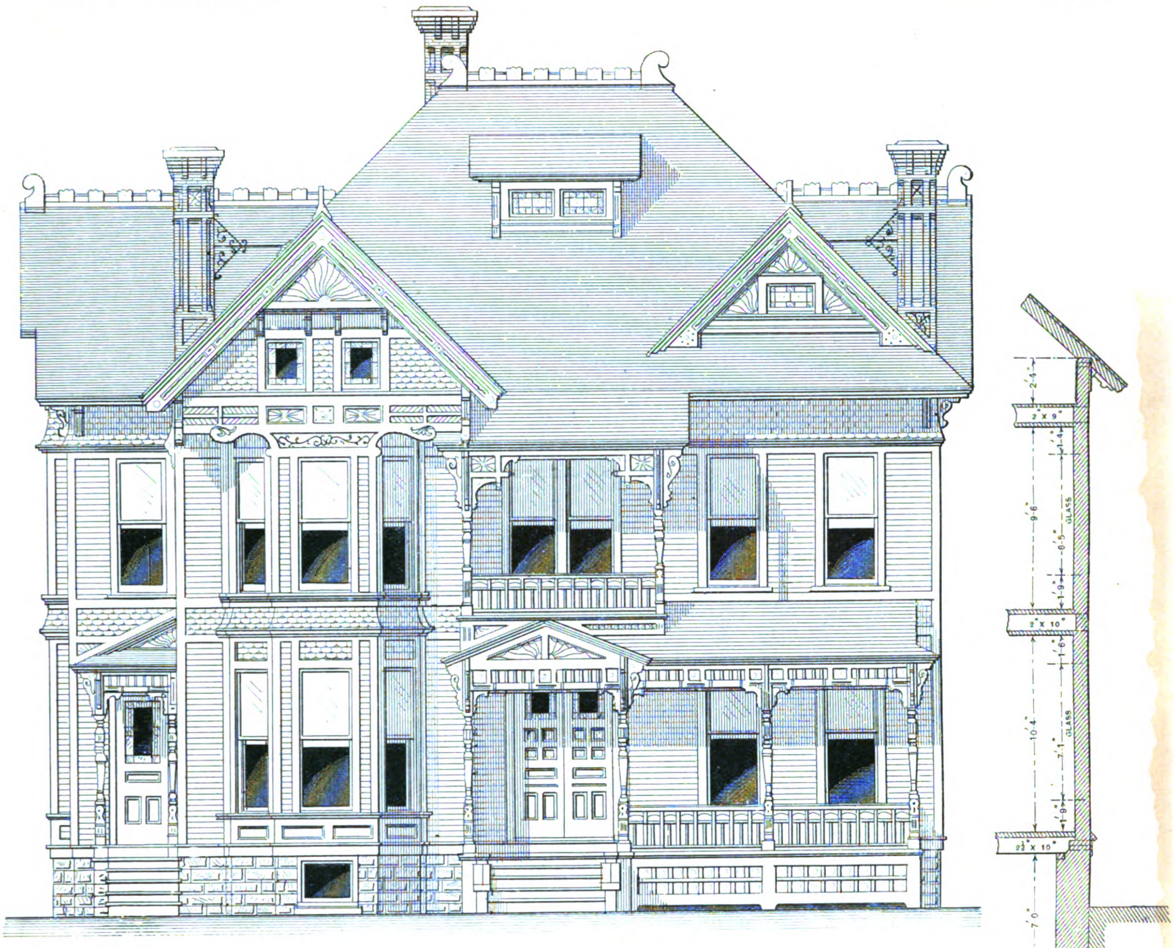



*Fig. 6.—Section at B, Fig. 2. (wrong way).*

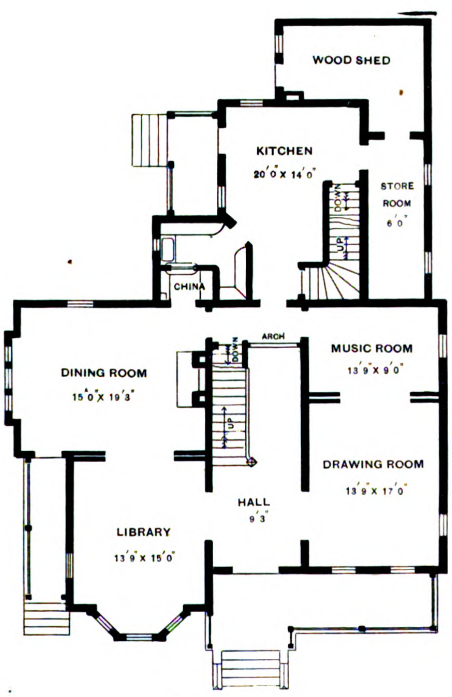
It will be seen that B H is the hight of the deck, but that K has diverged from B so that the line of jack must be continued

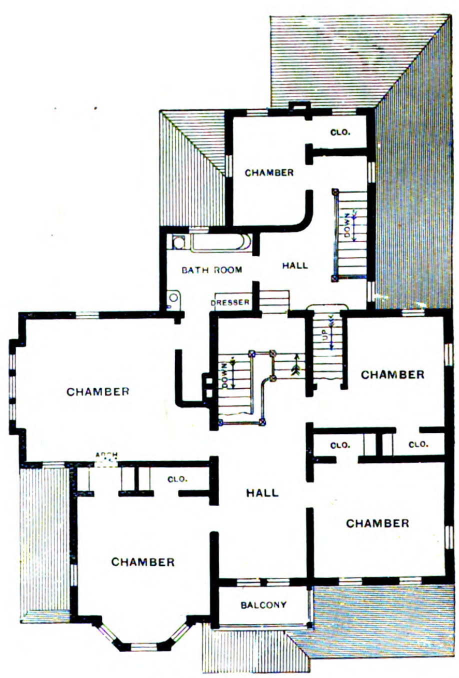


FRONT ELEVATION AND SECTION. Scale, 1-8 Inch to the Foot.

# STUDY IN HOUSE DESIGN.

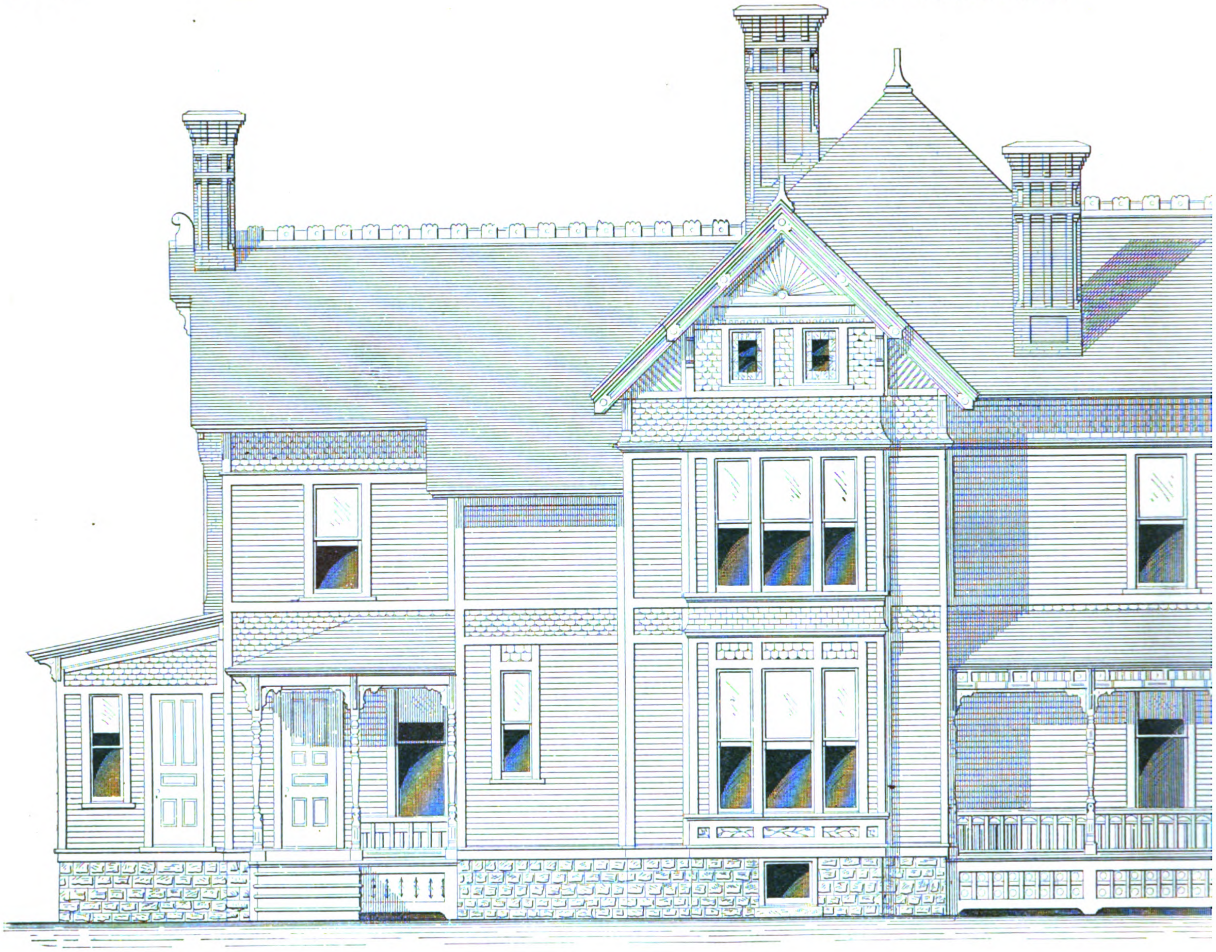
GEORGE E. WILSON, ARCHITECT,
OGDENSBURG, N. Y.



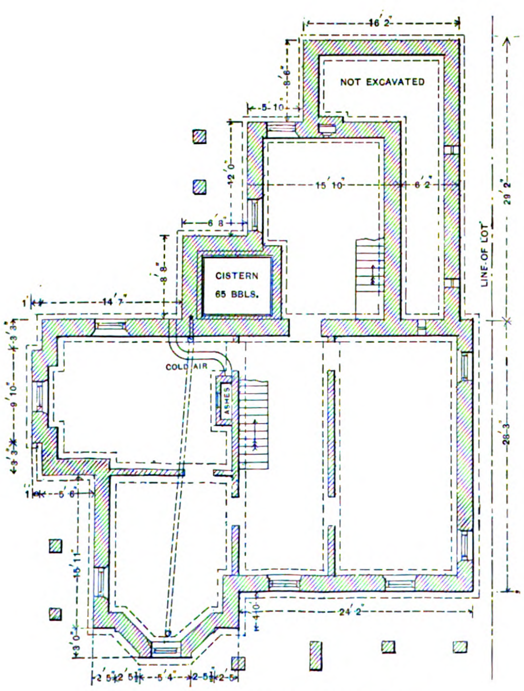



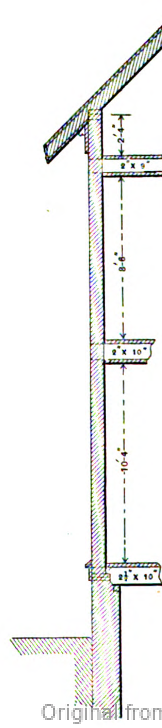

SECOND-FLOOR PLAN

FIRST-FLOOR PLAN. Scale, 1-16 Inch to the Foot.

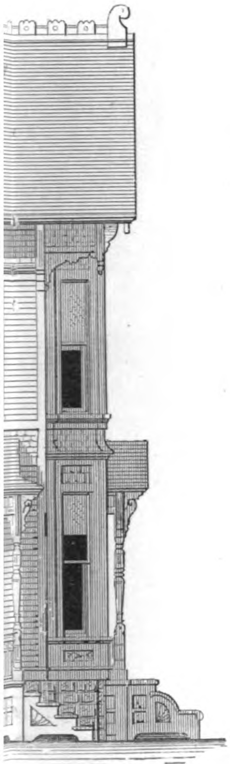


SIDE ELEVATION (LEFT). Scale, 1-8 Inch to the Foot.



FOUNDATION PLAN. Scale, 1-16 Inch to the Foot.

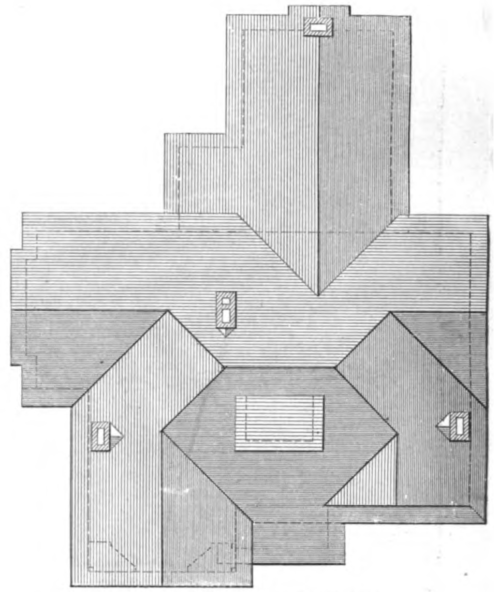


# Study in House Design.

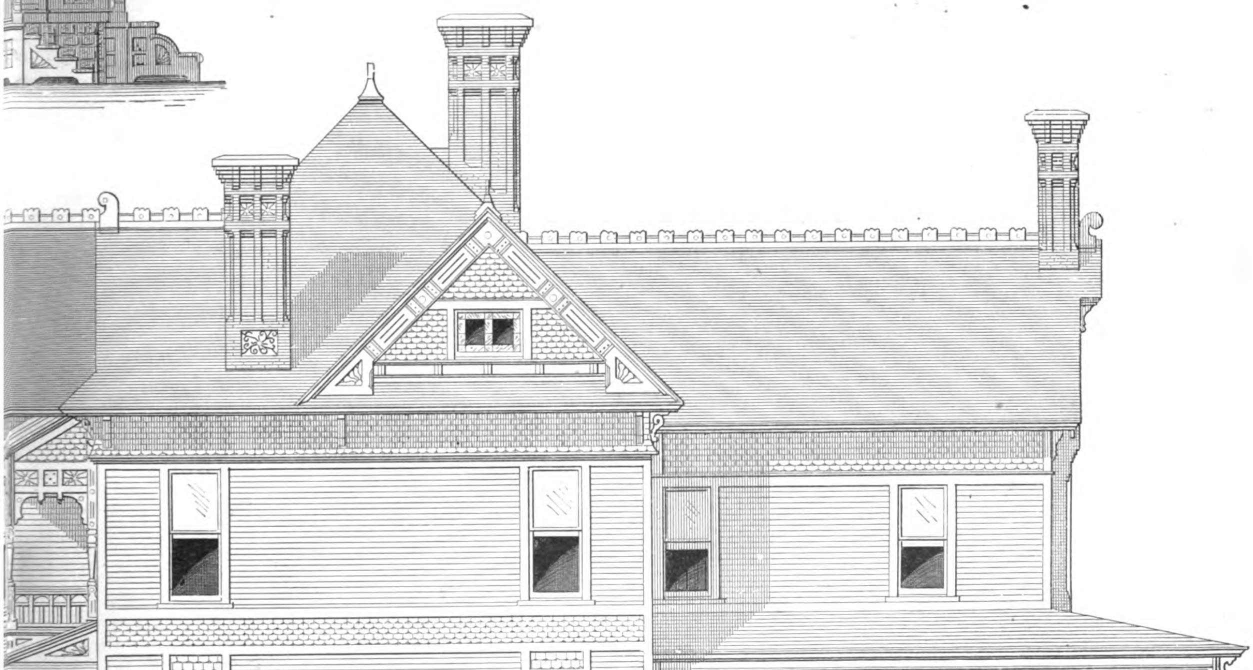
GEORGE E. WILSON, ARCHITECT,

OGDENSBURG, N. Y.

For Description and Details, see pages 133 and 134.



ROOF PLAN. Scale, 1-16 Inch to the Foot.



SIDE ELEVATION (RIGHT) AND SECTION. Scale, 1-8 Inch to the Foot.

A DECORATIVE PANEL. BY J. ALDAM HEATON.

above the deck to J. From F as center extend to J and describe the curve line to U, and connect U V, which is parallel to as shown by the line drawn from F H and shown at section.

*Second Method.*—Draw at right angles to the hip in plan, touching the face line of the plate at 8 9, with one foot of the


*Boarding a Building.—Fig. 7.—The Right Way of Framing a Building.*

Z E. Draw the curve line X 3. The angle U is the bevel for the top face.

*Third Method.*—Let X 4 equal the thickness of the jack. Connect J 4, giving the

*To Find the Backing for the Hip.*—At the intersection of the side-face of the hip and the face line of plate, as at V Y, square over to the center of the hip at

compasses in 11; extend to the line of hip in elevation as at 10; draw the curve line to the center of hip at 12; connect 12 8 and 12 9, giving the line to back from; sections 5 and 6 show the different forms it takes at different points.

The first method of finding the backing is superior to any other. The second

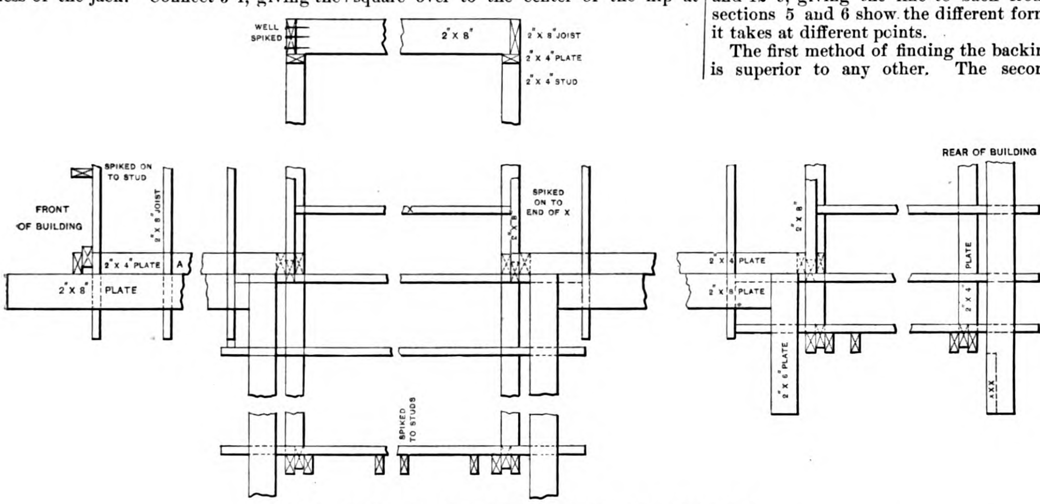



*Fig 9.—Correct Position of Plates, Ceiling-Joists and Studs.*

bevel at J, which is the same as at U. The rafters on this side will have to be backed

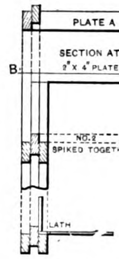



*Fig. 8.—Right Way of Placing Corner Stud.*

at the foot. F will be square, but at the top K it must be backed off on the long side,

1 2; connect 2 O, giving the line for the side of hip K V, or the short side. Con-

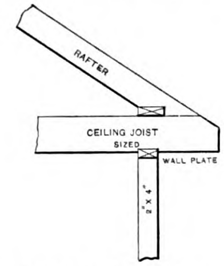



*Fig. 10.—Section at Eaves Showing Correct Position of Ceiling-Joist.*

nect 1 P for the line on the other side, Y L.

method gives it only at the point at which it is placed in plan.

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### Boarding a Building.

*From* J. D., *Winchester, N. H.*—I inclose herewith sketches showing the framing of a building which was erected in a city of one of the Eastern States at a cost of about $7000. It was designed by a competent architect, so called, and after completion was accepted by the architect and owner. It may possibly appear to some of the readers of *Carpentry and Building* that I have exaggerated the defects of the building, but such is not the case, nor have I actually shown one-half the defects in the construction.

Referring to Fig. 1 of the accompanying sketches, it will be noticed that there is a visible sag in the upper-floor joists over each window opening. This is owing to the lightness of the headers, being of a single thickness over the openings, coupled with the weight of the roof. This is especially noticeable on the attic floor, where the sag is bad. During the slating of the roof the ridge lowered over 6 inches on a chimney. The dotted lines on the plan of side plate, Fig. 2, show where the plate would have been had no displacement occurred. During the slating of the roof a workman called the attention of the builder to the giving way of the corner at A, as shown in the section of corner studs, Fig. 3. He then spiked on a 2 x 7 inch piece, as shown by the dotted lines. This I believe saved the building from falling, as the roof was only about one-third slated at the time. It will be seen that the 2 x 7 inch ceiling-joist that pulled off from the angle-stud was not long enough to give the nails a fair chance to hold, it only going on to the stud about 1 inch. Instead of being pieced the joists should have run to the outside corner.

The stud marked X in Fig. 4 of the sketches was not put on until the building was ready to lath and was cut in on the first and second floors only. It will be seen that the angles were not tied together at all. Owing to the position of the studs it was impossible to nail them together, thus weakening the angle very much. When the window openings were cut out on the second story a single header was put in as on the first story, but when the window frames came from the factory it was found that the openings were not high enough to admit the frames. The builder, therefore, gave orders to knock out the headers, which was done, and the frames were set without replacing them.

The ceiling-joists being long enough to reach only half way of the width of the building as indicated in Fig. 6, which is a section through B of Fig. 2, and not being properly nailed at T, pulled apart. This, of course, helped the building to spread. No floors were laid in the attic until the roof was covered. The joists were not properly tied together by nailing down temporary boards, so that the rear of the building spread more than the sides. The reason for this was that the joists ran in opposite direction to the strains, as did also those at C, Fig. 2. Studs should never rise above the top of the ceiling-joists where there is a heavy roof. The plate should be nailed to the top of the joists. Some of the timbers are too light for the duty required. A 2 x 8 inch floor-joist is not large enough for an 18-foot run. The same might be said also of the hips and valleys.

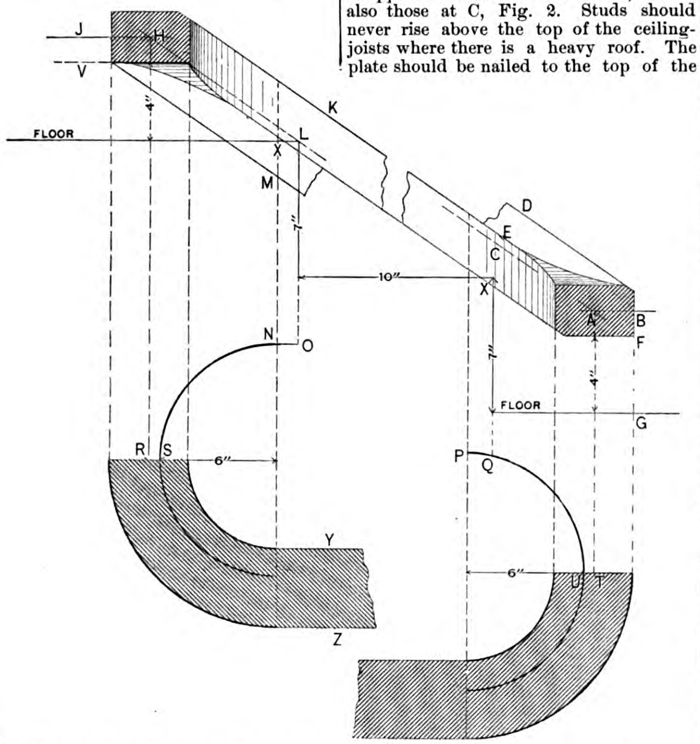
In Figs. 5, 7, 8, 9 and 10 I have endeavored to show how this building might have been erected and the defects referred to averted. I have increased the size of some of the timbers, as I believe it necessary in order to insure good results. I have changed the size of the sill, but this is not necessary, as an 8 x 8 inch sill is all right; it only requires more time for framing. Studs of an even 2-inch thickness and as straight as possible should be selected to make corners, and should likewise be spiked together every foot in length before raising. Straight pieces of 2 x 4 inches and of even thickness should be selected for the plates marked A, Fig. 8. Ceiling-joists must be placed directly over studs and rafters over joists, as shown in Fig. 9 of the accompanying sketches. If this were not done it would be necessary to double the plates. The ceiling-joists should not lap over each other above the center partition, as shown in Fig. 6, but the ends should butt together directly over the center partition. A ⅞-inch board should also be nailed over the joists on a straight line across the building.

Ceiling-joists when not sized by the planer at the mill should always be sized over plates, as indicated in Fig. 10. Joists No. 2 should be cut in on the corner studs, as indicated by the dotted lines in Fig. 8.

Hip No. 2 should run down to the plate, and not stop at the ridge, as was the case in the sketch showing the wrong method of construction. Should the rafter-plate be too wide for the depth of rolling cornice it can be cut out, as indicated at X X X of Fig. 9. Should a hanging cornice be required the ceiling-joists must be stopped even with the outside of studs and rafter-plates set back directly over the studs. I think the sketches which I have presented herewith, taken in connection with the above description, will convey to the reader a very clear idea of what it is desired to show.

### Problem in Hand-Railing.

*From* Jas. H. Monckton, *Brooklyn, N. Y.*—In the March number of *Carpentry and Building* "E. S. C.," of Pittsburgh, asks that some of the readers of *Carpentry and Building* "explain the drawing and working of a molded hand-rail wreath around a 12-inch cylinder—a half-circle—the rise being 7 inches and the tread 10 inches, the stairs to be a continuous flight." I will endeavor to enlighten "E. S. C.," and incidentally others of your readers who may need such information, asking, however, that in order to obtain a correct knowledge of these answers they themselves carefully make the drawings as given and accurately follow the reference letters and explanations. Fig. 1 is an elevation of one tread and two rises, showing the floor lines at the starting and the landing of the flight. Let the size of hand-rails be 4 inches wide by 2½ inches thick; also the plank out of which the wreath-pieces are to be worked 4 inches thick. Rest the bottom line of rail on X X, the centers of short balusters;* let X E and X K equal 2½ inches, the thickness of rail; let K L and L M each equal half the thickness of plank, 2 inches; then X M will be overwood to be removed in shaping the wreath-piece. Draw L H indefinitely and parallel to X X; make the hight 4 inches from the floor to the bottom line of rail V; make V J half the thickness of rail; draw J H parallel to the floor line; then H becomes the center of the rail at the level, also the center of the 4-inch plank, and R the center of the rail on the plan, S the face of the cylinder, N the chord line or commencement of the cylinder, and O the face of the landing-riser, showing that this landing-riser must set 1 inch in front of the chord line.




*Problem in Hand-Railing.—Fig. 1.—Elevation of one Tread and two Risers, Showing the Floor Lines at Starting and Landing of Flight.*

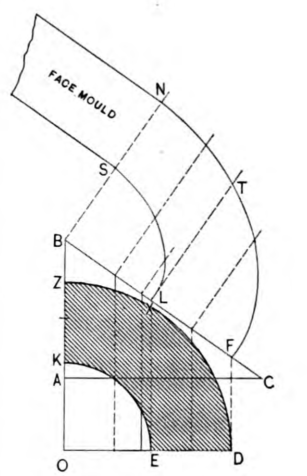



*Fig. 2.—Face-Mold.*

Again, at the starting make X D 4 inches, the thickness of the plank, and X C half the thickness of plank. Draw the lines C, E and D indefinitely and parallel to X X; make G F 4 inches and F B half the

* This fixes the calculation of the hights of rails on flight and level in its simplest form, as follows: Say the length of short baluster at its center X is made 2 feet 2 inches from the top of step to under side of rail; then add to this the 4 inches raised at landings, making 2 feet 6 inches the exact hight of level rail from floor to bottom of rail.

thickness of rail; draw the line B A parallel to the floor line; then A is the center of the rail at the level and the center of the plank out of which the wreath-piece is to be worked; also T is the center of the rail on the plan, U the face of the cylinder, P the chord line and Q the face of

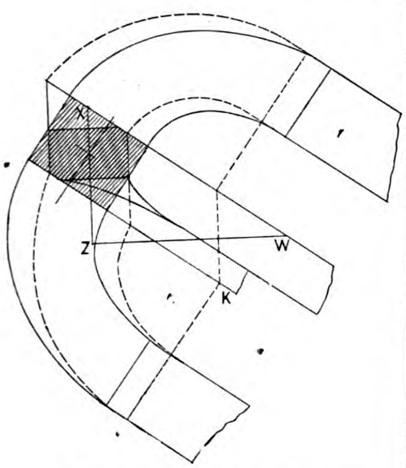



*Fig. 3.—Diagram Showing Edge of Plank, the Pitch-Board and Application of Face-Mold.*

the first or starting riser, showing that this riser must set 1¼ inches into the cylinder.

Fig. 2 shows how to draw a face-mold as required for the starting and landing twists. Let the shaded quarter-turn be the plan of rails as given at Fig. 1. Place the rise A B of pitch-board anywhere along the line O B and draw the pitch-line B C. At right angles to D O draw D F, E L, &c., at pleasure. At right angles to B C draw B N, L T, &c. Make B S N equal O K Z and L T equal E X, &c. Through the points thus found trace the concave and convex edges of the face-mold. This face-mold is first made use of as a pattern by which to mark on the face of the rough plank a suitably-shaped piece—to be sawed out square through—out of which that portion of the wreath is worked. Its further use is to give the exact shape on the two faces of the plank of the plumbed sides of the wreath-piece. The joints are made square from the face of the plank.

Fig. 3 shows the edge of the plank W K, the pitch-board W Z X in position, with the rise Z X to plumb the sides of the wreath-piece; also the application of the face-mold, as indicated by the dotted lines, to both faces of the plank. The above method (Fig. 1) of managing the overwood, both for the landing and starting wreath-pieces, makes the best-shaped wreath. But to do this work in this manner it must be understood that an elevation, as at Fig. 1, must be set up as a trial to determine the exact place of the starting and landing risers in connection with the cylinders; then the cylinders must be placed on the plan and be joined to the string as shown. If a hand-rail is to be carried over a stairs built with the chord-line of cylinders of this diameter placed at the face of risers starting and landing, or where this last plan is for any reason desirable, then proceed to find the disposition of the overwood as shown in Fig. 4. Set up an elevation of tread and rises—the same as Fig. 1. Let the bottom line of rail rest on X X, the centers of short balusters.

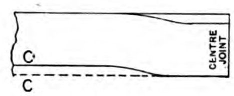



*Fig. 5.—Part of Rail.*

Let M E at the starting and H G at the landing each equal 6½ inches, this being the distance from the chord line of the cylinder to the center of the rails R and T, as given at Fig. 1. Make E L and G N each 4 inches; let LZ and NA each equal 1¼ inches, half the thickness of rail. Parallel to X X, from A, draw A W, which is the center of plank. Make W F and W R each equal 2 inches, half thickness of plank. Make X T 2½ inches, the thickness of rail, thus showing that ½ inch of overwood must be taken from the top of the straight portion of this landing wreath-piece and 1 inch of overwood from the bottom. At the starting wreath-piece the thickness of rail is X V and the thickness of plank X S. The line S C shows that the thickness of plank is not enough by ½ inch, which may be glued on; or drop the center Z equal to C C, and then, using the necessarily increased thickness of stuff, regain this hight on the adjoining level quarter, as indicated at C C, Fig. 5. For straight flights connected with cylinders the above treatment of hand-rail, both as to face-mold and the removal of overwood in shaping the wreaths, may be applied to any sized cylinder, but will fix the position of rise in a 12-inch cylinder, or cylinders of other dimensions, differently or according as the hight of rise, width of tread, size of rails and size of baluster vary. So far, what is given is simple in method and principle. If, however, a saving of run is important, a little more science in fixing the plane of the plank and producing face-molds will be required, so that the top and bottom risers may be set in the cylinders at pleasure, and the whole width worked in one piece. Or a wreath may be worked in two portions, one piece of which would contain more than a quarter-circle. By either of these last-mentioned methods the whole depth of the landing cylinder may be saved, and the same or a little more at the starting; at least 12 inches run saved in one flight of stairs—a saving in some cases of considerable value.

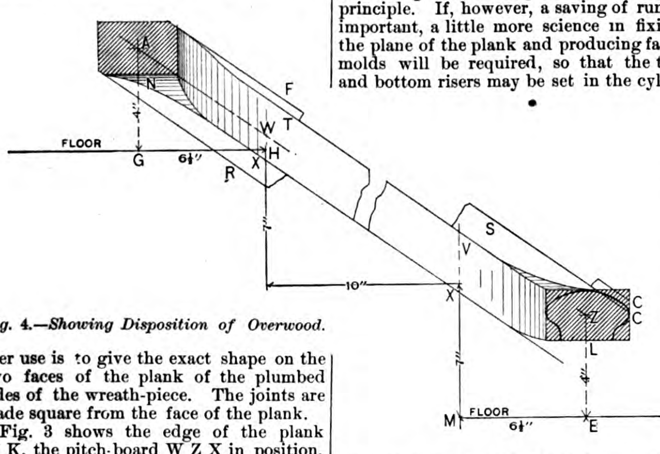



*Fig. 4.—Showing Disposition of Overwood.*

**Architects' Commissions.**

*From* W. H. H., *Elizabeth, N. J.*—Referring to editorials in the April number of *Carpentry and Building*, I should think you would be a little more careful in your utterances regarding architects' commissions. The confirmed jealousy and contemptible meanness of parties who falsely charge architects with all manner of rascality would be a more fitting theme for your paper. As one of your original subscribers, I hope you will bear with me in saying that the articles on the subject named are entirely uncalled for, as there is not a calling or occupation on earth so utterly destitute of real and substantial encouragement as the study and practice of architecture in this country. As for commissions, I will say that usually the architect gets more abuse than reward. He is tossed from pillar to post by owner and contractor alike. It is only deep-seated love for the work that keeps the architect at his post in many cases.

*Note.*—We think if our readers examine aright the article on architects' commissions which appeared in our last issue, they will see that we are jealous of the architect's good name and are therefore anxious to protect it. Unfortunately for the fraternity at large, things have been done in the past that seemed to warrant the public in believing that architects are open to bribery. We think it is a great mistake to believe that architects worthy of the name are open to bribery now or ever have been. But that men styling themselves aichitects have taken commissions alike from contractors and sub-contractors is too well known to our readers to be disregarded. It is only by discussing such things in print that the men who disgrace the profession by practices that are not honest will be driven from it. We are sorry if we have offended this correspondent or any one else, and accordingly we cheerfully give space to his reply. It occurs to us, however, that no one who has always been absolutely honest in his profession will feel that he has been wronged in what we said last month. We say this without any insinuations whatever, but because of ceitain remarks that have come to our ears from various sources concerning the article in question. We know the deep-seated love that good architects feel for their work, and it pleases us that our correspondent bears tribute to this fact. It is the hope of the profession.

**Brick-Veneered Houses.**

*From* R. M. C., *Moore's Salt Works, Ohio.*—I would like to ask of builders and others, through the columns of *Carpentry and Building*, concerning brick-veneered houses in general: Should they be sheathed on the outside or inside? If sheathed on the inside would it be proper to build the brick between the studs in columns here and there as an additional anchor of the brick to the frame? If sheathed on the inside would it benefit the house to cover the outside walls or sheathing with coarse building paper before plastering? Are brick-veneered houses great rat harbors? Are they the right kind of a house to build in the country?

**Weighting Windows.**

*From* N. I. M., *Eureka, Kan.*—In answer to "J. S.," whose inquiry appeared in the January number of *Carpentry and Building*, I would say I employ weights which balance the lower sash, and use the same number of pounds to weight the upper sash. As a general thing the lower sash is the heavier on account of the size of the bottom rail, and this makes the weights on the upper sash a trifle heavier than the sash itself.

# NOVELTIES.

### Wilson's Rolling Partitions.

James G. Wilson, of 907 Broadway, New York, is directing the attention of the building trades to what he is pleased to designate as Wilson's Patent Rolling Partitions, a substitute for sliding or folding doors and for dividing school-rooms and other apartments of large area. These partitions are made of wooden slats from ½ inch to ⅝ inch in thickness, strung upon

*Novelties.—Wilson's Rolling Partitions.—Fig. 1.—Section of Rolling Partition.*

tempered-steel bands from 18 inches to 24 inches apart. In these bands teeth are cut which, engaging in the mortises of the slats, hold and bind them firmly together, as indicated in Fig. 1 of the accompanying illustrations. The surface of the partition presents a smooth and finished appearance upon both sides. The manufacturer makes these partitions in any width up to 15 feet, and in closing openings of greater width than this they are made in sections, as shown in Fig. 2 of the illustrations. The posts or pilasters between sections can be removed if necessary, thus giving a perfectly clear space of any width required. They are generally made of soft wood and finished in hard oil. A feature to which the manufacturer directs special attention consists in the fact that the partitions are practically sound-proof and may be easily operated. Fig. 3 of the illustrations shows a section of a rolling blackboard and partition combined. This is made with one surface perfectly smooth and even, the joints between the

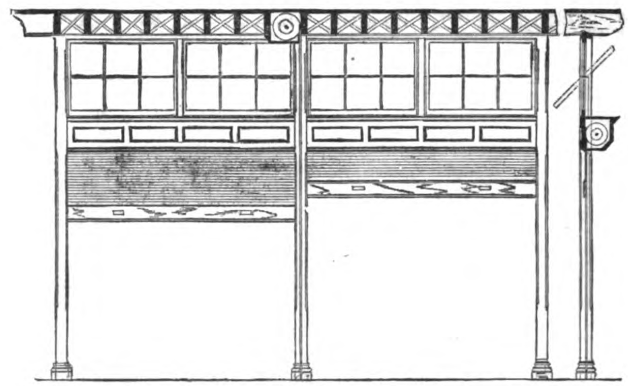


*Fig. 2.—Showing Method of Closing Openings of Greater Width than that of Section of Partition.*

slats being scarcely visible. The steel bands upon which the slats are threaded are placed about 18 inches apart, and are anchored to strong spiral springs in the

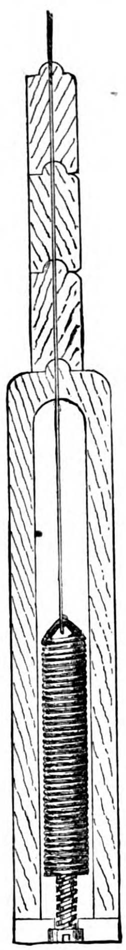


*Fig. 3.—Cross Section of Blackboard and Partition Combined.*

base-board of the partition, as clearly indicated in the engraving. This construction tends to keep the joints between the slats perfectly tight and presents an unbroken surface, while at the same time capable of being rolled with ease. Fig. 4 of the illustrations presents a view of the

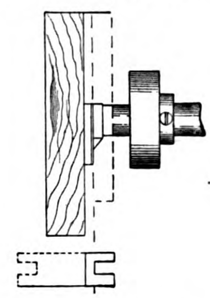


*Fig. 4.—End View of Shaft.*

end of the shaft employed for rolling the partitions.

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### An Unbreakable Wood Handle.

The annexed cuts show very clearly the construction of the Lunkenheimer wood handle, which is claimed to be unbreakable. The handle is bound by a seamless brass ring, B, about ⅛ inch wide, imbedded in the under side of the handle and there held and concealed by the lower plate of

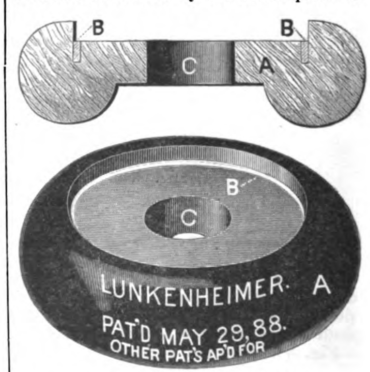
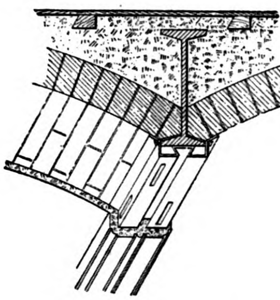



*Fig. 5.—Lunkenheimer Wood Handle.*

the handle, thus making it impossible for the handle to be pulled apart or split. The manufacturers of this handle, the advantages of which are self-evident, have prepared special machinery in order to turn it out in large quantities. It is made by the Lunkenheimer Brass Mfg. Company, of Cincinnati, Ohio.

### Sheet-Metal Furring.

Messrs. E. Van Noorden & Co., of Nos. 383 to 387 Harrison avenue, Boston, Mass., are introducing to the trade what is known as Phelps' patent continuous sheet-metal fire-proof furring, several applications of which we present in the accompanying illustrations. It is made of No. 26 B. W. G. black charcoal iron, coated with asphaltum paint, and is designed to suit the profile of any molding, following closely its outline and effecting a great saving of material. It is said to make a perfect



*Novelties.—Sheet-Metal Furring.—Fig. 6.—Furring Applied to Beams.*

form on which to run a molding, presenting an unyielding surface and furnishing a perfect key for the plaster. In Fig. 6 of the illustrations is shown the fire-proof furring as applied to beams; Fig. 7 shows its application to cornices, and Fig. 9 to girders. In Fig. 10 is shown the application of the furring and fire-proofing to columns, making it especially desirable for use as a covering for steam and hot-water pipes. Fig. 11 illustrates its use as a covering for pipe chases, heating or ventilating flues, and as a lathing between studding over hot-air flues in wood partitions. Fig. 8 shows its application as a furring for moldings either for flat-ceiling panel molding or for moldings on walls. It is also applicable as a furring for pilasters and other wall treatment where a light, cheap and durable fire-proof material is desired. The manufacturers keep in stock a number of forms for beams in various widths,

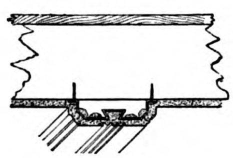


*Fig. 8.—Application of Furring as a Molding.*

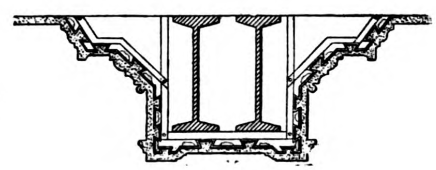


*Fig. 9.—Showing Method of Applying Furring to Girders.*

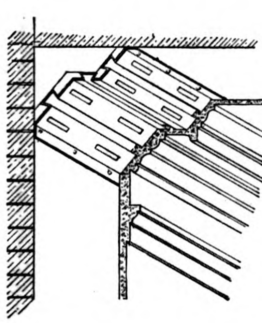


*Fig. 7.—Application of Furring to Cornices.*

which are made to suit a given molding, any one of which can be materially changed as to profile of plaster molding. This, of course, gives the architect great liberty in design. It is also claimed by the makers to effect a great saving in labor and materials, thereby decreasing the cost of construction, and at the same time increasing the fire-proof qualities of the building. As applied to columns, it is said to be more readily obtained than the hollow brick now in use, and more easily formed and adapted to the different diameters than terra-cotta.

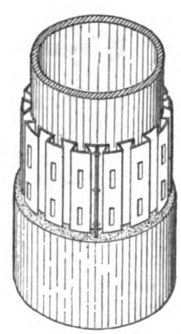


*Fig. 10.—Furring Used for Covering Columns and Steam and Hot-Water Pipes.*

*Fig. 11.—Method of Application as a Covering for Pipe Chases and Heating and Ventilating Flues.*

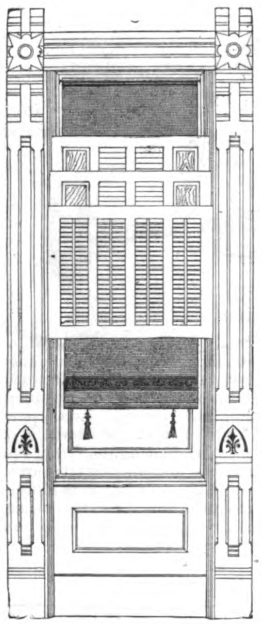
### Fray's Ratchet Brace.

John S. Fray & Co., Bridgeport, Conn., are manufacturing the ratchet brace shown in the accompanying illustration, in which is seen some of the features of its construction. It is put on the market as embodying many advantages and as meeting the want for an article of this kind of excellent quality. The manufacturers call special attention to the arrangement of the ratchet. In it there are two hinged pawls of steel, which are kept in position with the ratchet-wheel, which is also of steel, by means of spiral springs, but are raised out of contact therewith by a concealed or internal cam formed on the inside of a rotating ring, which fits into the ratchet frame. This ring, when in a central position, permits both pawls to be in contact with the ratchet-wheel, locking it and preventing any ratchet motion. Turning the ring to the right or left permits a forward or backward ratchet motion, as desired. The chuck or bit-holding device is Barber's style of socket and jaws. To these steel jaws a spring made of music steel wire is added, and performs a double duty. Passing through the rear or inner ends of the jaws it acts as a pin, holding them in place with each other, while it permits the free movement of each to the full extent of the sleeve in adjustment to the different sizes and shapes and bit-shanks, and passing back of the jaws, in which a spring cavity is formed, the ends of the spring engage and act upon the jaws adjusted forward of the centers, holding them open through their length. The sweep, jaws, pawls and ratchet are of steel, the handle is of cocobolo, the head of lignum-vitæ, the whole well finished and the metal parts nickel-plated. The manufacturers allude to the advantages of this construction, and refer to the favor with which the brace has thus far been received. It is made in 8, 10, 12 and 14 inch sizes.

*Fig. 12.—Fray's Ratchet Brace.*

### Hartman Sliding Window-Blinds.

By means of the accompanying illustrations we present two views of the Hartman inside sliding window-blinds, which are being manufactured by Hartman & Durstine, of Wooster, Ohio. The makers state that the construction of these blinds is such that they may be readily attached to an ordinary window-frame and as easily removed. They are so constructed that the blinds will remain in any position desired, being held in place by means of steel springs which are concealed from view. The blinds are made in three or more sections, each moving independently of the other, and can be furnished in 2, 3 or 4 panels in width, according to the size of window in which they are to be used. Fig. 13 of the illustrations shows the general appearance of the blinds in use. Where the window-frame will permit the blind-guides are extended down to the floor, so that if desired the blinds may be pushed down below the window-sill, where they will be out of the way. The company provide a patent adjustable sill or



*Novelties,—Fig.* 13.—*Showing Appearance of Blinds in Use.*

lid which is designed to close the pocket, as it may be called, into which the blinds are pushed. Fig. 14 of the cuts is a sectional view showing the details for this method of arrangement. In this sketch the front part of the window-sill is made stationary, while the back part is hinged to operate as a lid over the pocket, this feature being indicated by the dotted lines. The manufacturers claim that these blinds are much less liable to get out of order than the old style, and that they will therefore wear much longer. They also claim that the blinds do not rattle, and that they do not interfere with plants or flowers which may be placed upon the window-sills.

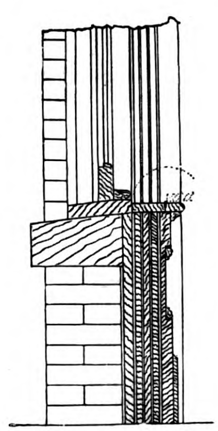


*Fig.* 14.—*Section of Window-Frame Showing Pocket for Blinds.*

**The Elmendorf Water-Closet Apparatus.**

A new system of flushing and ventilating water-closets is applied in the recently patented Elmendorf water-closet apparatus which is being put on the market by the Elmendorf Water-Closet Company, New London, Conn. The two cuts presented herewith illustrate the general appearance of the apparatus and the method of its operation. The principal merits claimed for this sanitary device are thorough flushing and ventilation of the bowl. The closet occupies little space, and as the flushing-water is contained in a stand-pipe the usual overhead tank is dispensed with. Furthermore, its parts are all accessible and do not offer any lodging places for dirt. The apparatus is secured to a board which when screwed to the wall is ready for connection with the service-pipe and bowl. Fig. 15 shows a general view of the apparatus, and in Fig. 16 a broken view of the pipes is presented, from which the method of operation will be understood. The flush comes from the stand-pipe B, Fig. 16, at the back, and which refills without noise from the service-pipe connected at the bottom. The fall of the water in the flush-pipe, forming a vacuum, draws the foul air from the bowl through the tube E. This will be better understood when it is explained that the valve C, between the tube E and the ventilating-pipe F, is closed during the flushing. As soon as the flush ceases the valve C opens and the foul air is forced up into the ventilating-pipe F by the water refilling the stand-pipe B. The opening and closing of the valve C are controlled by the same pull that opens and shuts the flush-cock A. The lever with chain and handle is shown in both illustrations. The manufacturers refer especially to the fact that where this apparatus is used there is no danger of flooding the house, for should the valve D in stand-pipe leak the water will flow down the ventilating-pipe E to the bowl. The stand-pipe and ventilating-pipe are of brass, and have an ornamental appearance, so that a wood casing is not required. The Elmendorf flushing and ventilating apparatus can be attached to any bowl with ventilating horn.

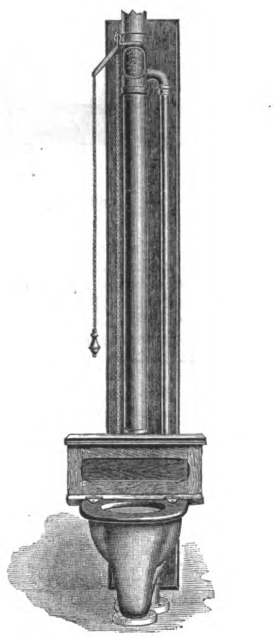


*Fig.* 15.—*Elmendorf Water-Closet Apparatus.*

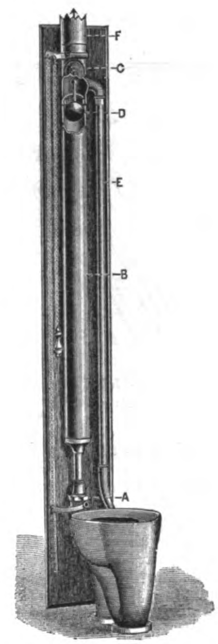



*Fig.* 16.—*Broken View, Showing Valve Arrangement.*

**Giant-Saw Tool.**

E. C. Atkins & Co., manufacturers of saws, tools and mill specialties at Indianapolis, Ind., with branches at Memphis, Tenn., and Minneapolis, Minn., have recently brought out a new tool to be used in the care of cross-cut saws. It is called the Giant-saw Tool and is a combined jointer, raker, tooth gauge, side file and set-tooth gauge, all comprised in one tool, and is described as a most perfect tool for the purpose made. It is represented in the accompanying illustration, which clearly shows the construction, without the necessity of a more extended description.

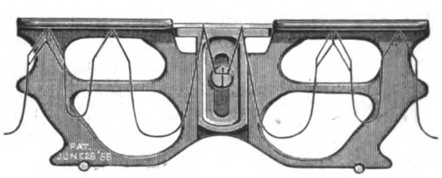
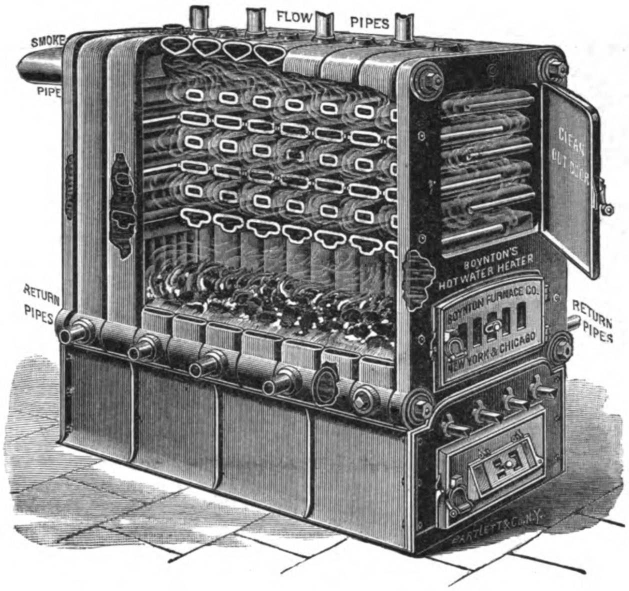


*Fig.* 17.—*Giant-Saw Tool.*

### Boynton's Hot-Water Heater.

A boiler or heater for warming buildings by hot-water circulation which shows the results of considerable care in designing has just been offered to the trade by the Boynton Furnace Company, 207 Water street, New York City. We show in the accompanying illustration a broken




*Novelties.—Fig. 18.—Hot-Water Heater Built by Boynton Furnace Company, New York City.*

view of the boiler, from which its general featutes of construction will be understood. The boiler consists of a series of vertical cast-iron sections connected together at the top and bottom, but each

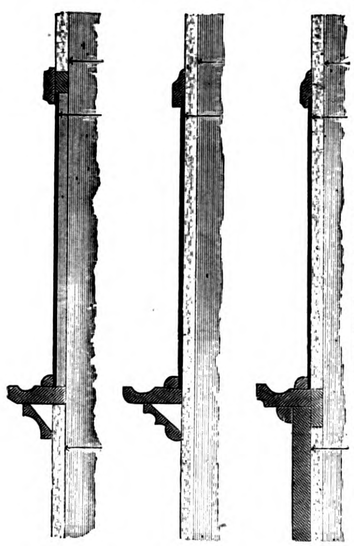


Fig. 19. Fig. 20. Fig. 21.

*Bangor Slate Blackboards.—Showing Different Methods of Setting Boards.*

one forming a separate water-heater and presenting a large surface to the hot gases by means of horizontal water-ways. At the four corners of each section are openings for the water circulation. Through these openings and extending the entire length of the boiler are the iron rods with nuts on the ends for holding the sections together.

The horizontal water-ways have flanges extending from their sides toward each other on alternate rows, forming horizontal passages, through which the products of combustion must pass going back and forth on their way to the chimney. The water-legs, or lower parts of each section, joined together, form the sides of the fire-box, while the back section has a corrugated side that completes the fire-box. The clean-out doors are of large size, both at back and front of boiler, and the arrangement of the sections is such that access can be had to every part of the surface.

The heaters are made in eight sizes having from 4 to 11 sections and are numbered according to the sections used, the one illustrated being No. 9, as it is composed of nine sections. The fire surface varies from 65 to 170 square feet, each ordinary section containing 15 square feet. The heaters are 63 inches high, with grates from 21 x 20 inches to 21 x 55 inches, and adapted to supply from 950 to 3300 square feet of radiating surface. On account of the size and form of the fire-box the manufacturers claim that their heaters will burn hard or soft coal, wood or natural gas with equal advantage.

### Bangor Slate Blackboards.

Auld & Conger, of 100 Euclid avenue, Cleveland, Ohio, have just issued a little circular devoted to the Bangor slate blackboard and presenting illustrations of the methods employed in setting them. As being of interest to our readers we extract a few particulars concerning the plans of erecting these boards most generally employed. Fig. 19 shows a case where the building is arranged for boards when built with the furring strip on top and with no plastering behind the board. The face of the board is set flush with the plaster and furring strips are put on the wall, leaving ¼ inch, which is the thickest of the board. No. 20 of the illustrations shows the manner of putting up boards on old walls or upon any wall after the plastering is finished. Where no wainscoting is used the illustrations show the chalk-board. Fig. 21 of the cuts shows the same plan as Fig. 20, except where wainscoting has been used. The company have exceptional facilities for producing blackboards, which are made from hand-shaved Bangor slate taken from the large beds of the Bangor Union Quarry. These boards, it is said, have been used many years without showing any signs of wear and are said to improve with age. The boards are made 2 feet 6 inches, 3 feet, 3 feet 6 inches and 4 feet wide, and in lengths range from 4 to 7 feet. The ends are jointed where the sections are longer than the length of a single piece. In packing the blackboards at the works the joints are numbered, and in case there is in one order boards for more than one room, the rooms are numbered for convenience in setting. The firm keep a large stock on hand and claim to be able to fill orders promptly. The statement is made that they frequently ship blackboards in the same car with roofing slate, which results in economy in the matter of freight charges.

### Wood Screws.

In order to show the manner in which their wood screws may be bent and twisted without fracture to the fiber, the American Screw Company, of Providence, R. I., have issued an illustrated circular or sheet, from which the accompanying engravings are selected. The illustrated sheet shows the screws bent and hammered into almost every conceivable shape, and indicates in a very striking manner some of the qualities possessed by the goods of this well-known company. Screws which can be bent and twisted into such shapes as are here illustrated cannot fail to command the consideration of those engaged in the building trades.

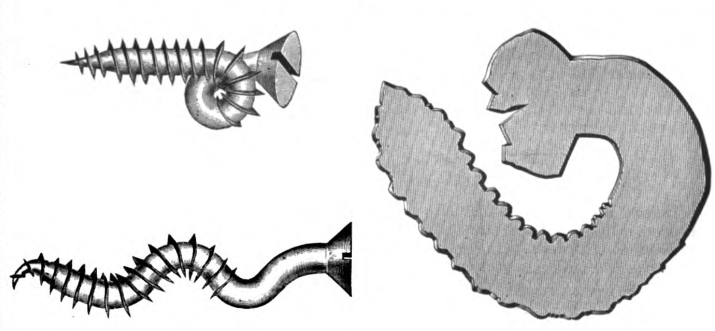
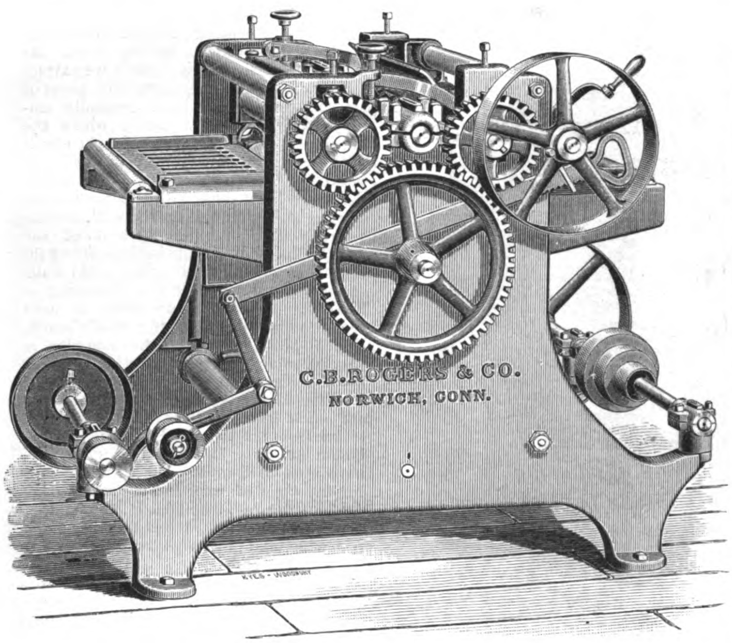


*Fig. 22.—Wood Screws Made by the American Screw Co., Providence, R. I.*

**Improved Single-Surfacer.**

C. B. Rogers & Co., with warerooms at 109 Liberty street, New York, and factory at Norwich, Conn., have just placed upon the market a single-surfacer, a general view of which is afforded by means of Fig. 23 of the accompanying illustrations. In the construction of this machine the cylinder is made from a solid steel forging, is double or single belted and runs in self-oiling boxes. The feed-rolls are made large, and in double-belted machines are geared both top and bottom. Three changes of feed are provided for by means of cone pulleys on the feed-counters, the changes being effected by simply shifting the belt on the cones. Cylinder and feed-roll boxes are made fast to the frame of the machine, and by means of the hand-wheel at the side the bed may be raised or lowered to accommodate different thicknesses of stock. The machine, it is claimed, is easily operated and is a valuable adjunct for all shops doing general work. The machine will work stuff up to 24 inches wide and 6 inches in thickness. The pulleys on the cylinder are $4\frac{1}{2}$ inches in diameter and have a $4\frac{1}{2}$-inch face. The machine weighs 1800 pounds; it requires 27 feet of 3-inch feed-belt and 2 or 3 horse-power to operate it.




*Novelties.—Fig. 23.—Improved Single-Surfacer Built by C. B. Rogers & Co.*

**The Boston Syphon Closet.**

Dalton & Ingersoll, 171 High street, Boston, Mass., manufacture the Boston syphon closet, embodying certain novel features, for which they claim special advantages. As will be seen from the engraving, which presents a sectional view of the Boston syphon closet No. 24, the bowl contains a large body of water and the lower trap has the usual seal. This closet, which is entirely of earthenware, is provided at its outlet with a patent floor connection, which, it is claimed, makes a positively tight connection between the earthenware and metal pipes. The operation of the closet is as follows: When water is supplied to the closet one-half of it goes through the jet at A and forces the air that is between the two traps through the water of the lower trap, thus creating a partial vacuum and establishing a syphon which draws out the contents of the bowl. The other half of the water passes to the flushing rim, washing the bowl and assisting to discharge its contents. The reason for dividing the stream of water in this way is not only to syphon the closet but to prevent the objectionable spattering which occurs when all the water is discharged directly into the bowl, and at the same time it produces a more forcible expulsion of water through the lower trap, and prevents the possibility of anything remaining in the trap after the closet has ceased to syphon. The refill to the bowl comes from a small service-box in the bottom of the tank. This closet is said to be almost noiseless in its operation, and the valve which supplies it is automatic in action, insuring a positive flushing of the closet at the slightest pull. The floor flange on this closet shows the lead connection of the soil-pipe running up through it and into the discharge end of the closet 1 inch. This construction not only gives a packing between the flanges but also up into and around and between the lead pipe and the earthen walls, and if the packing substance fails to press up the entire length of the socket space, the balance will be filled with water coming from the bowl, which water will form a trap around the joint. It will be noticed that the closet is not fitted with a trap-vent, which is omitted, the manufacturers say, for appearance' sake, and because it cannot be kept clean. To prevent the syphoning of the closet when other fixtures on the same stack of soil-pipes are flushed, the lead connection is vented as shown in the cut. The Boston syphon closet will work with any elevation of cistern.

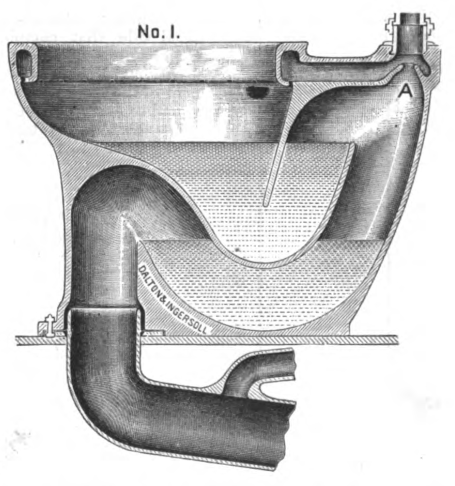



*Fig. 24.—Sectional View of the Boston Syphon Closet.*

**The Fox Adjustable Try and Bevel Square.**

This article is manufactured under a recent patent by the Bridgeport Steel Cutting Company, Bridgeport, Conn. It is represented in the illustration herewith. From this it will be seen that it consists of a try-square with an attachment on the back of the handle by means of which it is readily converted into a bevel, which is easily given a variety of adjustments, by means of which it can be set for any pitch or angle. The bevel attachment is a sliding bar on the back of the handle, and on it are marks for pitches from 7 to 16 inches, and another mark on the back of the square blade, which is used in giving the adjustment desired. For example, in order to obtain a 7-inch pitch the sliding bar is placed in such a position that the mark 7 is in an exact line with the notch cut in the back of the square blade, and it is fastened in that position by means of the thumb screw, when by placing the

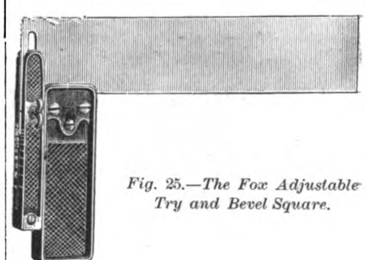
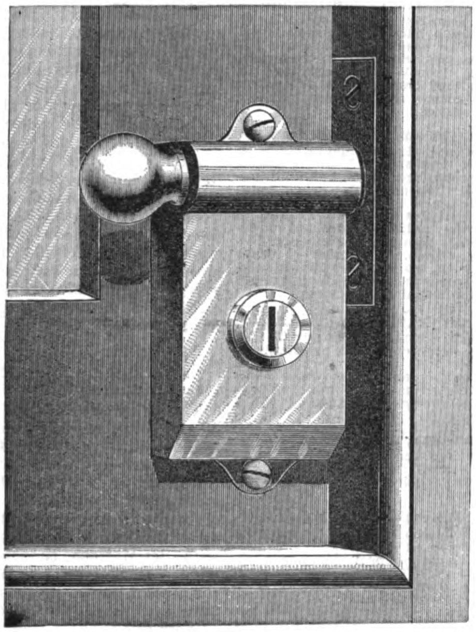


*Fig. 25.—The Fox Adjustable Try and Bevel Square.*

top of the slide and the rounding corner of the handle against the work the line of the blade will indicate the correct bevel or pitch desired. In the same manner it may be adjusted for a pitch of either 8, 9, 10, 11, 12, 13, 14, 15 or 16



*Novelties.—Fig. 26.—Standard Rim-Spring Sash-Lock.*

inches. The marks for octagon or pitches of 5 and 6 inches are on the top of the slide, there being a corresponding notch in the top of the blade. It will thus be seen that this ingenious and well-made tool can be set instantly to any pitch or rise from 5 to 16 inches without the aid of other tools, and combines in convenient form the try, bevel and miter square, and is thus adapted to a wide variety of uses. It is also to be borne in mind that when set for any pitch or angle the try-square can also be used. The quality of the workmanship and the accuracy of the tool are other points to which the company direct attention. Its price, 8-inch, is $15 per dozen, with a discount to the trade.

### Standard Rim-Spring Sash-Lock.

This sash-lock is made by the Yale & Towne Mfg. Company, Stamford, Conn., and 62 Reade street, New York. It is to be observed that it is in fact a *lock* by means of which the window is securely fastened. From an inspection of Fig. 26 of the cuts it will be seen to consist of a


*Fig. 27.—Key of Lock.*

spring bolt engaging with a keeper placed at any desired point on the window-casing, and has a lock by means of which it can when desired be fastened securely against opening until it has been unlocked. It is obvious that security which does not attend the use of other sash fasts is thus obtained, and its convenience and the excellence of the mechanism are also referred to. The sash-lock is furnished with nickel-plated steel keys as shown in Fig. 27 of the illustration.

### Barrett's Recessed Wash-Bowl.

James Barrett, 193 Tremont street, Boston, Mass., manufactures and offers to the trade Barrett's recessed bowl, basin waste, combination trap and basin support, a sectional view of which is presented in the annexed cut. The brass waste and overflow, it will be noticed, has no stem or rod passing through the marble slab, thus permitting the basin slab to be cut out the shape of the recess. Furthermore, it permits the recess, which is larger than ordinary, to be readily kept clean. The waste is operated by merely tilting back the stand-pipe to the position shown in the cut. As the stand-pipe is made, being hinged at the back, there are no parts to turn or work loose. The brass trap B is immediately under the waste, so that there is no long line of pipe to become foul. A single screw-joint connects the trap with the waste-pipe and vent. This joint, furthermore, is furnished with ears for screws, which when fastened to the wall is said to make a very strong and solid connection, the special feature of strength being also claimed for the trap, which is screwed in place. The solidity of these attachments enables the manufacturer to attach a basin support to the trap, as shown at C, and consequently doing away with the leading of brass clamps into the marble slabs. The bowl is readily taken out by disconnecting the union at E and the coupling connecting trap and waste fixture. The combination, it is claimed, enables the plumber to take the pattern for the slab in a very short time and be sure of its being exact, as the bowl and its fixture are entirely independent of the slab. This, it is pointed out, will be especially convenient when there are a number of bowls under the same slab.

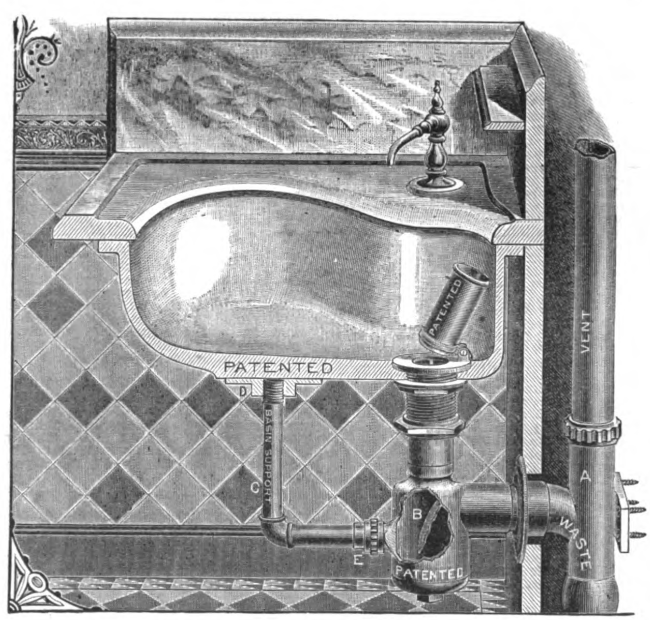



*Fig. 28.—Barrett's Recessed Wash-Bowl.*

**A Simple Boring Test.**—The question of simple methods of investigating the ground underlying foundations has been lately discussed in *Engineering News.* The latest method suggested for borings of moderate depths comes from a correspondent signing himself "Buckeye." He says he has frequently used for this purpose the following simple method: Take a worn-out locomotive boiler flue, and cut slots about ¾ x 6 inches in a spiral winding around the flue. Then sharpen one end of the flue to a cutting-edge and put a heavy screw-cap on the other end. This cap should be not less than 3 inches long and solid for 2 inches of its length. In using this testing apparatus drive the flue down with a heavy sledge and at the same time turn the pipe with a large chain-tongs. The pipe can be lifted again by a lever or a derrick of portable form. When the tube is withdrawn the character of the material penetrated can be examined through the slots in the sides. A locomotive boiler-flue is generally about 11 feet long, but this is usually sufficient to test the foundations of light structures.

# TRADE NOTES.

WE HAVE RECEIVED from the Lawson Valentine Company, New York City, a copy of the picture entitled "Army Teamsters." This picture is reproduced in *fac-simile* from the original painting by Winslow Homer and owned by Mr. Lawson Valentine. The lithographic work was done by Messrs. Armstrong & Co., of the Riverside Press, Cambridge, Mass. The picture is mounted upon imitation leather, and is being distributed by the Lawson Valentine Company primarily for advertising purposes. It is of a character well adapted to serve the purpose for which it is issued, and will be prized by all into whose hands a copy may come.

THE REPORTS at hand from the Northwestern section of the country indicate that up to the present time building operations are fully up to the average, and that the outlook for the remainder of the season is all that could be expected. In St. Paul, Minneapolis and vicinity there are a number of buildings in process of erection, permits having been granted for numerous structures designed for business and dwelling purposes. As a rule these are of comparatively small cost, few, if any, exceeding $100,000. It appears to be the impression that buildings ranging in cost from $5000 to $30,000 are calculated to give proportionately fully as large returns as those costing a great deal more money. Builders, contractors and architects are busy, and so long as they are fully occupied have no reason to complain of the condition of business.

THE GLEN COVE MACHINE COMPANY, Limited, of 24-30 Clay street, Brooklyn, N. Y., are distributing among the trade a poster of somewhat liberal proportions showing some of their improved planing-mill machinery. The poster is bound at the top and bottom with metal strips for the purpose of rendering it durable and is provided with an eye in order that it may be suspended upon the wall. The machines illustrated are the Glen Cove double decker, the No. 1 sectional rolls sizing machine, and the Nos. 1, 1½ and 2 planing and matching machines.

THE CARTON FURNACE COMPANY, of Utica, N. Y., have recently purchased the foundry buildings adjoining their premises formerly occupied by the Wood & Mann Steam Engine Company. The acquisition of this property gives them an addition of 40 floors and makes their furnace plant one of the most extensive in the country. The Carton Company are at present enjoying a very good demand for their furnaces, their sales showing a gratifying increase over last year, when they experienced difficulty in promptly filling orders.

ALEXANDER Y. LEE, of 96 Fourth avenue, Pittsburgh, Pa., has prepared an extended bird's-eye view of the valley of the Conemaugh, Johnstown and the lake at South Fork, some miles above it, which was drawn from personal sketches and is based upon surveys of the Pennsylvania Railroad. Mr. Lee has incorporated in this view some of the scenes of the recent terrible flood, and the picture is a faithful representation of what the visitor would have seen shortly after the bursting of the dam.

THE E. D. ALBRO COMPANY, of Cincinnati, are at present very busy meeting the demand for their hard-wood lumber, veneers, &c., which they handle in large quantities. They report a gratifying demand for the material known as veneered panel stock, and also for the three-ply built-up work, now becoming so popular. At latest devices they were receiving a cargo of choice white mahogany, a beautiful wood which comes from the west coast of Mexico and which is very popular with railway-car builders, who employ it for fine interior decorations.

THE EGAN COMPANY, of Cincinnati, Ohio, have just added to their extensive assortment of wood-working machinery a new three-drum sand-papering machine, which they consider one of the most perfect ever produced. An engraving of this machine is, we understand, in preparation, and we trust at no distant day to have the pleasure of presenting to our readers an illustrated notice of it

IN THEIR SPACE in another part of this issue L. Schwartz & Co., 89 and 91 Seneca street, Buffalo, N. Y., direct attention to the fact that they are manufacturers of hard-wood and slate mantels, and offer an extensive line to select from. They present an illustration of one style of mantel which they manufacture. They solicit correspondence with the trade.

THE CARTON FURNACE COMPANY, Utica, N. Y., present an illustration of their warm-air furnace, and direct attention to the Carton and Tropic Warm-Air Furnaces which they manufacture. They invite the trade to send for their 1889 catalogue.

IN THEIR CARD in another part of this issue, the Duplex Steam Heater Company, 23 Bethune street, New York, direct attention to their steam heater, an illustration of which is presented They state that skilled labor in its operation is not required and that it burns either soft or hard coal. They offer to furnish free illustrated catalogue and estimates on application.

THE MONTAGUE-WOODROUGH SAW COMPANY, 104 Pullman Building, Chicago, Ill., in their advertisement this month present a cut of the B. M. T. Patent Tooth Saw, which they describe as being a rip, cross-cut and miter saw, all in one. They assert further that it makes a perfect joint without planing, and cuts faster and better than others. They offer sample saws prepaid on receipt of price, and price-list and description on application.

C. POWELL KARR, Stewart Building, New York, has issued a circular referring to the special work which he is doing as architect and engineer. The headings include the following: Foundations, Strength of Materials, Fire-Proofing of Iron-Work, Calculations of the Stresses on Roof Trusses, Piers, Posts, Columns, Beams, Girders, &c. He also makes a specialty of Acoustics.

THERE HAS JUST BEEN ISSUED from the press an interesting little pamphlet by Major H. G. Denniston, of Denniston & Wallace, Waterbury, Conn., on the general subject of lightning-rods, their application and value when properly constructed and scientifically applied. The matter presented is of general interest to all engaged in the building trades and constitutes an important addition to the general literature of the subject. A number of pages near the close of the work are devoted to testimonials from those who have used solid copper rods as a protection against lightning.

THE MASONIC FRATERNITY of Natchez, Miss., contemplate erecting in the near future a hall and opera-house combined, and desire to announce to architects in that vicinity and in other sections of the country that those desirous of submitting plans may obtain full particulars by addressing "Committee," Lock Box K, Natchez, Miss.

GOULD & ANGELL, architects, of Providence, R. I., have recently removed their offices to the Swarts Building, located at 87 Weybosset street. Their Boston office is at No. 10 Tremont street.

GOODELL & WATERS, Philadelphia, Chicago and San Francisco, have just issued from the press a catalogue of somewhat liberal proportions showing their improved line of wood-working machinery. The catalogue consists of nearly 130 pages of letter press, profusely illustrated with wood-working machines of all descriptions. To many of their productions the firm have added during the past year a number of valuable features, which they feel cannot fail to be appreciated by the trade. They direct special attention to their Keystone Rapid-Feed Flooring Machine, their Nos. 10, 11 and 12 Combined Planers, in which they have introduced a number of improvements, and also to their new 10 and 12 inch Molders, which are offered as first-class constructions. All the machines made by this company are interchangeable and all are thoroughly tested before leaving the works The goods illustrated in this catalogue include single and double surfacers, planing and matching machines, molding-machines, sawing machinery, mortisers and tenoners, endless-bed machines, car machinery and a miscellaneous assortment of lathes, knife-grinders, belting, molding-heads, pulleys, shafting, sand-paper machines and sash and blind machinery. The catalogue is well printed throughout, and the engravings are of a character to convey a very clear idea of the machines illustrated. It is bound in paper covers, with neat typographical side title. The fourth page of the catalogue is devoted to a general view of the firm's works.

THE CHARLES W. SPURR COMPANY, 465-467 East Tenth street, New York, and 7 Park street, Boston, in their card in another part of this issue invite correspondence, and offer their new catalogue free to every applicant. Sample carvings will be furnished at a nominal price.

IN THEIR ADVERTISING SPACE on another page Charles A. Strelinger & Co., Detroit, Mich., present cuts of the Allard Patent Original Screw-Driver, which they claim to be of the best material and superior workmanship. Their special offer will be found very interesting by many of our readers. They invite the trade to send for their No. 12 catalogue of tools for wood-workers, containing 200 pages and 700 illustrations.

IN THEIR ADVERTISING SPACE in another part of this issue the W. F. & John Barnes Company, 71 Ruby street, Rockford, Ill., direct attention to their foot-power machinery. They present cuts of some of their manufactures and offer to send machines on trial. The trade are invited to send 5 cents for 66-page catalogue.

C. E. JENNINGS & Co., New York City, are offering the trade an interesting assortment of mechanics' tools and hardware specialties which are calculated to meet all existing requirements. They direct particular attention to their new patented iron plane, the bottom of which is inlaid with rosewood strips firmly dovetailed into the iron, and so combined as to prevent the wood from wearing away. It is made in several sizes, running from Nos. 303 to 307. Another specialty to which they direct attention is their perfected expansion bit made under Sturs' patent. It is stated that the cutter will not slip, and that the construction is such as to overcome the greatest objection in expansion bits. Barrett's combination roller-gauge, which they offer, is made expressly for wood-workers' use and is claimed to be the most perfect tool for lining out work either single or double, measuring depths and striking circles, that has ever been invented.

# NEW PUBLCIATIONS.

CONNORTON'S DIRECTORY OF THE NATIONAL ASSOCIATION OF BUILDERS OF THE UNITED STATES. Published by J. W. Connorton, 177 and 179 La Salle street, Chicago, Ill.

This is a work of nearly 600 pages, bound in stiff board covers, and is issued annually by the publisher. It is designed for the use more particularly of contractors engaged in the building trade, and presents a list of reputable dealers in all kinds of material employed in the construction of buildings. The names presented are carefully selected and cover the most important cities in the United States. Among the opening pages of the work is presented a list of officers and directors of the National Association of Builders elected at the second annual convention held at Cincinnati, Ohio, in February, 1888, while scattered through the volume are numerous advertisements which will be found of general interest to those engaged in the building trades.

A HISTORY OF THE PLANING MILL. By C. R. Tompkins, M.E.; John Wiley & Sons, New York, publishers. Price, $1.50.

The writer of this book, having been for 40 years or more identified with planing-mill machinery, speaks with confidence of the designs now well known and also of the needs of this important branch of mechanics. Opening his work with an early history of the planing-mill and the early inventions in England, he follows with descriptions showing the gradual advances and improvements made up to the present time. He then deals with the practical operation of wood-working machinery and the adjusting and working of these appliances. Although the book is headed "A History of the Planing Mill," it is really a discussion of the construction, care and management of wood-working machinery in general, the subjects treated including the various kinds of wood-working machinery, lubrication, hints about molding-machines, responsiblities of foremen, advice to operators, artistic wood-work, shafting, belting, &c.

A MACHINE for cutting down trees is said to be coming into vogue in Oregon. It is run by electricity, and, unlike steam machinery, can easily be moved about in the woods, as the motor is placed on a high cart and runs a cutting drill, which sweeps from side to side, and is advanced as the work progresses. The electricity can be supplied from a stationary steam-engine or a water-power.

A CEILING, consisting in general of sections of corrugated iron held in place by suitable cleats, forms the basis of a patent recently granted to L. L. Sagendorph, of Cincinnati, Ohio. A one-half interest in this patent has been assigned to Charles N. Harder, of Philmont, N. Y. Each cleat and panel strip consists of a single strip of metal bent so as to form a central ridge, having a flat top and sides, from which flanges extend latterly and terminate in up-turned edges. The flat top of the ridge is provided with apertures for nails, screws, or other means employed for holding the cleat and panel strip in place.

G. A. HERDMAN, of London, England, is the patentee of a felt roofing which consists of two or more sheets of felt with an intervening web of woven wire or other material, the whole being corrugated or fluted. The inventor claims that in this way a material is formed which has all the properties of ordinary felt and the added quality of rigidity and self-support, which cannot be obtained with ordinary felt or with materials having an intervening web without corrugations.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



VOLUME XI. NEW YORK, AUGUST, 1889. NUMBER 8

## Pittsburgh Office—Change of Address.

The Pittsburgh office of *Carpentry and Building* has been removed from 77 Fourth avenue to Room 511, Hamilton Building.

THE PARIS correspondent of the New York *Sun*, giving expression to some of the thoughts suggested by repeated visits to the exhibits at the Paris Exposition, says that "the artistic impression of the exposition of 1889 is not given by art, but by industry. The Eiffel Tower and the machinery gallery, in particular, are the precursors of a new architecture which will be created, not by architects and stone-cutters, but by engineers and metallurgists. Enough of strange mixtures of all styles and all epochs, enough of reductions of *renaissance châteaux* and enlargements of Greek temples; enough of servile copies and unintelligent combinations, where no attempt even is made to adapt a form to our state of mind, to our wants, to the habits of contemporary life. The reign of metal has begun. The engineers are inventing new harmonies, new forms, new curves, a new dream of beauty."

THE STUDY of drawing as required in the various branches of the mechanic arts is of high importance. It is as essential to each intelligent workman engaged in a particular line of trade to learn how to make drawings and to be able to read them as is a knowledge of writing to the intelligent individual in order that he may communicate his thoughts to others, read their writings and be instructed or directed thereby. Drawing is but object writing—a universal language—and for the young mechanic in the building trade who desires to succeed in his chosen profession it is essential that he early master the simple branches of drawing. A knowledge of practical geometry is the foundation of his needs; for besides the acquired understanding of practical geometry and its application to the details of his trade, there is gained in this elementary study and practice the ability to neatly and correctly draw geometrical figures. This accomplishment, together with the ready use of the drawing instruments, is the basis of an ability to produce the best drawings likely to be called for in the business in which he is engaged.

THE OLD SAYING "There is a time for everything" is as true to-day as it was centuries ago, and it suggests the thought that with the long evenings of winter not far away it is time to consider plans for their useful occupation. The young mechanic who desires to make progress, but who perhaps has not enjoyed the opportunity of acquiring a technical knowledge of drawing as applied to his particular trade, is reminded that he cannot too early begin to follow in the footsteps of some of his fellow-craftsmen, and emulating their creditable example, move forward with the march of progress, gathering knowledge and improving opportunities which in the years to come will redound to his advantage. If he be located in a town or village near or in which there is no school where the art of drawing as applied to the different branches of trade is taught, let him, with the co-operation of his willing associates, petition the local Board of Education or School Trustees, as the case may be, to open for use class-rooms and provide the necessary fixtures, text-books and tools and assign competent technical instructors, to the end that all who desire may profit thereby. It is scarcely probable that such a petition would go unnoticed by those having the education of the youth of the town in charge. Few if any of those who, by their service to the public without compensation, show a genuine interest in educational matters will fail to perceive the importance to individual applicants as well as to the community at large of the technical education of all ambitious mechanics, especially when it can be accomplished at such comparatively small expense.

TO THE MECHANICS interested in technical education we would say, Commence now. Do not leave it for some more convenient time, for none will be found. The present is full of glorious opportunities for good, and no delay should result in preparing for the winter's work. Agitate the subject of technical education in the workshop and where else the opportunity offers. Draw up a paper for signatures and circulate it among fellow-craftsmen. Let it bear a petition something like the following, and when liberally signed let it be presented to the proper officials, and we venture the prediction that much good may result:

*To the Board of Education of the Town of ——: or, To the School Trustees of the Village of ——:*

GENTLEMEN.—The undersigned mechanics, residents and citizens of ——, desirous of employing a portion of our evenings during the coming season—October to March, inclusive—in the useful and important study of drawing as technically required in our several trades, do respectfully petition you as citizens in charge of this educational branch of public service to appoint a qualified instructor for the purpose mentioned, and assign the necessary class-room, fixtures and tools.

Try it, and let us know the result. There should be anywhere from 500 to 5000 new drawing-classes started this winter if our readers act on the suggestion here offered.

THE ANNUAL EXHIBIT of work done at the Chicago Manual-Training School proved a very creditable display both in variety and excellence, and promises a successful future for the institution. The school was established by the Commercial Club of Chicago in 1882, and occupies the large building at the corner of Twelfth street and Michigan avenue. In the designing and drafting departments, on the upper floor, were exhibited some 700 out of nearly 10,000 sketches and drawings made by the three classes during the year. The prize drawings were very highly spoken of by those who saw them, and the other exhibits were the subject of much favorable criticism, special mention being made of a foot-lathe, a jeweler's lathe, a dynamo, a 3 horse-power steam-engine and a drill-press which the students had built. The visitors to the exhibit also had an opportunity to see the pupils while engaged in actual work at the forge, in the machine-shop and while using the wood-working machines. At the close of the present year there were 11 teachers and 229 pupils, of whom 106 were in the junior class, 66 in the middle and 57 in the senior class. The best proof that this school is not a sort of a play-house, which is what too many people consider institutions of this kind, is that the average age of the senior class is 18 years. A pupil 18 years old is well beyond the kindergarten age and may be relied upon to do conscientious and earnest work, and where work is done in this spirit the highest results are sure to follow. The popularity of these kinds of schools proves their necessity, and already in the case of the Chicago Manual-Training School there is complaint about lack of room.

AMERICANS are always chary about accepting English ideas or following the English lead, and yet there are many cases where they could imitate the older nation with advantage, more especially in the matter of laws and governmental regulations The latest legal restriction in Great Britain that deserves commendation, and might well be copied here, is the enactment relating to patent agents, who hereafter will be compelled to pass an examination before being permitted to follow their calling. The system was announced to come into operation July 1, after which time no one will be entitled to assume the title of patent agent who is not registered, and before registration they will have to pass a suitable examination before a board. Those who can prove that they were practicing patent agents previous to the passage of the act under which the new regulations are framed may claim to be registered. The penalty for practicing in violation of the new law is a fine not exceeding $100. The keeping of the register is committed to the Institute of Patent Agents, who are to frame a scheme for the examination of candidates. Certain previous qualifications are required of applicants. The registration fee is fixed at $25 and there is an annual fee of $15 additional. We have sketched the scheme in only the roughest outline, and in fact there would be no advantage of going into details, for to be applicable in this country the idea would have to be worked out quite differently. That the need exists in the United States for some sort of restriction on the patent solicitors no one will doubt who has had experience in the taking out of patents. The agents here are neither registered nor licensed, and are subject to no special jurisdiction whatever. An unfortunate client who has suffered through the dishonesty, ignorance or negligence of the agent has recourse only to the ordinary civil actions for damages. This entire lack of restriction has led many to enter the profession, if we may so call it, of patent solicitor, and the result is that it includes the good, the bad and the indifferent, with the latter two greatly predominating in numbers. If the patent solicitors themselves had an association they could accomplish a great deal, and it would be a step toward obtaining Government sanction of suitable regulations and restrictions.

## THE PLATES.

In our issue this month we present a few sketches of some of the buildings at the Paris Exposition, illustrating the history of human dwellings. These are located at the end of the Champ de Mars, near the river, and were designed by Mr. Charles Garnier, member of the Institut de France. In Plate XXIX we show one of the more interesting models of this series—an Aztec house from pre-historic Mexico. The precise date of these buildings is unknown, though Prescott's "Conquest of Mexico" and other works have thrown considerable light upon the customs of Aztecs and their institutions. Humboldt remarks upon the resemblance of some of the ornaments found on their ruined buildings to those which enrich Etruscan vases of Lower Italy.

In our double page plates (XXX and XXXI) are presented sketches of other noteworthy examples, including the Etruscan house (1000 B. C.) with its overhanging upper story of timber; the Hindu house (300 B. C.); the Arab house, the habitation of the thirteenth century; the house of the Incas of Peru and the dwelling of the sixteenth century. The Greek house represents the time of Pericles (circa 430 B. C.). In all of these earlier instances much of the detail necessarily is based upon surmise, though so learned and celebrated an antiquary as Mr. Charles Garnier was no doubt enabled to furnish particulars from his store of archæological knowledge with which to compose these historical reconstructions and compile them with a degree of accuracy seldom obtained, if, indeed, such an effort of exactitude has hitherto been attempted.

In Plate XXXII we show a Syrian house, 1000 B. C., and a house of the Gallic-Roman period of the age of Clovis.

With reference to the building of these houses, it may be mentioned that M. Cassien-Bernard acted as inspector of works, assisted by M. Nachon. The builder was M. Reynaud, also of Paris.

## Plastering.

Mr. James Wright, of Toronto, delivered an address before the Architectural Draftsmen's Association of that city some time since on the general subject of plastering. His address was replete with valuable hints and suggestions, and we append the substance of his effort, believing that it will be of interest to our readers:

Laths should be only 1 inch wide for ceilings and 1½ inches wide for walls and partitions. The joints should be broken every 12 laths; a larger joint than this is likely to cause a crack in the plaster through the expansion of joist. The laths should be well nailed, uniformly ⅜ inch apart. Green are better than dry laths in all cases, but particularly when no artificial heat is used, as there is no expansion; dry laths expand, then contract, generally cutting the key. Laths having the bark adhering to them and black supply laths should always be discarded, as they will certainly discolor the work, but as this class of laths is supposed to be only in No. 2 quality, No. 1 should always be used. In exterior work laths should never be employed, as they sometimes are, as a substitute for strapping. The strapping should be at least 1 inch thick, otherwise the key will be broken through the expansion of the boarding.

Architects' specifications usually call for "clean, sharp sand." Sharp sand may not always make the best mortar. On Carlton street and that vicinity, in this city, there is a sharp sand which has not the quality of consuming a proper proportion of lime to make good mortar. It is what plasterers call "too fat." One-fifth more of this sand than that of Bloor street could be used with the same quantity of lime. Soft and loom sands will not consume as much lime as the lake sands. Sand that contains small particles of clay should never be used. A good test of sand is to take a handful and work it well in the clean hand; if it leaves a deposit of color on the skin it contains clay or decomposed sand. A mortar has been made in England from crushed bricks and clay, and used with success in large cotton factories, where the machinery causes a continual jar. It sets very hard with lime, a hammer having to be used to remove it. Sea sand cannot be used for plastering, as the salt which it contains causes dampness.

Hair should be long and dry, beaten with rods and separted properly, and not, as is usually done, soaked in a barrel and then thrown in the pit. In England the hair is not mixed with the lime until the latter has stood for about three weeks; this is not necessary in this country, where the limes slake quickly.

All reliable firms keep a mortar man, who from his experience is skillful in the art of slaking limes, and on him depends the class of mortar used in a building, provided he is given the best materials. The mode of slaking the lime and mixing the hair and sand is so well known that it need not be repeated.

In two-coat plastering it is simply impossible to make the angles "straight, plumb and square," as usually called for in the specifications, unless the studding and strapping is plumb and square. Architects should always specify plastering to be done in three-coat work to insure a first-class job—the extra cost is only 3 to 4 cents per yard. A proper key is obtained for the first, or scratch coat, and all expansion and contraction is avoided, as only enough mortar is put on the laths to form a bond for the next coat, or what is called the "browning," or "straightening" coat. This coat should not be carried up to the ceiling where a cornice is to be run. In the preparation of putty for finishing, great care should be taken in slaking the lime, so that it does not burn or "dry slake." It should be completely covered with water in a box prepared for that purpose. After it is properly slaked it is mixed to a proper consistency, then run through a fine sieve into a pit. All putty should stand at least two weeks before being used. If used before that time it is likely to blister. A blister is caused by the lime not being properly slaked, small particles going through the slaking process after the lime has been used. The scratch coat not being covered to the depth or projection of the cornice, forms a key to retain it—that is, if the cornice is not very heavy. If very heavy, nails should be driven in where there are joists, and where there are no joists the key should be cleaned out at intervals and the gauged mortar pressed into it. Mortar is called gauged when plaster-of-paris is added to it. In heavy cornices the core is generally composed of hair, mortar and plaster-of-paris. For first-class work at least one-third of the core should be plaster-of-paris. The miters have to be worked in by hand with mitering tools, no mold having been devised as yet that will run the cornice into the angles. The short returns or breaks are generally planted in, having been previously run and cut on a board. The running of cornices and moldings of paneled ceiling, arches, &c., requires the judgment and skill of the best plasterers, to whose knowledge of plastering should be added an acquaintance with the moldings of the various styles and classic orders and some knowledge of practical geometry. In finishing walls which are required to be done in a first-class manner, it is usual to finish one wall at a time, one wall being worked from top to bottom before proceeding with the other. The ordinary way on two-coat work is to finish the ceiling and upper part of the walls first, then, after the scaffolding is removed, the lower part is finished. By the latter method it is very difficult to trowel down level the joining of the upper and lower parts of the wall, the upper part becoming hard and dry so quickly. The material used in finishing walls is a mixture of lime, putty and about one-sixth plaster-of-paris gauged together. Water applied with a brush is freely used in polishing or "troweling up," as it is called. After the finish is set and properly troweled up, it is brushed over with water and finally with the dry brush to give it a fine polish.

All centers should be put up to the lath—that is, the mortar should be removed within a few inches of the circumference of the center and the key of the lath entirely cleaned out; the center should be properly scored and soaked in water if dry. Very little lime putty, nearly all plaster-of-paris, should be used in this work. If these precautions are taken a center should remain in position as long as the joists. In putting up enrichments a little glue size added to the plaster prevents it from setting too quickly, allows more time for cleaning off the ornaments, and in the end sets a great deal harder. When the use of wire is necessary for fixing bosses or large centers copper or galvanized wire should always be used in preference to wire that would become rusted, as a collapse of work of this description might be a serious affair. A great deal of harm has been done this branch of the plastering trade through centers falling down. An architect or inspector should therefore be particularly watchful regarding the security of these ornaments.

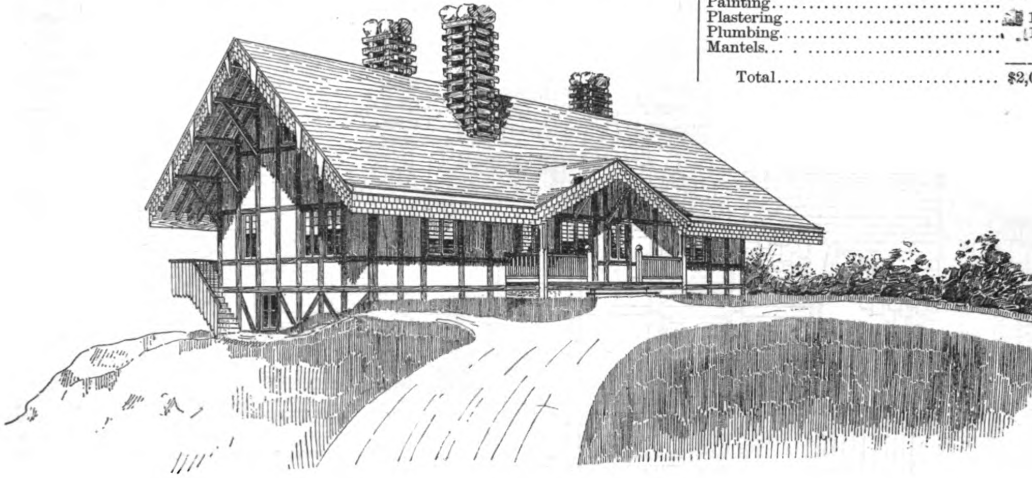
In patching the loose, broken edge should be removed, the dry plaster edge thoroughly dampened and secured with all plaster-of-paris, making the edge firm. When this is not done the old work springs from the new patch and leaves a crack. A patch in plaster work, if properly done, should be and can be done so as to leave the wall as good as it was originally.

## Design for a Mountain House.

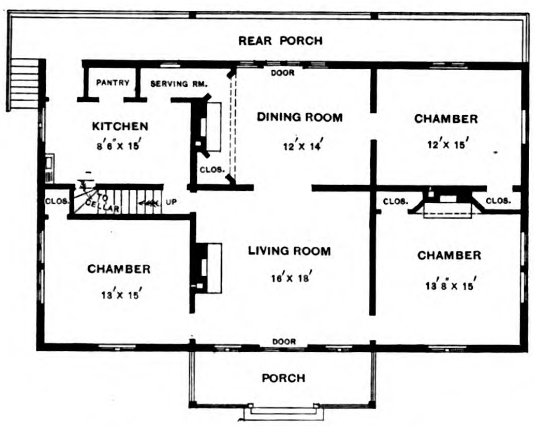
On this and pages following we show the perspective view, elevations, floor plans and details of a mountain house or summer resort of which M. Heister, of Cincinnati, Ohio, is the author. The first or main floor, it will be observed, contains the living-room, dining-room, kitchen and three sleeping-rooms, while in the attic is the bath-room and accommodations for the servants. The design of the structure closely approximates the Swiss as regards external architecture, while the general arrangement of rooms and the plan of construction render it an object of interest to our readers. We present below the estimate and specification of the house in question:

ESTIMATE.

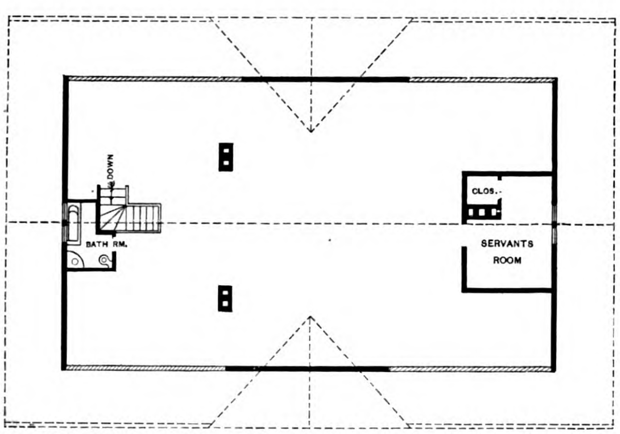
| | |
|---|---|
| Carpenter work | $1,200 |
| Brick-work | 300 |
| Masonry | 150 |
| Painting | 75 |
| Plastering | 175 |
| Plumbing | 100 |
| Mantels | 90 |
| Total | $2,090 |



*Design for a Mountain House.—Perspective View.*

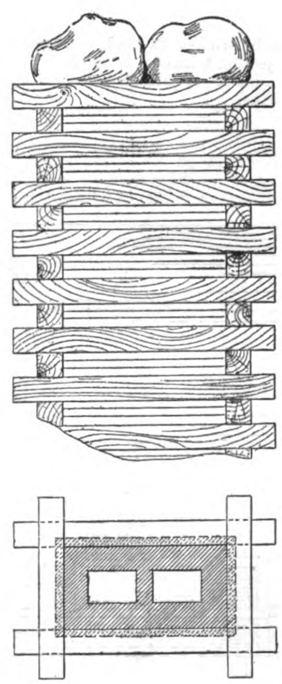



*First-floor Plan.—Scale,* 1-16 *Inch to the Foot.*




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

*Excavation.*—Grade sloping; excavate only the space to be occupied by cellar to the full depth, as shown on elevation. Owner does grading.

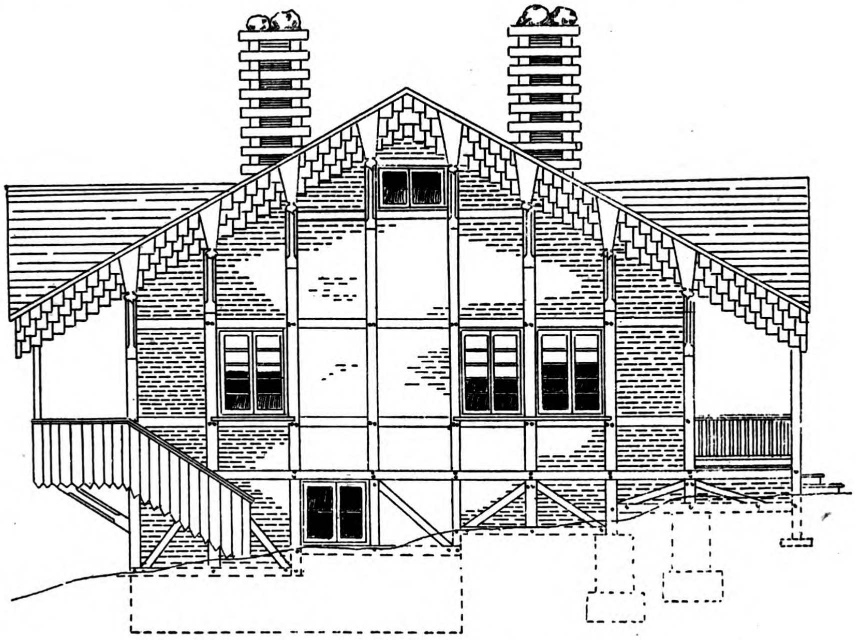


*Elevation and Plan of Chimney.—Scale, ¼ Inch to the Foot.*

*Masonry.*—Build a dry wall of ledge or field stone under part of house to be occupied by cellar; to be 18 inches thick and 7 feet 6 inches high; to be well bonded and pointed inside and outside 6 inches below grade line. The rest of house to be supported by piers 2 feet square by 3 feet high; to have footings 18 inches thick.

*Chimney*—To have same kind of brick as used on rest of building; flues to be 8 x 12 inches; to have 6 x 6 inch plates built, of well-seasoned poplar. Posts of porch to be 4 x 4 inches. Rafters and attic joists, 2 x 6 inches; 2 feet on centers. Floor joists, 2 x 8 inches; 16 inches on centers.

*Inside Finish.*—Inside finish to be clear, well-seasoned white pine; 5-inch architraves, as shown by detail; 4-inch plain architraves in kitchen; 5-inch base; 1-inch molding.



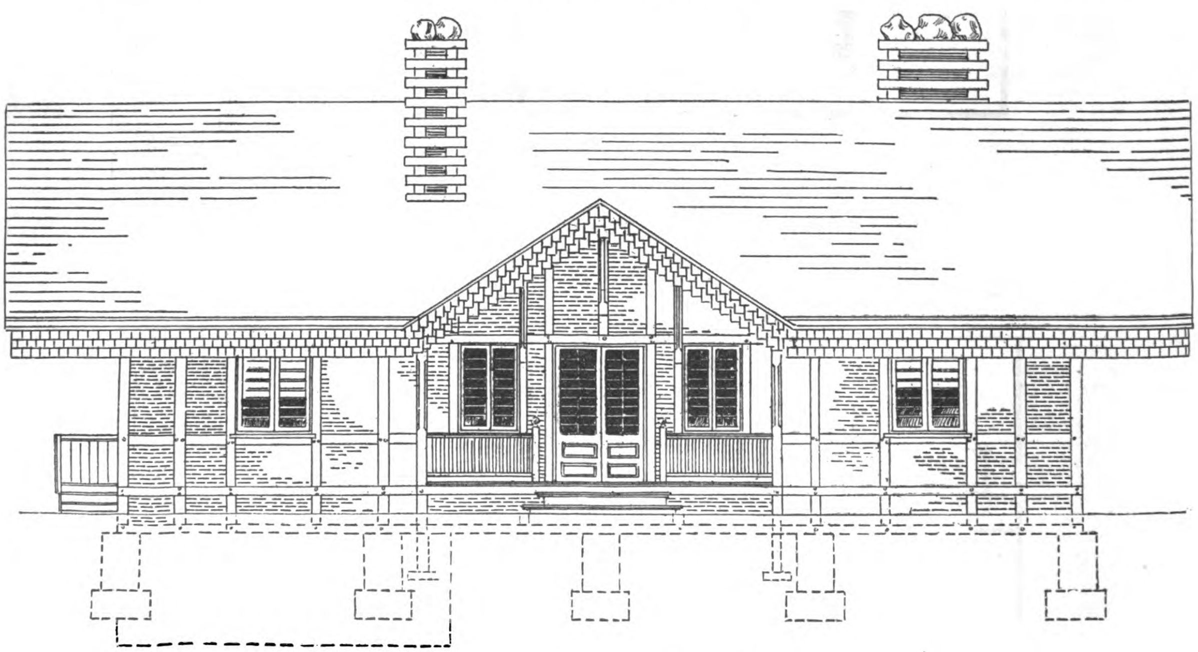
*Side Elevation.—Scale, 1/8 Inch to the Foot.*

2-inch brick-work and ends of same projecting 6 inches, as shown by detail. Fire-places of pressed brick, with slate hearths.

*Sheathing*—To be third common white pine 7/8 inch thick.

*Outside Finish.*—Finish to be first-class white pine; cypress shingles on roof and

*Flooring.*—Flooring to first floor front and rear porch to be of first-class yellow pine flooring not to exceed 4 inches in width. Attic to be floored with third



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

*Frames.*—All frames to be of third common plank, frames 2¼ inches thick. All timbers showing vertically and horizontally on building to be 6 x 5 inches; corner timbers to be 6 x 6 inches; to be eaves, wooden gutters, with galvanized iron down-spouts.

*Windows*—To be glazed with the best single-strength French glass. Sash to be 1¼ inches thick.

common mill-dressed white pine not to exceed 6 inches in width.

*Mantels.* — Thirty dollars allowed for mantels.

*Doors.*—Doors 1¾ inches thick, flush

moldings, all of white wood. Panels horizontal. Dining-room doors to rear porch to be glazed same as front.

*Plastering.*—Best two-coat work, poplar lath.

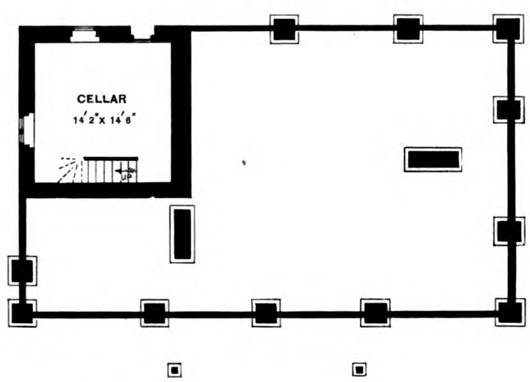
*Painting.*—All timbers, shingles and other outside wood-work to be stained with creosote. Stain dining-room cherry; hall, dark. Kitchen, two coats shellac rubbed down. Chambers and other work one coat shellac and two coats of lead and oil.

*Brick-work.*—All spaces between timbers to be filled in with brick. All brick to be of good, sound merchantable kiln-run brick; no account to be taken of different shades of colors.

*Plumbing.*—One hundred dollars allowed for plumbing.

*Hardware, &c.*—Contractor to furnish all locks, knobs, sash-fasts, hinges, butts, nails, hooks and catches.

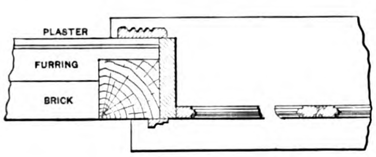
*Detail of Front Porch.—Scale, ¼ Inch to the Foot.*




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

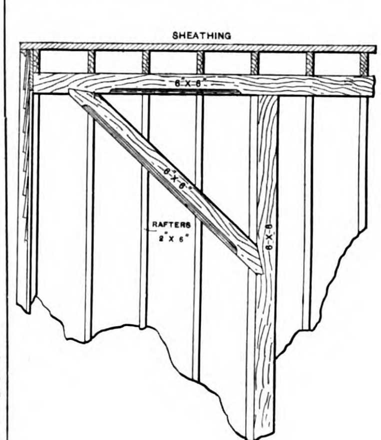
## Painting Sheet-Metal Roofs.

The subject of painting sheet-metal roofs is one of great importance, not only on account of the protection afforded, but because the material, when properly colored, can be made pleasing to the eye when placed in exposed positions. While many kinds of paint have been discovered and patented, composed of a great variety of materials, it is a question if there is a substance used that is an effective substitute for linseed oil, regarding the effectiveness of which an authority on the subject says: "By consulting experienced and unbiased painters you will learn the fact that there is no vehicle for pigments at all approaching linseed oil in effectiveness and durability, especially for exposure to the weather. A good paint must be both hard and elastic. It requires hardness to prevent abraison and wear, and elasticity to prevent cracking from expansion and contraction. Nothing but linseed oil will give these qualities, for,




*Detail of Window.—Scale, ¾ Inch to the Foot.*

strange as it may seem to many in these days of novelties, the best pigments really add but very little to the effectiveness of paints. Mark, we say the best of pigments, for many pigments are the reverse of protective and are really destructive to both the vehicles and the material which they are supposed to protect. For example, coal-tar and all its products, whether called dead oil, asphalt, rubber, &c., are of the class just described, and their use at any price, especially for covering sheet-metals, is a wanton waste of money. Extended experiments have demonstrated that there is no better pigment for metal than a good iron ore ground to an impalpable powder. To be most thoroughly effective, the pigment must be intimately incorporated with the vehicle, which can best be done only by grinding them together in a stone mill by steam-power." It is of the greatest importance that sheet-metal roofs, especially those made of iron, should be protected from the action of the elements, as when so protected there is hardly any limit to the time they will last. In order that the paint should be effective it should be applied before the iron has had an opportunity to rust, and the first coat should be of the best quality and applied in the best manner, for if it is defective it is plain that it will not only require repainting far sooner than it should, but no matter how good the subsequent coatings of paint are, they cannot be effective if founded on an original coating which has commenced to crack or peel, as it certainly will if not prepared with best methods and materials. Another important point to be observed in the painting of sheet-metal is that the paint should not be too thick, as it is the linseed




*Detail of Roof-Projection.—Scale, ¼ Inch to the Foot.*

oil that is to be depended on to furnish protection, and as the action of the air on the surface of the exposed oil gives it a particularly hard surface, two thin coats of paint are much more durable than one thick one. When a roof, old or new, is to be painted, care should be taken that it is swept clean, as the best of linseed oil will not make a good paint with dust or dirt as a pigment.

## An Important Decision Affecting Mechanics' Lien Laws.

An important decision as to the scope of the Mechanics' Lien law has recently been handed down by the Court of Appeals of the State of Maryland in the case of Schaper against the firm of Bibb & Stehman, surviving partners of B. C. Bibb & Son, of Baltimore. This decision is of general interest, for the reason that the laws of the different States touching the question of mechanics' liens bear a more or less close relationship one with another. The decision reads as follows:

Court of Appeals of Maryland. Schaper *vs.* Bibb & Stehman, surviving partners of B. C. Bibb & Son. June 11, 1889.

*Interpretation of Mechanics' Lien Law.*

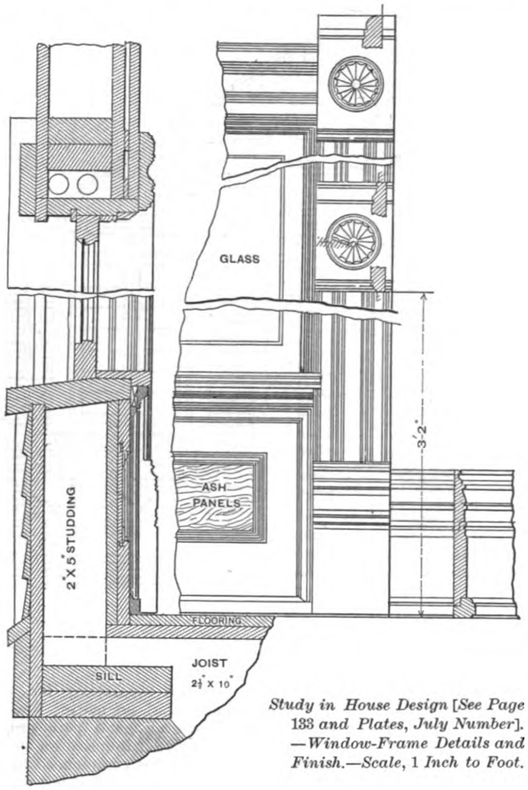
Fixtures.—The Legislature have expressly required that the Mechanics' Lien law shall be construed liberally, as a remedial law, and the right of lien exists for fire-place heaters, pipes, registers, &c., fitted in a house as permanent fixtures.

Appeal from the Circuit Court of Baltimore City.

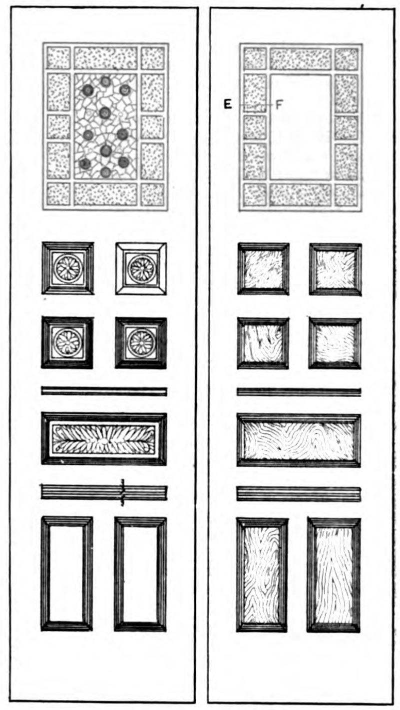
John P. Poe for appellant. F. P. Stevens & Son for appellees.

Argued before Alvey, C. J., Miller, Robinson, Irving, Bryan, McSherry and Stone, JJ.

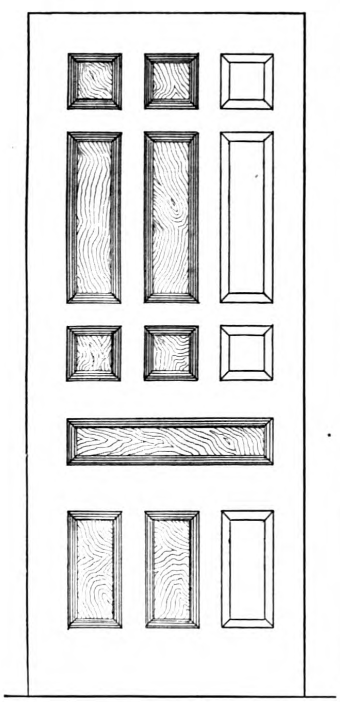
Alvey, C. J.—The Mechanics' Lien law provides that every building erected "shall be subject to a lien for the payment of all debts contracted for work done or materials furnished for or about the same;" and the Legislature has expressly required that this law shall be construed



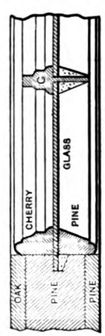

*Study in House Design [See Page 133 and Plates, July Number]. —Window-Frame Details and Finish.—Scale, 1 Inch to Foot.*



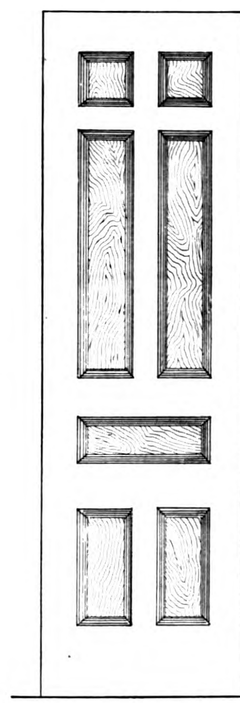

*Exterior and Interior Elevations of Front Doors.—Scale, ¼ Inch to the Foot.*



*Elevation of Sliding-Doors.—Scale, ½ Inch to the Foot.*

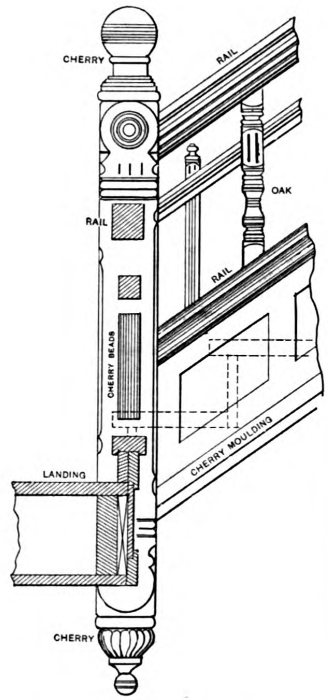



*Section at E F—¼ Full Size.*



*Double Doors in Hall.—Scale, ½ Inch to the Foot.*

liberally as a remedial law. Even without the express direction of the Legislature, this court said, in Blake *vs.* Pitchee and Wilson, 46 Md., 464, that the general




*Stairs at Landing.—Scale, ¾ Inch to the Foot.*

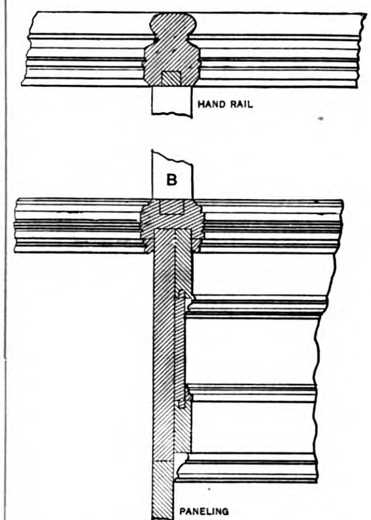
language of the statute plainly indicates that the most liberal and comprehensive meaning should be given its provisions in favor of mechanics and material men.

In this case the question is whether the claim of the appellees, being for range, fire-place heaters, and the usual accessories of pipes, registers, &c., and work done in placing the articles in the house of the appellant, then in course of erection, is such as entitled the appellees to a lien therefor on the house, under the provision of the statute.

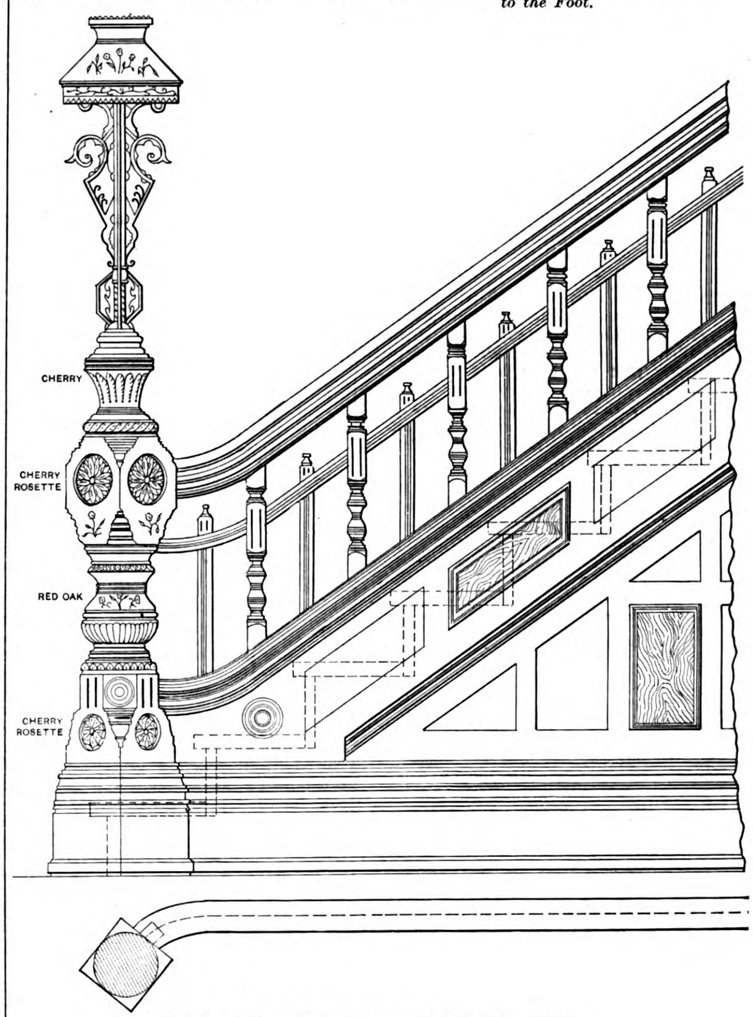
The facts are, as shown by the record, that Wilson & Co., a firm composed of E. J. Wilson and George H. Dobson, Jr., on the 6th of December, 1887, entered into a contract with the appellees for the furnishing, by the latter, of range and two fire-place heaters, with necessary attachments, for each of 23 houses then being or about to be erected by the firm on certain contiguous lots, the legal title to which appears to have been in Dobson, one of the firm of Wilson & Co. By the contract Wilson & Co. were required to pay $56.50 per house for such range and fire-place heaters within 30 days after the completion of the contract by the appellees; and Wilson & Co. were to have the privilege of calling for heaters and ranges as they needed them, provided they did not call, at any one time, for less than heaters and ranges for two houses; and if they did not take the whole lot within three months from the date of the contract, then the account for all the articles furnished up to the expiration of that time should be considered due and payable.

It is quite clear, therefore, that the contract was an entire and continuous one for all the ranges and fire-place heaters to be furnished for the 23 houses. The range and fire-place heaters for the house now owned by the appellant, being one of the 23, were furnished on or about the 12th of December, 1887, and on or about the 14th of December, 1887, the appellant purchased and took possession of the house. The appellees completed their entire contract by furnishing all the materials and work required by its terms by the 4th of February, 1888, within the time mentioned in the contract; and from that date the appellees had six months within which to file their claim for record, and it appears that the claim was filed on the 16th of June, 1888, and was therefore within time.

For what purpose and with what intent were the range and fire-place heaters fitted in the house while in course of erection? As a general rule, it may be stated that whether a thing which may be a fixture becomes a part of the building by annexing it depends upon the intention with which it is done. The character of the physical attachment, whether slight or otherwise, and the use, are mainly important in determining the question of the party making the attachment or annexation. (Hill *vs.* Sewald, 53 Pa. St., 271; Potter *vs.* Cromwell, 40 N. Y., 287; Ewell on Fixtures, 21, 22.) Here there can be no doubt of the intention of Wilson & Co. in fitting in the house, while in course of construction, the range and fire-heaters, with their attachments. It was doubtless the purpose to put in these articles as permanent fixtures and as part and parcel of the finish of the house. The houses were being built for sale or rent, and it was the manifest object to finish them in such modern and

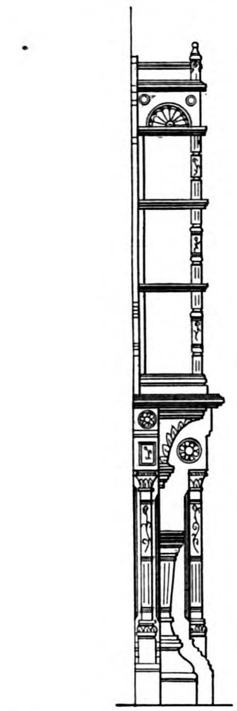



*Details of String-Piece.—Scale, ¾ Inch to the Foot.*



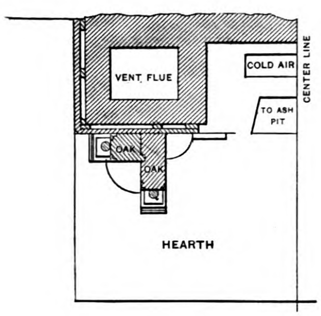

*Details of Main Stairs.—Scale, ¾ Inch to the Foot.*

improved style, as to convenience and comfort, as would make them desirable residences. This could only be done by finishing the houses by fitting in ranges and fire-place heaters. And this is shown



*End View of Fire-Place and Mantel.*

to be the universal understanding and practice among builders and material men in Baltimore. They all—that is, those called as witnesses—without exception testify that not only is a cooking or kitchen range necessary, but fire-place heaters, with their attachments, are equally necessary to the finish and completion of a modern dwelling-house of the class to




*Plan of Fire-Place.*

which that of the appellant belongs, and that such fixtures are regarded as being essential parts of the house. And that being so there would seem to be no reason for holding that the range and heaters, with their necessary attachments, were not materials furnished for or about the finish of the house.

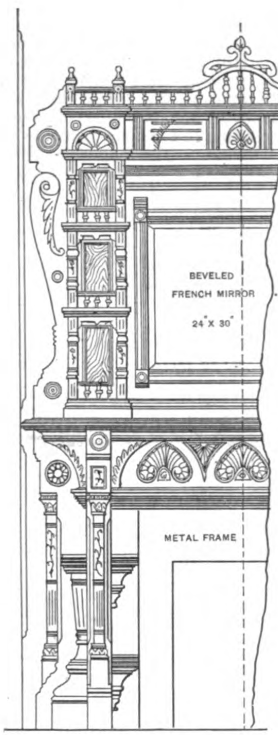
It is not contended, as we understand counsel for the appellant, that the lien does not exist for the range and its accessories and the work done in putting it up, but that the lien does not attach for the fire-place heaters and their attachments. It has been decided by this court—in Weber *vs.* Weatherby, 34 Md., 635—that the right of lien does exist for both range and furnace erected in a house, and we think, for the same reason that the lien exists for range and furnace, it should exist for the heaters, pipes, registers, &c., fitted in the house as permanent fixtures.

We shall therefore affirm the decree of the court below.

## The Measurement of Brick-Work.

A correspondent contributes the following remarks on the measurement of brick-work to a recent issue of the *Clay Worker:*

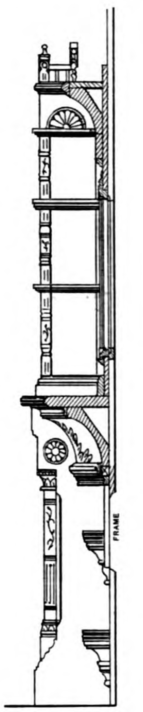
It is curious to observe how considerably the method of measuring brick-work varies




*Front Elevation of Fire-Place and Mantel.—Scale, ½ Inch to the Foot.*

in different parts of the country. In many localities—Philadelphia, for example—the custom is to measure it by the number of bricks contained, but this system possesses a serious disadvantage. There is no uniformity in the size of bricks, and hence the size of a wall which a given number of bricks will produce is uncertain. When, therefore, the price per thousand for laying bricks is given, considerable trouble is involved in arriving at the cost for the whole of the brick-work in the building.

Probably the better plan is to measure by the dimensions, as is common in several sections of the country. The unit of measurement in this case is not important. The cubic foot or yard is employed to some extent, but the perch of 25 cubic feet and the superficial rod in brick-work one brick thick are often used. Unfortunately the term "rod" has no very definite significance. Two hundred and seventy-two and one-half feet super and one and one-half bricks thick, 16½ feet square or 272½ square feet and one brick thick, 16½ square feet and 63 square feet are all termed "rods." Under these circumstances it would probably be of advantage if the cubic foot or yard could be made the standard unit of measurement for brick-work throughout the country. It may be added that the number of bricks contained in any piece of built brick-work




*Vertical Section.*

may be approximately ascertained by deducting one-tenth for the volume of mortar.

## Hardness of Woods.

The relative hardness of woods, says a recent writer, is calculated by the hickory, which is the toughest. Estimating that at 100, we get for pig-nut hickory 86; white oak, 84; white ash, 77; dogwood, 74; scrub oak, 73; white hazel, 72; apple-tree, 70; red oak, 69; white beech, 65; black walnut, 65; black birch, 62; yellow and black oak, 60; hard maple, 56; white elm, 58; red cedar, 56; cherry, 55; yellow pine, 53; chestnut, 52; yellow poplar, 51; butter-nut and white birch, 43, and white pine, 35. According to this formula woods possessing a degree of hardness equal to only about 40 per cent. or less than that of hickory should not be classed as hard woods. Such woods are, however, limited in quantity, and are not of sufficient importance to justify a classification, and the trade will continue to construe hard wood to mean everything except white pine.

The new buildings for the New York Central Railroad, to replace those recently destroyed in the $1,000,000 fire at the foot of Sixtieth street, in this city, will have many valuable improvements. An elevator of 1,500,000 bushels capacity that will cost $400,000 will be built upon the old timber foundations. Piers B and D will be rebuilt, each with a two-story iron shed. A large storage warehouse, 200 feet square, will also be erected. The improvements will cost nearly $1,000,000.

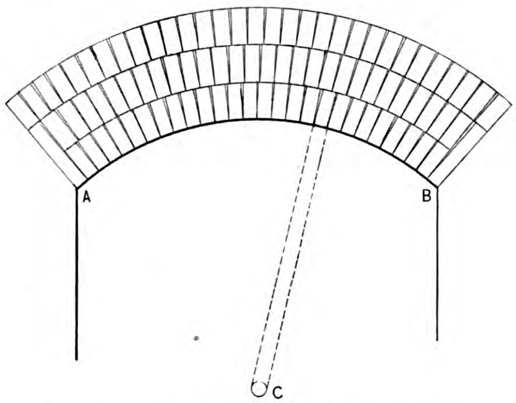
# BRICK-LAYING.

## Brick-Work and Brick-Laying.—V.

BY ARTHUR SEYMOUR JENNINGS.

It may be said that the average brick-layer finds more difficulty in constructing arches than any other portion of his work. The fact that a knowledge of the proper form and construction of the different arches is not thoroughly understood gives rise to very many defective pieces of work. The term by which an arch is designated will depend, first, on the curve it assumes, and, second, on the method of construction. Arches as a class are known as "rough" when they are constructed of bricks which have not been cut, in contradiction to "gauged," which are formed of bricks cut and rubbed to the shape which will produce mortar-joints having their sides parallel. The terms "rough" and "gauged" are used as affixes to that which describes the curve of the arch. For example, we have a rough-segmental arch and a gauged-segmental arch which only differ in the manner in which the bricks are joined. A semicircular arch is one which, as its name implies, is turned on a half-circle. Of pointed arches there are a number of different kinds, varying chiefly in the proportion of the breadth and hight. All such bear the general term of Gothic arch, but to distinguish them it is advisable that more accurate terms should be employed.

We have now to consider the manner in which both rough and gauged arches are constructed. First as to a rough arch, taking the segmental shown in Fig. 1 as an example. A suitable center is made by the carpenter and fixed between the opening on which the arch is to be turned. In previous numbers of this journal will be found an account of the principles which should guide the carpenter in making these centers. The center being fixed in position the brick-layer proceeds to lay the bricks in concentric rings, taking care that the under surface of each one sets against the center, so as to form a tangent with the curve. This produces a wedge-shaped mortar-joint. Not a little skill is required in forming these joints so that a line drawn through the center of the head of brick will radiate to the center of the arc from which the curve of the arch is struck. In all cases it will be obvious that the narrower the brick the smaller will be the mortar-joint at the top and hence the stronger the arch. For this reason the bricks are always set with their narrowest dimensions tangental to the curve. Where the depth of an arch exceeds the length of a single brick bond is obtained between the parts by breaking joint between the bricks, and this necessitates the employment of half-bricks at each end. In Fig. 2 is shown a plan of the under side or soffit of the arch represented in Fig 1, which is two bricks in thickness. It will be seen how the bricks lap and how bonding between the parts is thereby obtained. When the brick-layer has completed one ring and thereby formed what is practically an arch in itself he proceeds to build another upon and similar to it, spreading the mortar between the two rings equally so as to form uniform bearings for the rings which come upon it. As the different rings diverge from the center they will require more bricks to fill them, and where their length is such that no equal number of bricks will fit, a number of them are slightly cut down to permit the use of an additional one to completely fill the space. It may be useful here to say something about the manner in which this and other similar arches are set out on paper. The difficulty arises from the fact that the sides of the bricks do not radiate to the center from which the curve was struck. But the difference may be readily adjusted in the following manner: Taking the case of the arch shown in Fig. 1, first set out the width and span of the arch, through which draw the arc of a circle. From the abutments at the points A B draw lines upwardly, which, if produced, would radiate to the center C. The lines represent the skew-backs. Upon one of these lines set out the width of a brick as many times as it is intended to use rings—in this case three. From these points draw in the segments. Now commencing on one of the skew-backs, say at the point A, take in the compass 2 inches, or whatever the




*Brick-Work and Brick-Laying.—Fig. 1.—A Rough Segmental Arch.*

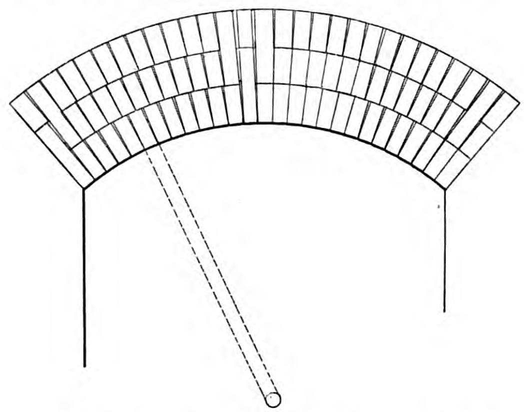


*Fig. 3.—The Strongest Form of Rough Segmental Arch.*

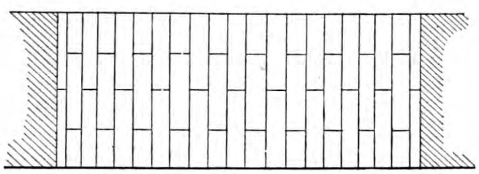


*Fig 2.—Soffit of Arch Shown in Fig. 1.*

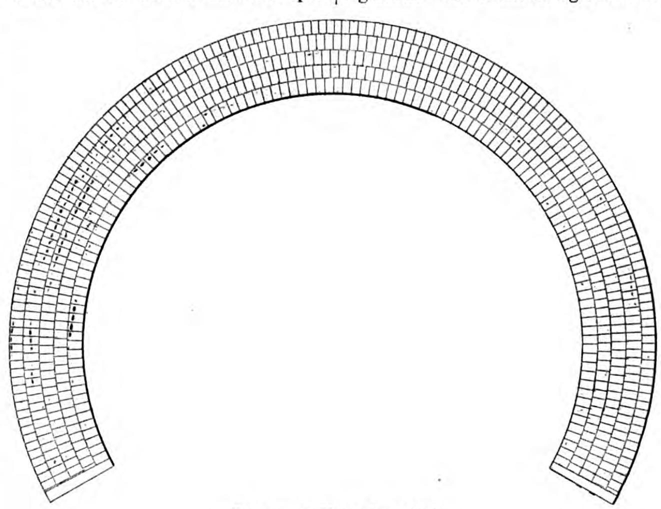


*Fig. 4.—A Horseshoe Arch.*

width of a brick may be, and set it off along the bottom segmental line. Do the same thing on the other segmental lines excepting the top one. Draw a circle of 2 inches diameter (the width of a brick) with C as center and draw in the lines which are to represent mortar-joints from the points marked on the segments, radiating them to make tangents with this small circle. This will be clear upon reference to Fig. 1, in which the tangental lines are represented by dotted lines.

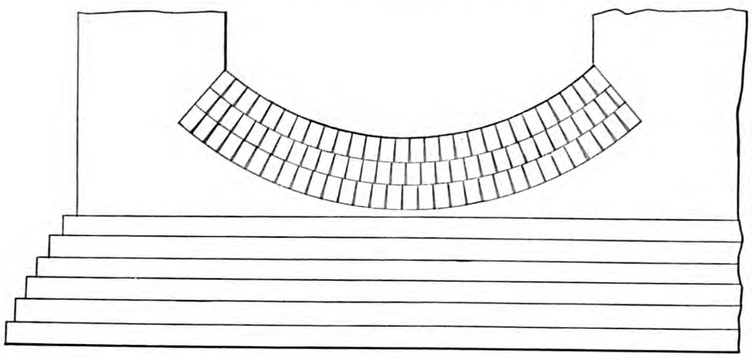


*Fig. 5.—An Inverted Arch.*

When this is done the arch is complete and the mortar-joints are wedge-shaped as required, while the sides of the bricks are parallel.

The method of constructing and drawing rough arches other than segmental does not differ materially from that described. In actual practice it is found that there is some tendency for the different rings of which the arch is composed to separate, and to prevent this it is well that stretchers should be laid on each of the skew-backs. It may be here remarked that the rough arch is the strongest form we have, because the hardest bricks may be used in constructing them, while in gauged arches specially-prepared and usually softer bricks

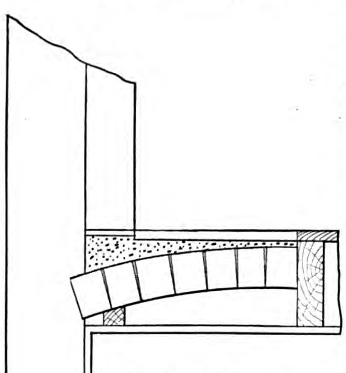


*Fig. 6.—A Trimmer Arch.*

are employed; at the same time the tendency of the rings to separate is, in very heavy work, a serious source of weakness. It is for the purpose of overcoming this defect that the form of arch represented in Fig. 3 is sometimes employed. The construction will be sufficiently clear from the engraving. Concentric rings are struck, as before, and stretchers, used as ties, are inserted at convenient intervals. The result is perhaps not very graceful, but the strength is certainly greatly increased, and this form of arch is strongly recommended for use in all very heavy positions.

The construction of a rough semicircular arch is the same as that of the segmental just described, excepting that, of course, it is turned on a center having a different curve. Sometimes a brick-key center is inserted. Such a key is formed of a number of bricks depending upon the extent of the arch, but it must always be remembered that an odd number must be employed so that the center of the arch is a brick rather than a mortar joint.

It has already been pointed out that the strongest construction of an arch is the rough form shown in Fig. 3, which consists of a number of rings tied together. The strongest form for the curve is that known as the horseshoe, and sometimes Moorish illustrated in Fig. 4. This arch is generally employed in very heavy work, and in such cases is always built of uncut bricks. In the engraving it is shown as used in the construction of the underground railway, in London, England. In this case it is the form of arch used for tunneling, which is required to be of great strength, inasmuch as the railway being beneath the houses and roadways has to support very heavy loads while resisting the vibration caused by the trains. The length of the railway in which this form of arch is employed in the case mentioned is several miles, and it is generally looked upon as being absolutely indestructible by pressure. It will be noticed that the insertion of stretchers to connect the rings together is not used in this case, but in the portion of the work last constructed they were inserted. Sometimes the Moorish arch is employed for ornamental purposes, and the Casino in New York may be mentioned as an example of very excellent brick-work where this style has been followed. In this case the arches are, of course, constructed on the exterior in gauged work. In building foundations where, as frequently happens in city property, the weight is thrown upon a number of piers it becomes advisable to throw the weight of such piers over the space intervening between them. This is done by means of the inverted arch shown in Fig. 5. The brick-layer having prepared the foundations as described in a previous paper and having built up the footings to the required hight, proceeds to build the inverted-brick filling to receive the outer curve of the inverted arch, which is then turned upon them and receives the piers upon its skew-backs. The construction of the inverted arch is exactly similar to that of the ordinary segmental, excepting that the curves are upside down. There are probably very many cases of frequent occurrence in which the inverted arch may be used with advantage, especially where the soil is either comparatively weak or the weight of the building heavy. It should be observed, however, that any such should be placed in close proximity to the angle of the building, as there is a tendency for it to push the pier out of position, although this may be to some extent overcome by inserting iron rods through the arch, clasping them by iron plates on the exterior surface. Perhaps the best example of an arch used for purely constructive purposes is that which is employed underneath fire-places for the purpose of supporting the hearth-stones. Such arches are known as trimmer arches and are constructed in one of two ways, shown in Figs. 6 and 7. Where the floor timbers run at right angles to the fire-place the form shown in Fig. 6 is used, but where they run parallel that shown in Fig. 7 is preferable. In the latter case it becomes necessary to insert iron rods through the header in order to prevent the thrust of the arch from turning the joist out of position, as shown by the dotted lines.

*(To be continued.)*

## Machine Quarrying.

Our sprightly contemporary *Stone* presents the following conversation with a quarry man, which aptly illustrates the modern tendency to introduce machinery in all kinds of operations:

"We have just been putting in about $25,000 worth of new machinery, and are now in a position to get out all kinds of stone-work at the quarry," said the owner of a new quarry in this State.

"What do you think about the getting out of stone-work finished for building purposes?" we asked.

"I feel quite certain that in the future most of the cut work for buildings will be gotten out in a finished state at the quarry.

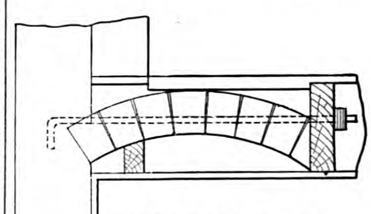
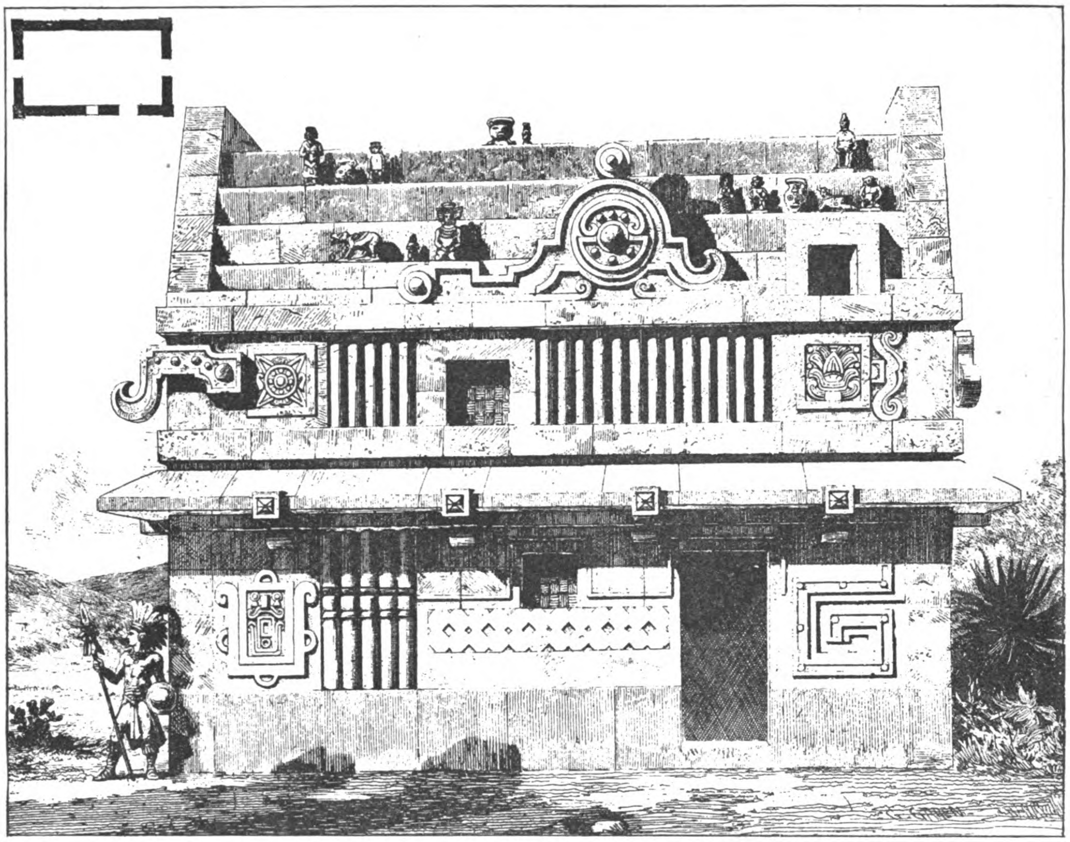


*Fig. 7.—Another Form of Trimmer Arch.*

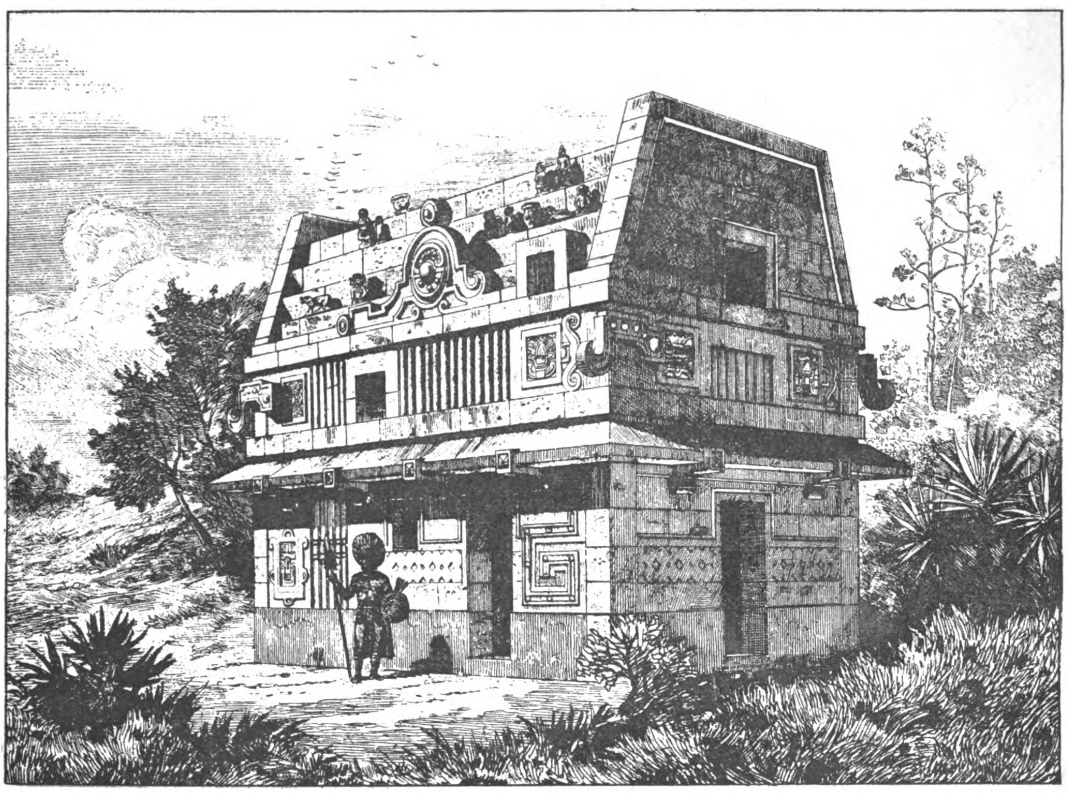
There is no reason why this should not be done. Take the case of the stone that we market; it is softer, less brittle and generally easier to work as soon as it is quarried. Furthermore, we have a larger plant than most stone-cutters in the cities and towns can afford to maintain. By doing a large quantity of work at one place it can be done at a less cost than the old-fashioned way."

"You say there is very little occasion for hard work?"

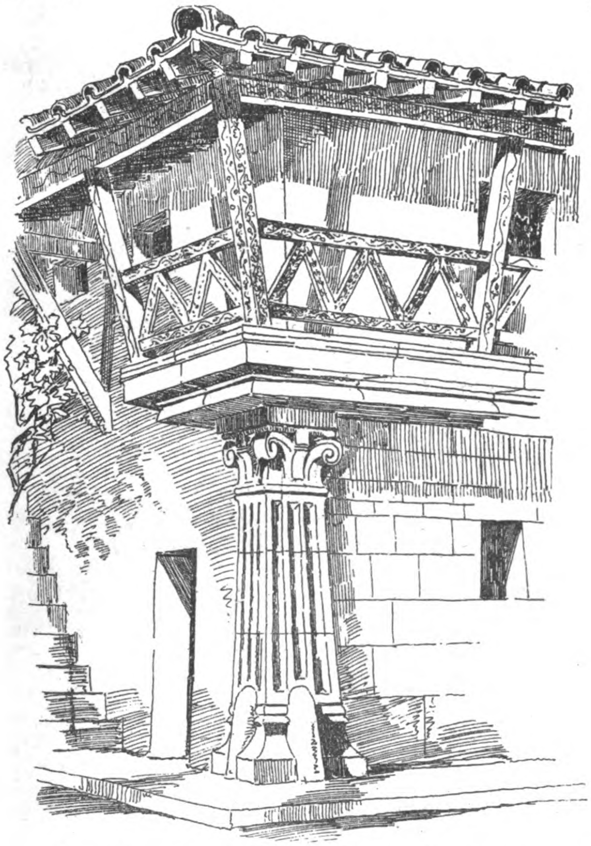
"In the first place, our arrangements for handling stone are such that large blocks can be rapidly transported from one part of the quarry to another. Then, all the work of sawing, molding, and, in fact, some of the laying off, can be done by machinery. This is much less expensive than it is possible where there is so much handwork. Furthermore, in transporting the stone from the quarry to the market we do not have to pay freight, excepting on that part which goes into the building. There is no freight on the waste stone. Of course the greatest thing of all is in the saving of labor, and there is little done in legitimate stone-cutting by hand that cannot be done by machinery. It can be done more accurately and in a way to appear better than by the usual hand methods. We have felt the necessity for this kind of a plant for some time, and it now appears that we have put it in none too soon."



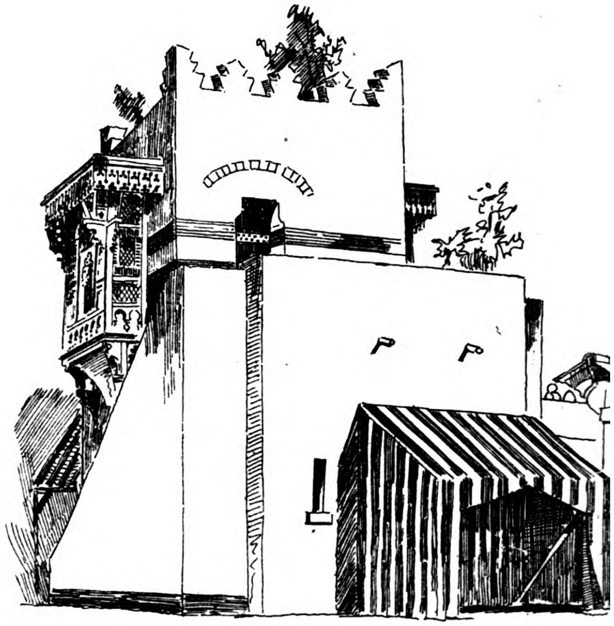
AN AZTEC HOUSE.—Elevation and Plan.



AN AZTEC HOUSE.—Perspective.

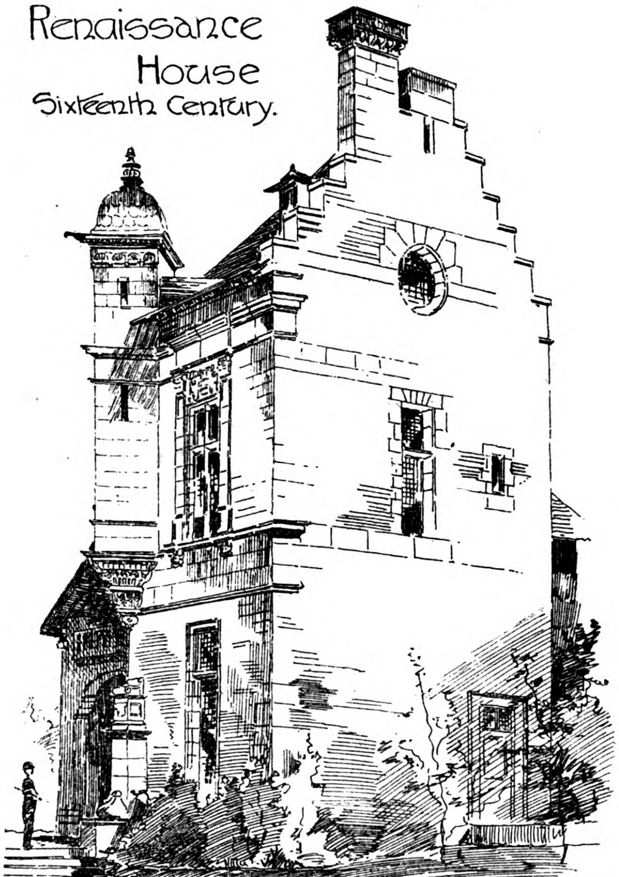


Angle of the Etruscan House
circa 1000 B.C.



Arab House — Eleventh Century.

Renaissance
House
Sixteenth Century.



In the Court
of the Greek
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time
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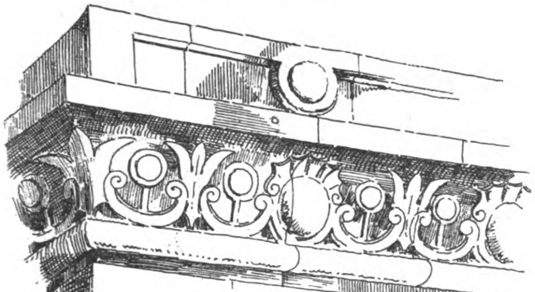
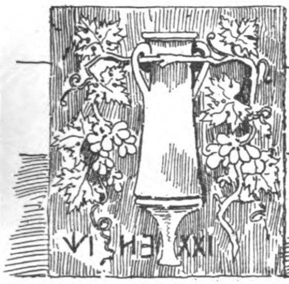
Historical Habitations at the E

CHARLES GARNIER, Archite



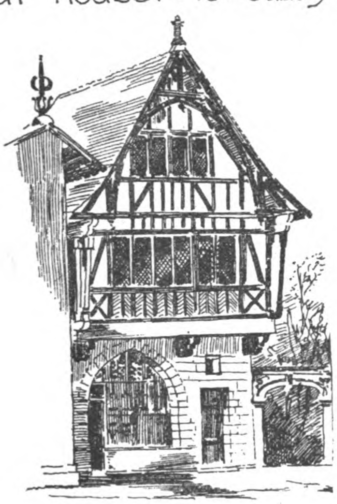
Carving on Cornice of Hebrew House.

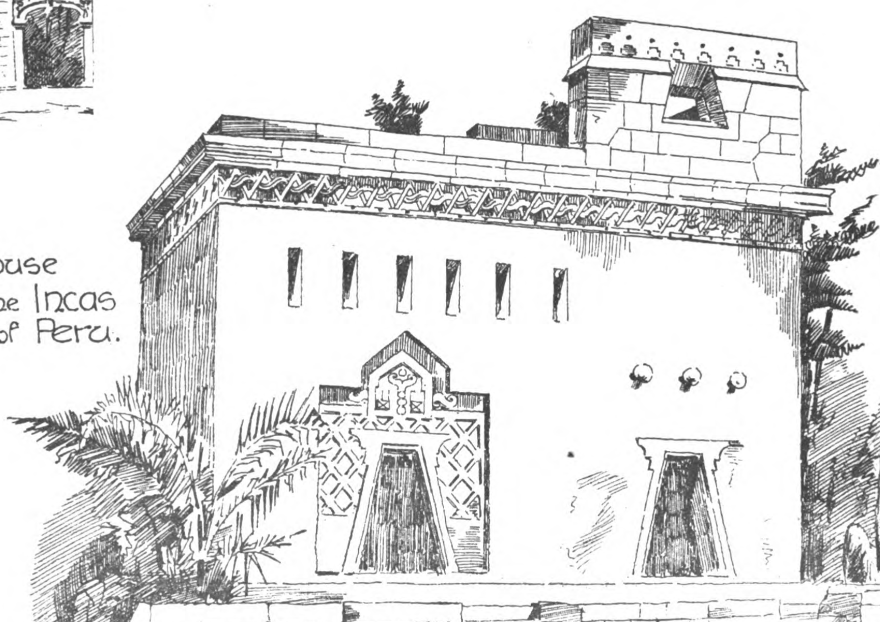


Terra-cotta Panel from Etruscan House.

Hindoo House c. 300. B.C.

…ediaeval House. — 13th Century





House of the Incas of Peru.

…of …es …B.C.

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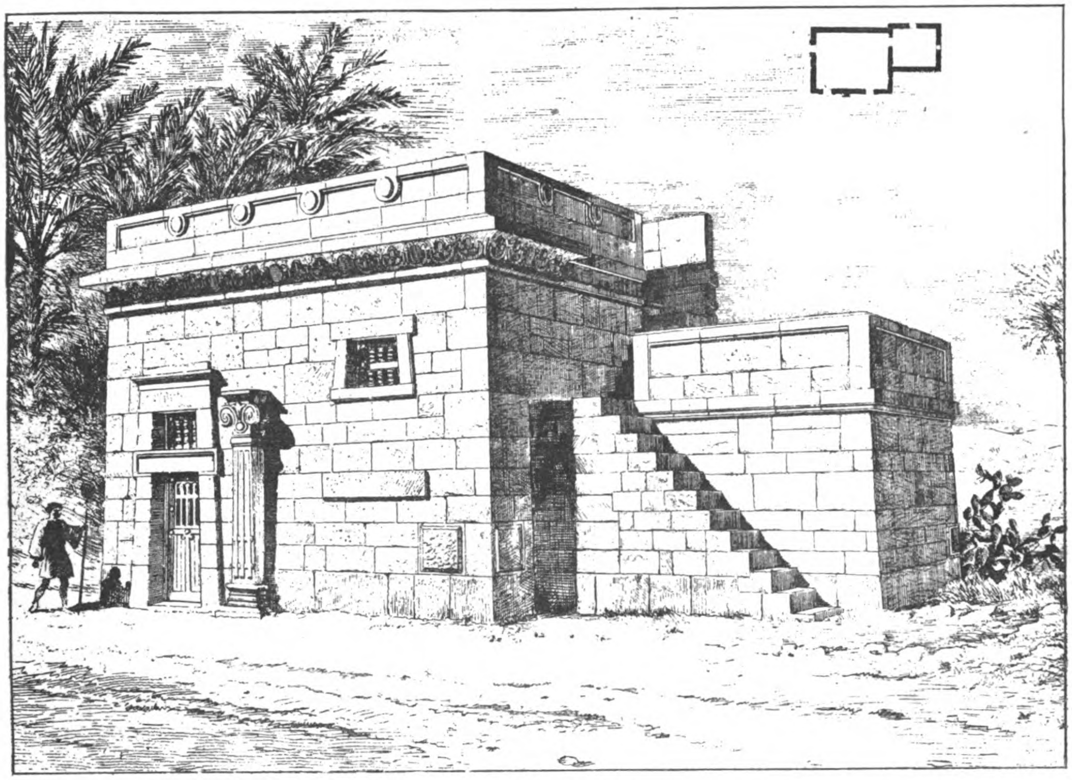
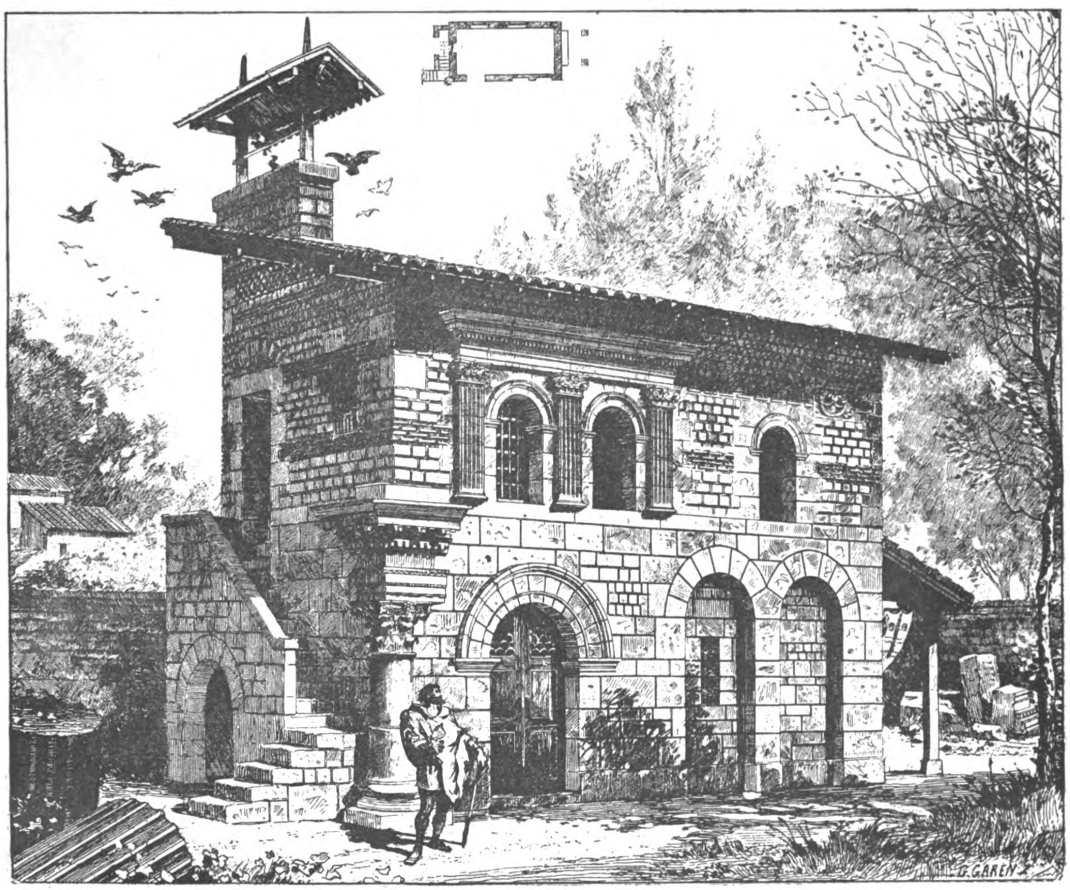


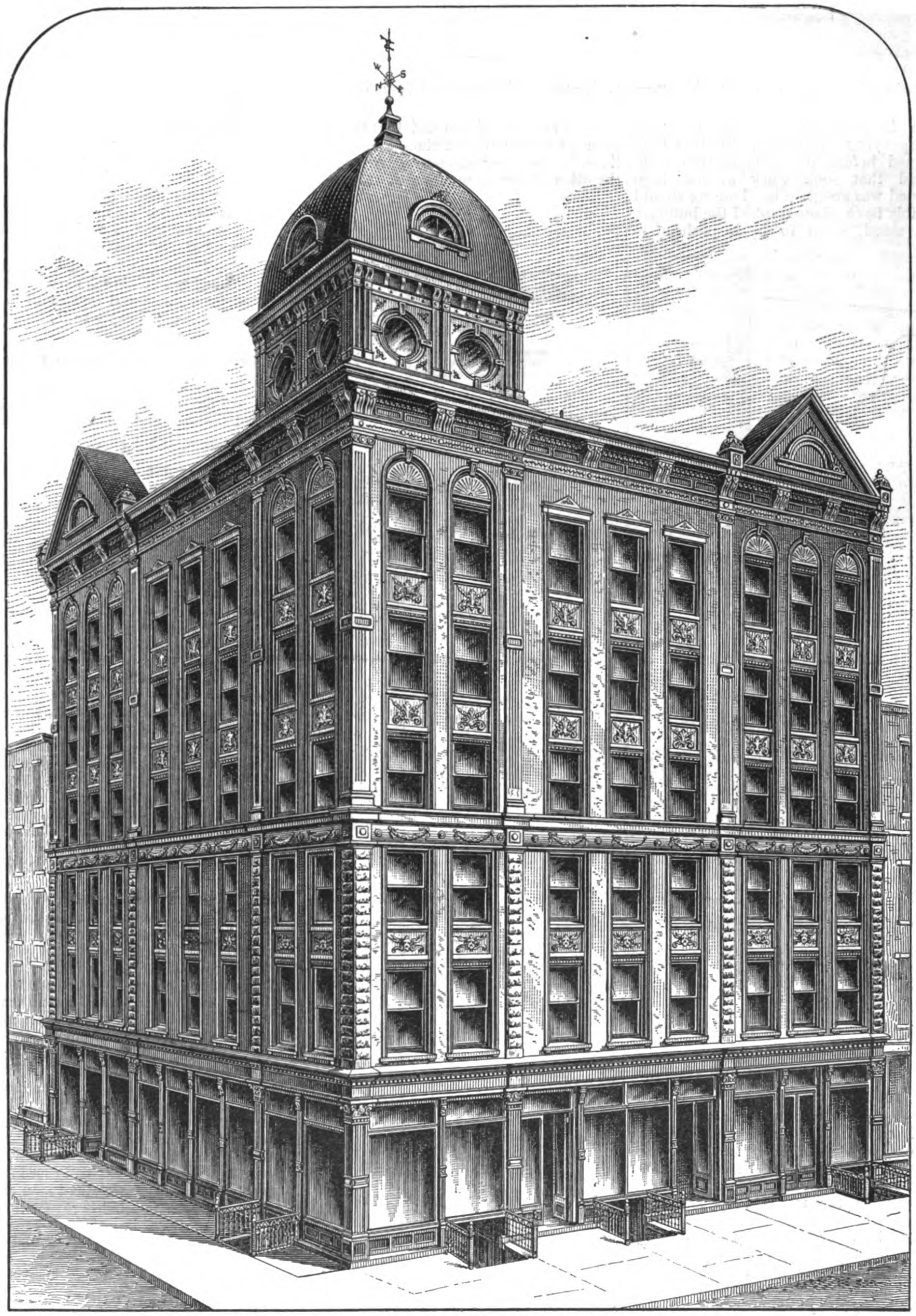
A SYRIAN HOUSE.



HOUSE OF THE GALLIC-ROMAN PERIOD.

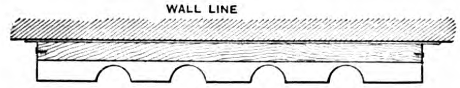
## Galvanized-Iron-Work on Old Buildings.

The utility of galvanized-iron-work is not to be gainsaid, whether it be considered upon the basis of trimmings for buildings of ordinary character in process of erection or the finish and trimmings of fire-proof structures, or on the lower plane of repairs and alterations of old buildings. Galvanized iron when it is used in the construction and finish of new buildings, whether they be of the very best character or of cheap construction, loses much of its special identity. All parts harmonize, and after the paint has been applied a casual observer does not know whether the finish is of metal or of some other material. The utility of galvanized iron in this connection is not less in the estimation of the architect and builder, but to the ordinary man of business it does not appear to the same advantage as where it is employed in remodeling an old building. All of our readers have had their attention called to the judicious use of galvanized iron in the remodeling of old buildings. Window-caps have been applied; a new cornice has been put on; string-courses have been run across the front, and after the work was finished and painted a new building with modern lines and neat architectural appearance had taken the place of something which, however substantial, had long been an eyesore to the public.



*Altered-Over Building, Corner Cortlandt and Washington Streets, New York.—Fig. 1.—Perspective View.*

One of the most successful jobs of remodeling to which our attention has been recently called is that of the building on the corner of Cortlandt and Washington streets, New York. The new structure is shown in perspective in Fig. 1 of the accompanying engravings. Had we been informed before the changes were commenced that such work as has been executed was about to be done we should probably have photographed the building as it stood, so as to be in position to show both the old and the new. Suffice it to say, however, that the building was one of the old-time structures, hundreds of which are to be found in the lower portion of New York. In the course of alteration the iron colums shown in the cut were introduced in the lower story, and provision for plate-glass windows was made. The building was carried a little higher, and finally given the beautiful architectural appearance manifested in the engraving by the judicious employment of sheet-metal. The pilasters extending from the lintel cornice through the second and third stories, and having the appearance of rough stone-work, are of stamped sheet-metal, supplied by the well-known firm of Bakewell & Mullins, of Salem, Ohio. The belt course between the third and fourth stories has a bulging frieze, on which stamped work is also employed. The pilasters in the upper stories are likewise sheet-metal, and the cornice, gables and finish to tower, of the same material, explain themselves. The windows have been finished in sections—that is, the small windows of the old building have been grouped by judicious architectural lines, in the lower stories in pairs and in the other stories in sections of three each.




*Galvanized-Iron-Work in Old Buildings.—Fig. 2.—Horizontal Section Through Pilaster.*

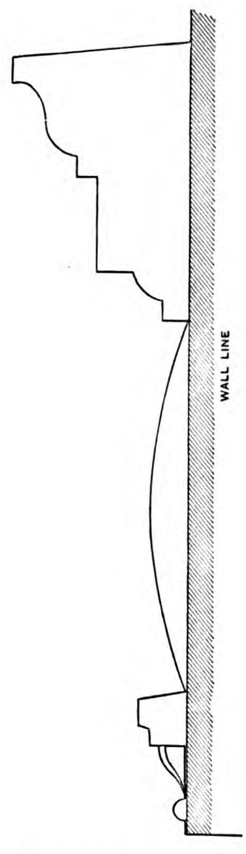



*Fig. 3.—Section Through Belt Course.*

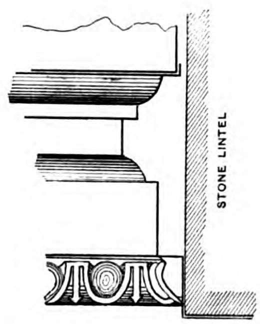



*Fig. 4.—Section Through Lintel Above Windows.*

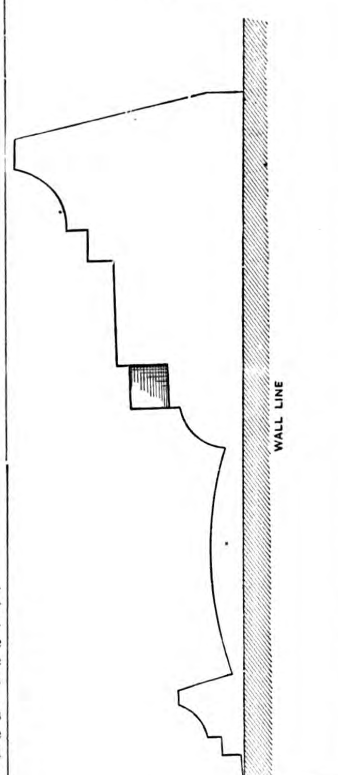



*Fig. 5.—Section Through Lintel Cornice.*

A molding extends around each of these groups, and the spaces between the windows of adjacent stories are occupied by panels of ornamental design. The building has been the admiration of many sheet-metal workers who have visited New York, and it continues to command the attention of passers-by, whether they be specially concerned in building matters or not. The sheet-metal work was executed by John Borkel, of Elm street, New York, and in many respects it embodies special ideas adopted by this contractor for work of this class. The profiles, Figs. 2, 3, 4 and 5, show sections through different parts of the work, and are self-explanatory.

## CORRESPONDENCE.

### Tackling.

*From* E. A. R., *Ogdensburg, N. Y.*—I desire to learn from practical readers of *Carpentry and Building* what kind of tackling would be used in raising a complete bent for a barn, without employing a team.

*Note.*—This subject has been discussed to a certain extent in the past, but if it has not been exhausted we should be glad to have our readers reply to it.

### Criticism of the $1000 Houses.

*From* J. A. C., *Taunton.*—In the May issue of *Carpentry and Building* "F. I. G.," of Toronto, makes criticism on the estimate submitted by (O) As I indorsed it I feel at liberty to reply. He complains of the estimate being too high. Now, he is at liberty to build a cottage of that description as cheaply as he can, but should he attempt to take contracts in this locality and make his estimate for work on the basis of such prices as he names ($1 per 1000 for laying shingles, &c.) he would come out at the small end of the horn ; in fact, I doubt his getting out at all without a sinking-fund back of him to crowd him through. I have employed men a great many years, but I have never yet found them to more than pay their way at $2 per 1000 on such a house as the one described. Where the courses are short and part of them are wall shingles it often comes nearer $3 per 1000. As for clapboards, a man who will average more than 150 per day is a better workman than we can hire here. "F. I. G." also thinks he can lay and finish five squares of flooring per day. I am well satisfied to have three as we lay them here.

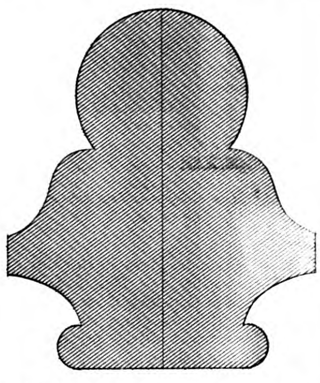
In regard to the cornice, I would say that the gutter alone costs 12 cents and the balance of the stock about 14 cents per running foot before it is ready to put up. I will take 1000 feet of "F. I. G." immediately at his price—10 cents per foot, put up—and can assure him of a ready market for all material he wishes to put here at prices that will compare with those he quotes. "F. I. G.'s" judgment in regard to labor estimates may be all right for Canada, but it is not worth a fig here. He says, "Any practical man would know the estimate was all guess-work," because the price of labor was about half the price of the stock. In making this statement he simply shows his ignorance, because if he was a practical man and acquainted with prices here (which he should be before he attempts to criticise them) he would know that the labor bill is about half the cost of the stock on the items mentioned.

### Marks on Slide-Rule.

*From* S. F. B., *Wilmington, Ohio.*—With reference to E and M marks on the slide-rule, I would say: Take a stick of timber, any square up to 2 feet, open the rule and lay it so that the outside corners of the rule will come even with the edges of the stick and mark at 7 and 17. The result will be an eight-square every time.

## Practical Hand-Railing.

*From* J. H., *London, England.*—In the December (1888) issue Jas. H. Monckton gives the readers of the paper a lesson in the planning of stairs so as to suit the tangent system of hand-railing. Before I go further it may be well to state that there are only two systems of hand-railing in existence. No. 1 is the most common, and is known as the tangent system. When working by it, it is necessary to arrange the position of the risers on the plan to suit the pitches of the tangents on the elevation or development so that the joints can be made square to the tangents and square from the face of the plank. The reason for this is that when there is a joint connecting two wreath-pieces in the curve of the plan, the tangents of both wreath-pieces must be of the same pitch. This system allows of no casing being worked connecting wreath and straight rail, except where tangent to the casing is the same pitch as that of the stairs. The center line of the rail lies in the center of the plank, which produces a wavy falling line and a great difference in the length of the balusters.



*Practical Hand-Railing.—Fig. 1.—Section of Ancient Form of Rail.*

In opposition to No. 1 we have No. 2 system. When working to this system we develop the central falling line of the rail, put in any necessary easements, make the joints square to the curve of the rail, and at any point desired. Tangents are used to find the direction of the joints across the ends of the face-molds, also to find the dihedral angle which is used to make the butt-joints by. Every point in the wreath-piece is correctly determined and its exact position found by a simple geometrical law, so that there is no guess-work. It takes more time to set out than the No. 1 system, but less time and labor to square up the wreath-piece ready for the molding.

There is no trouble about the length of the balusters on the winders, simply because the rail is made to correctly follow the line of nosings. Any plan of stair can be done on this system, and to any conditions that can be laid down, whereas by No. 1 system the hand-railer can only produce a wreath-piece that is somewhere there or thereabouts within 5 or 6 inches from being correct. Mr. Monckton says that there can be no objection to the raising of the wreath over the winders. I differ from him on that point. There is a limit to the lifting or raising of the rail over winders, which is as follows: When the radius to the center line of the hand-rail is less than 9 inches the wreath-piece should be raised parallel to the line of nosings and the balusters on the winders made longer than the short balusters on the flyers. When the radius to the center line is more than 9 inches the hand-rail should not be raised over the winders.

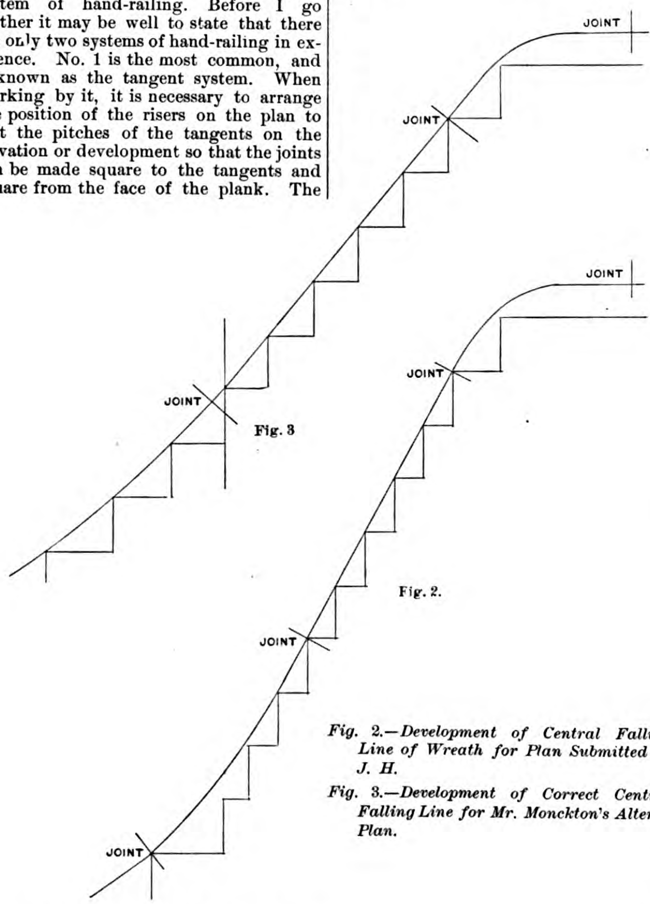



*Fig. 2.—Development of Central Falling Line of Wreath for Plan Submitted by J. H.*

*Fig. 3.—Development of Correct Central Falling Line for Mr. Monckton's Altered Plan.*

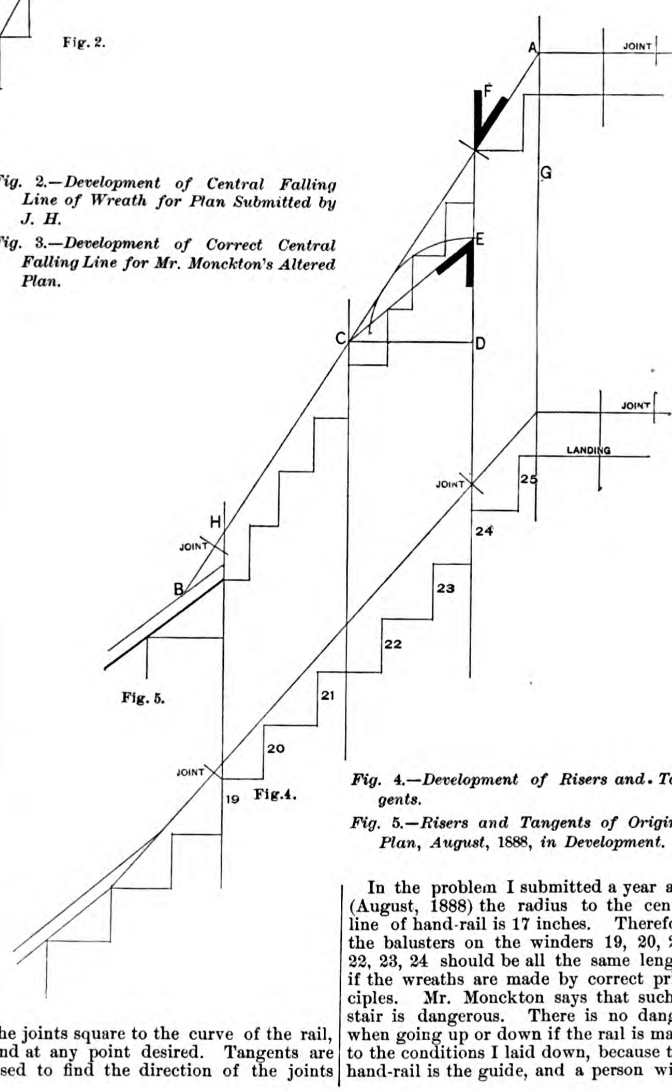



*Fig. 4.—Development of Risers and Tangents.*

*Fig. 5.—Risers and Tangents of Original Plan, August, 1888, in Development.*

In the problem I submitted a year ago (August, 1888) the radius to the center line of hand-rail is 17 inches. Therefore the balusters on the winders 19, 20, 21, 22, 23, 24 should be all the same length if the wreaths are made by correct principles. Mr. Monckton says that such a stair is dangerous. There is no danger when going up or down if the rail is made to the conditions I laid down, because the hand-rail is the guide, and a person with one hand on the rail could go up or down blindfolded. It is nearly seven years since I did the job. The architect planned the stair and told me that he would not allow of any alteration, so I rigorously adhered to the conditions laid down. When the plans were first drawn for the building that plan of stair was not in it, but was an after-consideration to suit the tenant who had taken part of the building, and it was not possible to arrange a landing so as to divide the flight in two parts. In the other staircase in the same building the flights have nine risers and then a landing or resting-place, but that does not touch the problem concerning the wreaths.

I do not admire Mr. Monckton's section of hand-rail any more than I admire the section I had to work to. Fig. 1 shows a half-section of an ancient form of rail that is superior to the modern form—at least I think so. I think that a rail that is deeper than it is wide looks better than a wide and thin rail. In this country the architect supplies the section of the hand-rails, design for newels, balusters brackets, &c. Some so-called architects who are not capable of making details choose the designs from a manufacturer's catalogue. But I am digressing, so I will return to the case in hand.

The circumscribing circle, as shown by Mr. Monckton in your December (1888) issue (see Fig. 6), is not a reliable method of obtaining the thickness of plank required for a wreath-piece. When working on No. 1 system the bevels will give the exact thickness of wood required.

Last year I produced a lot of wreaths on the tangent system, the size of the hand-rail being 3¼ inches thick. The planks used were exactly 2¾ inches thick. If I had used the circumscribing-circle method, which would have shown 3¼ inches, they would have taken more labor and time to square up. No. 2 system requires a little thicker stuff than No. 1 system, because the center line of rail deviates from the center line of the plank. To ascertain the exact thickness required it is necessary to find the exact section and position of the wreath-piece in the plank in five or six parts, according to the lengths of the wreath, then arranging the plank to suit the sections, the wreath being contained between two parallel planes, represented by the upper and lower surfaces of the plank. When working by No. 1 system the mechanic only knows the position of the section in the joints at each end and one intermediate point—viz., at the minor axis. The rest he gets over by guesswork, as he has to depend on his eye and his ability to follow the center-line of the plank. Falling molds are perfectly useless for a square-cut wreath-piece. I may as well inform the readers of your paper that there is not a book published on the subject that contains a correct square-cut face-mold.

Fig. 2 shows the development of the central falling line of wreath for the plan I submitted in the number for last August. Fig. 3 shows the development of the correct central falling line for Mr. Monckton's altered plan. Those interested should compare it with the development shown at Fig. 2 in the December issue, and they will see a good deal of difference. Mr. Monckton says a wreath should be made proportionately higher over the winders. His treatment of the improved plan fails on that point.

Look at Fig. 4, which shows the development of the risers and tangents of the improved plan. The position of the risers are measured on the tangents. The short balusters on the flyers are 2 feet 4¼ inches long, measuring up the center line of the baluster. If the wreath had been done correctly all the balusters on the winders would have been the same length, as shown by the development of the central falling line at Fig. 3. Instead of that we have four different lengths of balusters.

The difference in length is as follows:

| | Feet. | In. |
|---|---|---|
| 19th Riser—Length of baluster...... | 2 | 4½ |
| 20th " " " ..... | 2 | 6 |
| 21st " " " ..... | 2 | 7 |
| 22d " " " ...... | 2 | 7¼ |
| 23d " " " .. ... | 2 | 7¾ |

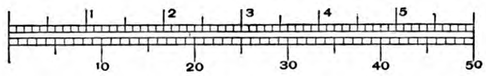
Such an arrangement is wrong and would cause unnecessary trouble to the turner, because he would have to gradually lengthen the turning in each baluster, so that the squares at the top of each baluster should be all the same length, measuring up the center line of each baluster.

Fig. 5 shows the risers and tangents of the original plan (see the August number) in development. The point A—that is, where the center line of the level rail on the landing has cut the line A G—is a fixed point. Connect A and B, B being a point taken in the center of the long side of the pitch-board. Look for a short time and carefully note the difference in the length of the balusters produced by such an arrangement. The baluster on the seventeenth riser is 3½ inches longer, while the baluster on the twenty-fifth riser is 3 inches shorter than the short baluster on the flyer, thus showing a difference of 6½ inches between the longest and the shortest baluster on the winders. That is the fault of the No. 1 system. By No. 2 system no such difference would be tolerated. The rail would follow the line of the nosings as shown at Fig. 2, which indicates the position of the joints as I placed them. The ramp is worked on the end of the lower wreath-piece, thus allowing the straight rail to be cut out of thinner plank than it would be if the ramp was worked on the end of the straight rail as shown by the position of the joints at Fig. 3. There was no necessity for Mr. Monckton to draw Fig. 3, because the angle of the tangents on the face-mold and the bevel can be produced without any other drawing than the development. To produce the bevel from C draw the line C D square to A G, put the point of the compasses in D and draw the arc touching the line A B; join E to C and we obtain the bevel. Note the following: If the tangents on the plan form an acute or an obtuse angle, the bevels cannot be produced on the development. The bevel marked F is for the shank of the upper wreath-piece that comes on the landing. The face-mold can be drawn on a piece of board at once with the aid of the framing square, because the tangents on the face-mold form a right angle. The curves should be put in with an elliptic trammel. I have not drawn the ramps at the lower ends of Figs. 4 and 5. Perhaps some other reader of your paper will show his treatment of the case. Alteration in the original plan and the problem must be worked according to the conditions laid down in the August number. The drawings are made to a scale of ¾ inch to the foot.

### Markings of a Rule.

*From* A. C., *Royalton, Ohio.*—Two years ago last winter I purchased a set of drawing instruments for $6, among the tools being an ivory rule 6 inches long and each inch divided into ten equal parts. Just below these is a line the length of the rule, but divided into five equal parts, and each of these five divisions is divided into ten equal parts, so there are 50 divisions in one line and 60 in the other. Please to explain the use of such a combination of scales. I inclose a full-size sketch with the same figures as are found on the rule.

*Answer.*—From the sketch accompanying our correspondent's letter we have made the engraving shown, reduced to one-half size. We do not wonder that our correspondent was in doubt concerning the meaning of the markings on




*Markings of a Rule.*

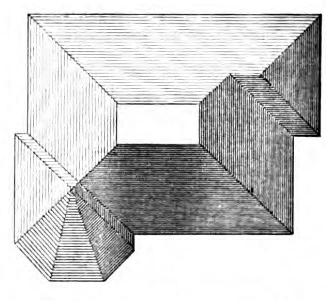
his scale, for the rule is very oddly divided, and it is seldom that such a rule is met with in the trade. Referring to the top line, it may be very simply explained that the divisions are tenths of inches. The lower line, on the other hand, has five main divisions in the distance of 6 inches, or if the scale were 12 inches long the lines would divide it into tenths of a foot. Each of these tenths is in turn divided into ten parts, so that the smallest divisions represent hundredths of a foot. In other words, it is a decimal division of the ordinary rule. We believe that such rules are used principally if not exclusively by civil engineers.

### Scrap-Tin.

*From* J. D. B., *St. Johnsville, N. Y.*—I would like to ask, through the columns of *Carpentry and Building*, where I can sell tin strips 1 inch wide and from 10 to 14 inches long. If some of the readers of the paper can furnish me with this information I would be greatly obliged.

### Framing Hip Roofs.

*From* A. E. G., *Cleveland, Minn.*—In reply to "J. M.," of Germantown, Ohio, I send a small sketch showing the manner in which I would frame a roof for the style



*Framing Hip Roofs.—Diagram Submitted by A. E. G.*

of house which he gives in the May number of *Carpentry and Building*. In his letter he states that he put on an irregular deck. In the drawing which I send "J. M." can make a deck any size desired and of a square shape.

### Improvised Square.

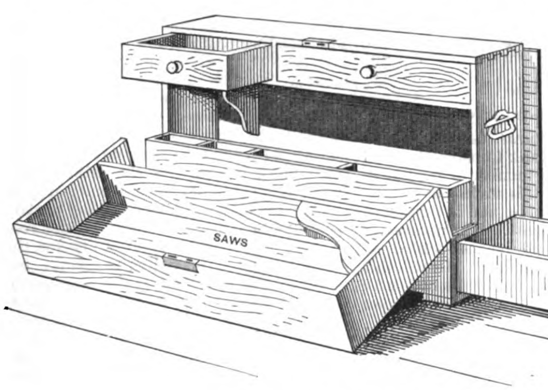
*From* J. C. M., *Richland Centre, Wis.*—As a little novelty I will give my fellow-workmen or any one else that may be in need of such a contrivance a little trick which furnishes an improvised square. By it the workman is enabled to cut a board or anything else on which he may want to lay off a square line accurately and expeditiously. It is particularly serviceable when the mechanic has not the necessary tool at hand. It is as follows: Take any ordinary piece of wrapping paper, or newspaper, or whatever is most convenient, fold it cornerwise, and then fold it again, laying the two long corners together carefully. By this means the lines of fold will afford him a perfect square. I suggest to my fellow-workmen to try it.

### Door-Clamp for Boring Mortise for Locks.

*From* W. M. T., *Des Moines, Iowa.*—I desire to ask the readers of *Carpentry and Building* if they know of a machine manufactured and in use designed to clamp on doors for boring the mortise for locks. I have heard of a machine of this kind being used in St. Louis, but never saw one. It is speed that is required nowadays, and any information concerning a machine of the kind described will be greatly appreciated.

### Convenient Tool-Chests.

*From* J. G. P., *Newark, N. J.*—I inclose a drawing of a tool-box which I find very convenient for use and which has a capacity sufficient to hold all the tools that are necessary. The idea was suggested by an article which appeared in *Carpentry and Building*, in which an inquiry was made for a tool-box that would take the place of the old tool-chests. This tool-box, clearly shown in the sketch, is 30 inches long, 16 inches high and 10 inches wide. The drawer shown in the sketch slides both ways. In this chest I find room for joiner-planes, jack-planes, 2 smoothing-planes, 3 molding-planes, 3 saws, brace, template-bevel, 10 chisels, 15 carving tools, oil-stone and cup and other small tools, such as bits, &c. I think from the sketch the readers of *Carpentry and Building* will be able to form an intelligent idea of the general construction.




*Tool-Chest Employed by J. G. P.*

*From* J. C., *Pryor, W. Va.*—I have from time to time seen in *Carpentry and Building* inquiries from correspondents desiring to know how a tool chest can be made which will be the most convenient for holding tools. In reply to these inquiries I will endeavor to give a description of a tool chest that I am now using. It is 3 feet long, 20 inches wide and 18 inches deep. It is provided with three tills, two of them being made to slide one over the other. These are made of thin wood and go in the chest lengthwise, there being small strips on which they slide. The bottom till is seldom moved from the back. The tills are made 3½ inches deep and 6 inches wide. The top one is divided into three compartments for holding bits and small tools. The other one is divided into two compartments for holding mortise and firmer chisels. The third till is used for saws and squares, and is attached by measuring from the front of the chest back 4 inches and cutting a slot deep enough to receive a saw edgewise. This gives room for four saws. The bottom is nailed to the piece that works in the slot and rests on a piece nailed to the chest to keep it from giving down. There is a slot cut in the left side for the tongue of the square. I use the bottom of the chest for planes and other large tools. The outside has a 1 x 4 inch piece of molding around the bottom. Next to the lid is a 1 x 3 inch piece similar to that employed at the bottom, and set on 1 inch from the top of the chest. The piece that goes around the lid is 1 x 2 inches. The cap on the top of the lid is 1 x 12 x 26 inches, with edges beveled. The hinges are put on the molding.

*From* C. A. F., *Waterloo, Ind.*—In reply to the inquiry of the correspondent who asks how to make a convenient tool box, I would say construct it according to the amount of tools it is desired to keep in it, but make it not less than 16 or 18 inches high inside. Put the drawers in the bottom of the box, so that they will open from the outside. I would place them in two rows, consisting of two or three each, and above these put another bottom in the box. Do not make the drawers too high, but make them long and wide enough to reach across the box. Partition off the drawers to suit the small tools, such as bits, chisels, machine augers, files, &c. Upon each drawer I would place a pull and lock. That portion of the chest above the drawers will be used for large tools, such as planes, saws, &c. Make a slot in the upper bottom at the back side for the tongue of the square. This will be found a most convenient form of tool box. Any tool can be reached and removed without disturbing any other tool, more especially if it is made a practice to keep each tool in its proper place. In my chest I can get any tool in the dark without disturbing anything else in it. The object of making the drawers shallow is to prevent putting the tools on top of each other. The drawers should be of ⅝ or ½ inch stuff. I have two boxes similar to that above described, with four drawers in each, measuring inside 19 x 19 x 36 inches. In them I can carry tools enough for three men.

### Geometrical Problem.

*From* W. E. R., *Newark, N. J.*—Will some of the readers of *Carpentry and Building* inform me how to strike eight circles in a square having 2-inch sides, each circle to be tangential to adjacent circles and adjacent sides of the square?

### Calking Floors.

*From* R. & Co., *Pittsburgh, Pa.*—We have some floors to calk and know very little about how it should be done. Some tell us to use oakum and cover with pitch; other to use cotton and pitch the joints; still others to use cotton and to putty the joints with white lead. The last remedy we have heard is to partly fill the cracks of the joints with very fine sawdust and fill hot asphalt into the joints. Please give us your opinion on the above methods, and make any suggestions you see proper under the circumstances.

*Note.*—We are disposed to advise our correspondents to rely upon the old plan of oakum thoroughly driven in by calking tools, by the hand of a ship-calker or other expert. We have little faith in the other "remedies," as our correspondents facetiously describe the plans mentioned above.

### Round Barn.

*From* J. T., *Madison, Wis.*—I would like to receive from some of the readers of *Carpentry and Building* their ideas about building a round barn. There is a farmer in this vicinity who is talking about building a barn 80 feet in diameter. The points which he presents in favor of the round form are that it is more convenient than a rectangular shape; that there is less outside wall and that there are no timbers or braces needed for the outside frame. Timbers 2 x 6 inches in section placed one in each 2 feet would make sufficient strength. The wall should be horizontal, with drop siding or ship-lap. The general plan would be somewhat like that given in the August number for 1886. There would be two rows of stalls all around, with the floor joists all running toward the center. They would be supported by the uprights that would be required to make the stalls. A 24-foot silo would be located in the center.

*Note.*—Our correspondent expressly requests the assistance of some of our practical readers. We shall be glad to have them join in the discussion and give what information they can on this subject. There are difficulties in the way of building a round structure which it would seem have not been taken into account by the farmer referred to above and his carpenter. On the other hand, there are certain advantages secured by the circular form. We shall be glad to have both sides of the case exploited.

### Measuring Timber.

*From* P. H., *Hampton, Neb.*—I desire to submit the following question to the practical readers of *Carpentry and Building:* Suppose I have a piece of timber 4 x 5 inches at one end, 9 x 9 inches at the other and 16 feet long. How shall I get the solid contents in square feet?

*Note.*—The problem submitted by our correspondent above has received somewhat exhaustive consideration in previous issues of *Carpentry and Building*, and we would refer him to the September and November numbers of 1885 and the April issue of 1886 for a satisfactory answer to his question.

### Dark Coloring for Brick.

*From* J. P. K., *Greensburg, Pa.*—I wish to say a few words in regard to dark coloring for brick. I regard Vulcum varnish as far superior to coal tar for coloring brick. It has the advantage of being durable and also keeps a bright, clean appearance. I have a job finished in the above-mentioned color which has been standing for three years, and is just as clean and bright to-day as the day it was done. I notice where coal tar was used, it has scaled off in some cases and has left the brick a dirty hue. In preparing brick to be colored with Vulcum varnish, the following directions should be observed: Wash all the dirt off the face of the brick to be dyed and then let the brick dry. Next apply two coats of varnish with a brush. This may be done after the work is laid in a building or before, as desired. There are two grades of the varnish in the market. The cheap grade answers a good purpose.

### Old Roofing Tin.

*From* GUMMEY, SPERING & CO., *Philadelphia, Pa.*—We have now before us a piece of tin which was taken off the roof of a building now undergoing alterations. This tin was placed on the building in the early part of the year 1825, and the roof is now being repaired by one of our roofers, whose father put on the original roof at the time we name. The plates were imported as bright plates, but were dipped in a coating of lead here by Jos. Truman, an old resident of this city, who first conceived the idea that if plate was dipped in a solution of lead it would make it much better. Perhaps the trade is not aware that the first terne or lead-coated plates were made in our city. This roof was not painted on the under side, but only on the outside, and the inside is just as good as the day it was placed on the roof. This latter fact of not being painted underneath we wish to call your attention to from the fact that so many roofs are painted underneath, when it is not really necessary to do so. The sheet we referred to in the beginning of this letter we have hanging up in our office, and it is quite a novelty to many roofers from the fact that it was placed on the roof some 64 years ago.

### Saw Kerfs for Bending an Elliptic Head Jamb.

*From* J. C. Y., *Springfield, D. T.*—I would like to ask some of the practical readers of *Carpentry and Building* how to form the saw kerfs for bending an elliptic head jamb. I am building a house with several circular heads and one elliptical head opening. I understand the circle part, but can find no one who understands the elliptic.

### Selecting a Superintendent.

*From* W. F., *Lincoln, Neb.*—I have been anxiously looking for opinions from subscribers to *Carpentry and Building* relative to the question of "M. R. D.," which appeared in the November (1888) number. I refer to the question whether it is the custom to employ a defeated competitor as superintendent of a piece of work. It appears to me rather unfair, but I would like to hear the opinion of others as to the custom.

### Applying for a Patent.

*From* G. M., *St. Louis.*—I desire to learn through *Carpentry and Building* something about patent matters. If I should apply for a patent on an article and the patent should not be granted for lack of novelty, could I, by making some alteration in the article, put myself in position to receive a patent? Would I, in that case, be allowed to make the article and mark it "patent applied for?"

*Answer.*—This inquiry opens up a broad question in the matter of invention and applying for a patent. If our correspondent applies for a patent on an article and his application is rejected for lack of novelty it would seem that he has a perfect right to make the article, and also that every one else has the same right. Adding some novel feature to it, while it might make the article patentable, would not necessarily protect him unless the feature in itself was an essential part of the article. He would, of course, obtain the right to put "patent applied for" on the article during the pendency of his application, and afterward "patented," assuming that the patent is issued, but what would this avail if some one else could make the same article by omitting the special novelty to which he refers? Our correspondent's question proceeds, evidently, from a lack of the clear apprehension of what a patent on an article is. The patent law does not give a right to the patentee on anything except that which is novel, and there is no means by which the Patent Office can be tricked successfully. The courts very soon right any errors and correct any mistakes which the office may make.

### Recipe for Marking Steel Tools.

*From* E. J. W., *Des Moines, Iowa.*—In reply to "J. J. B.," of Kalamazoo, Mich., who writes asking for a recipe for marking steel tools, such as saws, chisels or any others having bright or polished surfaces, I would offer the following: Warm the tool and spread over it a thin layer of beeswax. With the sharp point of a pencil—or, if necessary, an awl may be employed—write the name through the wax. Drop a little muriatic and a few drops of nitric acid into the channels thus formed in the wax and let the compound stand for about five minutes, when the acid may be poured off. Heat the tool again, working the wax into letters, which will form a black enamel and will remain so until the tool is worn out. My own tools are marked in this identical way, and I have had scores of mechanics ask me for the recipe. It is possible that there are many of your readers who will find the above useful.

### Tank Construction.

*From* D., *Agricultural College, Miss.*—In the article on "Tank Construction and Support," in January number of *Carpentry and Building*, I find this statement:

A tank is 8 feet wide, and is supported by joists 16 inches apart. The number of joists is "$8 \times 12 = 96$ inches $- 16 = 80$ inches $+ 16 = 5$ in number." How is this conclusion reached? Should it not be $12 \times 8 = 96$ $(96 \div 16) + 1 = 7 =$ number of joist if one is at each end of tank?

Then for the calculation that follows: Assuming five joists 16 inches apart, we will necessarily have the outside joists each 16 inches from outer edge of tank, and each will evidently have much more weight on it than any of the middle three. Hence each joist will not have $\frac{26}{5}$ tons, as assumed in article.

If it is desired that each joist hold up the same amount (approximately), we should have six joists 16 inches apart, thus giving a lap at the ends of 8 inches. Each joist will then practically support the weight on the 8 inches on each side, or 16 inches in all.

The calculation will be correct if we take the weight on each of the six joists as $\frac{26}{6} = 4\frac{1}{3}$ tons, instead of 5.2, as in the article. Again, the deflection for the joist of the size and load given will be very nearly 2 inches, or about $\frac{1}{120}$ of length. When we remember that only $\frac{1}{480}$ of length deflection is allowed for a ceiling of plaster, this deflection of four times greater seems rather large, and would tend to spring the bottom of tank and cause leak.

### Cost of Cornice-Work.

*From* G. W. O.—Is there a rule for measuring and estimating the cost of galvanized-iron cornice, brackets, finials and such other work as one would be required to figure on in the cornice business?

*Answer.*—It would be impossible to give any set rules for estimating the cost of sheet-iron architectural work, as the conditions under which it is made and put up are so varied. A method of estimating the cost of work that would be applicable to one shop would not be to another. An establishment provided with the latest and most improved tools and machines, operated by men of skil and experience, would be expected to turn out work at a less cost than a shop having only a cornice brake in connection with the usual tools found in an ordinary tin shop. The amount of material required for a certain job might be estimated with a greater degree of certainty than any other item of cost, but in case the estimating was to be done from scale drawings, it is a question if different persons would arrive at nearly the same results.

### Sweating of Roofs.

*From* ROOFER.—I have been troubled a great deal this winter by the leaking of an iron roof, at least the owner thinks it leaks. Sometimes it appears to leak all over, but I cannot find any place that seems to be defective. The building is new, and everything about it green and damp; the sheathing boards are laid on the ceiling joist, and there is no ventilation whatever between the ceiling and roof. Would not the moisture in the building condensing under the iron cause the trouble? and last, but not least, how is it to be prevented?

*Answer.*—There is no doubt that trouble with the roof our correspondent mentions is caused by the condensation of moisture under the roof, and the fact that sometimes the roof appears to "leak all over" would go to show that such was the case. The moisture contained in the air confined between the ceiling and roof, which moisture may be supplied from the evaporation of water from the plastered ceiling and inclosed wood-work, would naturally be condensed when coming in contact with the cold roof and drip on to the ceiling below. As the ceiling dries from the under side, the difficulty may in time be overcome. A more speedy remedy would be to place ventilators in the roof so there would be an opportunity for the moist air above the ceiling to escape, but as our correspondent states that the sheathing boards are placed on the ceiling joist, the matter of ventilation is much more difficult. It is somewhat curious to note how prone people are to think a roof leaks when moisture shows on the ceiling underneath. During cold weather the moisture in the building may condense on the window glass and run off in streams, yet this is considered as a natural result and something to be expected, but if a metal roof is so situated that moisture comes in contact with it under similar conditions and condensation takes place, the inference is apt to be that the roof leaks; yet how few would accuse the glazier of putting in leaky glass.

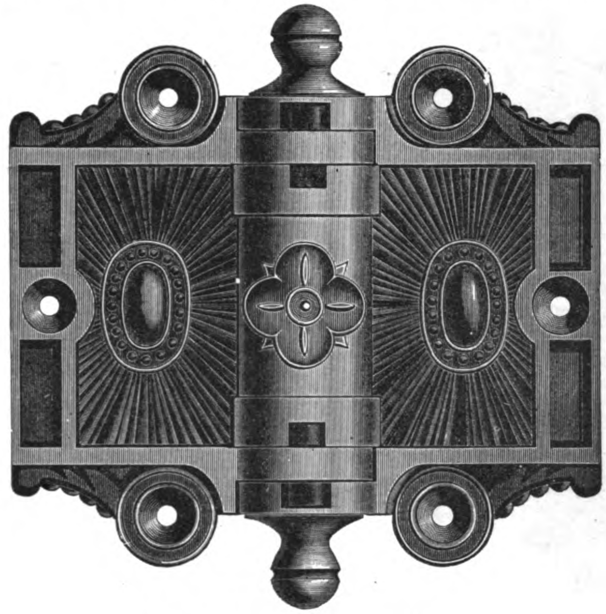
## New Roofing Material.

A novelty in the way of a roof covering, says a German exchange, consists of a metallic slate closely resembling those used in this country, but enameled, so as to be proof against moisture or acid vapors. Metallic slates of tin and galvanized iron have long been used in Germany, and galvanized iron has been pronounced by the highest scientific authority there to be the best protection against rust that has yet been applied to iron, but it is acknowledged that the bending necessary to form the locking joints of the metallic tiles is apt to throw off the protecting covering, leaving the iron exposed to corrosion. In order to provide against the bad effects of this the new plates are made of sheet-iron, stamped into shape in the usual manner and are then dipped into an enamel paint which, when heated, forms a continuous coating, unaffected by acids or alkalies. It is too soon to say how long a roof laid with such a material will last, but it promises to be of considerable value.

# NOVELTIES.

### New Spring Hinge.

The new spring hinge illustrated herewith and recently placed on the market by the Henry C. Hart Mfg. Company, Detroit, Mich., is designated as the Reliable No. 20 Surface Spring Hinge, and embodies some new features in construction as well as in design. Its principal point of difference from other hinges of the same character is that the manufacturers have substituted for the usual coiled wire springs a flat spring made of tempered steel and concealed by the leaves of the hinge. The advantage of this flat steel spring over the coiled wire spring is that it takes up very little space and is completely protected from the weather. It is described as made from the best quality of material, carefully tempered, thus giving an advantage over the wire springs, which are apt to vary in hardness and elasticity. The hinge is so constructed as to throw the door either open or shut. The weight of the door is referred to as supported by the knuckles of the hinge. The manufacturers refer to the hinge as meeting with favor wherever offered, and from its attractive appearance and durability likely to meet with a large demand.



*Novelties.—Fig. 1.—New Spring Hinge.*

*Fig. 2.—Little Gem Pipe-Wrench Attachment.*

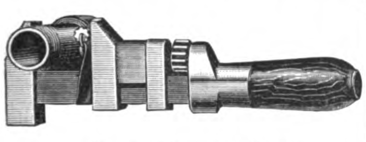


*Fig. 3.—Attachment in Use.*

### Little Gem Pipe-Wrench Attachment.

The accompanying illustration, Fig. 2, represents this simple article, Fig. 3 showing how it is used in connection with an ordinary wrench. It is the invention of A. A. Hutchins, Clyde, Ohio, for whom E. M. Richardson is New England agent, Waltham, Mass. The attachment consists of a piece of steel about ¾ inch long and ⅜ inch in diameter, toothed all around, as shown in the cut, and attached by means of a brass wire, on which it revolves, to the rubber band, by means of which it is connected with the wrench in the position shown in the cut. It is claimed that in use the attachment converts an ordinary wrench into an excellent pipe-wrench, and in order to secure its efficiency of operation it is suggested that the attachment be adjusted above the center of the pipe, thus enabling it to get a good grip. It is intended for farmers, mechanics or other persons who do not use a pipe-wrench enough to justify the purchase of one, and also for plumbers and others to carry in the pocket for an emergency.

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### Improved Pony Planer and Smoother.

The Indiana Machine Works, of Fort Wayne, Ind., have recently introduced to the trade a new and improved pony planer and smoother, a general view of which is afforded by means of Fig. 4 of the accompanying illustrations. The frame is cast in one piece, has a wide floor-bearing, and is, therefore, substantial and rigid. The bed is raised and lowered to provide for different thicknesses of lumber by means of a large hand-wheel, so placed as to be within convenient reach of the operator. Four large feed-rolls are provided, each 3½ inches in diameter, the lower ones being driven in a novel yet efficient manner. This gives, it is claimed, a positive feed which is under the immediate control of the operator, and may be started and stopped instantly by means of the balanced tightener. The gears are all cut, and are therefore, it is claimed, superior to those which are cast. The cylinder is a solid steel forging, provided with long journals running in bearings lined with babbitt metal and furnished with the company's improved self-oiling cap. A pressure-bar on both sides of the head prevents the tearing out in cross-grained and knotty

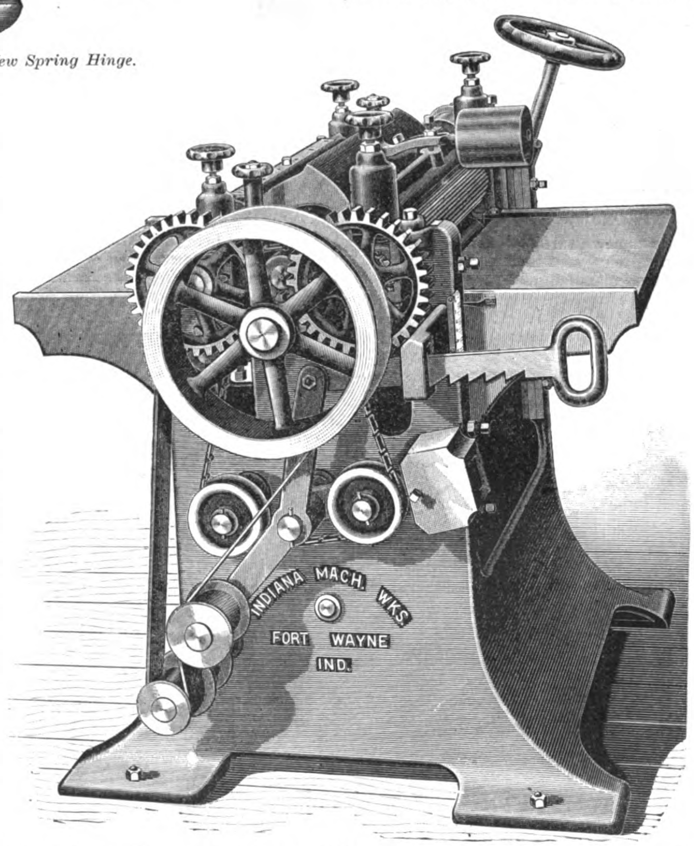
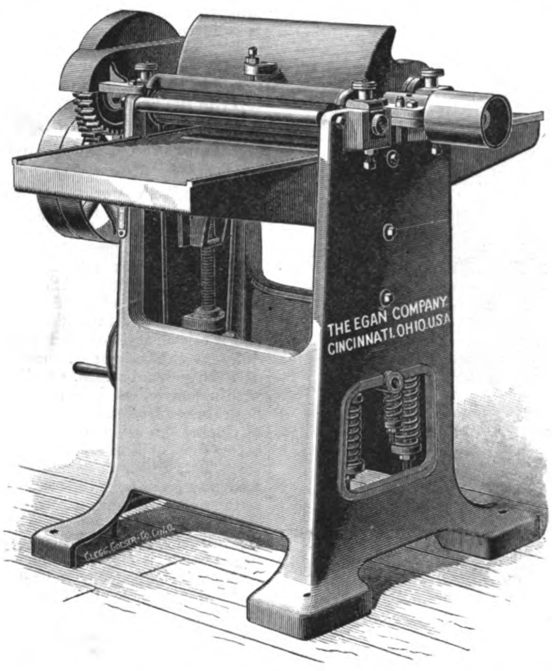



*Fig. 4.—Improved Pony Planer and Smoother, Built by the Indiana Machine Works.*

lumber, and renders it possible to do the finest smoothing. Both pressure-bars are adjustable while the machine is in motion. This machine is constructed in two sizes, adapted to plane 18 and 24 inches wide and 6 inches thick. Two feeds are furnished with the machine. The tight and loose pulleys on the countershaft are 10 x 6 inches and should make 1000 revolutions per minute.




*Novelties.—Fig. 5.—New Surface-Planing Machine, Made by the Egan Company.*

**New Surface-Planing Machine.**

The new surface-planing machine, a general view of which is shown in Fig. 5, is being manufactured by the Egan Company, of Cincinnati, Ohio. This machine is carefully constructed and has been designed to meet the requirements of carpenters, planing-mills, furniture, buggy and cigar-box factories. The frame of the machine is so constructed as to give it great strength and enable it to withstand severe strain. The bed is cast in one piece, as is also the frame. The bed is strongly gibbed to the frame, and any wear can be instantly taken up by bolts from the outside of the frame. The boxes for the cylinder are cast on the machine, making a very solid and rigid bearing, and being free from all vibration. The cylinder is constructed of the best refined cast-steel, while the bearings are long and lined with genuine babbitt metal. A pressure-bar operates on each side of the cylinder, thus insuring steadiness even when planing short or thin stuff. The pressure-bars are self-adjusting and easily regulate themselves to the various thicknesses of lumber being planed. The bed is raised and lowered by a single hand-wheel conveniently placed. The feed-rolls are adjustable, and the cylinder, being in stationary boxes, when once set is always the same. When the bed is raised and lowered it is only necessary to glance at an index on the side to ascertain the thickness to be planed. The feed-rolls are made of steel and extra large, the front one being fluted. The gearing is strong, and the manufacturers claim that every device has been introduced to make a powerful and reliable feed. The friction-rolls in the table are so arranged as to be easily adjustable. The machine is designed to plane from $\frac{1}{16}$ to 6 inches in thickness and $18\frac{1}{4}$ inches wide. If desired a counter-shaft is furnished, which can be placed on or under the floor, as may be most convenient.

**Improved Universal Wood-Worker.**

Cordesman, Meyer & Co., of Cincinnati, Ohio, are offering the trade an improved universal wood-worker, a general view of which is shown in Fig. 6 of the cuts. This machine, the manufacturers state, is capable of doing a great variety of work, including hand-planing, jointing, molding, rabbeting, mitering, beveling, paneling, grooving, rip-sawing, cross-cut sawing, boring and routing. The main frame of the machine is a heavy-cored casting with large base. The tables are arranged in such a way that they may be raised and lowered in V-slides on the inclined tops of the frame by large hand-wheels, clearly shown on the front of the machine. All wear may be taken up by set-screws on the back of the machine. The tops of the tables rest in slides, and can be adjusted to and from the mandrel by the small hand-wheel shown on the front of the machine. They are locked in place by other hand-wheels which are not shown in the engraving. The length of tables is over 6 feet. In the side is a groove 4 inches wide, in which slides the gaining-frame. The improved adjustable fence can be set at any angle, and is provided with lugs in the top for spring-posts. These springs can also be used in the sides of the tables

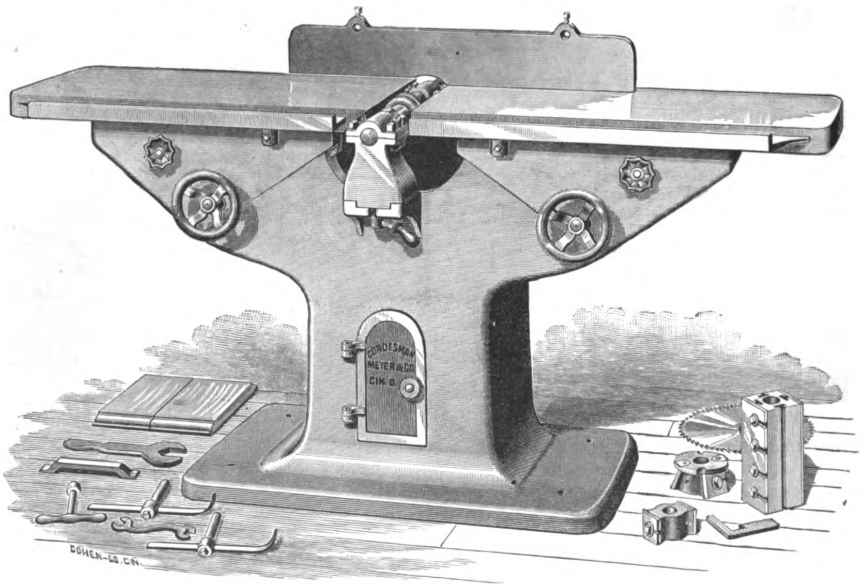
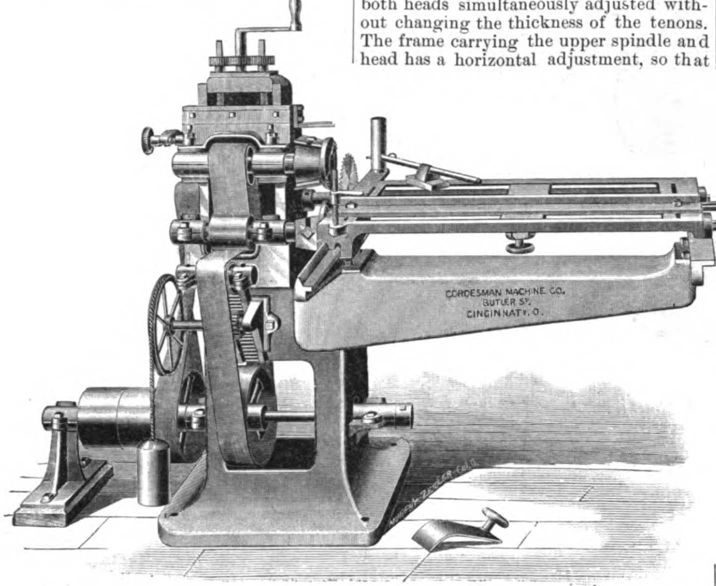



*Fig. 6.—Improved Universal Wood-Worker, Made by Cordesman, Meyer & Co.*

when working the edge of a board or when ripping. The mandrel is $1\frac{1}{2}$ inches in diameter and has two long self-oiling bearings lined with the best of babbitt metal. One of the bearings may be instantly removed, as shown in the engraving, for the purpose of changing heads. The mandrel is adjustable laterally across the table by means of a small hand-wheel on the back of the machine. If it is desired, a complete boring attachment may be placed on the opposite side of the machine. It is provided with a sliding-table with adjustable fence and may be raised and lowered. The loose and tight pulleys are 10 x $5\frac{1}{2}$ inches and the manufacturers state should make about 800 revolutions per minute. Three heads are furnished with the machine, one 9-inch four-sided slotted-steel head, one ripping-head and one small jointing-head. The manufacturers also furnish one 12-inch saw.




*Novelties.—Fig. 7.—Patent Tenoner, Made by the Cordesman Machine Company.*

## New Patent Tenoner.

The Cordesman Machine Company, of Cincinnati, have brought out a patent tenoner, made with or without cut-off-saw attachment, and shown in general view in Fig. 7 of the cuts. The table upon which the material to be worked is placed is cast in one light piece and substantially ribbed. The column with its extension is cast in one heavy cored out piece and is provided with a very substantial floor support. The table is movable back and forth on accurately-fitted ways. The under side immediately next to the cutter has a V-grooved way, and an adjustable gib which serves as a guide-rail and prevents the table from being lifted from the ways. The extreme end of the table is provided with anti-friction rollers, which also work on a planed way. A clamp-rod within convenient reach of the operator enables him to firmly secure or release the material instantly. The table is equipped with patent adjustable gauge-rod and stops adjustable to pieces of various lengths, by which the distance between shoulders can be readily regulated. The cutter-head spindles are made of the best steel and run in long babbitted boxes. The cutter-heads are made small and can be run at a high rate of speed. The knives are 4 inches wide, formed angling on the head, ground to the required shape and will make a perfect draw cut. The heads are provided with spur-cutters, by the use of which square shoulders may be smoothly cut. The frames carrying cutter-heads and spindles are adjustable vertically by means of independent screws, by which the heads may be set to suit various thicknesses of material. The statement is made that when desired both screws may be instantly geared and both heads simultaneously adjusted without changing the thickness of the tenons. The frame carrying the upper spindle and head has a horizontal adjustment, so that the shoulders may be formed in or out of line with one another, as the work may require. The counter-shaft is attached to the machine. The tight and loose pulleys are 8 inches in diameter, with $4\frac{1}{2}$-inch face, and their designated speed is 875 revolutions per minute. When desired a cut-off-saw attachment, designed to cut the tenons to any desired length, is furnished.

## Humphrey's Improved Awl-Haft.

Fig. 8 of the accompanying illustrations represents a new awl-haft which in put on the market by the Humphrey Tool Company, Warren, Mass. The haft is put on the market with the expectation that its special features will commend it to the trade and in its construction the manufacturers have endeavored to avoid difficulties which have been found with other similar tools. In some handles the awls are liable to pull out of the tool when they are driven into hard wood, but in this case the square part of the awl cannot pass through the round hole at the end of the cap. Neither can the awl turn in the handle, as it rests firmly in a square socket and is held upright and centrally by the cap, which is screwed down until the inside of the cap draws firmly upon the neck of the awl. The tools are safely and conveniently stored each in a separate chamber under the metal ring at the end of handle, where ten different tools—eight awls, one screw-driver and one point—are held in separate cells. The ring covering the chamber in which the tools are kept can be revolved bringing the one hole in it over any of the chambers containing the tool required, and thus permitting it to be readily taken out. The wood near the ring is stamped with figures or letters indicating the size of the different tools. The turning of this ring is so retarded that it is referred to as safe to leave it at the point where the tool is removed until the return of the tool, when the ring can be moved so that the opening comes to a space in the handle where no tool is contained, thus closing all the openings and leaving the tool secure. The handles are made of fancy hard wood polished, the metal parts being full nickel, with knurled surfaces at the points needed to enable the operator to screw them up firmly. The handle is solid wood and it is stated that it may be struck with hammer or mallet without injury.

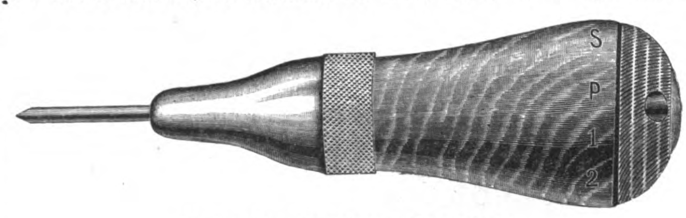


*Fig. 8.—Humphrey's Improved Awl-Haft.*

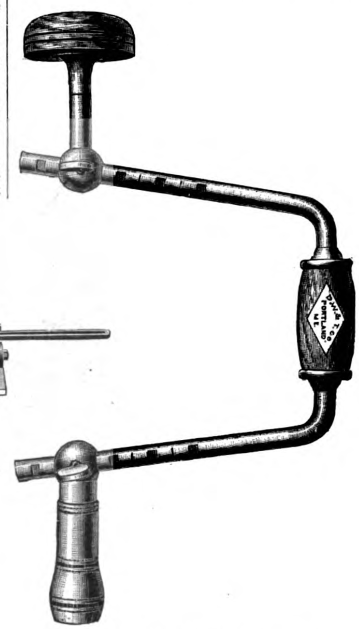
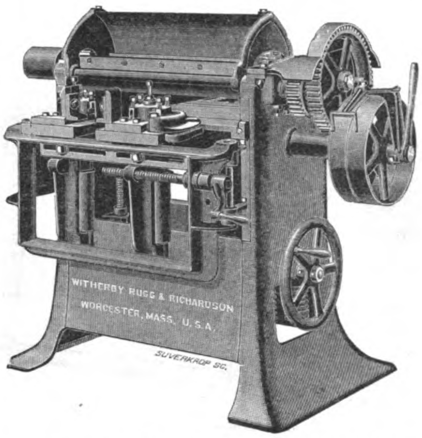


*Fig. 9.—The Extension Bit-Brace.*

## The Extension Bit-Brace.

This new brace is manufactured by the Diamond Wrench and Tool Company, Portland, Maine, and is represented in the illustration, Fig. 9, which shows its special features. By loosening the thumb-screws the head and chuck will move freely along the rod, so that it can be instantly adjusted to make a brace either 8, 10, 12, 14 or 16 inch sweep. The sweep is described as made of a steel rod and the head and chuck as being steel castings. All the parts are made interchangeable. The company point out that by equally dividing the distance—that is, setting the head for a 16-inch sweep and the chuck for an 8-inch sweep—by turning with both hands a crank motion is obtained doubling the power and the speed. In addition to the convenience resulting from the construction of this brace the manufacturers allude to its quality and finish. We are also advised that they are making a full line of plane and ratchet braces in connection with other tools.




*Novelties.—Fig. 10.—New Surfacer and Matcher, Made by Witherby, Rugg & Richardson.*

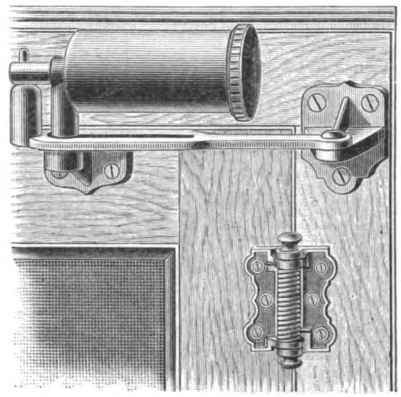


*Fig. 12.—The Chic Screen-Door Check.*

### New Surfacer and Matcher.

Witherby, Rugg & Richardson, Worcester, Mass., have introduced to the trade a new surfacer and matcher under the name of Panacea, a general view of which is shown in Fig. 10 of the cuts. The bed of this machine is cast in one piece and so gibbed to the machine that it can be kept always firm and solid, the latter being of such form as to withstand any reasonable strain that may be brought to bear upon it. Hinged to the table or bed is the matching attachment, so arranged that it may be swung to the right or left, as may be desired, when surfacing only is to be done. The machine is provided with two top feed-rolls geared together and two anti-friction rolls in the table, all of which are easily adjusted and can be readily maintained in proper position. The cutter-cylinder carries two cutters, is made from a solid cast-steel forging and finished in the best possible manner for executing fine surface planing on any and all kinds of lumber. The machine will work on stuff up to 6 inches in thickness and 24 inches wide, and will surface and match a joint 11 inches wide and 2 inches thick. It has on each side close up to the cylinder a pressure-bar which is both adjustable and self-adjusting for various thicknesses of stuff being worked, long or short. The machine is carefully made in all its parts, is very substantial, and is claimed to be among the best at present on the market. With it the firm furnish two surfacing-cylinders with cutters, two wing side-heads and cutters for matching, with $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ inch tongue and groove and four 2-inch jointing cutters. The fast and loose pulleys are 10 inches in diameter, with 6-inch face, and should make 1000 revolutions per minute.

### New Tenoning-Machine.

In Fig. 11 of the accompanying illustrations we present a general view of a tenoning-machine especially adapted for sash, door, blind and furniture factories which has been brought out by the Bentel & Margedant Company, of Hamilton, Ohio. The machine illustrated is known as an improved tenoner, with double-link pivoted table. The square solid column which supports all the operating parts of the machine is supplied with two heavy lugs, one on the top and the other on the bottom of the frame. A pivot-bar passes through these lugs and through an extra link-joint, which is also pivoted to the table, thus compensating, it is stated, for the difference in length in moving the table across the machine. The housings that carry the strong tool steel mandrel are well connected and gibbed to the vertical slides on which they are adjustable up and

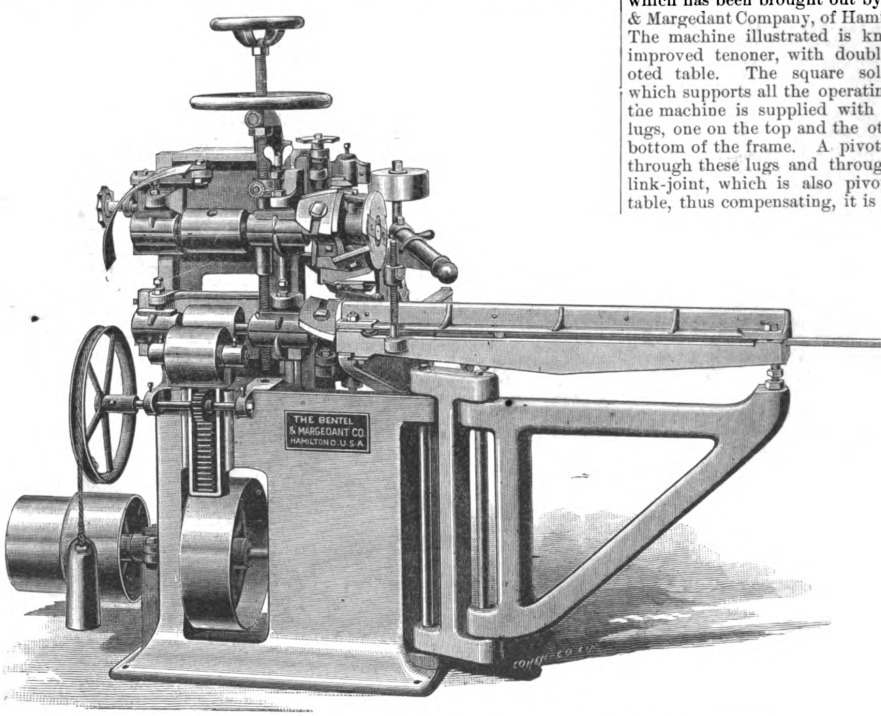
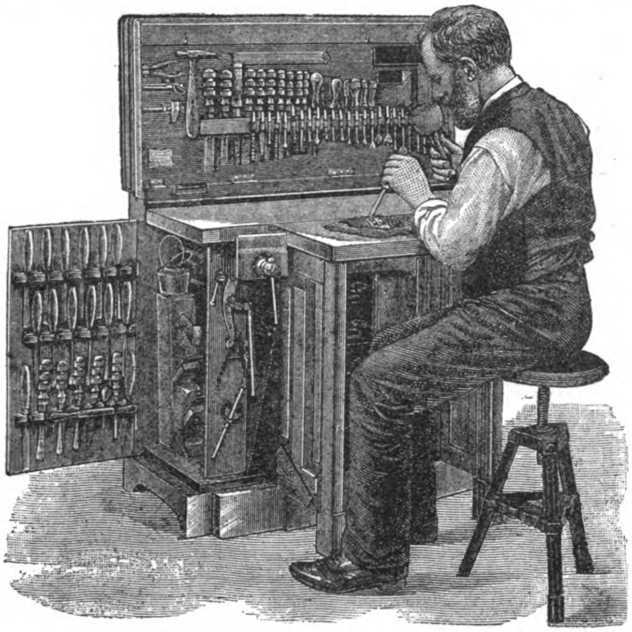



*Fig. 11.—Tenoning-Machine, Manufactured by the Bentel & Margedant Company.*

down. The cope housings and mandrels are attached to the principal housings and rise and lower with it. They are, however, provided with an independent adjustment, enabling them to be moved up or down and in or out by means of hand-wheels. The table is furnished with a strong fence, an adjustable hold-down device, and a neat and novel measuring stop-rod. The knives on the tenoning-heads are set at such an angle as to make a shear cut. The heads are furnished with spur-cutters and are well balanced. Both outside heads have a cutting face of 3½ inches wide and both inside 3 inches wide. The double heads have a cutting face 6 inches wide and tenons up to 8 inches in length and 16 inches in width. The tight and loose pulleys on the countershaft are of the company's patent differential pattern, the loose pulley being of smaller diameter than the tight, which is 10 inches in diameter with a face 5¼ inches wide.

### The Chic Screen-Door Check.

The use of door-checks has become so common that a door having a spring to shut it and without one of the several devices to prevent its slamming is a rare exception. So general has the spring and check been brought into use that the old "Shut the Door" signs, formerly so familiar on store doors, are now seen only as relics of former annoyances, and the pictorial artists are devoting their leisure to more pleasing objects. Doing away with the slamming of ordinary doors has directed attention to the slamming of wire-screen doors as they are shut by the spring hinges so generally used. The door checks heretofore made have not usually been suitable for screen doors, and are too expensive if they were otherwise practicable, but the Chic Screen-Door Check, illustrated in Fig. 12, has been made especially for this purpose. Sargent & Co., the manufacturers, describe it as follows: The new patent Chic Screen-Door Check is suitable for either right or left hand without changing any of the parts; it is easily applied, and can be used with any screen-door spring or spring hinge. The pressure acts toward the hinges and holds the door firmly in position. The piston is inclosed within the cylinder to prevent the summer dust from interfering with its free working. It effectually prevents slamming and can be placed on any screen door. By screwing the cap at the end of cylinder the check can be instantly varied to suit the tension of the door-spring or spring hinges that may be used.



*Novelties.—Fig. 13.—Combination Tool-Cabinet.*

### Combination Tool-Cabinet.

Our readers will remember that some months ago we published in these columns an illustrated description of a work-bench and tool-cabinet which was being introduced to the English trade by Messrs. R. Melhuish & Sons, of Fetter Lane, London, England. Since that time this firm have made still further improvements in their cabinet tool-chest, and are now putting upon the market a form of cabinet which is shown in general view in the illustration, Fig. 13. The improvement will be found in the table, formed by pulling forward the sliding pedestals and resting upon the top of them a carving-board, all of which is clearly indicated in the cut. This attachment presents facilities for drawing and painting, and, in fact, may be used for a variety of purposes. It is possible that an article of this description may not be for sale in the general market in this country, but we have no doubt the ingenious mechanic, possessing a reasonable amount of skill, will be able to fashion one of its general description, which will be found excellently adapted to his requirements. The cabinet shown in the engraving is fitted with a very useful selection of tools, all arranged with a view to convenience and compactness.

### Wilson's Sliding-Door Hanger.

The Scranton Iron and Brass Company, of Nos. 1321–1329 Capouse avenue, Scranton, Pa., are directing the attention of those interested to the Wilson Sliding-Door Hanger, a general view of which is herewith given in the illustration, Fig. 14. From an inspection of the cut it will be seen that neither rail nor track is required, and that it is unnecessary to cut or deface the door in order to place this hanger in position. The parts are strongly made of wrought-iron, with the exception of the geared portions, which are made of cast-iron. Before leaving the factory each hanger is carefully fitted and tested. It is designed for use upon either right or left hand doors, as may be desired, the hanger being entirely concealed from view. Referring to the engraving, C is a bracket, which is readily secured to the studding and extends inward and parallel with the face of the door. Upon this bracket (C) and within the recess are pivoted, near

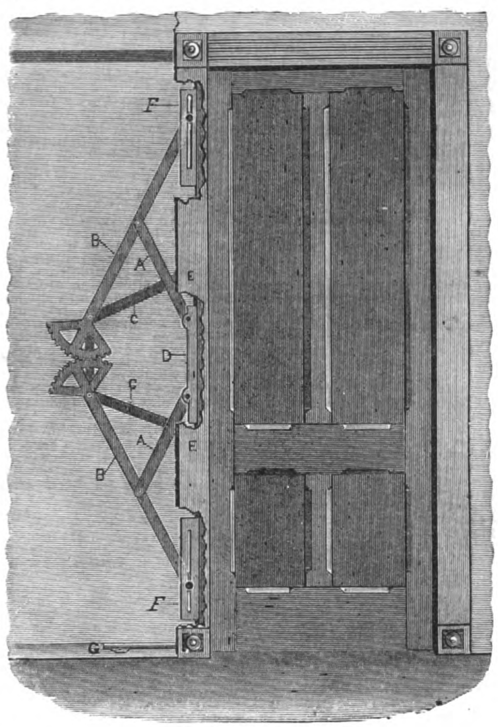



*Fig. 14.—Wilson's Sliding-Door Hanger.*

the geared portions, the levers B B. To these levers are pivoted two arms shown at A A, which extend and are pivoted by their opposite ends to the plate D. This plate in turn is firmly secured to the edge of the door at or near its middle portion. The ends of the levers B B are each attached to a button made to slide perpendicularly in corresponding slots in the two plates F F, all of which are clearly shown in the cut. These plates are bent at right angles and are firmly secured to the edge of the door near its top and bottom. In case it is desired to make the door more steady at the top this may be done by the casing or by dowels, while the same result may be accomplished at the bottom by the floor guide indicated by G in the cut. The manufacturers state that the longer the hanger in proportion to the width of the door the easier it will move. In case the doors are too heavy for the length of hanger required and not of sufficient hight to permit the use of the next size special hangers are made to order. It is also claimed that a horizontal movement of the door is at all times secured; that it can never sag or get out of plumb, and that a door with this hanger can be readily hung and adjusted in a quarter of the time necessary to hang a door with wheel hangers and at one-fifth the cost.

## TRADE NOTES.

WE HAVE RECEIVED from the Union Foundry Works, Chicago, Ill., an interesting little pamphlet devoted to illustrations and tables of strength of various forms of architectural iron. Much information of value to the builder of large structures in which iron is employed is presented, together with other data of a useful nature.

MR. JOHN M. FRENCH, of Ohio, was the choice of Scripp's League to study the art of cabinet-making during the sojourn abroad of the party of American workingmen which left New York on Wednesday, July 24. Mr. French is a thoroughly practical man of wide experience, and is competent both to design and finish any piece of furniture. He is also familiar with the various methods and machines used in manufacturing goods in his line. During recent years he has been engaged in superintending work in Paris, Ohio.

MENTION HAS RECENTLY been made in the trade journals of the country regarding the sale of the building, engine, &c., of the Cincinnati Corrugating Company, on Eggleston avenue, Cincinnati, Ohio. But we learn that this is merely one step in the important move the company are making toward occupying their new works at Piqua, Ohio. Among the new features of the business will be the manufacture of their own iron and steel sheets, under the auspices of the Piqua Rolling Mill Company, an allied concern. The large tract of land acquired just south of the flourishing city of Piqua will enable the two companies to extend their lines of specialties in many desired directions. The manufacture of all the sheet-metal used by the company under their own immediate supervision is an advantage not easily estimated in securing a uniform and superior quality.

HERBERT BAKER FOUNDRY AND MACHINE WORKS, of Toledo, Ohio, favor us with a catalogue of liberal proportions illustrating wood and iron working machinery manufactured by them. The assortment presented is a varied and interesting one, covering all descriptions of wood and iron working machinery. Among the goods illustrated we notice the Colburn Universal Saw-Bench, self-feeding rip-saw tables, improved resawing machines, Eureka Band-Saws, fret scroll-saws, fast-feed flooring-machines, New England Planer and Molder, hand planers and jointers, molding-machines, mortisers, borers, shaping-machines, dove-tailing-machines and knife-grinders The company also give attention to engines, boilers, pumps, shafting, hangers, pulleys, belting, emery-wheels, &c., besides dealing in second-hand machinery. Several pages at the close of the work are devoted to price-list of wood separable pulleys, emery wheels, circular saws, machine belting and miscellaneous goods. The company report trade as very satisfactory, being sold far ahead in all departments, more especially on their Universal Saw-Bench and Universal Wood-Worker.

AMONG THE MEMBERS of Scripp's League of American Workingmen's Expedition which left New York on Wednesday, July 24, on the Anchor Line steamer City of Rome, was Mr. George W. Nettleton, a graduate of the special course of architecture of Cornell University. This gentleman occupies a responsible position in Detroit, Mich., and while abroad will make a study of the workingmen's homes, factories and shops, and the general progress in building materials, heating and ventilation.

WE HAVE RECEIVED from the Lincoln Iron Works, Rutland, Vt., a very neat and interesting catalogue of machinery made by them for working and handling stone and marble. In distributing this catalogue the company direct particular attention to their facilities for building and equipping mills or complete plants for working, quarrying and handling stone or marble. They have recently increased their facilities both in the foundry and machine-shop, having added several special tools and other labor-saving devices, and feel that they are now in a position to fully meet all reasonable demands which may be made upon them. Their stock of patterns is large and is constantly receiving additions. The catalogue consists of nearly 70 pages of carefully arranged letterpress, presenting illustrated descriptions of specialties of the company, together with table of rates of sawing different materials, remarks on the uses of wire rope, and numerous tables of interest and value in this connection. The closing pages are devoted to a list of references

THE MECHANICAL and technical papers of England, France and Germany are illustrating the late improved machines of the Egan Company, of Cincinnati, Ohio, giving such full and complete descriptions that their readers may learn of the progress being made in this country in wood-working machinery. The mechanical engineers of these countries recognize the merits of the tools of this company for rapid work, and as a result the company's foreign trade is now largely on the increase.

MR. RUFUS C. LONGSDON, of Illinois, was selected by Scripp's League to represent the carpentering industry in the American Workingmen's Expedition which left for Europe on July 24 in the City of Rome. He was one of the founders of the St. Louis Mechanical Association and was the unanimous choice of his craft.

J. E. BOLLES & CO., of Detroit, Mich., have just issued an interesting catalogue of iron-work for buildings, including iron columns and lintels, iron grills and railings, roof cresting, fencing, iron stairs, stable fittings, &c. The work consists of nearly 100 pages of letterpress, profusely illustrated with the goods manufactured by this firm. The statement is made that in the arrangement of the matter the firm have had in view the convenience of architects, builders, contractors and the trade generally, and they have endeavored to give as complete information as possible. The firm at present enjoy exceptional shipping and largely-increased manufacturing facilities, which place them in a position to promptly fill all orders. The catalogue contains a great variety of the latest designs in wrought and cast iron work, and will be found of more than ordinary interest to the trades referred to.

WE HAVE RECEIVED from Mr. Alexander Y. Lee, architect and civil engineer, Pittsburgh, Pa., a copy of a bird's-eye view of the Conemaugh Valley from Nineveh to the lake. It is a faithful reproduction of the country between the points named, being made from personal sketches and from surveys of the Pennsylvania Railroad.

WE HAVE RECEIVED from Mr. William Mueller, of 695 Broadway, New York, a copy of a work entitled "Academy Architecture and Annual Architectural Review of 1889," edited by Alexander Koch and C. W. English, architects. It consists of a selection of the most prominent architectural drawings hung at the Royal Academy exhibition, together with a review of interesting architectural subjects carried out or designed during the last few years, and is of interest to architects, draftsmen and designers. The work was first published some months ago in London, and the success with which it met abroad induced the publishers to issue an American edition. It consists wholly of plates with descriptive text, consisting of the various captions. A comprehensive index greatly facilitates reference.

IN THEIR ADVERTISEMENT SPACE this month the Cincinnati Corrugating Company, No. 147 Eggleston avenue, Cincinnati, Ohio, make the special announcement that hereafter all their corrugated sheets will cover 24 inches exactly.

THE STONE AND BRICK WATER-PROOFING COMPANY, of No. 115 Broadway, New York, favor us with circulars setting forth the merits of the Caffall process for water-proofing and preserving stone and brick work. The company have recently purchased the exclusive right to use this process in New England and the Middle States, and they also control the Caffall process for restoring marble buildings, monuments, &c. The company were incorporated on May 7 last, with Henry M. Keasbey, president; Rowland P. Keasbey, secretary and treasurer; Robert M. Caffall, the inventor of the process, superintendent. The company make strong claims for this process, the statement being made that by it the pores of the stone, brick, &c., including the mortar-joints, are permanently filled and rendered solid by a compound the base of which is paraffine wax of special manufacture, with refined creosote. It is claimed to be insoluble and impenetrable by the elements under all circumstances, does not alter or conceal the natural appearance of the surface of the material and prevents the soluble salts from coming to the surface through the evaporation of moisture and their lodgment there in a thin white crust or film.

WE HAVE RECEIVED from Lawson Valentine Company a pamphlet descriptive of their No. 60 Varnish, the literary and artistic merit of which is sufficient to commend it to the attention of all our readers. The address of the company is New York City and Hunter's Point, L. I.

THE SCIENCE OF MASONRY was represented in the American Workingmen's Expedition which was sent abroad under the auspices of Scripp's League, by William Delaney, a practical brick-layer and mason who learned his trade in this country.

THE GAGE TOOL COMPANY, of Vineland, N. J., are sending out to their friends in the trade a wooden rule 4 inches in length, on one side of which is an illustration of their new self-setting plane and a testimonial from James DeKay, manager of the New York trade schools. Upon the side marked with inches we find the statement that these self-setting planes are sent on 30 days' trial to any part of the United States where they are not kept by dealers. This advertising novelty is something unique in its way and is likely to attract attention.

WE HAVE RECEIVED from Frank & Co., Buffalo, N. Y., a catalogue of wood-working machinery which is manufactured by them. The volume is oblong in shape, consisting of over 80 pages of descriptive letterpress profusely illustrated and is bound in paper covers. Attention is given to a great variety of wood-working machinery, including planers and matchers, double surfacers, cabinet-makers' planers, pony planers, hand-planers, molding-machines, shaping-machines, blind-slat tenoning-machines, mortising-machines, band-saws, resawing machines, self-feeding rip-saw benches, combination saw and dado machines, saw-filers, pin and dowel machines, sandpapering and universal boring-machines, stave machinery and miscellaneous goods. The descriptive text is ample for the purpose, and the volume will be found one of interest to all having occasion to employ wood-working machinery.

THE HENDERSON MFG COMPANY, of Geneva, N. Y., have just issued a little work on the subject of steam and hot-water heating which they consider among the most interesting of the kind ever placed before the trade. Great care has been given to the preparation of this little volume, and it will be found an important addition to the dealer's library of trade literature. Within its covers is presented a full description of the company's steam and hot-water boilers, together with the method of computing the requirements of a house or entire block in order that the size of boiler and amount of radiation may be determined. The rapid growth of steam and hot water as a means of heating dwellings and, in fact, buildings of all kinds has made the industry an important one, and one which cannot be too thoroughly understood by all engaged in the building trades. The work referred to is of a character to invite inspection, and even though the system therein described may not be adopted by the reader, he is likely to obtain some interesting information bearing upon the subject of steam and hot-water heating.

The fashion of placing objects like coins, inscribed bricks and so forth under or in the corner-stone of an important building, says one of our exchanges, is very ancient. M. de Sarzec found four such hiding-places in the foundations of a palace built by a very ancient King of Chaldea called Gudea, whose headless statue is now in the Louvre. There were sacred cones and statuettes of clay, seals and other amulets from protection against bogeys, and tablets or cylinders of clay inscribed. The fashion is found later in Babylonia and Assyria. Nabonidus, the last King of Babylonia, while restoring the Temple of the Sun at Larsa, found the original foundation cylinder, according to his own statement, on one which he placed in the cavity. He boasts that Kurigalzu (about B. C. 1350) and Esarhaddon (B. C. 680–667) had sought for it in vain. Unfortunately this most ancient cylinder has not been found. Perhaps he kept it for his own library. In his late excavations at Naucratis, Egypt, the English explorer Petrie found under the four corners of a building erected during the Greek Ptolemy reigns miniature models of all the tools used in the work and small specimens of all the materials, from a tiny brick to a slip of gold and bit of lapis lazuli. These objects are now in the British Museum.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.




VOLUME XI. NEW YORK, SEPTEMBER, 1889. NUMBER 9

## NOTES AND COMMENTS.

THE decision of Judge Wallace in the United States Circuit Court for the Southern District of New York, just handed down in the Anchor Brewing Company case, is of vast importance to all holders of foreign patents who also have later United States patents for the same inventions. Judge Wallace in this case says that, contrary to his original impressions, he understands the opinion of the United States Supreme Court in the Bate Refrigerating Company case to be that "the exclusive right to the invention here is to cease with the exclusive right of the patentee in any foreign country," and he therefore holds that a United States patent granted in March, 1889, for an invention previously patented in Germany on September 6, 1877, and in France on September 3, 1877, lapsed with those foreign patents when they became forfeited (before the expiry of their full terms) by the failure of the patentee to pay the annuities and work the invention as required by the laws of Germany and France. Judge Thayer, in an opinion rendered some few weeks since in the Eastern District of Missouri, had previously reached a like conclusion. It therefore may be taken as tolerably well settled (until and unless the Supreme Court reverses the ruling) that the holder of a United States patent for an invention *previously* patented abroad must continue to pay the foreign taxes on the foreign patents to keep the United States patent in force.

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THE INTELLIGENT READER cannot fail to notice the rapidly growing trade in domestic hot-water and steam heating apparatus. The use of these forms of heating for dwellings, offices, &c., is superseding stoves in almost every part of the country. This development of what we may style advanced heating apparatus is only natural and is along the well-defined roads of improvement. The first fire the pioneer builds both for heating and cooking of wood is in a crude fire-place in a log hut. Later on he obtains for the kitchen he builds the cheapest cook stove that can be secured. After the log hut has been replaced by a more comfort able dwelling the cheaper grade of wood heating stoves supplant the draft-provoking fire-places and better cook stoves are also employed. The next improvement made by the pioneer is to remove some of the wood heating stoves that he has been using and put in place an improved coal-burning parlor stove, either of the magazine or surface-feed variety. Following this, or perhaps taking the place of the step last recorded, comes the hot-air furnace, and coincident are improved grates, such as double-heaters, ventilators, &c. In the cities and suburban towns, where the conveniences of life can be carried to an extreme, there soon arises a demand even beyond this, and accordingly steam and hot water are called for. Our country has passed through all these several stages, and just at present there is special enterprise manifested among the promoters of hot-water and steam heating apparatus, because so large a portion of the general public has reached the point of appreciating the merits of these modes of house-warming.

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THERE IS now in use at Ocean Grove, N. J., a so-called wave motor, which, if we remember rightly, has been employed in a somewhat modified form both on the Pacific Coast and on the St. Lawrence River. The device uses the wave motion and consists of a swinging leaf or blade hung perpendicularly and with its broad side parallel with the shore line. The incoming wave strikes the blade, gives it an impulse toward the shore, and thereby operates the pump-plunger, which is attached to the blade. After the wave has passed the blade swings back to its original vertical position. The motor at Ocean Grove consists of a series of swinging gates secured at their tops to a steel rod resting in suitable bearings. These are mounted in a crib-work built a little from the shore. Each gate is 12 feet long, and it was found that the force acting to move it shoreward was about 500 pounds per foot in a calm and 800 pounds in heavy surf. Such a gate placed on the shore of the ocean would be continually operated, since the wave motion is always present.

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IN DISCUSSING the art excellence of heating appliances a recent issue of *The Metal Worker* contains the following: Only a little while ago, it would seem when we look back, our columns week after week were used in discussing stove ornamentation and stove decoration. At the outset the idea was altogether new that a stove might be made beautiful, or at least attractive, as well as useful as a heater. But finally art stoves were produced, and that manufacturer would be considered crazy to-day who would talk about putting a stove upon the market which is based entirely upon its heating capacity and which has no claim whatever to beauty and art excellence. A little while ago the steam and hot water men were entirely content to put their apparatus on the market without respect to any æsthetic considerations. Coils of pipe were considered quite good enough for use as radiators, and in many respects it was a "machine-shop" job which was introduced into the finest parlors for heating purposes. Just at present the art craze, if we may use the phrase, has struck the radiator men. One or two enterprising and courageous firms a few months since put out radiators with efforts at ornamentation. They were well received, and one step has followed another until at the present time we hear of decorated patterns in all directions. We are confidentially shown photographs of new goods that are soon to be put on the market and others are already in the sand. Many of the patterns have real claims to popularity. Some few are overdone; others might be improved in various respects, but the general trend is in the right direction, and it will not be long before parlors and sitting-rooms, libraries and dining-rooms can be fitted with steam or hot-water heating and have the necessary radiators quite as artistic and attractive as anything else that is put in the rooms.

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WHOEVER in this world labors for the wherewithal to support life and obtain its comforts is supposed to be paid according to his work, but if we stop to consider the matter we soon learn that wages are not always proportioned to work. The shiftless laborer and the stupidly contented workman, besides all the large indifferent class who simply toil for the privilege of eating, receive full and adequate wages, but it is the progressive and ambitious workman who for a long time must be satisfied with under-pay. To command increased wages a man must prove to his employers that he is worth more to them than others of his grade, and the tangible proof of greater efficiency is a larger product or work of better quality. Having risen to a higher grade on the pay-roll, the man whose fortunes we are following must still work ahead of his fellows if he hopes for further advance. As soon as an apprentice, a clerk, a journeyman or any one else in the humble ranks of labor ceases to produce more or better work than he is paid for he gives up all chance of bettering his position. If this demand for greater exertion was encountered at every advancing step there would be some excuse for the energetic workman giving up the struggle and learning to live contentedly at the bottom of the scale, but happily this is not the case, for after passing a certain point the demand on his physical energies decreases. It is true that more responsibility attaches to the higher position and there is a larger call for brain-work and less for manual labor, but where the exertion is thus distributed between the mind and the body it is borne with far greater ease, and the business of each day becomes an actual pleasure. While speaking of the need for brain-work in those occupying positions, it is well to point out the benefits of applying the mind in all work of whatever nature. If people could be taught to think more of what they are doing their work would be easier and the results would be better. Brute force will kick a rock out of the path where reason would pry it aside or roll it out of the way with but little exertion. So with all the little obstacles that are constantly met in the shop and in business which fret and tire the unthinking workman, but are overcome without difficulty by his more intelligent companion. Common sense and reason are better lubricants than all the patent oils ever compounded, and their application is simply the matter of a little brainwork.

THE RAPID accumulation of wealth in this country is having far-reaching influences and lies at the bottom of much of the dissatisfaction which business men express when the question of profits comes up. Beginning with the safest securities, like Government bonds and some municipal obligations, interest has been scaled down until the very best do not net much more than $2\frac{1}{2}$ per cent. The same has been going on in railroad securities. "Poor's Manual" tersely puts the matter in the following shape: "But the days of large profits appear to have passed. A railroad which in the future can pay regular dividends of 5 per cent. per annum will be regarded in much the same light as those which formerly paid 8 and 10 per cent. for years without intermission." These facts are thoroughly appreciated generally, but their consequences in other directions do not appear to be well understood. Putting it bluntly, the lowering of the interest rate, permanent as it seems to be, involves a sharp lowering of profits to manufacturers and merchants. If in any branch the returns are now as great as ten years ago would have been thought reasonable, or even if that impression gets abroad, there is a rush into the business which drags profits down, sometimes considerably below the normal level. Probably every business man can recall instances within his observation, if, indeed, he has not had them come within his own experience.

IN THE manufacture and in the handling of staple articles the tendency has been irresistably toward lower profits, and there are some considerations worthy of attention which make that tendency more pronounced. It is a fact quite generally recognized that investors have lost some confidence in railroad management, and that there has been some pressure, notably in England, to place funds in the industrial enterprises. The purchase of American establishments is an incident in this movement. The flow of money into Southern enterprises is similarly significant. Thus far these investments have been limited to the acquisition of concerns showing a brilliant record in the past, or holding out exceptional prospects for the immediate future. But before it ceases there are likely to be some very wild transactions from the stand-point of the purchasers. Moneyed men smarting under recent losses may be content to pay dearly for safety of principal in the form of sharply-diminished revenue. It is not in human nature to continue such sacrifices very long. In order to average up the interest rate a fraction of the capital will be put into some enterprise which holds out the promise of larger returns. That is done conservatively and tentatively at first, but emboldened by success greater risks will be taken. We believe that the signs of the times point to a reaction in the form of a speculative era in which profits will be larger, accompanied by the waste capital which is usually coupled with periods of over-sanguine investment. Enlarged operations, in whatever directions, mean more business for builders and a wider range of employment for mechanics in general.

THE FOLLOWING crisp review of a circular recently put forth by the founder of a school for artist-artisans in this city is from *The Metal Worker:* The work of Mr. John Ward Stimson in organizing and carrying on the New York Institute for Artist-Artisans, 140 West Twenty-third street, New York, has before this received our favorable comment. The idea that prompted Mr. Stimson to undertake this labor was a most worthy one, and we could desire no stronger evidence of its meritoriousness than the list of eminent persons who indorse the scheme. At the root of the whole movement is the wish to instruct artisans in the finer side of their work and to inculcate artistic notions among the higher class of working people. Lack of the artistic sense is one of the most serious failings of the American people, and while we do not doubt that there is plenty of latent power in this direction, it needs a long course of instruction and the refining influences of artistic surroundings to bring it out in its active form. The work of Mr. Stimson and every other endeavor that goes to further this end deserve the support and good wishes of all citizens, and it is hardly necessary that we should say anything in favor of this enterprise, because its good features are self-evident. We regret all the more having to say anything in criticism of it.

THERE CAME to hand very lately a highly ornate pamphlet, from the front cover of which we learned that it was the first annual report of the New York Institute for Artist-Artisans, and down in one corner was the invitation: "Your suggestions or criticisms are welcome." At the very outset, then, we will advise the getter-up or whoever is responsible for the first page that, in the second annual report, he omit the indescribable flag, banner or what not, in gilded tracery, for a little simplicity in this part of the pamphlet will, we believe, more impress the general public than any amount of decoration that has the fault of being beyond the appreciation of ordinary folk. The major part of the pamphlet contains the superintendent's address and is signed with the name of John Ward Stimson. If we could distil out of the address its principles or ideas and clothe them again in plain and simple English we have no doubt it would prove a proselyting tract of much strength. As at present printed, however, it breathes altogether too much of the spirit of the artist and is tempered too little with the practicalness of the artisan. Mr. Stimson has the gift of language to an extraordinary degree, and the fantastic tricks he plays with words and ideas are enough to make the angels weep. It needs a very charitable mind or else one well trained in the subtleties of metaphysics to read this address and receive any good from it, and though its inner truth may, as we say, be found by searching, we see no reason why it should be so obscured. In other words, if Mr. Stimson had given a plain statement of the object of the movement which he heads, and had pointed out the good which would come of it, we think he would enlist sympathy and support in a hundred cases where now he will be lucky if he raises only ridicule and not active opposition. The latter part of the pamphlet gives specific information concerning the New York Institute for Artist-Artisans. It describes the work done in its several departments, the terms, the hours of the classes, &c.

## THE PLATES.

In Plate XXXIII we present a pattern of wall-paper made by Jeffrey & Co., London, and designed by Lewis F. Day. The pattern here shown is what is known as the "arabesque panel decoration" and is taken from an interesting volume issued by the firm named and illustrating what they term "the Victorian series" of designs.

In Plates XXXIV and XXXV we present a number of interior views of the New York Trade Schools, located on First avenue, between Sixty-seventh and Sixty-eighth streets, New York City. In another part of this issue will be found various particulars concerning the course of study at these schools, which we have no doubt will be of interest to many of our readers.

In Plate XXXVI we show two more designs of wall and ceiling paper taken from the volume issued by Jeffrey & Co. The upper one is the "strap" pattern, designed by G. A. Audsley and is well adapted for flat-surfaced ceilings. The lower engraving represents a charming wall pattern for staircases, being characterized by good drawing and design. It is called "flower scroll" paper and was drawn by A. F. Brophy.

### Lime for Removing Frost.

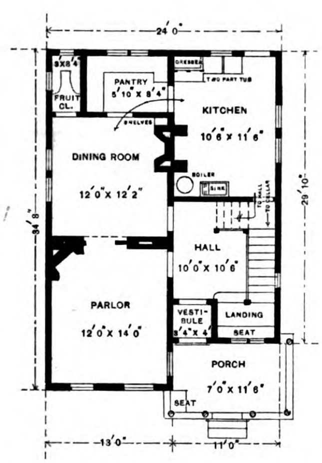
The high temperature produced during the slaking of lime has been but rarely utilized, says an exchange, except as an agent in matters of accident in setting fire to vessels and to buildings. We may add to these the ordinary method of the helpers to masons, who warm up the coffee for their dinner in cold weather by placing the pail of coffee on a lump of lime, sprinkling on a little water, and watching it carefully to see that it does not boil too hard. Many years ago, before the invention of the diving-bell, a large wager was made between two gentlemen in regard to the possibility of one cooking a pudding at the bottom of the Thames. The winner had his pudding placed in the middle of a large sack of lime, lowered to the bottom of the river and in due time pulled up, with the result of finding that the conditions of the wager, in regard to the cooking of the pudding, had been fully carried out. But of late lime has been frequently used to remove the frost from the ground in winter, and also to melt out water-pipes; as it has been found that a heap of lime laid on the earth, wet slightly, and covered over with blankets and other non-conducting materials, will draw the frost out of the ground. This is the compliment of the process of facilitating engineering work in quicksand by means of the freezing processes frequently used for such purposes.

### Study in House Design.

In the accompanying illustrations we present elevations, floor-plans and details of a house prepared by C. Powell Karr, of New York City. The house, which is designed for a family in moderate circumstances, is supposed to face a little west of the south, giving a bright and cheerful

*Study in House Design, by C. Powell Karr, New York.—Perspective View.*

dining-room, a southern exposure to the best chamber, while the kitchen has the morning sun the entire year, yet is protected from the sun in the afternoon. The entrance to the house is from the piazza through a vestibule, which protects the interior from inclement weather. The hall has been finished in such a manner as to serve as a reception-room, an entrance from the kitchen having been provided beneath the main stair-way. Entrance to the hall is secured through two doors, which shut off all unpleasant odors and sounds from the kitchen. The kitchen pantry is lighted and ventilated by a high window. From the dining-room a door opens into a closet, which may be used either as a store-



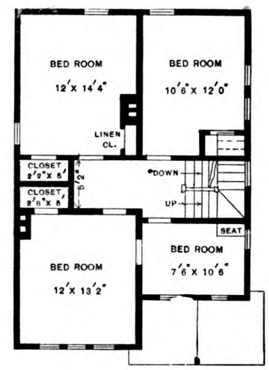

*First-Floor Plan.—Scale,* 1-16 *Inch to Foot.*

closet or china-closet. The kitchen is provided with a brick-set range, boiler, sink, a two-part wash-tub, a dresser and provision shelf. It is lighted on two sides, and has a door opening into the back-yard. The cellar is reached from the kitchen by way of the stairs under the main hall stairs. The second story is arranged for three good-sized rooms, with a smaller room, which may be fitted as a bath-room at a small additional cost Ample closet room is provided throughout the house and provision made for placing each bed so as to protect it from drafts of air. A room is finished in the attic, and is well lighted and ventilated. The exterior of the house, except the porch and one gable, is clap-boarded, instead of shingled. Outside blinds are placed upon all full-sized windows having a northern or western exposure. The cellar is divided into three parts, the fuel-room having an out-door entrance to the back-yard.

### Use of the Left Hand.

Probably most mechanics consider it as much as they can do to learn a trade right-handed, yet there are operations connected with most trades in which it would be convenient to work with the left hand. The tinner is often placed in positions where ambidexterity would be convenient, and sometimes almost indispensable, as are most mechanics who work about buildings and are placed in positions where it would be convenient to use the hammer with the left hand. The painter who is able to use the brush with the left hand could work to much better advantage when painting a house or cornice from a ladder than one who is only able to employ the right hand.

Until of late years, says a writer in the New York *Star*, the most of the world has believed that it was a serious error to



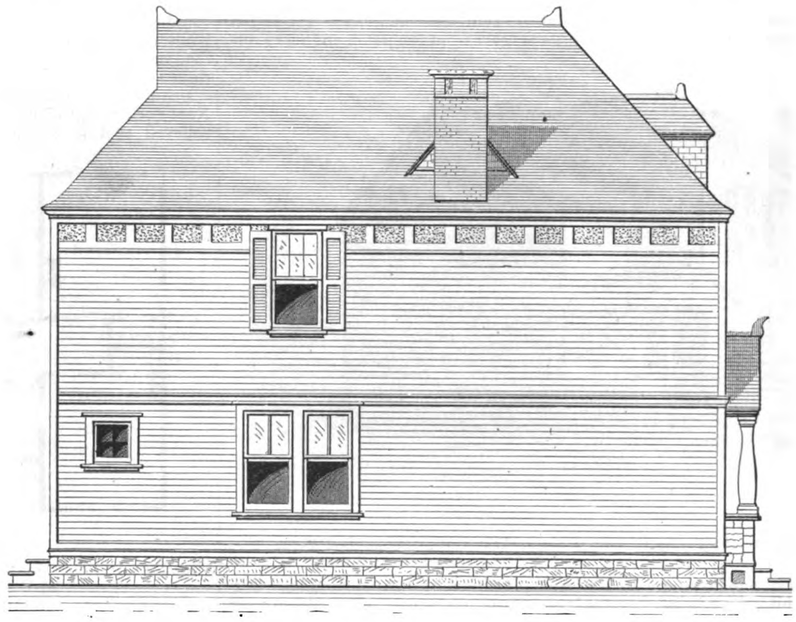

*Second-Floor Plan.—Scale,* 1-16 *Inch to the Foot.*

allow a child to use its left hand as much as its right one. It was Charles Reade who once said men were right-handed by habit, education, and perhaps by inheritance. It is no more natural to be right-handed than left-handed, except that, having two hands, we get in the habit of using one of them more than the other. Indeed, every mother will tell you how she fought against Willie or Johnny or

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

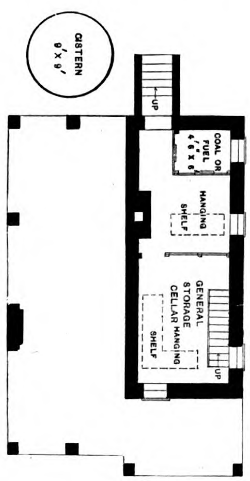
Jennie being left-handed, not that to have a left-handed son or daughter is a positive disgrace, but all mechanical appliances and everything intended for the use of humanity is by common consent made right-handed.

Take a child when it is first able to sit alone and it is neither right nor left



*Study in House Design.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.*

handed. Offer it an object and the chances are ten to one it will reach for it with the left hand. Every one has noticed this. How it worries the mother, and how she struggles for months, or until the child has got into the habit of using the right hand, to prevent it from being left-handed.




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

The left hand is the more sensitive of the two; it is nearer the child; it is nearer its being, its life and action. Offer to shake hands with it and it extends the left.

"Not that hand!" says the mother; "give the gentleman the other hand." And after being directed two or three times it extends the other, and the mother apologises by saying she does not understand why it wants to give its left hand; that she is sure none of her people or her husband's are left-handed. Poor, deluded mother. And then when the little thing is put up to the table it insists upon taking its fork in its left hand to eat. Every child does it, with hardly an exception, as every mother can testify.

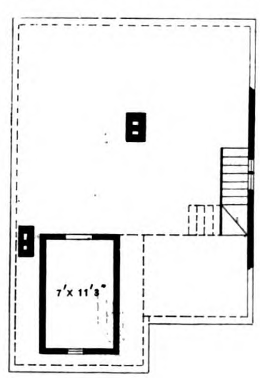
It is not natural to use either hand—that is to say, both hands are certainly

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

made to use, but until they have been trained both seem useless appendages. The child will ram its fists into its mouth, its eyes or into anything that is within reach. It does not know what its little hands are for, and it has not the least idea what to do with them. They are so many white elephants to it.

Go into a factory and watch the operators. How deftly they use their fingers; how accurate every movement. The variation of ⅛ inch in a movement might cost them the price of a week's work, so accurate must they be, and yet they continue, their fingers flying swiftly day after day without an error. They are not using the right hand alone. The left is doing its part. Perhaps at this machine, or at that table, the office the left hand performs is more important than that of the right, but it is trained, as the right is trained, in the performance of the ordinary affairs of life and it is true to its master.

The factory operator was as awkward at his work the first day he began at it as the child is in its efforts to handle material things, with the single exception that the operator knew what his hands were for, and they had been trained to respond to his will in the ordinary movements. But how long did it take him to become perfect? One year—two years. So can you train the left hand in the same length of time to perform any act accurately which can be done with the right. It is well known that persons who lose the use of the right hand entirely learn to write more beautifully with the left than they ever

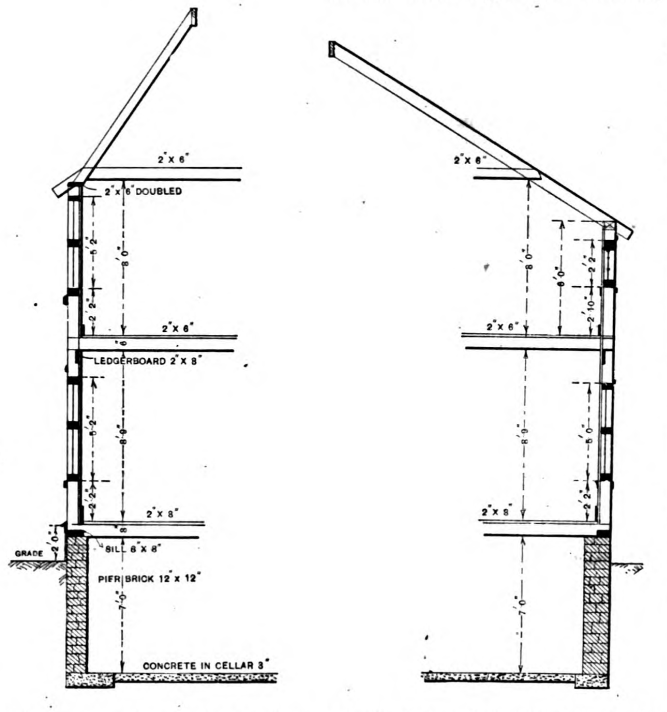



*Attic Plan.—Scale,* 1-16 *Inch to the Foot.*

did with the right. This is accounted for, as stated at the beginning of this article, by the fact that the left hand or arm is more sensitive in its nature than the right, and, therefore, more accurate in precision.

All persons have certain things which they do with their left hand, and which, from never having done the same things with the right, they would be as awkward about, were they to attempt it, as they are about doing things with their left hand which they have trained their right to perform.

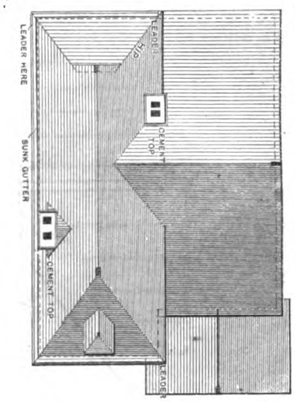
Nearly every one holds a garment in the left hand to put it on. Why? Well, they learned to do it that way because their mothers never taught them differently.




*Study in House Design.—Sections of Front and Side Walls.—Scale,* ⅛ *Inch to the Foot.*

*Rear Elevation.—Scale,* ⅛ *Inch to the Foot.*

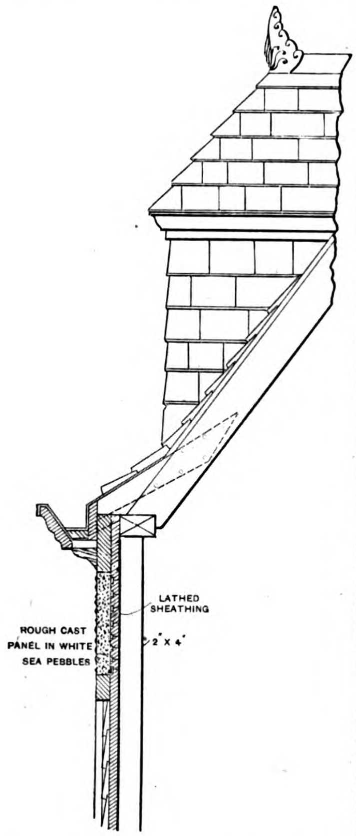
And in putting on a garment this way—putting the right arm in first—the left hand performs all the work. It holds the garment, draws it on to the right arm, and then, while the right arm crooks and the hand comes up and catches the lapel of the coat, the "awkward" left hand goes




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

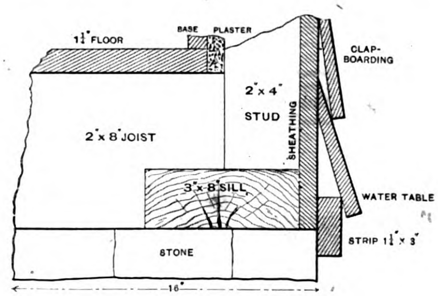
round behind you, catches the coat, straightens it out, as it were, and proceeds to search for the place to insert itself, and having found it goes in and actually puts the coat on. The left hand has done it all. And now which hand do you button with? Nine people out of ten use the left, and those who use the left cannot button with the right to save them. They never learned that way. In guarding against the use of the left hand that was one thing the mother forgot.

The man smoking uses his left hand to hold his cigar or cigarette. He will tell you the reason he does not use his right is because he has got in the habit of using the left. The fingers of the left hand of nearly every smoker are yellow with nicotine. He uses the left hand; it's simply habit. The right hand is busy with the pen or pencil, and the left hand is trained




*Study in House Design.—Section through Main Cornice and Side View of Dormer. —Scale, ½ Inch to the Foot.*

to perform this duty, and when it has once been trained it always performs the task whether the right hand is engaged at something else or not.




*Detail of Water-Table.—Scale, 1½ Inches to the Foot.*

Pugilists use their left hand to protect themselves from the blows of the adversary, and probably the hardest blows ever struck in a prize ring are the "left-handed" ones. "Landed one with his left" is almost as much of a chestnut in the report of a fight as "dull thud" is in a hanging report.

Delsarte, famed for teaching the court children how to walk, move or sit down, and whose methods of stage fainting, falling, walking, &c., are studied by all emotional actresses, says the left arm and foot are stronger than the right. The woman sweeping or the man chopping wood or hoeing in a garden calls upon the left hand to perform the greater portion of the task. Upon the broom, axe or hoe handle the left hand goes nearest the point of operation and directs the movements of the instrument, while the right simply steadies the end of the handle.

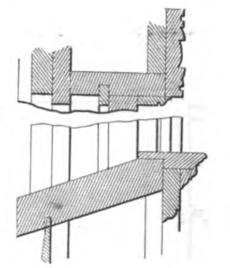
It is an undeniable fact that left-handed persons, or rather those who have trained the left hand instead of the right from infancy, are much better performers on the piano than right-handed persons. One of the greatest difficulties to be overcome by piano-players in the rendition of classical music is the accurate execution of the base—if it may be so called in such a connection—and musicians give two reasons for it; one that the left hand is weak from inactivity, and the other that it has lacked or does lack the education which the right hand has received.

Doctors cannot tell by dissecting a corpse whether the subject was right or left handed. There is no difference in the physical condition of the two persons.

After all, the whole subject must go to the brain for an explanation. The brain is in two sections, right and left. The left side of the brain directs the right side of the body, and *vice versa.* If the right side of the brain is permitted to remain inactive and almost torpid for a lifetime, while the left side during our entire adolescence—the most important period—is kept in a constant state of activity and consequent development, every nerve centering there is raised to a high state of cultivation, is familiar with its offices and performs them, not only naturally but mechanically—scarcely without any direction. There is no reason why the brain of the left side of the head should be more sensitive or active than that of the right side. We hear equally as well with the right ear as we do with the left, and one eye can see as distinctly as the other.

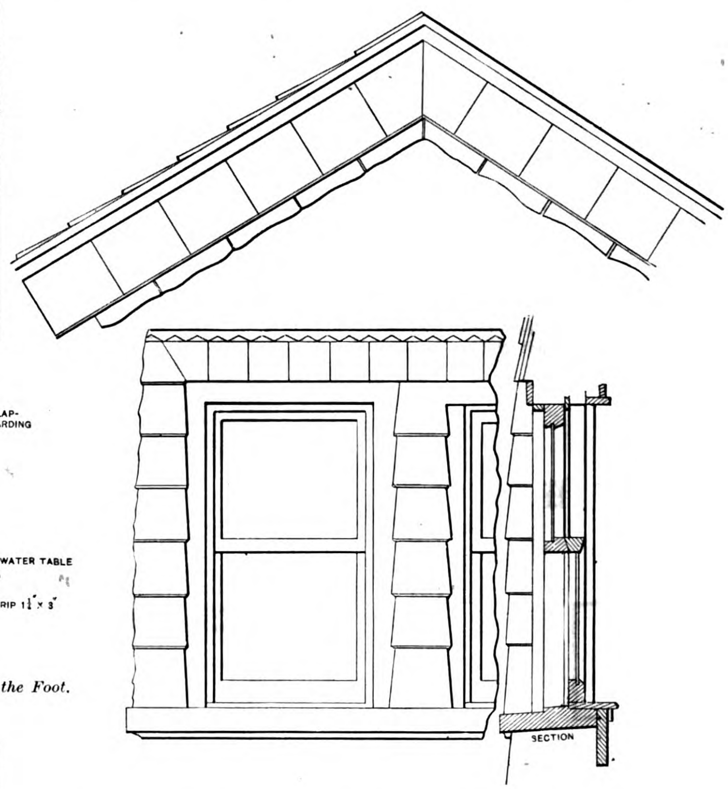
## New York Trade Schools.

The prospectus for the ninth season of the New York Trade Schools, First avenue and Sixty-seventh street, New York, has just been issued, and we take pleasure in



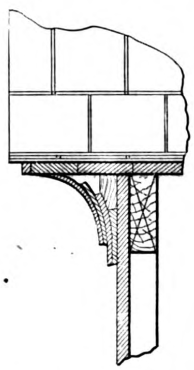
*Sections through Window.—Scale, 1½ Inches to the Foot.*

presenting some facts concerning the courses at these schools, together with several illustrations, which we show in our double-page plate. The next school year begins October 23. The classes are both day and evening, the former including instruction in plumbing, house and sign painting, brick-laying and tailoring, while the evening classes comprise brick-laying, plastering, plumbing, carpentry, house and sign painting, fresco-painting, stone-cutting and blacksmith's work. It will be of



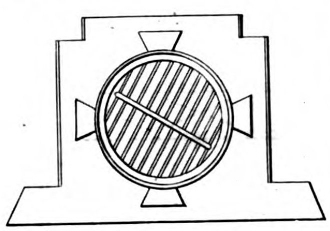

*Detail and Section of Window in Wing Gable.—Scale, 1 Inch to the Foot.*

interest for those who live in or near New York to state that the schools are open to visitors every week day and on Sunday afternoons, when work done by last season's



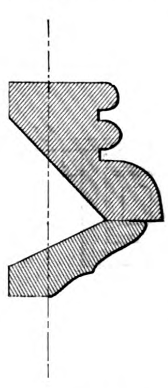
*Study in House Design.—Section Showing Covering of Shingled Cornice.*

classes can be examined. The New York Trade Schools cover a plot of land measuring 200 x 113 feet and are one story in hight. The main entrance is on First avenue, and the front door opens into a broad hall, with the office on one side and the janitor's apartment on the other. The handsome ceiling and wood-work of this was all



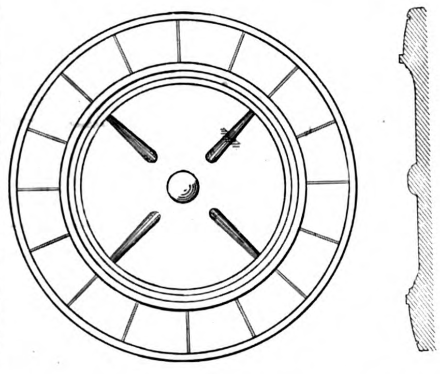
*Window in Porch Gable.—Scale, ½ Inch to the Foot.*

done by members of the carpentry class of 1886–87. At the rear of the hall is a small court communicating with the plumbing-shop, tailoring-shop and the brick-laying-room. The carpenters' shop and the plastering-room are entered from the brick-laying-room, and beyond the



*Section of Double String Course Molding.—Scale, 3 Inches to the Foot.*

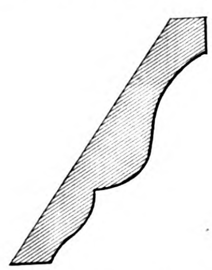
plumbing-shop is the paint-room. The walls of the plastering-room were built by the first brick-laying class, and those of the brick-laying-room by the class of 1883–84, all the work being paid for the same as if done by outside parties. On the south side of the building is the large reading-room, the wood-work of which, as well as much of the other construction throughout the schools, having been done by the scholars. The reading-room is well



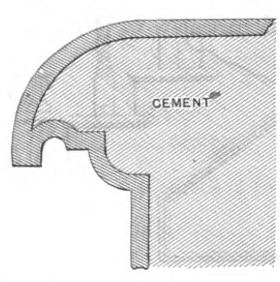
*Detail of Corner-Block in Hall Window.—Half Size.*

supplied with trade papers and magazines and is open to members every evening from 6 to 7 o'clock, while during the day and after 7 in the evening the room is reserved for members of the day classes.

The plates show a number of views taken from the prospectus mentioned above and illustrate the work-rooms in which the young men are taught the different trades, as well as specimens of practical work that they have done. It is unnecessary to mention the cuts individually, for the captions underneath them are a sufficient explanation of what they represent. A few particulars concerning the different classes in which our readers are interested will not be out of place in this connection.

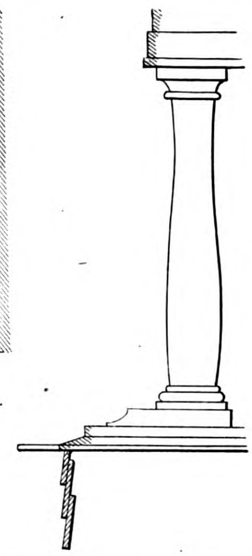


*Main Cornice Molding.—Scale, 3 Inches to the Foot.*



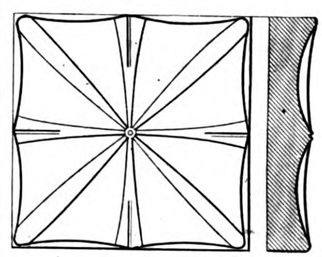

*Section of Chimney-Cap.—Scale, 3 Inches to the Foot.*

In the brick-laying class the manual instruction includes building 8, 10, 12 and 18 inch walls, turning corners, and building walls intersecting at different angles, building tiers, arches, flues, fire-places, in setting sills and lintels, in corbelling, &c. Scientific instruction given by means of lectures will be upon the strength of walls, construction of flues, thrust of arches, mixing properties of mortar, cement, &c.



*Porch Column.—Scale, ¼ Inch to the Foot.*

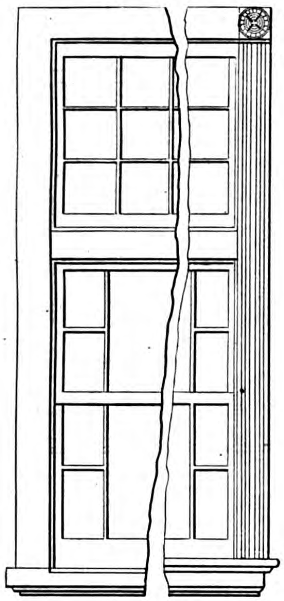
The evening class is divided into two sections, the first receiving instruction on Monday, Wednesday and Friday evenings, and the second on Tuesday, Thursday and Saturday evenings, from 7 to 9.30 o'clock, commencing October 23 and ending April 12. The terms of the course are $18, to be paid in advance, and the class is reserved for young men between 17 and 22 years of age. The day class in brick-laying and plastering has a three months' course, beginning January 6, 1890. Instruction is given every day from 8 a.m. to 5 p.m., except Saturdays, when the school closes at 2.30 p.m. The instruction in plastering is given on Monday, Wednesday and Friday evenings. The terms of this course are $40, and as the class is limited to 25 it is desirable that early application be made. This three months' class is reserved for young men between 19 and 23 years of age.



*Detail of Corner-Block in Front Door.—Half Size.*

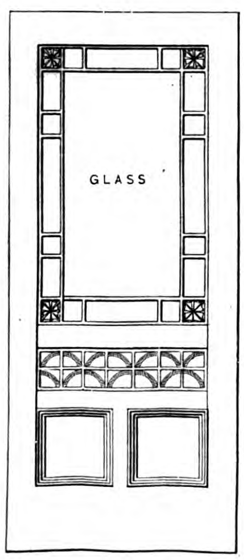
In the plastering-room instruction is given in scatch-coating, brown - coating and hard-finishing, also in running and mitering the plain cornices, Monday, Wednesday and Friday evenings from December 2 to March 8, the terms for the course being $16.

There are two classes in carpentry and joiners' work limited to 40 young men each, the evening instruction being divided the same as noted above in the case of the brick-laying classes. The term begins October 23 and ends April 2, and the charge for the course is $16, the class being reserved for young men between 16 and 21 years of age. It is also mentioned



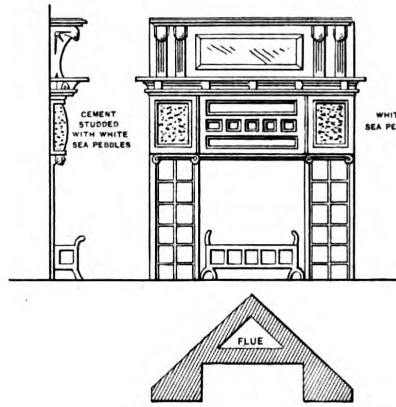
*Study in House Design.—Detail Showing Interior and Exterior Finish of Hall Window.—Scale, ¼ Inch to the Foot.*

that a three-months' day class will be opened January 6, provided a sufficient number of names are entered by December 10. The charge for the day class will be $35.

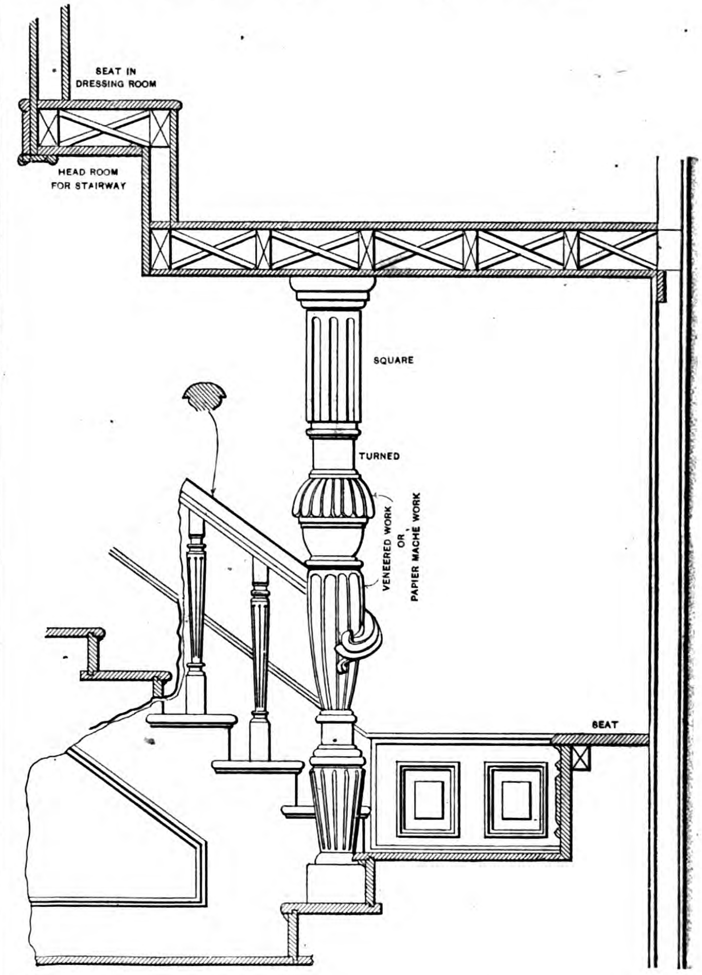



*Front Door.—Scale, ½ Inch to the Foot.*

Courses in plumbing, house, sign and fresco painting are also provided for, instruction in fresco-painting being given Monday, Wednesday and Friday evenings from 7 to 9.30 o'clock, commencing October 23 and ending April 2, the terms for the course being $12. The instruction consists in preparing walls and ceilings for calcimine, lining, laying out work and




*Plan and Elevations of Mantel.—Scale, ¼ Inch to the Foot.*

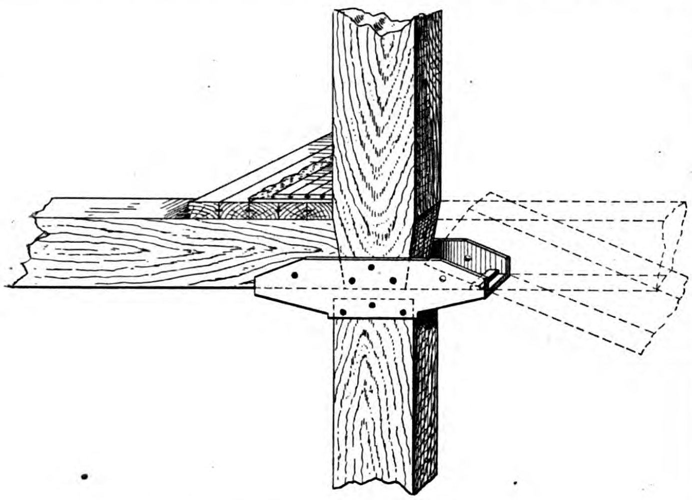



*Detail of Main Stairs.—Scale, ½ Inch to the Foot.*

making pounce and stencil and applying same, putting on flat and shaded ornaments, &c. The teacher is a practical fresco-painter, and the pupil is made to follow a systematic course. There are other classes at the New York Trade Schools in addition to those we have mentioned, and any of our readers who desire to get fuller particulars concerning this establishment will do well to write to the schools for their recently-issued catalogue.

## Safe Construction.

It is not necessary to inform the person who keeps posted in regard to the trend of current insurance opinion that the inspection and improvement of risk idea is becoming more popular with fire underwriters every day. It is conceded that before many years it will become the legitimate work of fire insurance companies to



*Safe Construction.—Fig. 1.—Base Plate and Cap.*

advise proper methods of building, to regularly supervise, inspect, examine and correct abuses with a view to preventing fires, and by this service reap better rewards therefrom than from any attempt to exact big premiums as a tax upon popular ignorance and carelessness. Any improvements, therefore, which prevent the spread of fire result in lower rates of insurance, and benefit both the companies and the

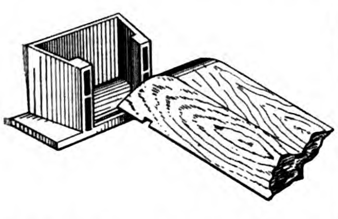


*Fig. 2.—Method of Anchoring Horizontal Timbers to the Wall.*

public. The inclosing walls of a building if properly considered are the most important element to prevent the spread of fire; nothing presents such a formidable barrier to the extension of fire as a vertical wall that remains standing. In construction, therefore, the aim should be to prevent as much as possible the falling of walls during a fire. But do we try especially to do this? The joists are usually cut on a splay so they can fall out, but they are at the same time so securely fastened to the wall by our present methods of anchoring that they cannot part without serious damage to the wall. In all kinds of heavy construction the main idea should be to put the parts together in such a way that the burning parts could fall without damage to the balance of the structure. Several of the insurance companies have adopted as "standard" the Goetz - Mitchell method, which is illustrated herewith.

The inventors, Goetz & Mitchell, of New Albany, Ind., are introducing this method as fast as possible by licensing foundries in every city. In Fig. 1 is shown the base-plate and cap combined, having upwardly and downwardly extending sides, which are bolted to the vertical columns, thereby forming a continuous column to the roof. The casting has also outwardly-extending base-plate with upwardly-projecting lug over which the horizontal beams fit. The lower end of upper column is slightly beveled, thereby forming a key and locking all parts together. Fig. 2 shows the method of anchoring horizontal timbers to the wall, consisting of a cast-iron box of dovetail form whereby it is adapted to interlock with the wall a base-plate with an upwardly-projecting lug and side-guides. The side-guides will not permit the timber to warp and also provide air to prevent dry-rot. Fig. 3 shows timber in position. The ideal specifications then for safe construction would be, solid beams, or beams in two pieces bolted together, 8 to 10 feet on centers—not to be painted or filled for at least three years, lest dry-rot should ensue; ends of tim-

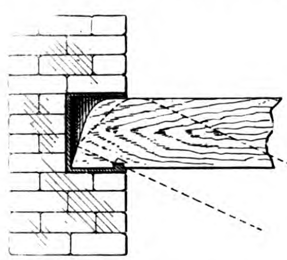
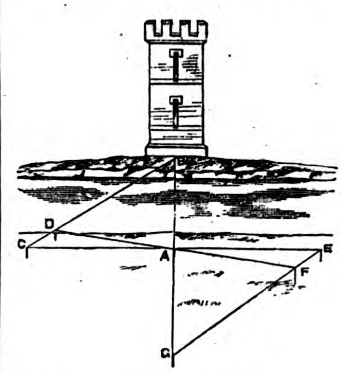


*Fig. 3.—Timber in Position.*

ber ventilated; floor-plank laid flat, grooved and splined, 3 inches thick on narrow and 4 inches thick on wide bays. Over this mortar or asbestos, and finish with 1-inch flooring. No sheathing permitted upon the under side of timbers so as to make a hollow floor. Wooden posts of suitable size, not tapered, with 1-inch hole bored through center and ½-inch holes crosswise near top and bottom for ventilation to prevent dry-rot. In a structure of this kind a fireman can form a pretty good judgment of the time a burning piece of timber will stand, and may move about in its vicinity to direct the stream of water, while with iron construction he will keep away for fear of a sudden collapse. With the method as here shown any part or section could burn and fall without damage to the rest of the structure, as a falling beam frees the anchorage and leaves the wall standing. No beams can butt or overlap in the same wall. No beam can enter a smoke-flue, nor is there any danger from fire from beams in close proximity to smoke-flues. The air-spaces prevent dry-rot. If the beam falls out the socket remains and forms a space for the easy replacement of timbers.

## Measuring Hights and Distances.

To ascertain the hights of towers, chimneys or other inaccessible points with positive accuracy, says Mr. J. Barsley, requires expensive instruments and considerable practice. There are, however, some very simple methods by which, with tolerable correctness, the hight of a building or the distance of an inaccessible place may be ascertained. If the object, the distance of which is required to be ascertained, should happen to be a tower or

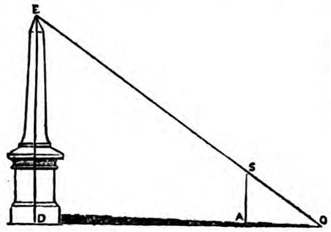



*Measuring Hights and Distances.—Fig. 1.—Finding Hight of an Object on Opposite Bank of a Stream.*

other building on the opposite bank of a river, take six sticks about 4 feet in length and proceed as follows:

First place a stick at A, as shown in Fig. 1 of the engravings, at a short distance from the bank and as nearly opposite the building as possible; then take another point, C, to the left of A, and place a stick there also at about the same distance from the bank as that at A. Close to the bank and in a line with C and the building place a third stick, D. Then, walking backward from A, keeping A and D in one line, place a fourth stick at F, at the same distance from A as A is from D. The same must be done with reference to A C, and a stick placed at E. If the last stick be placed at G at such a point as to keep A and B in one line and F and E in another, the distance between G and A will be equal to that between A and the object. Should there not be sufficient distance to place G in its proper situation, then make A E and A F equal to one-half of A C and A D, and in that case G A will be equal to one-half of the distance from A to B.

In order to measure the hight of a building when the base only is accessible, two plans may be resorted to. The following is extremely simple, but it can only be employed when the sun is shining and when the object is between the sun and the spectator: Place perpendicularly in the ground at A, Fig. 2, a stick of any hight, say 3 feet; let this be at such a distance from the base of the obelisk as to cause the shadow of the obelisk just to pass the summit of the stick at S and to reach the ground at O; measuring then the distance from A to the base of the tower at D, the points O A will bear the same proportion to the hight of the stick as A D does to that of the tower, so that, supposing O A to be equal to 5 feet and the stick 3 feet, if the distance A D is equal to 50 feet the hight of the obelisk will be 30 feet. As the sun is not always shining the above method cannot always




*Measuring Hights and Distances.—Fig. 2.—Obtaining Hight when Base Only is Known.*

be employed, but the hight can be ascertained by the use of the following simple plan illustrated in Fig. 3 of the sketches:

Provide a thin piece of wood, the shape of a set-square of an angle of 45°; let A B and B C be each 9 inches in length; D is a small plummet attached to a thread; hold this triangle between the tower and the eye, keeping the plumb-line parallel to the side B C—that is, perpendicular to the horizon. Then either approach or retire from the tower until a line drawn from the eye along the line A C of the triangle would, if continued, reach the top of the building. The distance must then be measured from the spot on which you are standing to the base of the tower or obelisk, and add to its amount 5 feet, about the distance from the base of the triangle to the ground, and the amount of these two measurements will give the hight of the object. The correctness of this method may be easily ascertained by applying it to the hight of a building the dimensions of which are already known.

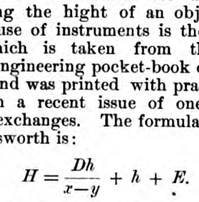



*Fig. 3.—Another Method.*

A convenient formula for use in ascertaining the hight of an object without the use of instruments is the following, which is taken from the well-known engineering pocket-book of Molesworth, and was printed with practical example in a recent issue of one of our foreign exchanges. The formula as given by Molesworth is:

$$H = \frac{Dh}{x-y} + h + E.$$

The following is the description of its application as supplied in the correspondence department of our contemporary: Measure any convenient length, *D*, on level ground (here it is 32 feet); erect a permanent staff (here it is 16 feet) at the mark nearest the object you are measuring; with a short movable staff in your hand (here it is 4 feet, shown at *E*) step back from permanent staff, keeping the short staff in a vertical position until you get the top of your staff in line with permanent staff top and top of your object; measure the distance between your staffs, *y* (here we have 12 feet 6 inches). Erect another permanent staff (exactly the same hight as the first) at the other mark, and proceed the same as with the first, which gives *x* (here it is 17 feet); deduct the hight of your staff from permanent staff to find *h* (here it is 12 feet), and work out your answer by the formula given. I have here worked it out by arithmetic, and find our object is 101 feet 4 inches high. Although I have had to work to small scale to explain myself, it will make everything more clear if you will work it out on a larger scale (¼ inch to a foot) for yourself, and, if possible, try this method (as I have

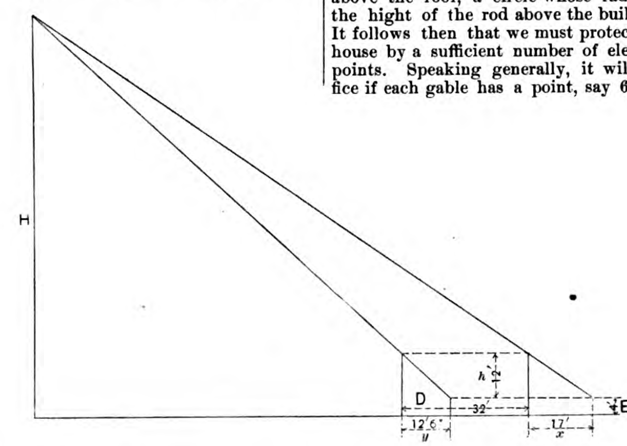



*Fig. 4.—Diagram Showing Method of Measuring Hights Without an Instrument.*

done) upon some object where you have a chance of proving your result. You need not know the distance you are from the object. Following is the application of the formula in the above example:

$$H = \frac{32 \times 12}{1.7 - 12\frac{1}{2}} + 12 + 4 = \frac{384}{4\frac{1}{2}} + 16 = 85.4 + 16 = \text{(answer) } 101.4 \text{ feet.}$$

### Concerning Lightning-Rods.

A correspondent of the *Insurance Monitor* says that the requirements for a good lightning-rod are:

*First.*—Material and size. The best available metal, it being the best conductor, is copper; good, soft wrought-iron is about one-seventh as good a conductor as a pure copper rod of the same weight per foot. And yet a ½-inch iron rod has conducting-power sufficient for an ordinary house, say 20 x 50 feet. But copper is the best, as I have said, not only because it is a better conductor, but also because it does not oxidize so rapidly and will therefore last longer, and because it is more pliable and can be bent and fastened to the building much easier. In no case can you make the rod too large if it is properly erected and grounded.

*Second.*—The joints. Care must be taken that the joints are perfect, for a film of dirt or rust in a joint adds largely to the resistance of the rods. And a good rod may be rendered almost worthless by bad connections at the joints.

*Third.*—Don't try to insulate it, because, first, you cannot do it if you try, for electricity which has just shown its power of overcoming resistance by leaping from a cloud to a rod hundreds or thousands of feet through air could hardly be restrained by a ridiculously small ring of glass, which is wet all over with the first dash of rain; and, second, because you only weaken the fastening and render the rod more liable to be torn away by the wind when you run it through those glass thimbles. Nail the rod solid to the house. If it is in the firm of a flat copper strip, so much the better. Nail it closely (with copper nails, to prevent chemical action and oxidation of the nails). Then paint it the color of the rest of the house, and it is out of sight and protected.

*Fourth.*—Extent of rod. Remember that your effort is to interpose between the house and the atmosphere a conducting medium that will carry to the earth all accumulations of electricity. Recollect, also, that a rod will protect, when elevated above the roof, a circle whose radius is the hight of the rod above the building. It follows then that we must protect the house by a sufficient number of elevated points. Speaking generally, it will suffice if each gable has a point, say 6 or 8 feet high, and each chimney the same, and all are strapped together by strips of copper nailed on the ridges of the roof. Connect this system to the eave-troughs if they are of metal and go to the ground.

*Fifth.*—Earth connections. And now, having put plain metal points on each rod —put no money into gold, platina and other fancy points—a copper one well tinned to keep it bright is as good as any —having done all this, and done it well, carry the rod or rods down to the ground, and to permanent moisture. Otherwise they are worse than useless—absolutely dangerous. If there is a well near by, go to the bottom of that. If there are water or gas pipes in the house, scrape the pipe clean outside the house, wrap your copper strip tightly around it and solder it on. If you have no well or pipes, dig down to permanent wet, not merely to a point that is damp in wet weather. Bury a plate of copper, say 2 x 4 feet, setting it on edge, to get moisture on both sides, and rivet and solder your strips to it. Then pack it with charcoal or coke on both sides, to retain moisture, and fill the holes. If you can run waste-water from the house into the hole to keep it damp, so much the better.

At a town on the Mississippi River, a few years ago, a large number of rods were tested, both new and old, and not one of them went to water. On inquiring it was found that the nearest water was over 50 feet below. All above was fine, sharp sand. Of course every building there struck by lightning was burned. In cases like this there is but one remedy. Drive iron tubes for water, making a driven well, and solder to the top of that, and the same tube that brings your water up will carry your lightning down.

# CORRESPONDENCE.

### Problem in Hand-Railing

*From* M. W., *Scranton, Pa.*—I present the following, with accompanying diagrams, in reply to the communication of "E. S C.," Pittsburgh, Pa., which appeared in the March number of *Carpentry and Building*. If he will carefully examine and endeavor to grasp the principles by which these figures are constructed, I may say that he will never require information on the method of constructing any kind of rail for quarter-space landing, stair to be the size of well and pitch of flyer, whatever it may be:

To construct Fig. 1: On the line A B form the square A B C D, the size of radius of well being 12 inches. Continue the lines D A and C B vertically and indefinitely. From the center D, with radius D A, describe the arc A C, the center line of rail on plan. From the center B, with radius B C, describe the arc C L D. The chord of this arc is the ordinate on base or plan, and the line B D the tangent B C unfolded. Draw the pitch of stair as shown, also the longitudinal section of straight rail. From A mark half a riser to Q, and from Q to D draw pitch over landing and continue to Y. From the center D, with radius D C, describe the arc R. From center F, with radius F D or F A, cut R in R. Draw the line R D, which is the ordinate on section of the base-block, cut to the pitch over landing. From F draw F R and proceed to form the square R G Q F, which is the development of tangents on the oblique plane, or the true shape of section of block cut to the pitch as center, and radius half the width of rail, describe the circle W X I. With center O stitute the various widths of the face-mold. Now find the foci and strike the elliptic

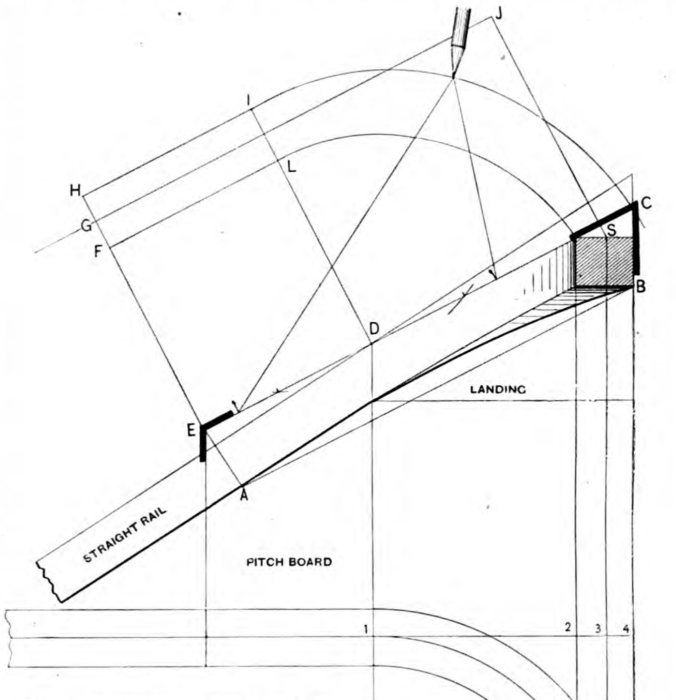
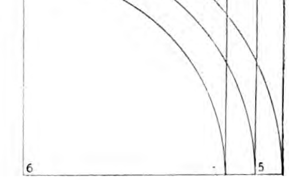
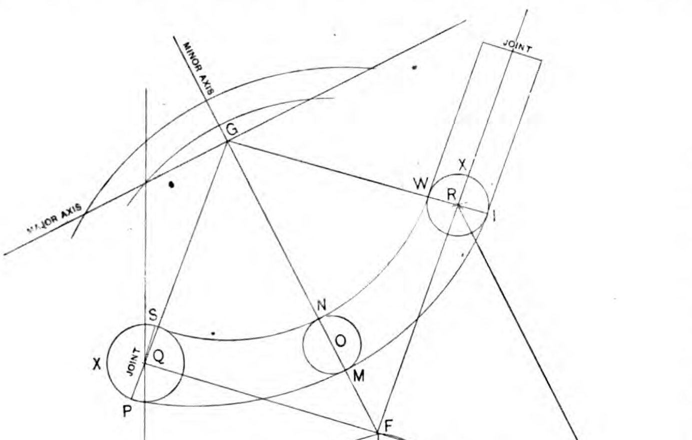
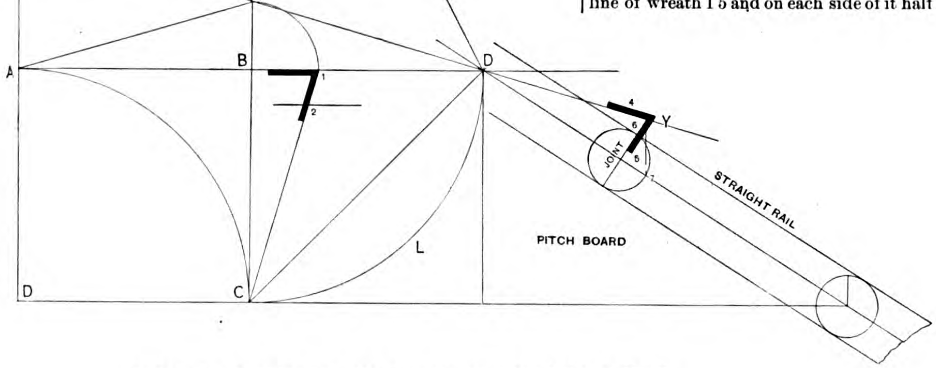



*Fig. 2.—Accompanying Letter of M. W.*



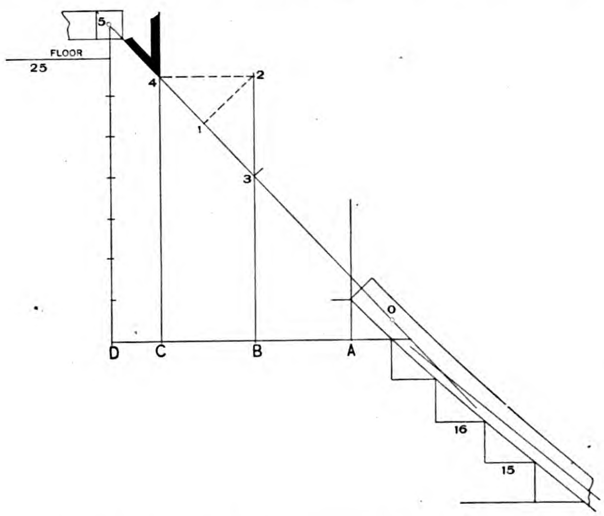




*Problem in Hand-Railing.—Fig. 1.—Accompanying Letter of M. W.*

curves for the inside and outside of the face-mold. Notice the bevel 4 Y 5 and cut the joint at shank. It will be a square joint when the slab D Y C is chopped off. Notice also that the plank for wreath-piece is to be the length of the vertical line Y 7 and thicker than one thickness of the straight rail. The bevel 1 2 is to square the wreath.

After this rather minute explanation of Fig. 1 I trust that "E. S. C." will be able to practically utilize the principle therein described. I will now proceed to demonstrate the construction of Fig. 2. Draw the quadrant 1 3 5 6. Describe the center line of wreath 1 5 and on each side of it half

over the well. From F draw the line F G, which is one of the minor axes of the ellipse. At right angles to the minor axis draw the major axis, as shown. With R describe a similar circle. With center Q and radius 1 2, which radius is obtained from bevel 1 2, shown in the diagram, describe the circle P X S. These circles con- the width of the rail. From 1 2 3 4 erect perpendiculars extending indefinitely. Draw the pitch of stair and the width of straight rail. Draw the landing. Mark half a riser above landing and draw section of rail, as shown. From the corner B of the section draw the line B A; from corner K draw K D E parallel to B A and from points E D S erect perpendiculars. Make E F G H equal to 1 2 3 4. Continue G to J parallel to E C. Continue *h* and F to *i* and L parallel to G I. To find the foci take *i* as a center and D C as a radius and cut the line E C as shown. The points of intersection are the foci for outside curve. With center L and radius D K cut the same




*Problem in Hand-Railing.—Fig. 1.—Tangent System Employed by J. B.*

line as before, and the points of intersection will be the foci for inside curve. The bevels, I think, need no explanation. The method exemplified in this diagram is, in my opinion, very simple and is one calculated to effect a great saving of material --two elements of no inconsiderable importance.

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*From* J. B., *Omaha, Neb.*—I notice in the December issue of *Carpentry and Building* for 1888 the reply of J. H. Monckton to the inquiry of "J. H.," of London, England, whose letter appeared in the August issue. I take it for granted that the stairs are to be built and put up into the building. The point at issue is how to construct the rail, together with its joint. Assuming this to be the case,

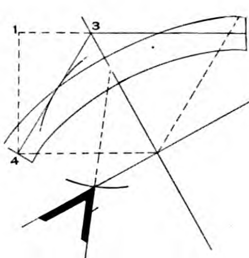


*Fig. 2.—Face Mold.*

my reply, published in the February issue of *Carpentry and Building*, was to that effect. Mr. Monckton has not shown himself the Good Samaritan in helping "J. H." out of his difficulty. Suppose he were passing a lady and gentleman in a horse and buggy caught in a snow-drift and requiring assistance: would he pass on, informing them that they should have taken another road? "J. H." may be real or imaginary; it matters not. Stair-builders in planning stairs invariably manage to locate the risers in a way to give the best possible appearance to the rail. In my long experience, when employed in an Eastern stair factory we were called upon to get out rails over stairs planned and built with the risers placed similar to those submitted in the plan of "J. H.," of London; hence the difficulty in making the joints. Under these conditions I would unfold the circle, and by so doing follow the line of nosing as desired. If the risers are placed in proper position I unfold the tangents, and in this way it does not become necessary to draw all the treads and risers, for this proceeding is to me like solving certain algebraic problems. Where fractions occur I prefer the Hindoo method. I think your readers would like to know how J. H. Monckton finds the joint at the eighteenth rise without a lot of cobweb drawings. The method I last gave is simple and correct, and any one should be

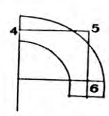


*Fig. 3.—Landing Face-Mold.*

able to understand and put it in practice. I have drawn the plan as suggested by Mr. Monckton, as most of the boys could not make them out, being like so many cobwebs to them. He has given us a strange method of finding the lengths of balusters, but it is not practicable and is too much trouble in finding the widths of the molds at the ends. Why does he make the balusters longer on the large circle? Making the lump on top of the rail requires a thicker plank. Now, suppose we cut a narrow strip of paper with straight and parallel edges; then winding this paper obliquely around a stove-pipe—let it represent the position of a hand-rail wreath—it will be seen that this straight line produces the best result. I have not seen Mr. Monckton's latest book on stair-building and hand-railing, and am not in the stair-building business now.

I submit the following methods for constructing the rail: Let A B C D of Fig. 1 equal the tangents A B C D on the plan, Fig. 4.

*To Find the Face-Mold, Fig.* 2.—On Fig. 1 square out 1 2; transfer 1 3 to 1 3, Fig. 2, and 3 4 of Fig. 1 to 3 4 of Fig. 2. Complete the face-mold.

*To Find the Landing Face-Mold, Fig.* 3.—4 5 equals 4 5 of Fig. 1 and 5 6 equals D 6 of the plan; complete the face-mold. Some stair-builders draw 8 3 of Fig. 1 parallel to the pitch of the first winder in the cylinder; by so doing it may cut either above or below 5 on the landing. I prefer calling 5 a fixed point.

*Note.*—Our correspondent furnishes us with a diagram of face-molds, but without sufficient explanations as to detail. He also sends an unfolded elevation similar to that given by Mr. Monckton in our December number, with the exception that the

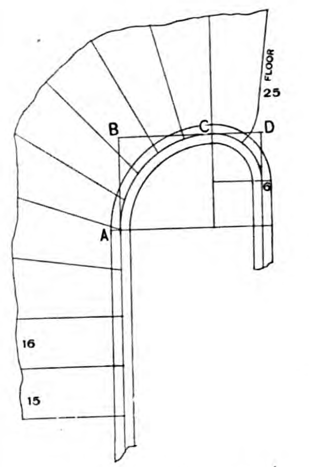


*Fig. 4.—Plan of Stairs.*

position of the lines of the wreath are shown on this elevation as straight with an easement to the level at the top, through which "J. B." claims lengths of balusters may be obtained wherever placed on the treads in the cylinder. He says that "in practice we do not take the trouble to stretch all the winders," and concludes his communication with the remark that "no person knows more about hand-railing than J. H. Monckton. He could give us simple methods by stepping on holy ground."

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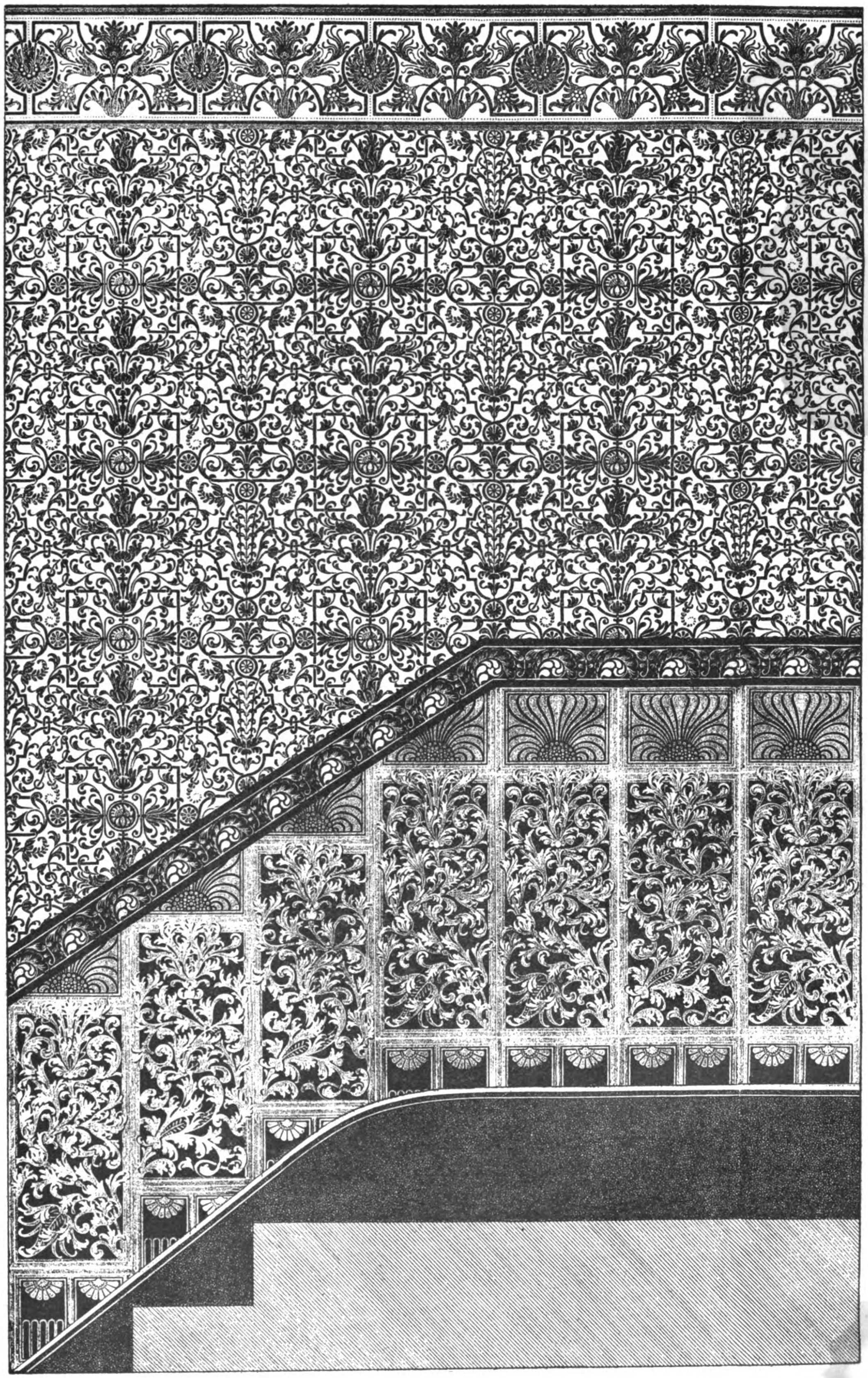
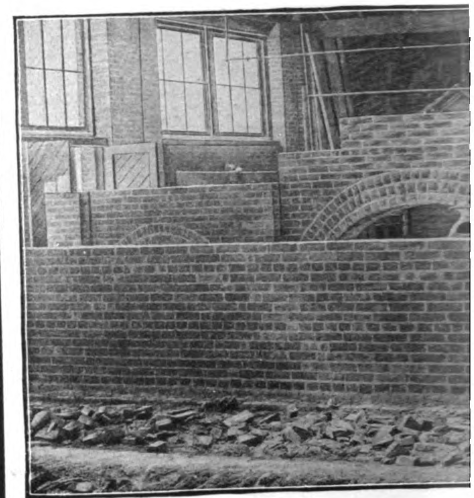
*From* M. W., *Scranton, Pa.*—Will you kindly permit me to make a few remarks respecting the diagram on hand-railing bearing my initials which appeared in *Carpentry and Building* for June? From your copious and valuable notes on same I conclude that owing to want of sufficient explanation accompanying the diagram you have been led to believe that there are serious defects in its construction. My prime motive in its submission to the readers of *Carpentry and Building* was to add to the diversity of methods of developing the oblique plane of section of the supposed block enveloping the curved plan of wreath and of finding the center line of rail and face-mold in the development. I had no idea of claiming superiority of method over those that had already appeared, but simply to tender a different method, knowing from experience that something would be gained by the earnest student of the complex science of hand-railing from any and every correct method submitted to his observation. I said in my last communication that the plan I adopted resembled the one given by Mr. Monckton



ARABESQUE PANEL DECORATION, DESIGNED BY LEWIS F. DAY.



Twelve-Inch Wall Built by Class of 1888.

Interior View of Part of the Carpenter-Shop.

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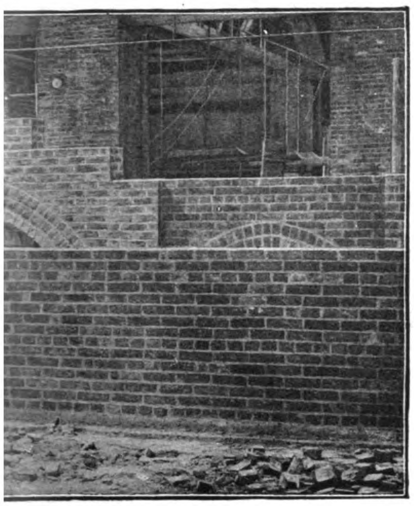
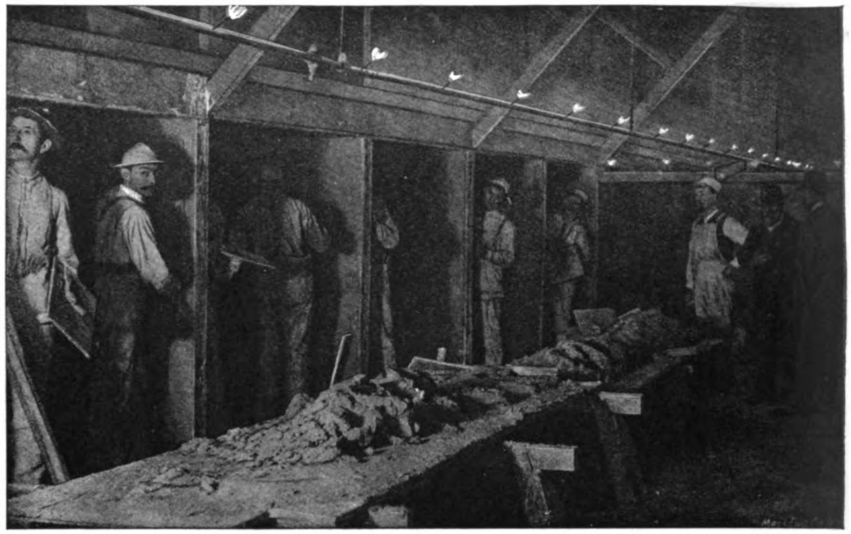
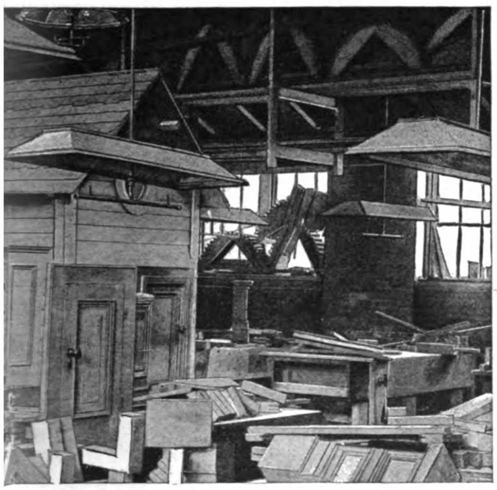
Interior View of Bricklayers'-Room



", NOW ON EXHIBITION AT THE SCHOOL.



INTERIOR VIEW OF THE PLASTERING-ROOM.

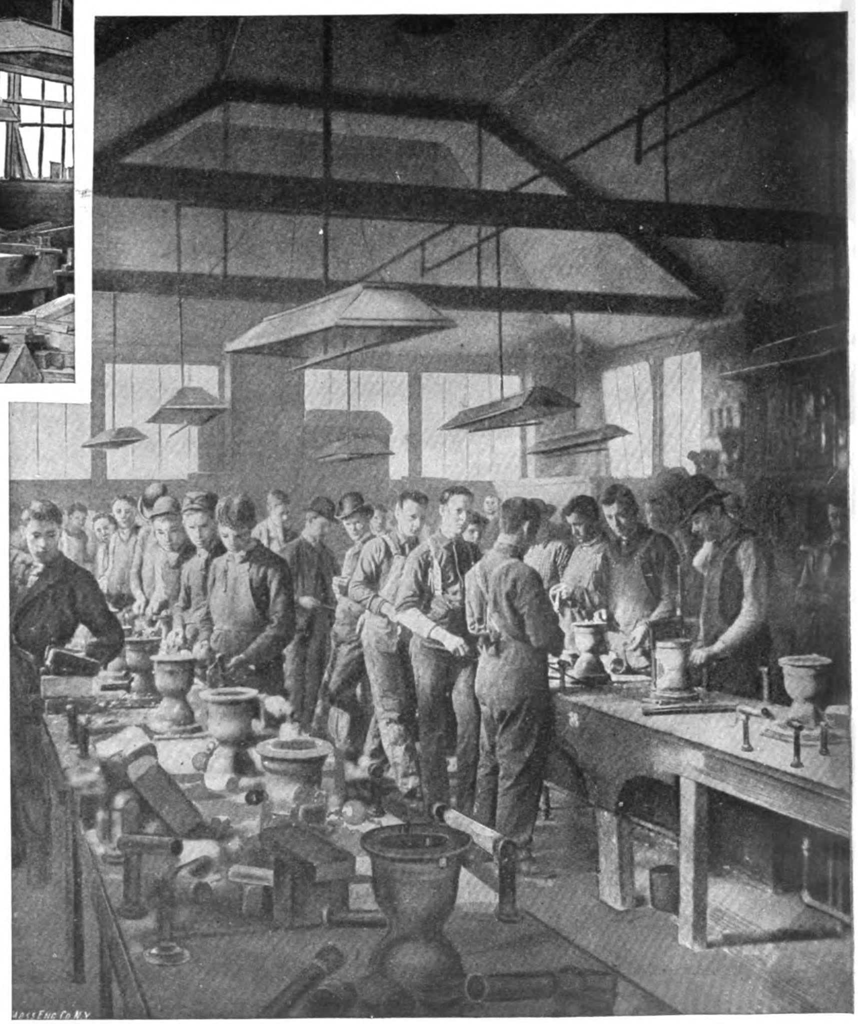


...RK NOW ON EXHIBITION AT THE SCHOOL.

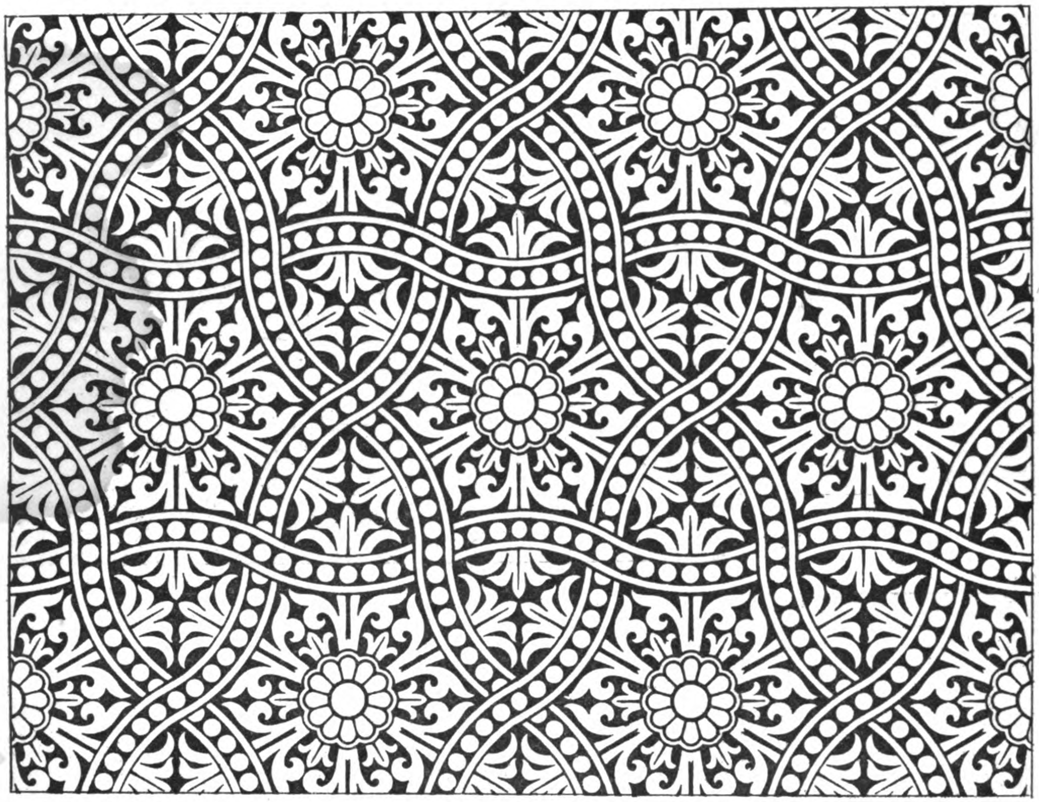
...RK TRADE SCHOOLS,

..., 67th and 68th Streets, New York City.

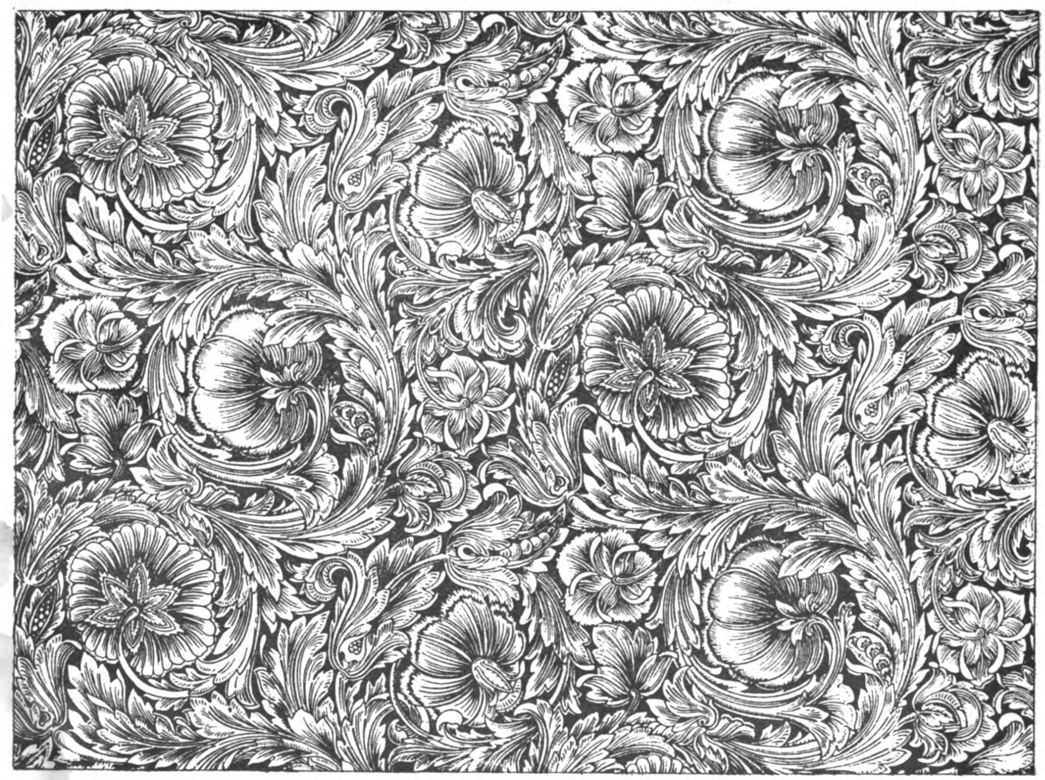
...EWS OF SOME OF THE WORKSHOPS.



INTERIOR VIEW OF THE PLUMBING-SHOP.



STRAP CEILING, DESIGNED BY G. A. AUDSLEY.



FLOWER SCROLL, BY F. BROPHY.

differing in the placement of the risers in the well, and that I had so placed them that every step or tread would follow the falling line, and the balusters consequently would be of the same length. My method of drawing the falling line is to stretch out the curve of the plan, placing it on the ground-line to form the base of a triangle the hight of which shall equal the hight of risers in the cylinder, and the hypothenuse of same will be the falling line.

It is a known fact to all geometrical hand-railers that the line of nosing around a well, if the risers be equally divided, will not coincide with the central line of plank. This deviation between the central line of plank and the nosing line causes a difference in the length of balusters, To have the balusters of the same length, horizontal lines should be drawn across the triangle spaced according to hight of risers and cutting the hypothenuse. From the intersections there made projectors should be drawn to the ground-line and therefrom ordinates to the curved line of plan. Where these ordinates cut the plan will be the location of risers, so as to have all the balusters of equal hight. This method I made use of in placing the risers in the diagram forwarded to you, but not having made the diagram to any scale you were led to conjecture their proper location.

I did not intend for the divisions in the pitch-line of tangents to represent the treads as you presume. They merely represent the intersections of the points projected from the plan to the oblique plain, the pitch-line of tangents being the vertical trace of some and not at all the falling line proper.

Another important defect pointed out in your notes is the want of ramp in the hand-rail connecting with the lower end of wreath, thus causing, as you say, a forced joint. The joint is to be square to face of plank and square to pitch-line of tangent. The ramp is to be in the straight rail over flyers and should have been drawn on diagram The intersection there made between the pitch of rail over flyers and pitch-line of tangents plainly shows the absolute necessity for ramp either in the straight rail or wreath.

The method exemplified in the quarter-landing wreath is in my opinion superior to any for large wells, but of little value in small wells. In future I shall avail myself of the benefit of your advice by being careful to fully explain and correctly execute my diagrams.

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#### Stairs and Hand-Railing.

*From* J. H. Monckton, *Brooklyn, N. Y.*—In the December number of *Carpentry and Building* I submitted carefully-considered drawings, explanations and suggestions induced by the publication in the August and October numbers of a plan of stairs under stated conditions, with questions relating to hand-railing, by "J. H.," of London, England. In the April number I find a correspondent, Mr. J. V. H. Secor, giving the readers and "J. H." his ideas and methods of proceeding, and in a separate article criticizing mine above mentioned. Before replying to this correspondent allow me to say that having re-examined with great care what I wrote in connection with the drawings, all as published in *Carpentry and Building* of December last, I would not alter one line or one word as therein given. The plan of stairs I suggested and my treatment of the hand-rail might be called in question by an inexperienced workman, a superficial investigator or a carping critic, but not by the studious mechanic of fair practice and mindful of mechanical and mathematical possibilities of this age of progress, as he would carefully investigate the geometrical laws involved as I applied them, and, although new in their application, find, as I have found, their absolute correctness, simplicity and practical usefulness.

Mr. Secor writes that I "start with a criticism of the plan submitted by 'J. H.'" Yes, I did, and who that had a knowledge of planning stairs correctly would not criticize such a plan? He adds —"and proposes to instruct the correspondent in drawing a plan as in his judgment will be far better." I plead guilty of drawing a "far better" plan of stairs, and thereby offering instruction to "J. H.," Mr. Secor or any other reader of *Carpentry and Building* who would present such a plan of stairs in connection with its hand-railing as "J. H." did for discussion. Why, Mr. Secor himself, in his communication proposing to instruct "J. H.," modestly remarks of the plan submitted by him that it is "a rather awkward one." I went further than that and frankly stated that such a plan was fit only for a step-ladder; that it was a menace and a danger to children, the aged and infirm; and I then showed by a better plan—not necessarily a best one—how to make the proper arrangement of treads and rises confined to the limited space specified by "J. H." and secure as comfortable and uniformly easy and safe stairs for travel as the space intended to be occupied would permit. No modest milk-and-water remark would satisfy me with regard to a plan of stairs such as "J. H." submitted, for I fully believe that a landlord who accepts that kind of a trap ought to be held responsible in exemplary damages for unavoidable injury caused by accidents to his tenants in making use of such uncertain irregular stepping things. No doubt the plan coming from "J. H." is one given by some local architect—which he was bound to follow—and who evidently has a limited knowledge of planning stairs. Mr. Secor, after enumerating in detail the changes I made in the plan submitted by "J. H.," and that I located my line of travel 14 inches* from the front string, adds: "This is his improved plan," and, further, "if the 8-inch tread had not been put in it would be a better plan." Probably I ought to be thankful to Mr. Secor for so generous an admission—that in his wisdom I came within 1 inch on one tread out of the whole number of making, as he writes, "a better plan."

My next offense, as this critic writes, is: "In going up stairs when on the nineteenth step you are in advance of the rail on this step about 4 inches, and the rail is nearly 3 inches higher than along the flyers." As to this statement of being in advance of the rail on the step mentioned about 4 inches, what of it? It could not be otherwise, because in winding stairs at the top of a flight several of the risers on the line of travel ascending are from the nature of the plan some inches more or less in advance of their connection with the cylinder or front string. I have measured the hight of rails at the point complained of, and I find at the chord-line and nineteenth rise from top of step to top of rail it is $5\frac{1}{4}$ inches and measuring at the flyers along the line of rise from top of step to the top of rail it is 4 inches, showing a difference of $1\frac{1}{4}$ inches, instead of 3 inches, as this writer states; and part of this difference in hight is due to the fact that a plumb-line through the thickness of the rail on the greater pitch at the nineteenth rise measures necessarily something more than at the flyers. And, further, if the reader will refer to the explanation of Fig. 2, pages 259 and 260 of the December (1888) number of *Carpentry and Building*, he will find that I there explain that the point B, of the line G B, at the chord-line and nineteenth rise, controlling the position and formation of the ramp, may be raised or lowered at pleasure; but that the point G is fixed; therefore lowering the point B shortens the ramp, and brings both the upper end of ramp and bottom end of wreath lower. In this case it was my pleasure to fix the ramp and wreath somewhat higher than over the regular flyers; and this I am apt to do because the steeper pitch over the winders brings the rail nearer the nosings than at the flyers. If the pitch of winders and that of the flyers of this plan of mine each be compared with the same vertical hights, it will be found that the rail over the winders, measured at right angles, will be about 4 inches nearer the nosings than the rails over the flyers, measured in the same manner.

The next damaging charge I have to encounter from this correspondent is: "At the intersection of the two center lines to form the ramp and incline of the cylinder* he starts two treads below the chord-line, making it still worse, for the ramp easily covers nearly four treads." Oh, how bad and "still worse" it appears in me—under the eyes and searching scrutiny of this wary hunter of mistakes and errors that have but little or no foundation in fact, and none at all in good practice—to start two treads below the chord-line of a plan, making it still worse, for the ramp easily (which is, according to the authoritative dictionary, in an easy manner) covers nearly four treads." Dear readers, I must tell you, in confidence, that I made no mistake, no error in planning two treads below the chord-line, for I wanted them there, both of them. First, to help dispose of the space in grading the treads at the wall-line; and, second, most important of all, to be able by their diminished width and position to form a sufficiently long nicely-curved ramp in connection with wreath and straight rail, even if it did "easily cover nearly four treads," or possibly five treads. If there is anything I hate it is a short patch of a ramp, but which Mr. Secor evidently affects to admire. I invite interested readers to again take a look at the December number, page 259, Fig. 2. For my part I am perfectly satisfied with the length and appropriateness of the ramp and its curve in connection with that of the wreath as given. And also it will be seen that within the straight at the lower end of the ramp, if thought desirable, it can be cut to a length which will include but three treads below the chord-line.

Another pretended fault assumed to be found is: "In running his tangent up over the landing-quarter he has the bottom of the rail 4 inches above the floor. Then he will be too low, as one of the requirements is 3 feet to top of the rail." Let us see if this charge of being too low cannot be refuted by the drawing and figures as given. On reference to Fig. 2, page 259, of the December number it will be seen that on the flyers at the center line of short baluster next to riser Q it is figured and measured 2 feet $4\frac{1}{2}$ inches in hight from top of step to bottom of rail. Add to this 4 inches raised from floor at landing to bottom of level rail; then add also $3\frac{1}{2}$ inches, the thickness of level rail, which altogether equals 3 feet, as follows: 2 feet $4\frac{1}{2}$ inches + 4 inches + $3\frac{1}{2}$ inches = 3 feet. Now, as the statement of this critic is here proved absolutely untrue in the matter of a few simple figures, to what consideration his whole criticism is entitled by the readers of *Carpentry and Building* I leave them to decide Cer-

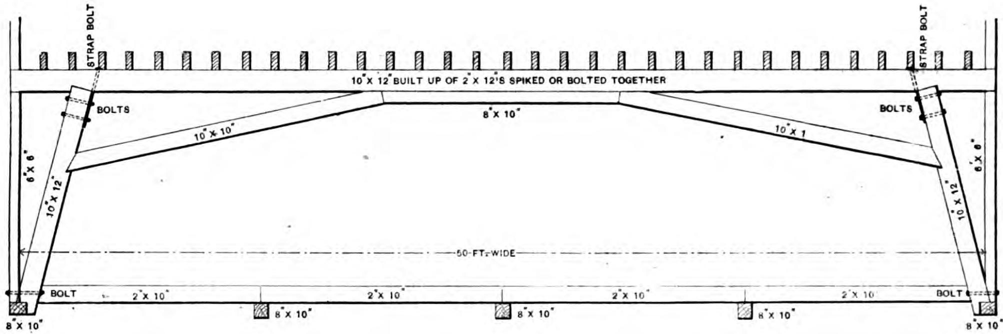
* I hope that locating my line of travel is not all wrong, too. I happen to be the author of this useful line for planning winding stairs. No matter what the plan of stairs may be containing winders, all treads throughout the flight should be equal on this line of travel; just as much so as that all rises should be equal hight throughout a flight. Any person can fix this line of travel to suit himself if while walking up stairs as usual he will stop and measure the distance from front string to the feet. I would rather if anything make the distance less than 14 inches.

* He means, no doubt, the incline of the tangents, not of the cylinder.

tainly if the writer's knowledge of arithmetic is so faulty and unreliable these same readers will naturally be led to weigh carefully his unscrupulous efforts at fault-finding, so obvious in his communication to which I am replying. Quoting this critic further: "Again, he says that the balusters will be in their exact position to get their lengths." Yes, as fixed at the elevation, Fig. 2, measured from their places on plan, Fig. 1. I so stated, and by means of reference letters and numbers showed how these measurements and positions gave their exact lengths. No previous author has given any method whatever of finding the lengths of balusters under wreaths, or of unfolding the central section of a wreath in position over the unfolded elevation—which is necessary for the purpose of finding those lengths.

This critic now asks me—not understanding the geometry that he has undertaken to review: "How is it that ordinates will give the exact location of the balusters on the line of tangent?" My reply is, they won't give the exact location of the balusters on the line of tangents, and I never said they would. His summary statement following that "this can be done correctly, but not in the way he does it," won't do, for what I did in all of my drawings as published in *Carpentry and Building* was done in a practical way on absolutely correct geometrical principles and by simple methods. Frankly, I do not think as I advance in my rejoinder to this critic's review that he grows large-mined or in even little things fair when in quoting from my article in the December number he stoops to insert in parenthesis a statement as follows: "Again, at Fig. 2, (*this is the elevation which has already been spaced for balusters*) mark on each tread the center of balusters as taken from the plan." Now, while the quotation itself is given incomplete, the statement which I have italicized, that "this is the elevation which has already been spaced for balusters," will by reference to my article be found untrue, for it had not before been spaced or so required until the direction here quoted to mark on each tread the center of balusters as taken from the plan. His remark, "that this is all un necessary work and can be done with less drawing," I freely leave to answer for itself through his mixed diagrams on page 79, in which his highest efforts are, it appears, displayed in the upper elevation, wherein he happily relieves himself of that 8-inch tread, and of which he says: "I have also given an elevation from the same plan omitting the 8-inch tread and correctly locating the balusters in the quarter so as to get the lengths without using the stretchout of the curve line."

It is useless for me to prolong this rejoinder by discussing in detail the last claim and its fallacies by Mr. Secor, because I have reached a limit that admonishes me not to tresspass further on the space of this journal, whose varied and valuable contents in other directions demand reasonable consideration at the hands of correspondents. But I shall venture to add that, as a teacher of 45 years' experience and as a mechanic of a still longer period, I will if allowed hold myself in readiness to answer through the columns of *Carpentry and Building* any of its readers who may ask pertinent questions. And further, if permitted, by the kindness of the editor, I will at once submit to its readers examples in solid geometry and the unfolding of circular surfaces intersecting oblique cutting-planes, such as occur in hand-railing, that will demonstrate and put at rest any question as to the geometrical truth and simplicity of my new and improved practice in hand-railing.




*Self-Supporting Roof Truss, Submitted by J. T.*

### Recipe for Coloring Brick.

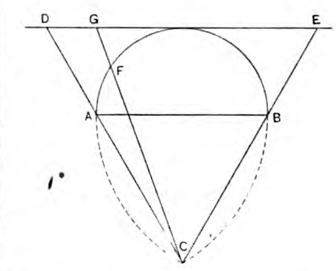
*From* J. C. F., *Stillwater, N. Y.*—Will some the practical readers kindly give me a recipe for coloring brick-work red?

### Self-Supporting Roof Truss.

*From* J. T., *Madison, Wis.*—In the March issue of *Carpentry and Building* "A. T. S.," of New Albany, Ind., asks for plans of self-supporting roof trusses. I inclose a plan for a self-supporting floor truss, which is recommended for a building where posts are objectionable, for the purpose of supporting the second floor. This plan leaves the floor entirely free from posts, and no more lumber is required than would be the case if posts were used. The 6 x 6 at the end of the truss is to be cut off so as to fit under the beam with cap. Then a 6 x 6 is set on the top to go under the plate in order to make a good support for the roof truss. The second-floor joists run lengthwise of the building and are supported by trusses, one in every 10 feet. I would recommend an iron rod 1 inch in diameter running the full width of the building and put through the sills where the bottom of the trusses rest in order to prevent spreading.

### Measuring a Circle.

*From* J. H., *London, Eng.*—In reply to the inquiry of "A. O. S.," Woodstock, Ont., I present the following workshop method: Referring to Fig. 1 of the sketches, describe on the line A B the semi or half circle; take A B as a radius, also as a center, and describe the arcs which intersect at C. Draw the lines C A and C B; then draw D E parallel to A B, and tangent to the curve; D E is the exact circumference of the semicircle. Fig 2 shows another method of accomplishing the same result. Let A B C be a quarter-circle; extend C B indefinitely and draw A D parallel to C B. From B set out B D, making an angle of 60°. This gives A D as the circumference of the quarter-circle. Still another method is as follows: Extend the curve shown in Fig. 2 to the left. Make B E and E F equal to C B. Join F to B and draw B D at right angles to F. B. Then A D is the circumference of the quadrant. Referring now to Fig. 1, suppose we wish to find the length of the curve from F to B: Draw a line through F from C until it cuts the line D E. Then G E is the exact length around the curve from F to B, and D G is the length on the curve from A to F. The practical application of the problem is to obtain the development and position of the risers on the face of the string in circular stairs.




*Measuring a Circle.—Fig. 1.—One Plan of Procedure.*

Also to set out the central falling line, so as to work the wreathed hand-rail to truly follow the stairs.

### Carpenter's Shop.

*From* M. F. B., *Waterloo, N. Y.*—I have taken *Carpentry and Building* ever

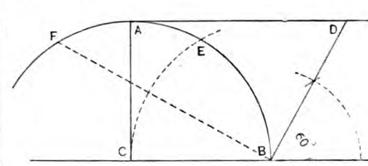
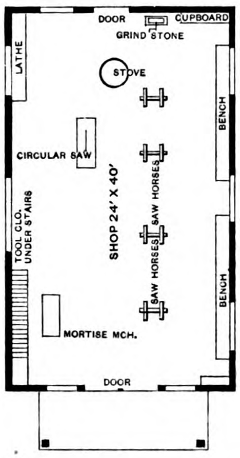



*Fig. 2.—Another Method of Measuring a Circle.*

since it was published. I like it very much, and though I have taken many others, I consider it the best and cheapest of them all. I have been much interested in the building plans which have been published, and thought I would take the present occasion to forward floor plans of a carpenter's shop which I have designed. The size of the shop is 24 x 40 x 18 feet. It is sided with grooved siding and paper and sheeted inside. The cost of the shop was about $350. The tools, foot-power machinery, cases, work-benches and cupboards cost about $300 more. Referring




*Carpenter's Shop.—Fig. 1.—First-Floor Plan.*

to the sketches which I inclose, Fig. 1 is the ground-floor, in which is shown the position of the work-benches, cupboards, turning-lathes, buzz-saws, mortice-machine, grindstones, saw-horses and other articles contained within the building. Under the stairway I keep my coarse tools, such as ropes, pulleys, crowbars, boring-machines, &c. Fig. 2 represents the sec-

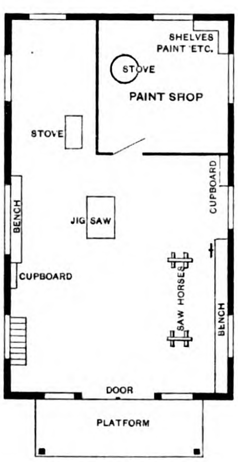
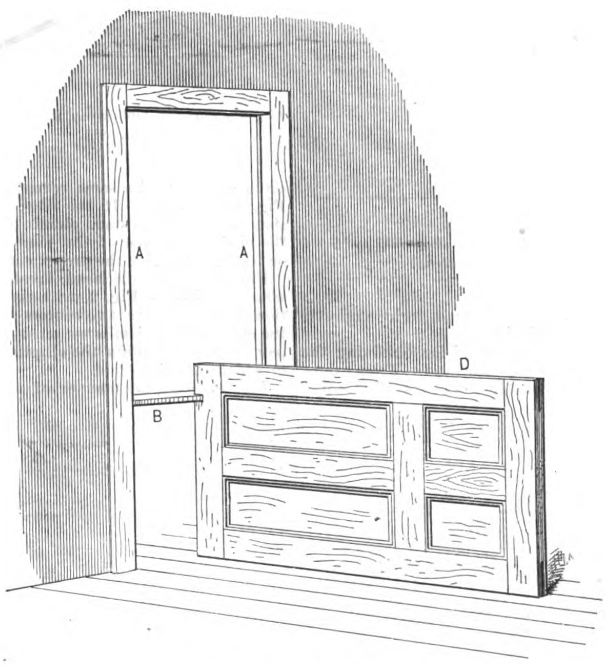



*Fig. 2.—Second-Floor Plan.*

ond floor of my shop, with the position of the various tools, benches, &c., clearly indicated. The platform shown at the front of the shop I use for drying articles that have been painted. I make use of a very convenient carpenter's tool cabinet, the drawers in which I use for chisels, bits and small tools of similar description. I also employ a conveniently-arranged case for screws, nails, &c.

### Convenient Door-Holder.

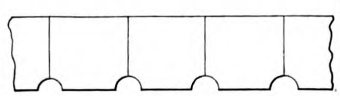
*From* N. P. W., *Omaha, Neb.*—In reply to the communication of "M. F. B." concerning a convenient door-holder, would say that the way we do here in Omaha is to take any waste piece of wood found on the floor and cut it so that it will fit tightly between the jambs. We cut a notch about two-thirds the distance from the end and large enough for the door to fit in, as indicated by the sketch which I enclose. Referring to the illustration, A A are the jambs, B the stick and D the door. We think a man who would go to work and build a large frame like the one described by "M. F. B." would stand a very good show of being discharged if he was working for some of the "git-up-and-git-thar" contractors of Omaha. The arrangement I have described is convenient, easily knocked out and changed from one door to another opening, and it is not necessary to set it in far enough to interfere with the fitting of the door or the putting on of the butts.




*A Convenient Door-Holder.*

### Shingle Clapboarding.

*From* W. H. K., *Alton, Ill.*—Can you or any of the readers of *Carpentry and Building* inform me if there is such a thing as clapboarding made to represent shingles, something after the style of the sketch which I inclose. I have never seen any, but a person for whom I am to build saw some in Albany, N. Y. I should like



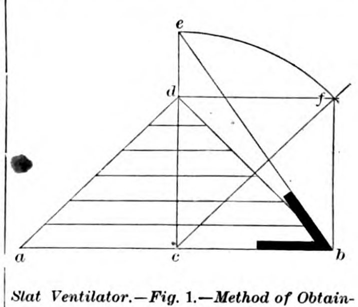
*Sketch Submitted by W. H. K.*

to have the address of the manufacturers of this article.

*Note.*—We do not know of any clapboarding of the description given by our correspondent above which is at present on the market. We are under the impression that he is mistaken in thinking the article referred to is clapboarding, using the term in its literal meaning. From an inspection of the sketch which he sends we should judge that the clapboarding was made up of shingles, either wooden or metallic, or possibly slate, which are very extensively used in the manner indicated. If the design is clapboarding the grain would necessarily run the long way of the board, and there would be danger of the points easily breaking off. We submit the question, however, to our readers, and shall be glad to have an expression of opinion from them.

### Slat Ventilator.

*From* J. C. Y., *Springfield, D. T.*—I send the inclosed drawings in answer to "Old Hickory," whose communication appeared in the February issue of *Carpentry and Building*. Fig. 1 represents my method of obtaining the cuts on ends of




*Slat Ventilator.—Fig. 1.—Method of Obtaining the Cuts on the Ends of Slats for all Straight Pitches.*

the slats for all straight pitches. Draw $b$ $d$ representing the pitch of jambs, which in this figure is one-half. Divide $a$ $b$ and draw $c$ $d$, continuing the line some distance above $d$. From $c$ draw the pitch of slat (45°), and from $d$ draw a line parallel to $a$ $b$ until it intersects at $f$. Now make $c$ $e$ equal to $c$ $f$ and draw $b$ $e$. The bevel shown at $b$ will be the cut on the sides of the slats, also on the edges of them when square and placed at an angle of 45°. Any other angle of slat may be obtained by simply making $c\,f$ the pitch of the slat and for the square edge repeating this operation on the other side of the center, except that the

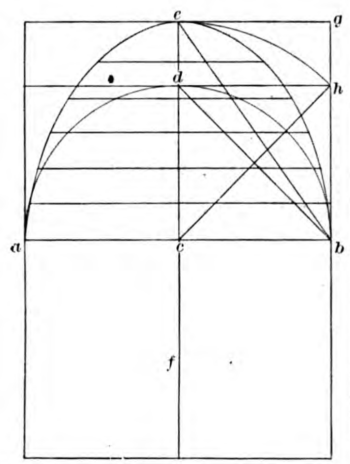



*Fig. 2.—Method of Obtaining Cuts for Semi-circular Head.*

line $c\,f$ must be drawn at right angles to the one on this side.

Fig. 2 is the method for obtaining the cuts for a semicircular head. From $c$ draw $a\,b\,d$; connect $a\,b$; draw $c\,d$, continuing

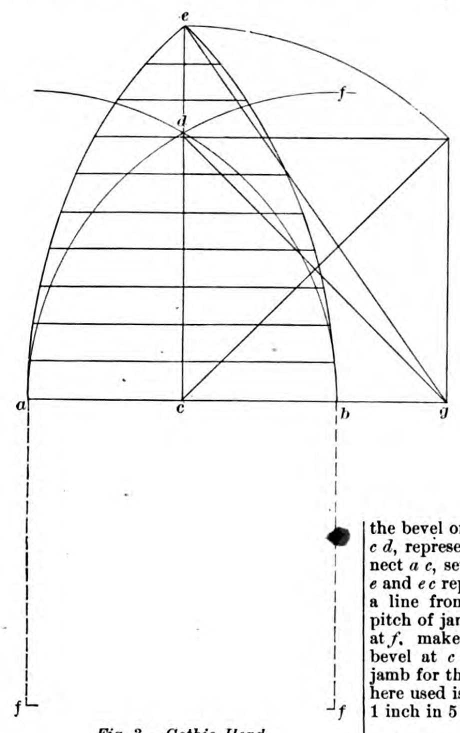



*Fig. 3.—Gothic Head.*

above $d$. Draw $c\,h$, the angle of the slats, and $d\,h$ parallel to $a\,b$. Make $c\,e$ equal to $c\,h$, which is one-half of the major axis of the ellipse, in which the lower slat is placed. The ellipse may be drawn in various ways. The plan we have adopted here is as follows: Make $b\,d$ and $b\,f$ equal $b\,g$; stick pins at $d$ and $f$; make a loop of string reaching from $f$ to $e$, and with a pencil in the loop trace around from $a$ to $b$; find the number of slats required and space off on the line $c\,e$. Then draw through these points lines parallel to $a\,b$. The intersection of each one of these lines with the ellipse will be the curve on which the corresponding slat must be cut to fit the jamb. As to the different

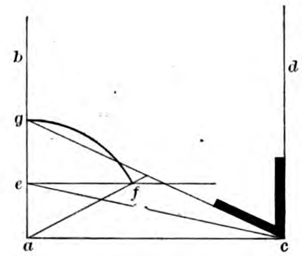



*Fig. 4.—Plan of Obtaining Bevel on Jamb for Sill.*

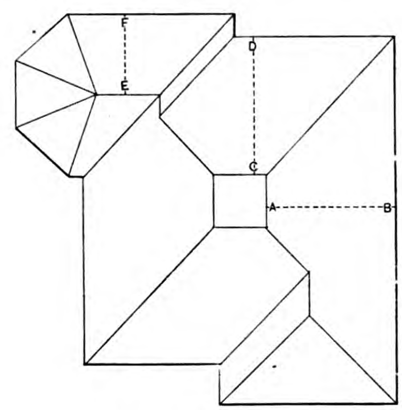
pitches of slat, the same remarks under Fig. 1 will apply. If the edges of the slats are beveled to stand plumb, of course the pitch or circular of the jamb marked on its face will give the proper cut.

Fig. 3 is a Gothic head, involving the same principle as Fig. 2, with the exception that as we use two centers to strike the curves of the jambs we must use two pair of foci to obtain the elliptical plane in which the slats stand.

Fig. 4 shows the manner of obtaining the bevel on jamb for sill. Draw $a\,b$ and $c\,d$, representing the width of jamb, connect $a\,c$, set off the rise of sill from $a$ to $e$ and $e\,c$ represents the pitch of sill. Draw a line from $e$ parallel to $a\,c$. Draw the pitch of jamb from $a$, intersecting this line at $f$, make $a\,g$ equal $a\,f$, draw $g\,c$. This bevel at $c$ will be the proper cut on the jamb for the sill. The pitch of the jamb here used is one-quarter the pitch of sill—1 inch in 5 inches.

### Problem in Hip Roofs.

*From* A. Y., *Kenton, Ohio.*—In reply to "J. M.," of Germantown, Ohio, who presented in the May number of *Carpentry and Building* the plan of a house with a hip roof to have a square deck of 30 feet surface, I send the inclosed sketch. I have made the sides a little more pitch than the ends. To explain it I would say that the deck is raised 10 feet high, although "J. M." can make it any hight he may desire. The side from A to B will then measure 13 feet 4 inches run and 10 feet rise, while from C to D it will be 14 feet 4 inches run to 10 feet rise. The octagon part from E to F will be 8 feet 6 inches run to 5 feet 7½ inches rise. I prefer not to say how this plan will look viewed from an architectural stand-point, for I do not know what style of a house it is to be put on. It will, however, answer the question for a hip roof with a square deck.




*Solution of Problem in Hip Roofs, by A. Y.*

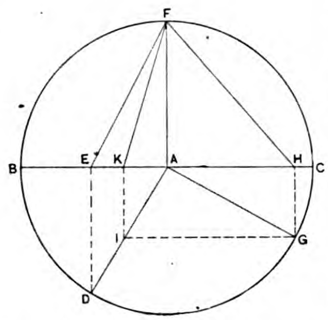
### Sweating of Roofs

*From* G. & S., *Ann Arbor, Mich.*—Can a roofer be held responsible for the sweating of a standing-seam steel roof? We have such a case on hand; the roof is on a carriage paint shop, which is kept very warm. There is no ceiling, and on cold days the roof sweats enough to drip down on the floor. Are there any such cases on record, and can we compel the owner of the building to pay for the roof?

*Answer.*—Regarding the matter of responsibility, we fail to see that a roofer should be held responsible for the moisture that is condensed under a roof when there is no ceiling or other protection to prevent the warm air from coming in contact with the metal of the roof, any more than he would be for the rain or snow that falls on top; and yet his general knowledge ought to enable him to show the liability to annoyance from this cause in advance, and to urge a change in construction. It would appear to us that it is the place of those who have charge of the construction of a building to see that means are provided to prevent the difficulty. As the roof is constructed, nothing would be more surprising than that during cold weather the moisture contained in the warm air in the building should not be condensed when coming in contact with the cold glass of the windows or metal of the roof. That it should condense is the obvious rule. According to the books, at 60° a cubic foot of air will hold 5.82 grains of watery vapor; at 70°, 7.94; at 80°, 10.73, and at 90°, 14.38. When the air is saturated—that is, contains all the moisture it can hold—and the temperature falls, then a certain amount of the moisture is condensed and appears in drops, as, without doubt, the reader has noticed when a pitcher of ice-water has been brought into a warm room. If a cubic foot of saturated air at 90° is cooled 10°, it would deposit 3.5 grains of water; but it is not supposed that the air contained in an ordinary building is saturated with moisture, yet it contains enough so that when brought in contact with a cold surface, like a metal roof, enough moisture is condensed to cause serious annoyance. The air in a building may appear to be dry, and yet be capable of depositing much moisture. As the hot air rises to the cold roof and the moisture is condensed, the air becomes cooler and sinks to the floor, thus giving place to other warm air, which has its moisture condensed in a similar manner. At zero a cubic foot of air will contain but 0.18 grain of watery vapor, so, if the temperature of the roof is at zero, all of the vapor in the air but 0.18 may be condensed. In answer to the second question, it might be stated that during every cold season for a number of years past there have been inquiries regarding the subject of condensation or sweating of roofs, and our back volumes abound in them.

### Bevels for the Construction of Rectangular Figures.

*From* W. S., *Toronto, Canada.*—In the accompanying sketch I show a very simple method for accurately finding the bevels necessary for the construction of any rectangular figure when its sides are not perpendicular to the horizontal plane. The plan is especially applicable for use in constructing hoppers, carriage-seats and the like. From any center A with any radius A B describe a circle B C D. Through the center A draw the diameter A C. From A draw the radius A D, making the angle B A D equal to the angle which the side of the figure to be constructed makes with the horizontal plane. From A draw the radius A G,

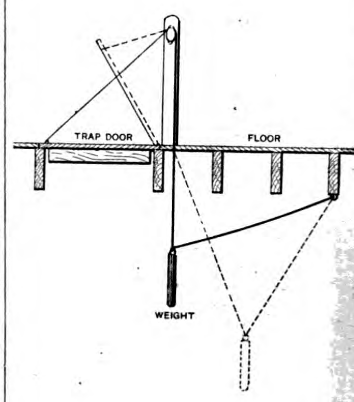



*Plan for Finding Bevels in Construction of Rectangular Figures, Submitted by W. S.*

making with A D a right angle or an angle equal to the angle which edge of the side of the figure makes with the face of the side. From A draw A F perpendicular to B C. Through G draw G I parallel to B C, cutting A D in I. From the points D, I and G draw D E, I K, and G H perpendicular to B C, cutting B C in the points E, K and H. Join E F, K F and H F; the angle C E F will be the angle across the face of the side, and the angle B K F will be the angle of the edge for a "butt" joint, and the angle B H F will be the angle for a "miter" joint. If pieces are put down the corners to strengthen the figure, take the distance D E on the tongue and the distance E F on the blade of the steel square and the tongue will give the "backing" of the corner-pieces.

### Balanced Hatchway Doors.

*From* C. F. M., *Easton, Pa.*—For the benefit of the readers of *Carpentry and Building* I submit herewith a sketch of self-balancing trap or hatchway doors which are hung by weights. From an inspection of the drawing it will be seen that when the door is closed the weight is brought directly upon it, serving to maintain a perfect balance. The dotted lines show the position of the weight when the




*Balanced Hatchway Doors.*

door is partially open. I have discovered that the trap doors may be used to advantage in a great many places, and the arrangement which I describe herewith serves a very satisfactory purpose.

### Construction and Care of Roofs.

Roof coverings, no matter how well put on, require a proper amount of care. If the covering is of tin or iron it should be protected from the action of the elements by application of paint, put on as often as necessary. If there are cracks in the seams of tin roofs, caused by the contraction and expansion of the metal owing to changes in temperature, they should be repaired by soldering on strips of tin or by covering the cracks with solder. A point that is apt to be neglected on many roofs is where the metal joins the brick fire-wall. This joint may have been properly made at the time the roof was put on, but the action of the elements may have caused the cement or mortar to become loosened or to fall out, so that water may enter, or in case the roof should be covered with melting snow or ice a dam may be formed that will cause the water to back up and run in between the brick and tin. It is evident that the remedy for this defect is to renew the cement, after which it can be painted, so as to prevent the water from again entering and causing the same trouble. The same difficulty is apt to occur at the flashings about chimneys, and the remedy is the same. When the covering of fire-wall is of stone or other similar material the mortar or cement at the joint is liable to be washed away, allowing water to enter and soak the brick below, and when this water freezes the brick-work is apt to be greatly injured, to remedy which the joints should be cemented and painted. The hanging gutters to carry away the water from a roof should be so arranged that in case of an overflow the water will not run over the back side of trough or gutter and run down the wall and perhaps be blown into the building by the force of the wind. When gutters are placed in a cornice the seams may be broken by the expansion and contraction of the metal, or by the action of ice and snow, and the water that leaks through the broken seams is apt to cause damage to the cornice, especially if of wood, to prevent which the breaks should be repaired by soldering strips of tin over the seams, which is a better method than using solder alone, as the strips will spring enough to allow for the expansion and contraction of the gutter.

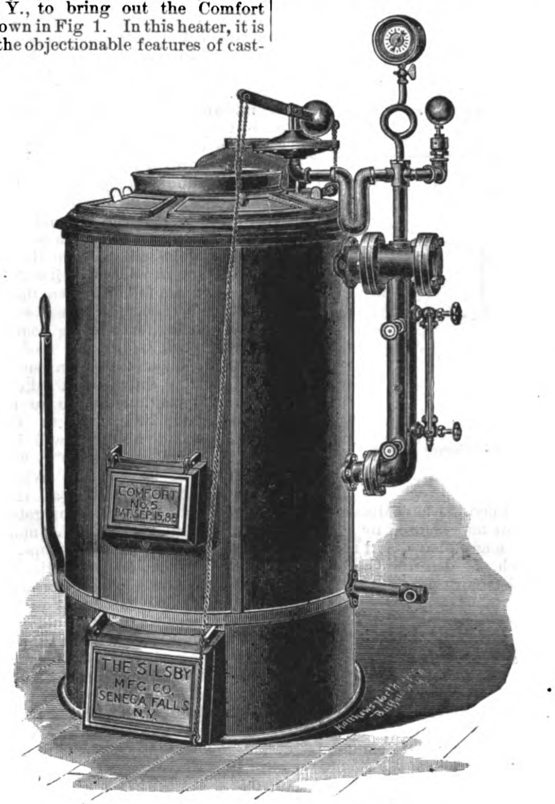
While it is a comparatively easy matter to protect the outer surface of a sheet-metal roof from the action of the elements by the application of paint, the under side may receive injury from the condensation of moisture without some provision is made to prevent it. This can be done by applying a layer of rosin-sized paper to the roof-boards before the metal covering is put on, and placing ventilators in the roof to carry off all vapors that may collect between the ceiling and the roof. When a building having a metallic roof not so arranged as to prevent the moisture from coming in contact with the roof is first used in the fall, or when the weather is sufficiently cold, the moisture from the walls being brought in contact with the cold surface of the roof covering is sometimes condensed in such quantities as to drip upon the ceiling below, and continue to do so until the building has had time to dry out. At 60° 1 cubic foot of air will hold 5.82 grains of watery vapor; at 70°, 7.94; at 80°, 10.73, and at 90°, 14.38. When air is saturated—that is, contains all the moisture it can hold—and the temperature falls, then a certain amount of the moisture is condensed and appears in drops, as without doubt the reader has noticed when a pitcher of ice-water has been brought into a warm room. If 1 cubic foot of saturated air at 90° is cooled 10°, it would deposit 3.5 grains of water, but it is not supposed that the air contained in an ordinary building is saturated with moisture, yet it contains enough, so that when brought in contact with a cold surface, like a metal roof, enough moisture is condensed to cause serious annoyance. The air in a building may appear to be dry and yet be capable of depositing much moisture. As the hot air rises to the cold roof and the moisture is condensed the air becomes cooler and sinks, thus giving place to other warm air, which has its moisture condensed in a similar manner. At zero 1 cubic foot of air will contain but 0.18 grain of watery vapor, so if the temperature of the roof is at zero, all of the vapor in the air but 0.18 may be condensed.

THE NEW YORK CENTRAL IRON WORKS, Geneva, N. Y., manufacturers of the well-known Dunning Heating Boiler, issue a new edition of their catalogue. In sending out the circular to the trade, the proprietor, William B. Dunning, directs attention to the latest improvement, which is the portable boiler to be set without brick-work; also the new construction designed especially for soft coal and with a patent improvement of a direct draft. Mention is made of the fact that with these new hot-water boilers there is a large assortment to choose from. Passing on to the illustrated portion of the catalogue, we first notice cuts showing an exterior view of the Dunning Base-Burning Magazine Boiler, brick-set. The same is next shown as a surface-burner. The sections of the boiler are afterward illustrated, followed by cuts of the portable boiler, hot-water boiler and the new Dunning. The grates and parts of the boilers complete this part of the catalogue, at the end of which is a table of sizes, prices, &c. The next 75 pages of the pamphlet are taken up with testimonial letters and references. These are followed by illustrations, with descriptive tables of power boilers and engines.

# NOVELTIES.

### The Silsby Steam Heating-Boiler.

The demand for a cheap construction of boiler to be used in the smaller class of residences and buildings induced the Silsby Mfg. Company, 235 Main street, Seneca Falls, N. Y., to bring out the Comfort Boiler, shown in Fig 1. In this heater, it is claimed, the objectionable features of cast-iron boilers have been overcome. Instead of being built up of many sections the boiler in all the different sizes consists of but two sections—the upper or flue section, and the lower or fire-pot section—these being joined together by short lug-bolts at flanges, which are connected to waterways, and are easily accessible when the jacket is removed. The connecting flanges between fire-pot and boiler, also water-column, are perfectly faced, and for the joint corrugated-copper gaskets are employed, no soft packings or cement being used in any of the joints. These boilers are easily kept clean, as the fire-surfaces are vertical. By simply removing the covers, which are shown on top of boiler, all accumulation of soot or dirt is very readily swept down into the fire-pot. The grate is of the rocking and dumping type, simple in construction and easily operated. The magazine, or coal-feeder, holds a sufficient amount of coal to last from 10 to 24 hours, depending upon the severity of the weather. As will be seen, this boiler is neat in appearance, is very compact and has all the necessary trimmings and draft-regulating appliances.




*Novelties.—Fig. 1.—The Comfort Steam Heating-Boiler, Made by Silsby Mfg. Company.*

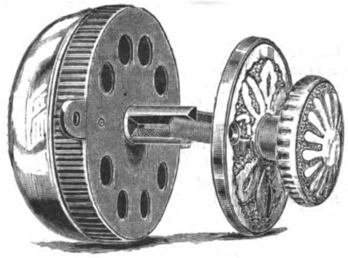


*Fig. 2.—Columbus Door-Bell.—View of Knob-Bell.*

### Columbus Door-Bell.

The Columbus Door-Bell Company, of Columbus, Ohio, have placed upon the market a door-bell known under the name Columbus, a general idea of the construction of which may be gained from an inspection of the accompanying illustrations. This bell is made in two sizes, having nickel-plated gong and japanned metal base. At the present time two varieties are offered, known respectively as the crank and knob bells. In both cases the principle of operation is the same, the sound being produced by a rotary motion of what may be designated as the handle. Fig. 2 shows the knob bell, while Fig. 3 represents the crank bell. The crank or operating-lever is inserted in the tumbler projecting from the inner face of the bell. This is operated by a ratchet, to which is attached the striker. The bells are made of few parts, of simple construction, and of such a nature as to render them little liable to get out of order. The best material is employed in their construction, and they are offered, as stated above, in two sizes, 3 and 4 inch.

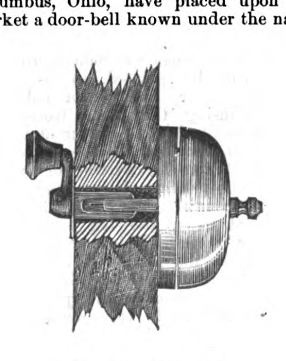


*Fig. 3.—Crank Bell.*

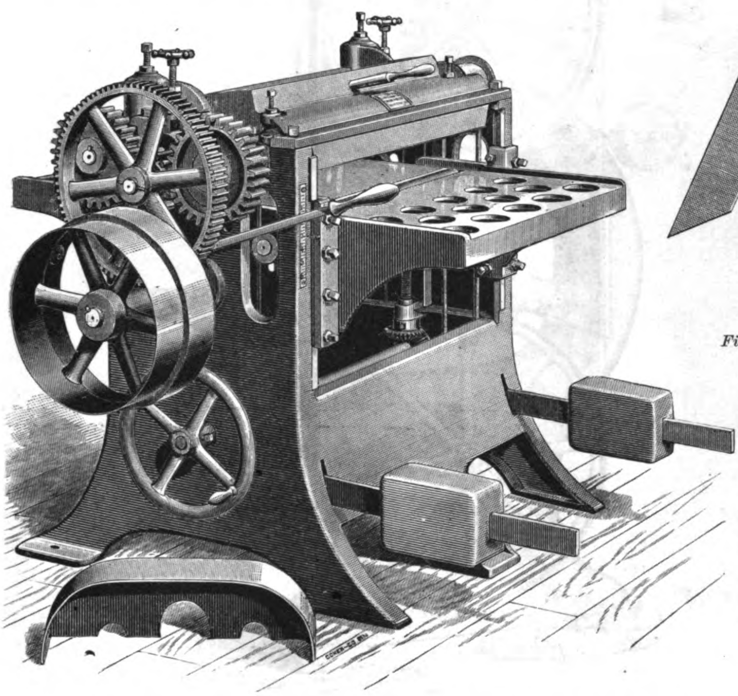
*Fig. 4.—Self-Feeding Rip-Saw, Manufactured by Frank & Co.*

### Self-Feeding Rip-Saw.

In Fig. 4 of the accompanying illustrations we show a general view of a No. 1 Self-Feeding Rip-Saw, which has been placed upon the market by Frank & Co., 176 Terrace street, Buffalo, N. Y. The manufacturers claim for this, first, that it is very simple in construction and can be changed from power to hand feed by simply raising the feeding works on the swinging joint at the end of the machine. The feed is driven by a series of belting and can be started and stopped by means of a tightener. The frame of this machine is made very heavy, is strongly ribbed and braced. The saw-arbor is made from 1⅞-inch crucible machinery steel and is self-oiling. There are three bearings to the mandrel, one being outside the driving-pulley. Two speeds of feed are furnished with each machine. The machine is capable of employing saws up to 16 inches and has capacity for cutting through material 4 inches thick. The table is hinged at the back end to give free access to the saw-arbor. The boards being operated upon are held firmly on each side of the saw by means of a spring, thus removing all danger of injury to the operator. The floor-space required for this machine is 4 feet 9 inches by 4 feet 5 inches. The size of pulley is 7 x 7 inches, and should run from 3000 to 3500 revolutions per minute, according to the size of saw employed. The firm make a No. 2 size of this style of machine, adapted for much heavier work and having attachment for sawing siding, which is furnished with wood and iron table or all iron table, as may be preferred.

### Improved Pony Planer.

Frank H. Clement, of No. 131 Mill street, Rochester, N. Y., has recently introduced to the trade an improved pony planer, a general view of which is shown in Fig. 5 of the accompanying illustrations. This machine is one of the single-surface variety, with four feed-rolls, the upper pair being driven while the others remain idle. It is designed more especially for finishing or smoothing, but is so constructed that it will take a heavy cut when necessary. The cylinder, which is of small diameter, is a solid steel forging with steel "capping" lips. The frame is heavy and substantial and rests on three feet, rendering it very difficult to strain it on an uneven floor. The manufacturer also states that by this arrangement the cylinder-caps may be always kept closely screwed down without heating, and thus avoid wavy work. The bearings of the bed on the frame are outside on the feed-rolls, and being supported at six points and unusually deep and well-ribbed, the bed cannot spring under the pressure of the upper rolls. The pressure bars are carefully arranged and have all the necessary adjustments independently of each other and the feed-rolls. All bearings are extra long and carefully fitted, particular attention being given to the cylinder bearings. Two changes of feed are provided and a lever for starting and stopping. The forward feed-rolls are weighted and the gearing is especially heavy. The machine is well built in all its parts and is said to give very good results in operation.



*Novelties.—Fig. 5.—Improved Pony Planer, Made by Frank H. Clement.*

### The Prescott Door-Hanger.

Since the illustrated description of Prescott's Trackless Door-Hanger was published in our issue for March, 1882, the Prescott Hardware Mfg. Company, of 108 and 110 Randolph street, Chicago, Ill., have made a number of improvements in the device which cannot fail to be appreciated by the building trade generally. In the accompanying illustrations we show two applications of this door-hanger, the arrangement being so clearly indicated as to call for very little explanation. The Prescott hanger supports a door on the principle of the ordinary swinging door hung upon hinges. In this case no track is employed, the hanger being applied to the jamb on one side of the sliding door, after the plaster is completed and the interior finish in place. The hanger is secured to the jamb and covered by a wide stop. The manufacturers claim that it can be adjusted by taking off the stop and altering the set of the hanger. The hanger works in a pocket at one side of the door and does not show. It is warranted not to get out of order with constant use. In Fig. 6 of the illustrations a hanger is shown applied to folding doors, the plastering being broken away at the left of the cut in order to clearly indicate the general arrangement. In Fig. 8 of the cuts the Prescott Trackless Door-Hanger is shown in its application to barn doors. The statement is made that the almost total absence of friction makes the largest doors run easily, and that the doors cannot jump nor get off the track, as none is employed. They are well constructed and have already established a wide reputation in the trade.

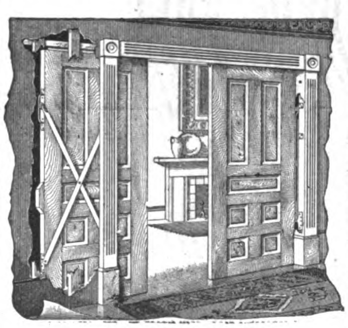


*Fig. 6.—Prescott's Parlor-Door Hanger.*

### Witter's Improved Flush Bevel.

An interesting novelty which has recently been brought out by Frank E. Witter, of Willimantic, Conn., is shown in Fig. 7 of the accompanying illustrations. This is known as Witter's Newly-Improved Flush Bevel, and is a tool particularly useful in framing hips, valleys and jack-rafters, including other work where two blades are needed at one time. The tool is made of sheet-steel and brass, with wood center, and has two blades, one 10-inch sliding blade and one flush blade. It is handsomely finished, the steel portion being nickel-plated and the brass lacquered, while the wood center is made of mahogany. At each end of the device are thumb-nuts, so placed as to be out of the way and yet convenient for use. In the edge of the thumb-nuts are two holes designed for the insertion of a nail-set to tighten the blade and hold it firmly in place when it is desired to use the same bevel for a long period. The flush blade is very useful in working from plans, as it rests flat on the table and can be tightened if necessary before raising it. Beneath the blade are gauge-marks, by means of which may be formed a square miter, octagon, hexagon and try-square, both right and left. The view at the right shows the tool in vertical cross section.

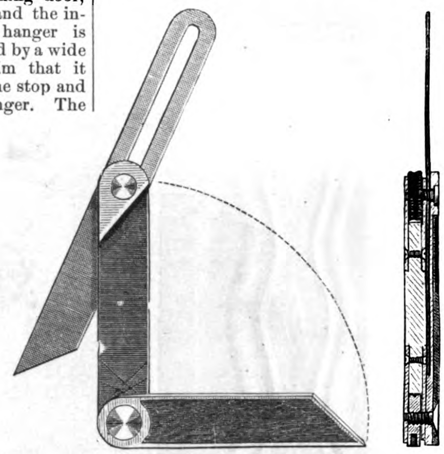
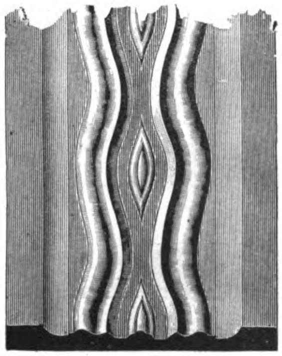


*Fig. 7.—Witter's Improved Flush Bevel.*

*Fig. 8.—Prescott's Barn-Door Hanger.*

### Wood-Carving Machinery.

As a striking example of what may be accomplished in the way of artistic wood carving by machinery we would refer our readers to the specimens shown in Figs. 9 and 10 of the accompanying illustrations. These patterns were made direct from the rough board by one passage through a machine which has been invented by Dr. C. L. Goehring, of Allegheny City, Pa. It is stated that the machine performing this work resembles a first-class planer in its general appearance, is fully as durable, and is capable of producing an unlimited variety of geometrical figures. They are produced by a series of cams, something after the style of the geometrical lathe. As the lumber comes from the machine it possesses a fine finish. The inventor states that with the "shear cut" of the knives, it matters little how knarly may be the



*Novelties.—Fig. 9.—Wood-Carving Machinery.—Specimen of Wood Carving by Machinery.*

wood or how twisted the grain. A sample lot of California redwood was lately run through this machine at the rate of from 10 to 15 feet per minute, according to the figure to be carved, with very satisfactory results. The machine takes the board in the rough, surfaces, carves, scallops the edges if desired, grooves, tongues and cuts an overlapping bead, and leaves it finished and ready for the joiner. The machine is claimed to produce work especially adapted for wainscoting, ceiling, window and door frames, or other finish for which plain lumber is suitable. A number of these machines are at present in process of erection and others will be soon commenced to meet the demand. The capacity of the machine is said to be about 5000 feet for hard-wood lumber and 10,000 linear feet for soft lumber per day. The specimens of carving shown in Figs. 9 and

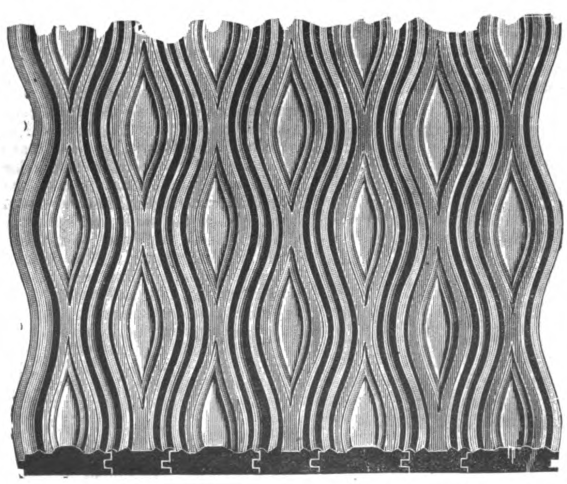


*Fig. 10.—Pattern Put Together.*

10 were made by the same cutter. Other specimens before us show a pleasing variety in design.

**Band-Sawing Machine.**

The Egan Company, Cincinnati, Ohio, have just brought out a new band-saw embodying various modern improvements and of superior construction. This saw has been brought out to meet the require-

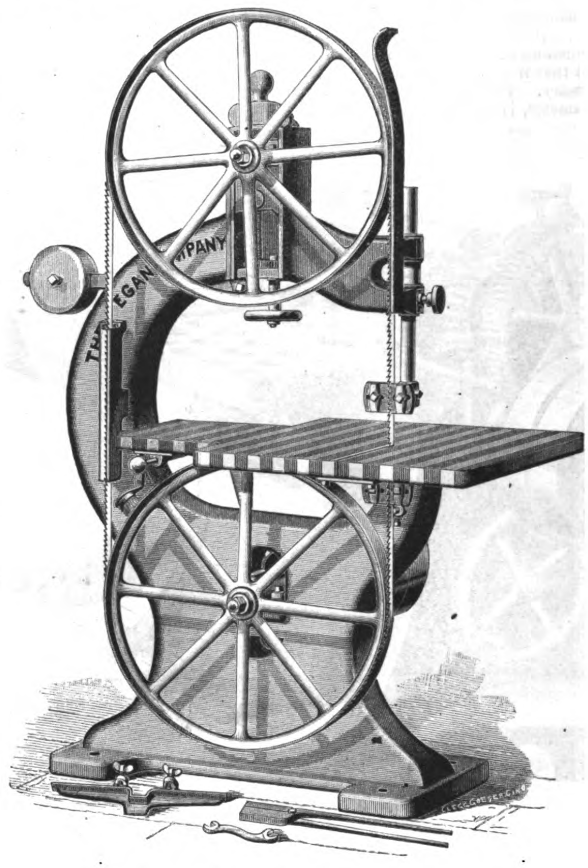
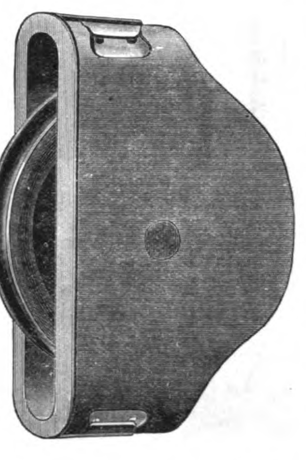


*Fig. 11.—Band-Saw, Made by the Egan Company.*

ments of planing-mills, carpenter-shops and for general wood-workers of all kinds. The machine is substantially built, the iron frame being cored out and cast in one piece. The parts are well designed and the machine is put together in a very thorough manner, being fully tested before shipping. The wheels, which are 34 inches in diameter, are light and symmetrical, covered with pure gum and ground true. The upper box or wheel may be inclined so as to lead the saw to any path by a thumb-screw, the saddle and box being raised or lowered by a main screw. The patent weight for giving the proper tension to the saw is adjustable and can be readily changed to suit the width and density of the work to be executed. The steel plate at the back gives the saw a full bearing and support, the plate being reversible. The side guides are adjustable to the width and thickness of the blade. The manufacturers claim that the patent shifter, used for shifting the belt and stopping the saw, is rapid and effective in operation. The patent guide rises and lowers with the guide-bar for the purpose of adjusting itself to thick and thin lumber. It will take in 12 inches under the guide. The manufactnrers claim that this machine is the most perfect for working in hard and soft wood now before the trade.

**Ideal Sash Pulley.**

The Stover Mfg. Company, Freeport, Ill., are putting on the market the sash-pulley shown in the Fig. 12 of the accompanying illustrations. The pulley-wheel has a cone axle cast to it under a new process which, it is claimed, greatly enhances its working qualities in point of accuracy, in the matter of durability and light running, while it renders it noiseless in operation. The bearings in case are made with reference to the cone-shaped axle of pulley, and when put to actual use the weight of the window and sash-weight applied to the sash-cord running over the pulley-wheel causes it to run to a center, or midway between the two sides of the cases, thus relieving it of contact with sides of case and overcoming friction and noise. The company make various styles of cone axle-bearing sash-pulleys, but the pulley illustrated is more particularly adapted for



*Novelties.—Fig. 12.—Ideal Sash-Pulley.*

the mill trade, as it is readily applied with mortising-machines such as are in general use, though it may be applied by hand in the usual way.

### Humphrey's Brad-Awl Handle.

This brad-awl handle is manufactured by the Humphrey Tool Company, Warren, Mass., and is intended for use by workmen desiring a cheap handle for the old-fashioned or forged shank brad-awls. It is made of hard wood polished, with double metal ferrules at the end The inner ferrule has an oblong hole or slot squared at the ends to keep the awl from turning when the shank is inserted therein. It is threaded on the outer surface, and on it the outer ferrule is screwed, which has in the center of the top a round hole of such size that it is adapted to many sizes of awls. The awl is placed in the handle and the outer ferrule, which is knurled, as shown in Fig. 13, is screwed tightly over it, holding the awl firmly and centrally. Its adaptation to large or small

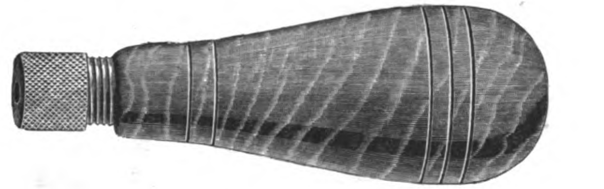


*Fig. 13.—Humphrey's Brad-Awl Handle.*

awls is one of the points in regard to it emphasized by the manufacturers.

### The Van Duzen Gas Engine.

Among the popular forms of small motors the gas engine occupies a prominent position, and a new style of this class of engine is put on the market by the Van Duzen Gas Engine Company, Cincinnati, Ohio. The appearance and general features of the motor will be understood by referring to Fig. 14 of the accompanying illustration. In describing their engine the manufacturers refer to the fact that it is of the vertical type and therefore economizes 20 to 50 per cent. of the floor space as compared with horizontal engines. The base of the engine is a single casting, making a solid support. The interior of this casting is hollow and forms a reservoir for the oil and water, which constantly lubricates the working parts of the engine. The fly-wheels are specially constructed with heavy rims and light but strong arms, which tend to give the engine greater uniformity of speed. The governor used in the engine is of special design andmconstruction, adapted for use on this motor. It has perfect and instantaneous control over the gas and air valves, as well as the speed of the engine, under all conditions. The valves of the engine are direct-acting pop-pet-valves, and their use is spoken of as a new departure in gas-engine construction. The water-tank is of heavy mild steel, and is usually a part of the engine, as shown in the annexed cut. Special attention is directed to the fact that this engine does not need a constant supply of water, and

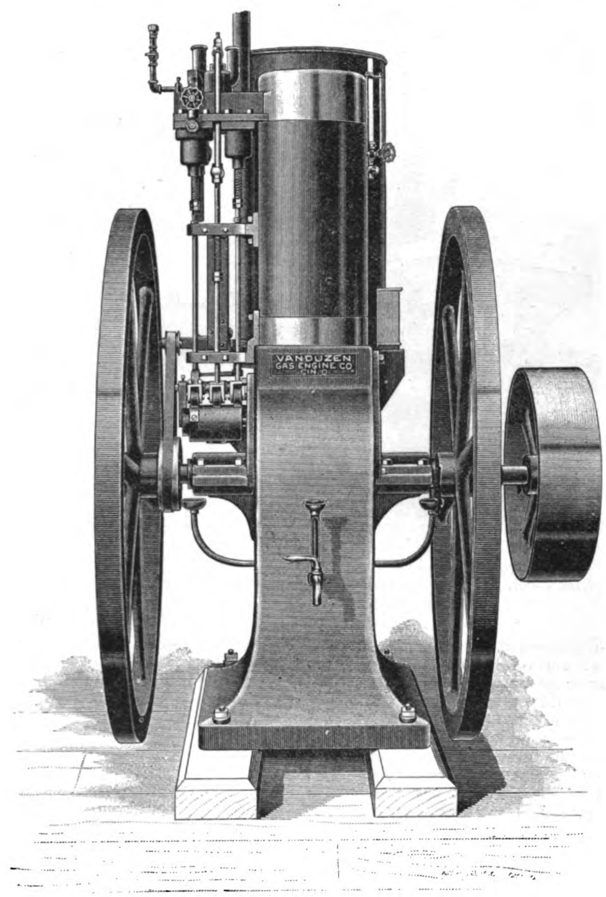
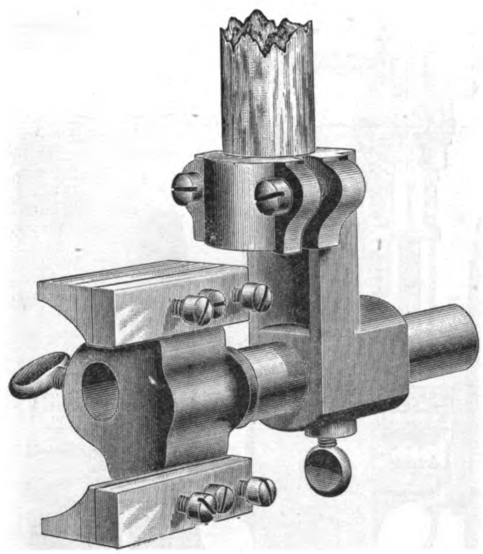



*Fig. 14.—The Van Duzen Gas-Engine.*

consequently requires very few pipe connections. The regulating of the engine is accomplished by altering the supply of gas, according to circumstances. The applications of gas-engines of this type are very numerous—in fact, they may be used to advantage wherever small power is required. They are made in five sizes, from 1 to 10 horse-power, weighing from 1000 pounds to 2200 pounds.

### Non-Friction Band-Saw Guide.

Figs. 15, 16 and 17 of the engravings show clearly the construction and application of a non-friction band-saw guide manufactured solely by Cross & Speirs, of Waterbury, Conn. The guide consists of a holder, in the top portion of which is fitted a sleeve, adjustable to and from the saw and held by a set-screw, and in which turns the shank of the wheel which forms a bearing for the back edge of the saw. In setting the guide, the back of the saw is made to bear a little harder on the upper edge of the disk, leaving a slight opening on the lower edge. The pressure of the work against the saw then makes its back bear securely against the disk. As the movement of the saw revolves the disk or wheel friction is done away with, and there is practically no wear at all. The wearing parts of the guide are made from hardened tool steel, and if kept properly oiled will last as long as the saw. The parts are so arranged that they can be adjusted easily to any width or thickness of saw, while the guide can be readily attached without injury to the machine. For resawing or heavy work it is preferable to have two guides, one above and one below the table, but for ordinary work one upper guide is sufficient, as it is so set as to take all the pressure. Testimonials received by the manufacturers indicate that the use of these guides has resulted in a great saving in saws, as the temper is preserved and the back edge is prevented from checking.



*Novelties.—Fig. 15.—Non-Friction Band-Saw Guide.—View of Holder.*

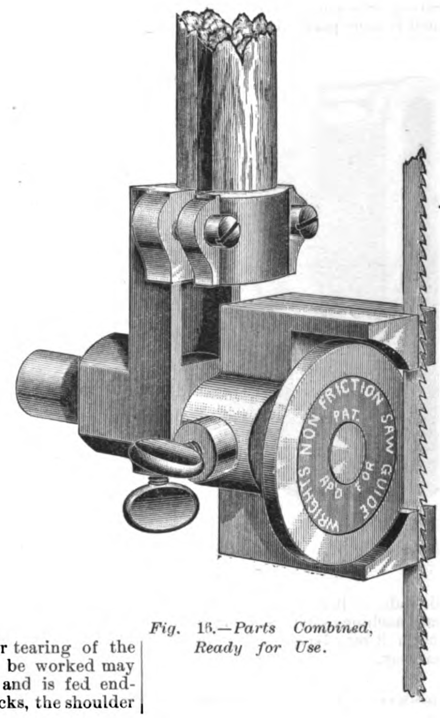



*Fig. 16.—Parts Combined, Ready for Use.*

**Blind-Slat-Tenoning Machine.**

In Fig. 18 of the accompanying illustrations is shown a new and improved machine for automatically tenoning blind-slats, which has recently been introduced to the trade by J. A. Fay & Co., Cincinnati, Ohio. In its construction the feeding mechanism is placed within the column of the machine, and consists of a worm and worm-wheel connected with a pitman operating the chuck arms. A cam on the worm-wheel shaft draws down the pitman and chuck arms until the tenon on the slat is cut, and then spring pressure on the upper end of the pitman returns it to its place. Two speeds to the worm-shaft are provided in order to accommodate different lengths of slats. The feed is started and stopped by a clutch on the counter-shaft, controlled by the hand-lever shown at the left of the cut. In the top of the pitman is an adjusting-screw for regulating the size of tenon to be cut. The rotation of the slat gives a true cylindrical form to the tenon, the arrangement being such as to prevent splitting or tearing of the wood. The material to be worked may be of any length desired and is fed endwise through rotating chucks, the shoulder being pressed against an adjustable gauge. The machine is so constructed that by means of the revolving cutting tools two tenons are cut and divided by one cutter-head at the same time. Each chuck is fitted with a right and left hand screw for adjusting it to different sizes of slats.

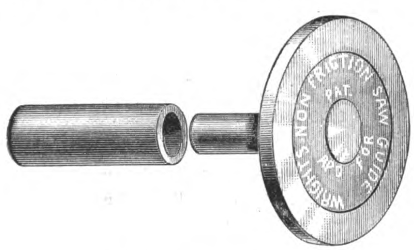



*Fig. 17.—Sleeve and Wheel.*

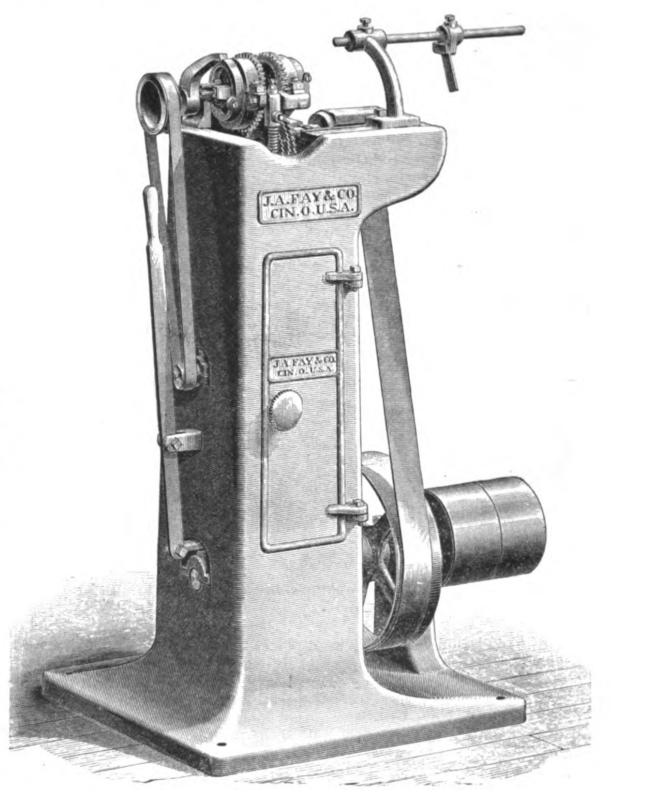
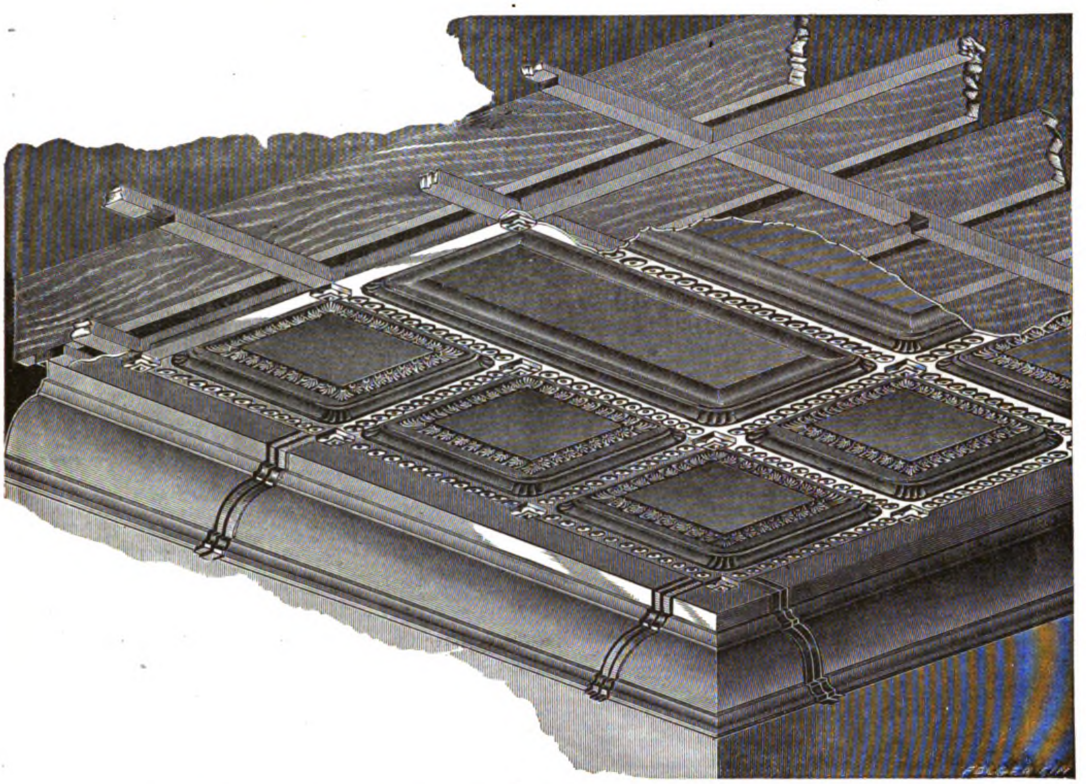



*Fig. 18.—Blind-Slat-Tenoning Machine, Made by J. A. Fay & Co.*

The tight and loose pulleys are 6 x 3 inches, and the manufacturers state should make 600 revolutions.

### Kinnear's Paneled Ceiling.

In Fig. 19 of the accompanying illustrations we show some of the leading features of paneled steel ceiling which is being manufactured by W. R. Kinnear & Co., of Columbus, Ohio. This cut is taken from an attractive pamphlet which the firm are distributing among the trade, and shows the method of suspending the ceiling, while giving a very clear idea of the general arrangement of the parts. By reference to the engraving it will be seen that furring-strips are employed against which the ceiling is fastened, the construction admitting of every joint and nail-head being concealed. The rosettes at the intersections of the margins of the panels are the last to be put in place. In our issue for November, 1888, page 229, we presented somewhat at length a description of the method of constructing this style of ceiling which may be of interest in this connection.



*Novelties.—Fig. 19.—Perspective View of the Under Side of Kinnear's Paneled Ceiling, Showing Method of Suspension, Made by W. R. Kinnear & Co., Columbus, Ohio.*

### Indurated-Fiber Bath-Tub

There appears to be no limit to the uses to which indurated fiber is adapted. Among the latest applications of this valuable material are indurated bath-tubs, manufactured by the Oswego Indurated Fibre Company, Oswego, N. Y. The general appearance of the tub is shown in the illustration herewith. The manufacturers have been experimenting some years in this line, with the idea of producing an article which should embody as many desirable features as possible. The material of pure fiber is molded in one piece under heavy pressure, and is thus without joint or seam, even the rim being a part of the body, and leaving no crevice where dirt might collect. Mention is made of the fact that the fiber is a non-conductor of heat, and thus retains the warmth in the water longer than would be possible in metal; and, furthermore, it is adapted for electric baths. The material is the same as that used in other indurated fiber-ware. The outside of the tub, in baking, is given a mahogany or rosewood finish, unless specially made to correspond with the wood-work of the room, while the rim is finished as wood, or white enamel if desired. The inner surface of the tub is lined with imported white enamel specially prepared for this use, but the enamel may be tinted if preferred. It also is subjected to a high temperature and thoroughly baked into the tub, making, it is said, a hard, lasting, durable, impervious lining that can be cleaned without scouring. The manufacturers further direct attention to the low price of the tub. Fittings, including standards, wastes and overflow, are specially designed for the tub. As will be noticed, it is open and raised from the floor, so that it can be easily kept free from dirt. It is specially well adapted to country houses, since it only weighs 50 pounds and is easily portable and can be moved from room to room. The Western agent of these goods is G. W. Best, No. 45 Wabash avenue, Chicago, Ill., the agents for the New England States being Dalton & Ingersoll, No. 171 High street, Boston, Mass., while for New York City and vicinity the goods are handled by Henry Huber & Co., 81 Beekman street.

*Fig. 20.—Indurated-Fiber Bath-Tub.*

### Testing Roofing-Slate.

We take the following interesting account of some tests of the quality of roofing-slate from a recent issue of the *American Architect and Building News:*

The *Wiener Bauindustrie Zeitung*, one of the most useful technical journals which comes to our office table, contains some tests of the quality of roofing-slate which are new.

It seems that an important lawsuit against a contractor turned to some extent upon the quality of the slate used on the roofs of a row of houses, and an expert chemist was appointed by the court to examine the slate and give testimony concerning their quality and concerning the properties of roofing-slate in general, about which few architects or builders know much with certainty. The result of his investigations is well worth remembering by every one who has to do with roofing-slate.

He found that as a rule all slates contain fine lines, running parallel with what may be planes of secondary stratification or crystallization. By holding a roofing-slate a little below the eye and inclined from it these lines may be seen. If they run parallel with the long side of the slate this is properly cut, and if of good quality will keep its place in the roof. If the lines run across the slate or at an angle with its sides it is likely, whatever the quality, to break across or lose a corner at the least provocation. The hardness or specific gravity, contrary to the usual belief, gives no reliable indication of the quality of a slate. A better test consists in striking them together or tapping them with a hard substance. If they ring clearly under this treatment they are likely to be good, and a dull sound or percussion generally shows a poor slate.

The familiar experiment of setting the slates upright in a dish of water and noting how far the water ascends by capillary attraction in the substance of the slate is still one of the best tests that can be made. In a good slate the water should rise only slightly above the surrounding surface. A slate that draws up the water to a considerable hight should be avoided as likely to be destroyed by frosts and weathering.

Some slates, apparently hard and non-absorbent, decompose on exposure to the air by chemical action. These are best detected by placing samples in test-tubes and covering them with a saturated aqueous solution of sulphurous acid. A bad slate will always begin in a few days to crumble away, while a good sample will resist the action of the acid for weeks and even months.

If a portion of the slate to be examined, when powdered and covered with muriatic acid effervesces strongly, the presence of carbonate of lime will show, and the slate should not be used. If another sample which, powdered and strongly heated in a test-tube, gives off a yellow sublimate of sulphur, with a smell of sulphurous acid, the slate contains iron pyrites and will not be durable on a roof.

The reports of extensive forest fires in Montana, Oregon, and other wooded sections of the country again call public attention to the great need of some system of forest supervision. The timber areas of this country are being rapidly depleted, and yet there are no steps taken to prevent the destruction by fire of vast forests every year through the carelessness of hunters or by accidents. It is estimated that as much lumber is consumed every year by needless fires as is cut annually from all the forests in North America.

A company has been organized in London under Sir Edward Walker to build another Eiffel tower, this one to be 2000 feet high.

A new union railroad depot at Detroit will cost $1,000,000.

# TRADE NOTES.

The Cincinnati Corrugating Company, formerly of Cincinnati, have just occupied new quarters at Piqua, Ohio, where they enjoy additional facilities for turning out their line of specialties. The place is advantageously located on the Miami River, the Miami and Erie Canal, and at the junction of the Cincinnati, Hamilton and Dayton and Pennsylvania lines of railroads. It is about 80 miles north from Cincinnati, and has a population of 15,000. The company above referred to have an extensive plant, and are in a position to promptly handle all orders for iron and steel roofing with which they may be intrusted.

Charles A. Strelinger & Co., of Detroit, Mich., have ready for distribution an illustrated catalogue of their extra fine quality tools, for which they request applications. It consists of 200 pages, illustrated with 700 engravings.

F. W. Bird & Son, East Walpole, Mass., are directing the attention of the building trade to the Neponset water-proof paper. This is claimed to make a first-class roof-covering at one-quarter the cost of shingles, and if properly cared for will endure as long. Used as a siding it is said to present a very handsome appearance, and is not affected by heat, cold, snow or rain.

W. F. & John Barnes Company, No. 71 Ruby street, Rockford, Ill., advertise this month an assortment of foot-power machinery of special interest to contractors and builders. The machines include those for ripping, cross-cutting, scroll-sawing, mortising, forming edges, grooving, gaining, rabbeting, cutting dadoes and turning. Several letters from those who have used the machines made by this company are also presented, showing the satisfaction which they have given.

We have received from Murphy & Co., of Newark, Boston, Cleveland, St. Louis and Chicago, a number of neat little pamphlets relating to the subject of varnish. Among them we find "Varnish Secrets," Nos. 1, 2 and 3, "A Little Bit of a Tale of 50 Years," and "Good News." The title page of the latter bears the inscription, "Apparently the Last Step Taken in Finishing Varnish by Murphy & Co." These little volumes serve an admirable purpose for calling the attention of the trade to the firm's specialties, and we have no doubt they will be perused with interest by all into whose hands copies may come.

Samuel Cabot, of 70 Kilby street, Boston, Mass., calls attention to his brick preservative, which is claimed to prevent the white appearance on buildings so common to all constructed of brick. He requests applications for samples and circulars fully describing the merits of the article.

Goodell & Waters, Philadelphia, illustrate this month their No. 12 six-roll planer and matcher. It is especially recommended for job shops and for all estab ishmenes requiring a machine for surfacing, working flooring, ceilings and moldings. The machine is on exhibition at their Chicago and San Francisco warerooms.

The Howard Furnace Company, with office and salesrooms at 529 and 531 South Clinton street, Syracuse, N. Y., direct attention elsewhere in this issue to the Howard furnace, which possesses many features of interest. It is a combination heater employing warm air and hot water. It is well made and has established a record for economical and satisfactory operation.

In their advertisement this month the Hamsley Metal Roofing Company, 18 Cliff street, New York, direct the attention of the trade to the Hamsley Patent Metal Shingles, which they manufacture in a variety of designs.

Mr. M. T. Richardson, editor and publisher of the *Blacksmith and Wheelwright*, has just issued an interesting little volume, entitled, "Practical Blacksmithing." It consists of a collection of articles contributed at different times by skilled workmen to the columns of the *Blacksmith and Wheelwright*, and covers very nearly the whole range of blacksmithing from the simplest to the more complex forgings. Primitive tools and ancient blacksmithing are briefly considered, and plans of shops, chimney-building, forges and a description of a varied assortment of tools are presented. The work is profusely illustrated.

C. B. Putnam, of Marion, Iowa, has recently patented a wind-mill tower, using in its construction a frame-work of wrought-iron pipes held together by appropriate castings and adjusted by screws. The tower is of such a character as to be used for the mast supporting any wind-mill, although it is more particularly intended to supplement prior inventions of the same manufacturer.

The New York Central Iron Works, Geneva, N. Y., manufacturers of the well-known Dunning Heating Boiler, issue a new edition of their catalogue. In sending out the circular to the trade the proprietor, William B. Dunning, directs attention to the latest improvement, which is the portable boiler to be set without brick-work; also the new construction designed especially for soft coal and with a patent improvement of a direct draft. Mention is made of the fact that with these new hot-water boilers there is a large assortment to choose from. Passing on to the illustrated portion of the catalogue, we first notice cuts showing an exterior view of the Dunning Base-Burning Magazine Boiler, brick-set. The same is next shown as a surface-burner. Sections of the boiler are afterward illustrated, followed by cuts of the portable boiler, hot-water boiler and the new Dunning. The grates and parts of the boilers complete this part of the catalogue, at the end of which is a table of sizes, prices, &c. The next 75 pages of the pamphlet are taken up with testimonial letters and references. These are followed by illustrations, with descriptive tables, of power boilers and engines.

Among the more interesting exhibits in the American department of the Paris Exposition is the display of wood-working machinery made by J. A. Fay & Co., of Cincinnati, Ohio. The space occupied is 80 x 39 feet in size, and is covered by a heavy raised floor with a fine office in the center. In the exhibit are 26 machines of late design, some of which are said to be entirely new to the trade of Europe. The whole display is in charge of W. H. Doane, president of the company, and a corps of assistants that accompanied him from this side.

H. J. Smith, proprietor of the Keystone Stained Glass Works, Philadelphia, reports a large business at this season, not only in stained glass, but in clear glass, worked up in artistic shapes. Among recent orders is a large one from Tacoma, Wash. Ter., and another from Santa Fé, New Mexico.

In our notice last month of the little work on steam and hot water heating, issued by the Herendeen Mfg. Company, of Geneva, N. Y., the intelligent (?) compositor made a slight error in regard to the name of the company. It was printed Henderson Mfg. Company when it should have been Herendeen Mfg. Company.

We have received from L S. Starrett, Athol, Mass., an interesting little pamphlet of 36 pages, illustrating and describing the line of fine tools for mechanics manufactured by him. The line embraces a great variety of small tools, which are well made and calculated to give satisfaction, including calipers, bevels, dividers, gauges, hack-saws, leveling instruments, micrometers, rules, squares, straight-edges, trammels, &c. The work is neatly printed in tinted ink and is gotten up in a form calculated to invite inspection.

The Pike Mfg. Company, Pike Station, N. H., are offering the trade an oil-stone for which they are making many claims. It is said to be very satisfactory for general use, cuts away steel rapidly, sets a keen, smooth edge and will not glaze.

Elsewhere in our issue this month the Prescott Hardware Mfg. Company, of 108 to 110 Randolph street, Chicago, call attention to the Prescott hangers, adapted for use in connection with parlor and barn doors. No tracks nor rollers are used, the hanger working in a pocket at one side of the door out of sight. It is applied after the plastering is done. It is stated that the almost total absence of friction makes the largest doors run with the greatest ease.

F. P. Burcaw & Co, Hazleton, Pa., call attention in their advertisement this month to their Concave and Convex Interlocked Weather Strips, which are claimed to give very satisfactory results in operation. These strips are of interest to carpenters and builders, and we understand that State and county rights can be secured at very reasonable figures.

A windmill tower made entirely of metal, the sections being pipes and rods ingeniously joined, is the subject of a patent recently granted to Gorge Wallenbeck, of Ithaca, N. Y. The construction shown is light, graceful and withal well adapted to the purpose in view.

We have received from M. S. Huey & Son, Indianapolis, Ind., an attractive catalogue, showing numerous illustrations of wood mantels which this firm are manufacturing. The designs are neat and attractive, some of them being especially rich in their general effect. We also find designs of majolica tiles for mantel facings, &c., which the firm are ready to furnish in a variety of colored enamels. In addition to manufacturing wood mantels and cabinets, the firm deal in grates and brass fittings, and tile for hotel floors, vestibules, facings, &c.

Erskine W. Fisher, of No. 18 Broadway, New York City, has issued a circular to the building trades calling attention to the merits of Portland cement. The statement is made that the demand for a superior quality of material of this kind is becoming so great that Mr. Fisher has found it necessary to supplement his Stettin Anchor brand with another which he can equally recommend. He has completed arrangements for the entire control for the United States and Canada of the celebrated Sphinx Portland cement, manufactured at Boulogne, France. The circular referred to also presents a number of tests showing the strength of the cement handled by him.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.

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## NOTES AND COMMENTS.

IN OUR PAGES this month will be found a variety of most interesting and valuable matter. Two house designs will command the attention of those who look to our pages for suggestions concerning the structures which they put up. Another chapter on masonry takes the learner into some of the most difficult problems encountered in stone-cutting. Our plate pages contain some designs of Swiss furniture and two views of an English cottage, both of which are appropriate subjects for careful study. A host of correspondents discuss different matters, ranging from the proper framing of wooden buildings to the shaping of hand-rails in stair-building. In novelties we show machines and tools in considerable variety, and also present some porch designs which cannot fail to please.

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EVERY ONE who travels over the country at the present time and uses his eyes must be impressed by the amount of building work that is in progress almost everywhere. Indeed, the wide distribution of building activity the present year is a matter of comment upon the part of people generally, and yet there is no occasion to talk about a building boom. The building business has been fairly good almost everywhere. In only a few places has it been dull, while in a number it has been unusually brisk. Numerous dwellings have been put up, factories have been built, additions have been made to both houses and business structures, and repairs in all kinds of buildings have been thoroughly sustained. A few very large buildings have gone up in the more important towns and cities, but activity for the most part has been in the way of unpretentious and moderate-priced structures. Such a year of building is in all respects the best for the trade and in the long run is the most advantageous for the country. There is no reaction from such activity, whereas a boom, so called, is almost always succeeded by a practical cessation of operations.

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THE PROSPECTS for the building business at the present time for another year are excellent. The crop conditions of the country are quite favorable, financial affairs are in such a shape as to encourage building and the general distribution of wealth is such that more dwellings are likely to be built in the near future than for some time past. We hear of occasional strikes and misunderstandings between employers and employees in the building trades, but, taken as a whole, labor conditions are also favorable to building enterprise. All this is a very cheerful outlook for those who are engaged in the building business as contractors, mechanics, &c., but it is no less favorable to those who are supplying building specialties, such as heaters, lighting appliances, electrical goods, &c.

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SPEAKING of the state of trade in the Eastern or manufacturing section of the country, the *Weekly Record* says: "The remarkable expansion of manufacturing capacity in all directions is one of the most gratifying features of the business situation at the present time. All lines, including cotton mills, machine-shops, shoe factories, bridge-builders, ship-builders, car-builders, &c., are reported as having more work on hand and in sight than at any time for years. Several of the corporations of Lewiston, Maine, one of the largest centers of cotton-manufacturing in New England, held their annual meetings last week and reported all the mills to be in a prosperous condition. The various companies have made extensive improvements in the way of new buildings, machinery, &c., and more are contemplated. As to manufacturing and business in the South, the *Manufacturers' Record* reports the best prospects ever known for industrial activity. The increase in the value of Southern crops over 1888 will be upward of $125,000,000, though last year's crops were the largest on record up to that time. In the last three and a half years more than 11,000 new industrial enterprises have been organized in the South, covering every line of manufacturing, and over 8000 miles of railroad have been built." All this means demands upon the builders and mechanics of the country.

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IN CONVERSATION with a member of a large supply firm a few days since the editor asked some questions about the grade of dwellings being erected at the present time, so far as is indicated by the demand for certain specialties. The questions had reference to heating apparatus more particularly. Do more buildings of a cheap grade employ improved heating apparatus at the present time than formerly? The answer indicated that whereas a few years since it was considered useless to send a circular relating to steam-heating apparatus, for example, to any save such as were building houses somewhat expensive in character, at the present time it is found to pay to send to people who are building comparatively cheap houses. This is an interesting feature of the present activity and has been repeatedly brought to our notice of late. Dwellings of a grade so cheap that formerly they were put up as mere shells without conveniences are at present supplied with steam or hot-water systems for heating. They also have plumbing fixtures and water-supply, electric bells, attractive mantels and gas-fixtures. Both the conveniences and luxuries of life are every day coming into the reach of a larger number, and it is to be remarked that while fewer buildings of the better class are going up this year than usual, the trade in such building specialties as plumbing, heating, electric and lighting supplies is fully kept up by the new demand in cheap buildings and is on this account perhaps larger than ever before.

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JUST AT PRESENT there is a lively controversy in progress between the newspapers of the East and the West concerning the location of the World's Fair which it is proposed to hold in this country in 1892 in honor of the voyage of Columbus. Shall the fair be held in Chicago or New York or shall it go to Washington, the capital of the country? New York has claims for the honor not to be gainsaid, and Chicago is very actively interesting herself in the scheme and showing vigorous enterprise in a most practical way. In New York long discussions have taken place as to a site. The Financial Committee appointed by the Mayor some time since have done nothing pending the selection of a site, and now that a site has been nominated they seem reluctant to make known their scheme for raising the necessary funds. Of course the ultimate decision of where the fair is to be held will depend upon the action of Congress, but that city which makes the best showing of claims to the honor by preliminary work actually performed is likely to have the advantage before that body. Naturally we are specially interested in New York, but we recognize the fact that Chicago is in many respects more nearly a typical American city than the metropolis. In any event we wish the fair the greatest measure of success, and have faith to believe that whether it is held East or West it will exert an important and salutary influence upon the industries of the country. It is evident that it will promote the building business, at least locally if not in general. In addition to the large contracts involved in the structure to be erected for exhibition purposes there will be many smaller buildings. There will be the buildings of the different States and countries that are represented, and last, but not least, there will be the necessary provision for housing the multitudes that may be expected to attend the fair.

WE MIGHT CONTINUE this train of thought and refer to some of the special structures that are likely to characterize the event—a very high tower, for example; but upon this point we are in full sympathy with remarks printed in the *Iron Age* of recent date as follows : "Whatever decision may ultimately be reached on the question in which of our greatest cities the World's Fair of 1892 is to be located, some considerations deserve attention during the early stages of the work to be done. We observe an unfortunate tendency against which a vigorous protest should be entered. The ideal which seems to be before the majority of our people is that whatever we do we must eclipse everything in size. The plan seems to be to cover more acres of ground with larger buildings, and above all, to build a tower anywhere from 300 to 1000 feet higher than that of Eiffel. This latter ambition appears to us to border on childishness, and its only possible justification can be that in Europe everybody expects us to do that very thing. What made the Eiffel Tower famous was the originality of the conception and the boldness of the execution. To clap on a few hundred feet is certainly not original and cannot be considered daring. A 1500-foot tower in New York or Chicago or Washington would be a lasting monument of our powers of imitation and our love of boasting. Its novelty is the chief claim of the Eiffel Tower to admiration and attention. American genius, skill and daring ought to be able to discover some worthier object. If we want to outdo the Parisians let us undertake something original, grand and above all useful. It is well to humor Mr. Eiffel's friends and accept without discussion their laborious explanations of the utility of his great monument to science, military art, &c., but those who are frank about it will acknowledge that the Eiffel Tower is a splendidly-successful advertisement of the Paris Exposition —nothing more. Its efficacy in that capacity has been exhausted, especially when what we want is something to attract Europeans, to whom it has lost the charm of novelty. Our own people can be expected to come to the World's Fair in great numbers, even without a 1500-foot monument."

THE SAME writer adds other good advice as follows: "Another widespread idea is that a 'big' acreage is a first consideration. Any one who has wandered about in the wilderness of second and third rate exhibits of any of the great world's fairs must have been convinced of the necessity of contracting rather than expanding these shows. There is no good reason why a dozen concerns who are rivals in making ugly and poor hats should be given the privilege to inflict hundreds of square feet of them upon an indifferent and tired public. In a good many industries collective exhibits carefully chosen should be insisted upon. Every legitimate effort should be made to keep the size of such a show within reasonable bounds. The simple fact that some person is willing to spend a good deal of money to show what nobody cares to see ought not to be a sufficient justification to swell an unwieldy mass of articles. Until now a few thousand exhibitors have been allowed to largely defeat the objects of millions of visitors. It is to be hoped that, so far at least as the American section is concerned, a reform will be made in this direction in 1892."

## THE PLATES.

In Plate XXXVII we show miscellaneous details of a house designed by Frank M. Snyder, of Chicago, the elevations, &c., of which are on pages 203 and 204. The plate is a photo-reproduction of the author's drawings, the only change being in the figures representing the scales, which are made to correspond to the reduced drawings.

In our double-page plate we show a number of designs of German and Swiss furniture taken from a work illustrating the "History of Furniture," by Lambert and Stahl and published by Julius Hoffmann, of Stuttgart. The work includes specimens of all styles of furniture, such as Egyptian, Pompeian, Greek and Roman, as well as Mediæval and Renaissance work. The sheets of the book are of small folio size, our double-page plate representing the subjects of five plates reduced to about one-half scale. These are from line drawings, but many of the illustrations have monochrome tints over them, introduced presumably to enhance their solidity and effect, while others, to render the information more graphic, are delicately printed in colors. Referring now to the design in the plate, the Swiss buffet belongs to Herr Hunsiker, a painter in Sienna. It was found by him in the kitchen of the Schloss Rallingen, the ancient property of the Republic of Berne, on the Lake de Thun. The owner says it is an original specimen of the cabinet-maker's art of the fifteenth century. It is executed in deal, simply constructed, with shaped dresser-like sides and carved on the faces of the framing and panels to the doors with ornament crisply cut out of the thickness of the stuff. The central lower drawing, wherein the young lady is seated on a settle, represents some old Gothic German furniture. This bench and the richly-carved fronted chest are in the National Museum at Munich, while the armoire in the corner of the sketch belongs to the Imperial Collection at Vienna. The Swiss writing-table, or *secrétaire Gothique*, of fifteenth-century date, is now to be seen in the Museum at Bâle, and originally was used in the Augustinian cloisters there. The decorations are in white, red and blue. Its construction, like many other Mediæval tables, is designed on the trestle principle, the solid upright standard ends being braced together by a rail running through and clipped by wedges. The table-top is hinged so that when the cover is closed the writing materials are shut in out of the dust and harm's way. The German furniture shown to the left of the last-named specimen is some years later in style, and though somewhat Gothic in general idea, is elaborated with Renaissance ornamentations and details very prettily conceived. The table comes from Munich Museum, and the roll-chest on sideboard, which bears the date 1539, is now at Bâle. It contains in one of the panels a portrait of Erasmus of Rotterdam. The little cabinet, or coffer, on the top behind the helmet is of the same date. The German buffet, in the lower right-hand corner of the double-page plate, is a typical specimen of the later Renaissance, inlaid with dark woods. The forms used are more architectural than the last, and masonry forms are imitated in its elaboration; as, for instance, the arched niche accommodating the lavatory for washing the fingers after meals.

The favor with which English cottages are at present regarded by architects and builders in this country, and the fact that similar structures are gradually coming into demand here, lends interest to the double cottage, of which we show two views in plate XL. One view shows the front of the cottage, while the lower cut presents a view at the rear. The building is known as the Grange, and is located at Crawley Down, Sussex, England. Each cottage contains on the ground-floor a living-room, 13 feet x 11 feet 6 inches; scullery, 11 feet 6 inches by 6 feet 9 inches; also pantry and closet and a shed behind for fuel, with water-closet attached. On the first floor there are three bedrooms, the front one in each case having space for two beds. The outside walls are hollow, 15½ inches thick, the outer portion being 4½ inches and the inner portion 9 inches thick, connected with galvanized-iron ties. The brick are Rowfant red hand-made kiln bricks, and the roof is covered with St. John's hand-made tiles. The work has been executed in a substantial and very satisfactory manner by Mr. Samuel Webber, of Crawley Down, from plans prepared by T. MacLaren, architect, of Great Queen street, Westminster.

### Woven-Wire Roofing.

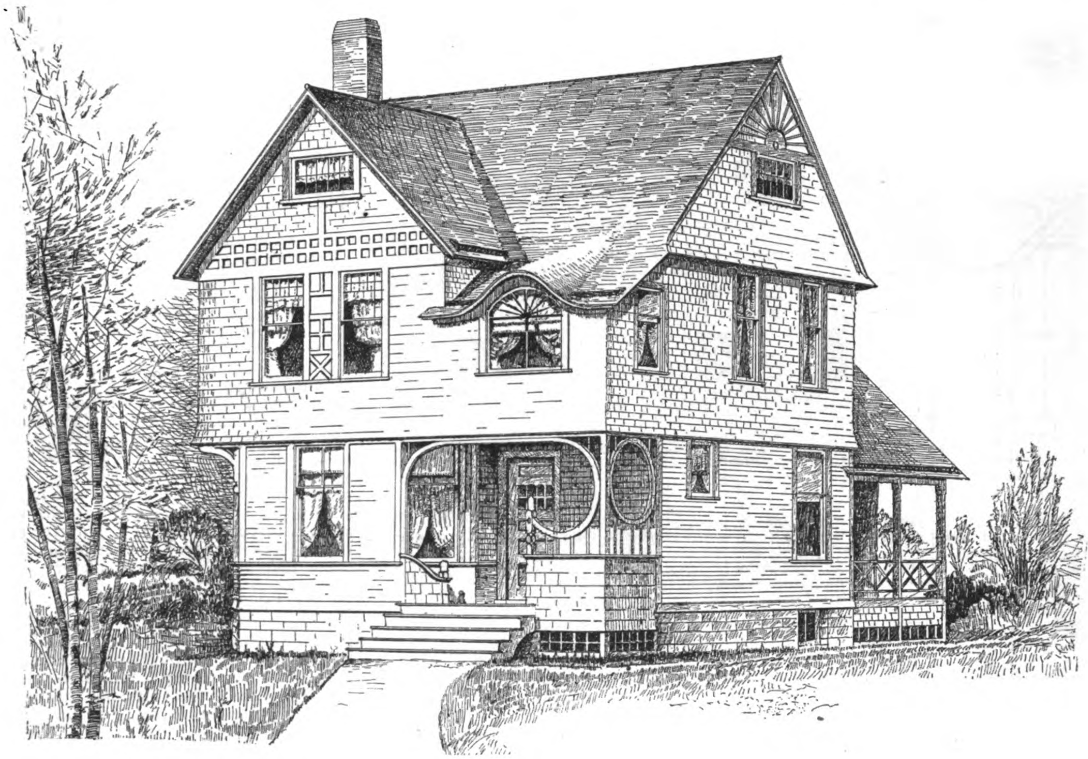
We have ere this, says an English contemporary, expressed ourselves favorably upon wire-wove roofing, which has now been for some years before the public as a substitute for glass roofing and many other purposes. Its application on a large scale has been most successfully accomplished at the Royal Aquarium, Westminster, the directors of which substituted this transparent wire-wove roofing for glass in the enormous roof of the aquarium, which has been constructed out of this material at an expense of £1700. The great advantages of the new material are obvious, as the glass roof always caused great trouble and expense for repairs, while unable to prevent the rain from coming in, apart from the danger to visitors to the building from the falling of panes.

For those unacquainted with the material we may state that it is extremely pliant, and may be bent backward and forward like leather, and be subjected to very considerable tensile strain with impunity. It is almost as translucent as glass, and is of a pleasing amber color, varying in shade from very light golden to pale brown. The basis of the material is a web of fine iron wire, with warp and weft threads about $\frac{1}{12}$ inch apart. This is inclosed, like a fly in amber, in a sheet of translucent varnish, of which the base is linseed oil. There is no resin or gum in the varnish, and once it has become dry it will stand heat and damp without suffering any change, neither hardening nor becoming sticky. The manufacture is carried out by repeatedly dipping the sheets edgewise into tanks of varnish and then allowing the coating which they thus receive to dry in a warm atmosphere.

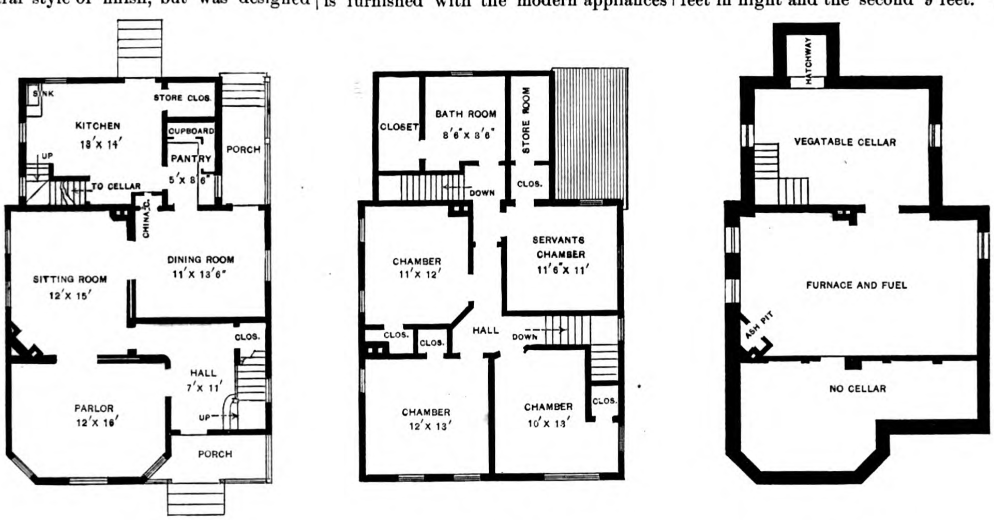
The large size of the sheets, 10 x 4 feet, renders the joints very few, and these can be made absolutely tight by the use of varnish between the overlapping edges. No glazier is required to apply the material; it can be cut by a pair of strong scissors and be nailed in place by any ordinary workman. The frames to carry it may be extremely light and their construction of the simplest. Curved surfaces can be glazed as easily as flat, and if a great amount of light be required the entire roofing may be made of this material. The sun's heat gets through with difficulty, so that no awnings are needed, which is a great advantage in winter gardens and places of that description. The material is being used by the Admiralty and the War Office and in many other places. Its successful application for roofing the aquarium is likely to spread its fame, greatly to the advantage of the Transparent Wire Wove Roofing Company, Limited, of 184 Queen Victoria street, E. C. The inventor of the wire-wove roofing and of the company's new material carboline is Mr. Ford.

### Design for an Eight-Room House.

We take pleasure in laying before our readers this month an attractive design for an eight-room house, of which David S. Hopkins, of Grand Rapids, Mich., is the author. The house is of such a character that it may be more or less expensive according to the location and general style of finish, but was designed by the author as a residence of very moderate cost. On the first floor are four rooms, consisting of kitchen, dining-room, sitting-room and parlor, while upon the second floor are four sleeping-rooms, two large store-rooms and a bath-room. Entrance is gained by means of a porch and a large hall from which the two front rooms open. The passage from the kitchen to the dining-room is through a pantry 5 x 8½ feet in size, and provided with ample shelving and large cupboard. The kitchen is furnished with the modern appliances and has opening from it a room designed as a store closet. From the kitchen the cellar may be reached by means of stairs, and also the second floor, thus avoiding the necessity of passing through the dining and sitting rooms to the front stairs in case it is desired to reach the sleeping-rooms. On the second floor the sleeping-rooms, with the exception of the servant's room, are provided with ample closets fitted with hooks and shelves. The bath-room is at the rear of the house and is 8½ feet square. The first story is 9½ feet in hight and the second 9 feet. The house is of frame, of the balloon style. The sitting-room is provided with a neat wood mantel, tile hearth and open grate.



*Design for an Eight-Room House.—Perspective View.—David S. Hopkins, Architect, Grand Rapids, Mich.*

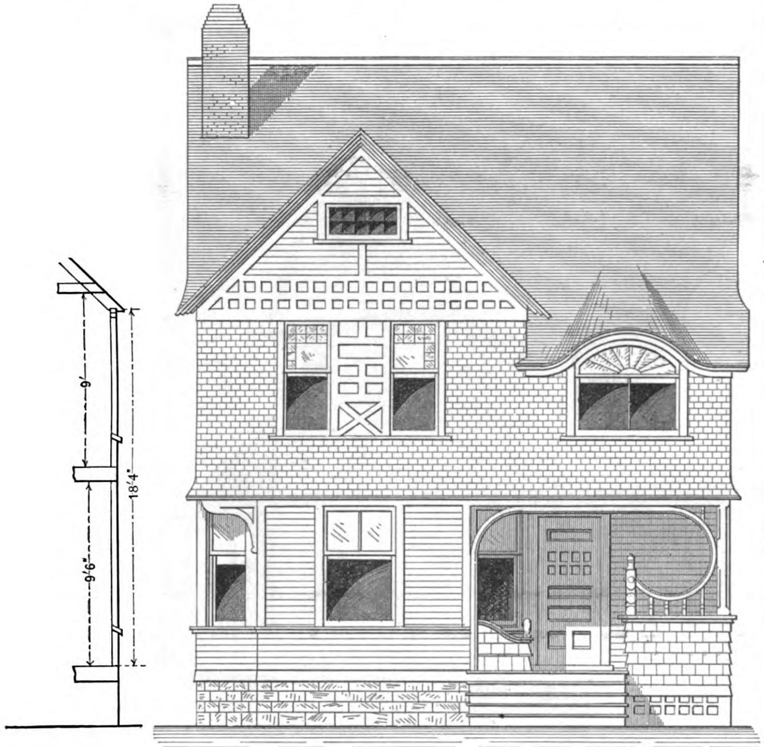



First Floor. Second Floor. Foundation.

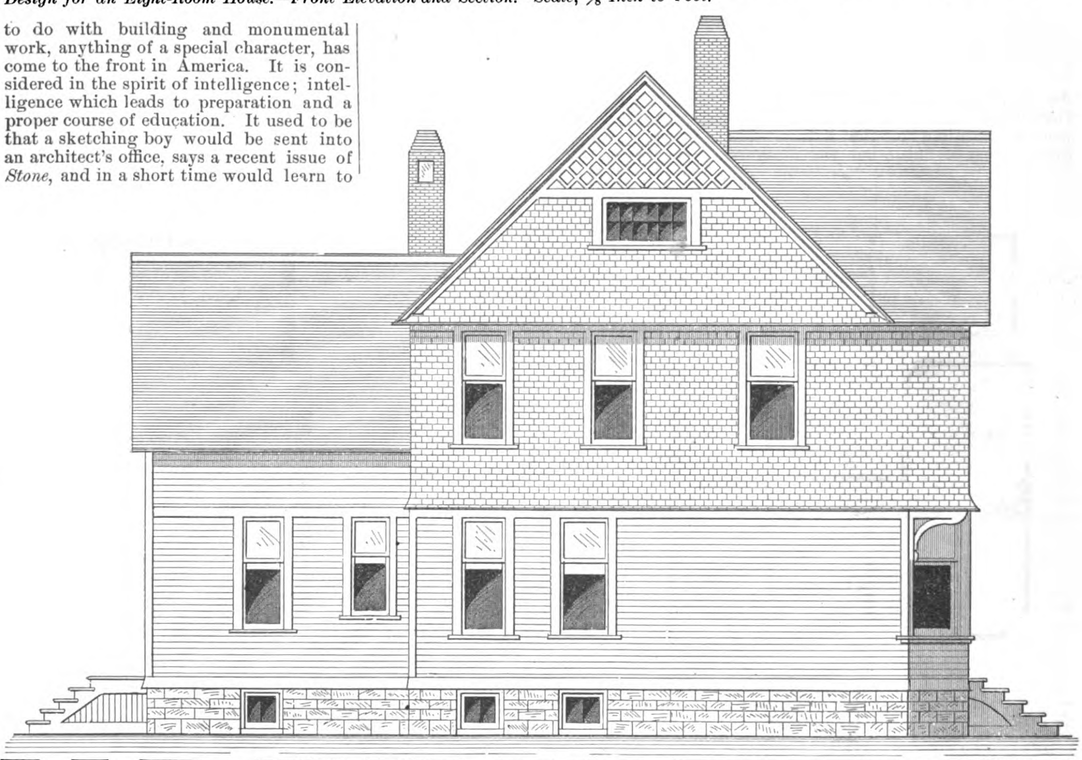
*Floor Plans.—Scale, 1-16 Inch to the Foot.*

### Architectural Education.

Design in the sense of detail as to molding and carving, all that design which has to do with building and monumental work, anything of a special character, has come to the front in America. It is considered in the spirit of intelligence; intelligence which leads to preparation and a proper course of education. It used to be that a sketching boy would be sent into an architect's office, says a recent issue of *Stone*, and in a short time would learn to be an architect; or that he would go into some local school of design, draw a little, do a little modeling and then go into a stone-yard or a monumental shop, serve some sort of an apprenticeship, and because he could spread himself over paper, assume the airs and graces which did not belong to him. This sort of thing was true of architectural and monumental work during past years, but the time has now come through the force of education and preparation for an artistic career in architectural and monument matters which is bringing out a different state of things. It is apparent that those who have had the best preparation in this direction are compelling others less fortunate and with less foresight to stay in the background. The encouragement which has been given education is such as will lead to further and more complete education in architectural and monumental matters and, in the end, to better results as applied to American design.




*Design for an Eight-Room House.—Front Elevation and Section.—Scale, ⅛ Inch to Foot.*

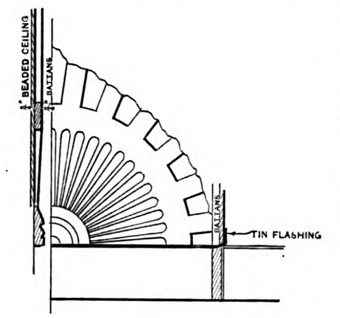


*Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.*

## NEW PUBLICATIONS.

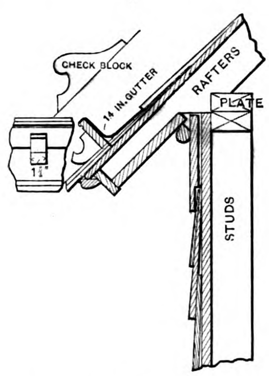
GRAPHICS, OR THE ART OF CALCULATION BY DRAWING LINES APPLIED ESPECIALLY TO MECHANICAL ENGINEERING. By Robert H. Smith, Mason College, Birmingham. Part I, 257 pages, 6 x 9. Bound in cloth, accompanied by an atlas of diagrams. XXIX Plates, 11 x 13 inches, bound in cloth. Longmans, Green & Co. 1889.

This work, which is quite ingenious in various features, will not enable the student of practical mechanics to dispense with the use of other books treating of mechanics in the ordinary manner. If it did, this work might be entitled "Engineering Mechanics Developed Graphically." The work is intended to enable those who have a knowledge of elementary mechanics to advance that knowledge to any degree of thoroughness they may find useful, and to apply that knowledge to the every-day problems of engineering science without the aid of the more complicated portions of algebraic and trigonometrical mathematics or of the differential and integral calculus. As the author appropriately remarks, many have no taste or faculty for this latter sort of mathematics; others have not the time needed to keep themselves proficient in its use; and again, it is undeniably true that the solution of many a problem becomes practicable in point of time and ease by the graphic method which would be intolerably tedious and difficult without its aid. A comprehensive glossary of special terms and symbols is provided, which must be first learned before studying the book, and the application of these terms and symbols is fully explained. The author seeks



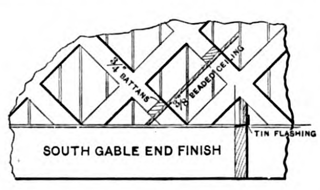

*Design for an Eight-Room House.—Finish of North Side Gable.—Scale, ¾ Inch to the Foot.*

to apply new graphic methods to the solution of the various problems which are met with in mechanical engineering, and takes the student along from the simplest problems in what he calls graph-arithmetic up to grapho-kinematics. The chapter head-



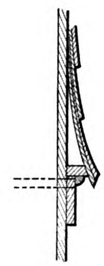

*Detail of Main Cornice.—Scale, ¾ Inch to the Foot.*

ings include the following: I. Instructions. II. Division of the Subject. III. Graph-arithmetic. IV. Graph-algebra. V. Graph-trigonometry and Mensuration. VI. Combined Multiplication and Summation; Moments of Parallel Vectors. VII. Vec-




*Finish of South Gable End.—Scale, ¾ Inch to the Foot.*

tor and Rotor Addition. VIII. Locor Addition and Moments of Locors and Rotors. IX. Kinematics of Mechanisms. X. Flat Static Structures, Frames or Linkages without Beam-Links. XI. Flat Static Structures containing Beam-Links. XII. Solid Static Structures. These various chapters are supplemented by a general index. The author proposes in Part II, which is to be issued at an early date, to

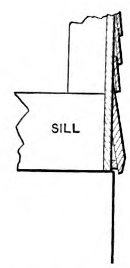


*Section of Shingle Spring Course Over First-Floor Window.—Scale, ¾ Inch to the Foot.*

deal with such subjects as "The Distribution of Stress and Strain;" "Strength, Stiffness and Design of Beams and of Struts;" "Economy of Weight in Structures;" "Stresses in Redundant Structures;" "Statics and Dynamics of Machines;" "Frictional Efficiency;" "Governors;" "Fly-Wheels;" "Valve-Gears," &c.

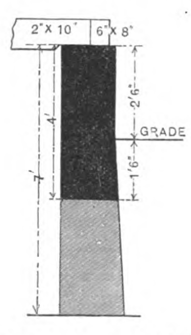
ARCHITECTURAL STUDIES. Part IX, City Houses. Thirteen plates. Published by Wm. T. Comstock. Price $1.

This little work consists of 13 plates of drawings, which with one exception were selected from the efforts submitted in




*Section of Water-Table.—Scale, ¾ Inch to the Foot.*

what is known as the building sketch club competition for city houses. The designs presented are the best of those submitted, and include the first and second prize studies, as well as two receiving "honorable mention." The conditions of

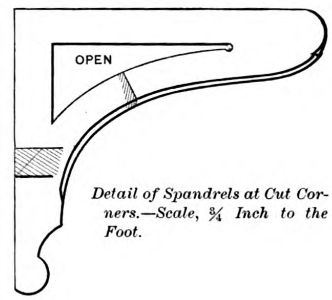



*Section of Foundation.—Scale, ¼ Inch to the Foot.*

the competition required the house to occupy a lot 20 x 100 feet, and to be used as the home of a professional *litterateur.* The drawings were contributed by architects from four States and the Dominion of Canada, the majority emanating, as might naturally be supposed, from the Empire State. The studies are varied and interesting, and present many features of value to those engaged in the building trades.

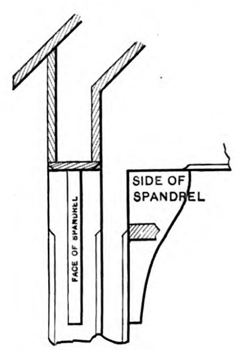
PRACTICAL BLACKSMITHING, Vol. I. Compiled and edited by M. T. Richardson. Size 5½ x 7½ inches. Published by M. T. Richardson. Price $1.

The literature relating to blacksmithing is of the most meager sort, and, in fact, before the work in question came to hand

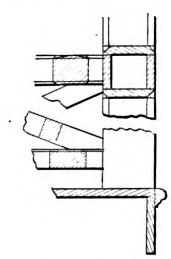



*Detail of Spandrels at Cut Corners.—Scale, ¾ Inch to the Foot.*

we do not recall having seen anything relating directly to it. The book which Mr. Richardson has brought out consists of a collection of articles contributed at different times by skilled workmen to the columns of the *Blacksmith and Wheelwright*, and covers nearly the whole range of blacksmith-work, from the simplest jobs to some of the most complex forgings. A book compiled from contributions of

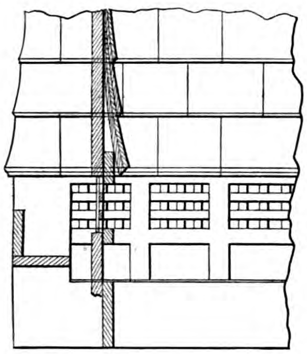



*Section of Rear Porch Lintel.—Scale, ¾ Inch to the Foot.*



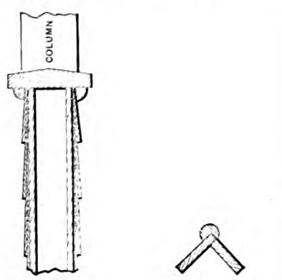
*Detail of Rear Porch Finish.—Scale, ¾ Inch to the Foot.*

this sort is specially valuable, for we know that the writers treat only of the subjects with which they are particularly familiar. Many blacksmiths are especially interested in some portion of their work, and it is this part that they would be most apt to write about. We thus have, as it were,



*Design for an Eight-Room House.—Finish Around Bottom of Front Porch.—Scale, ¾ Inch to the Foot.*

the best ideas selected from a number of different sources, and Mr. Richardson's experience in connection with the *Blacksmith and Wheelwright* has well fitted him

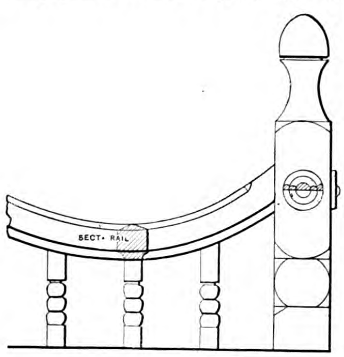



*Section of Porch Baluster Filling.—Scale, ¾ Inch to the Foot.* *Section of Ridge-Board.—Scale, ¾ Inch.*

for the work of editing the present volume. The book is neatly gotten up and is freely illustrated.

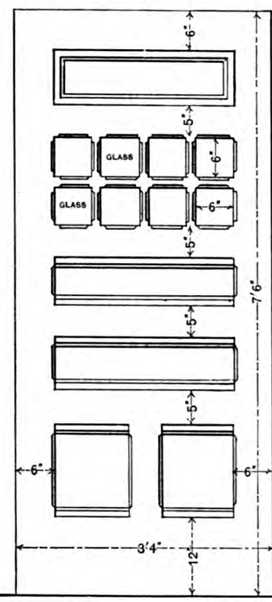
**Steam Boilers; Their Management and Working on Land and Sea.** By James Peattie. E. & F. N. Spon, London and New York.

The writer very sensibly leaves the history of the steam-boiler alone, and deals solely with the boiler as a production. He



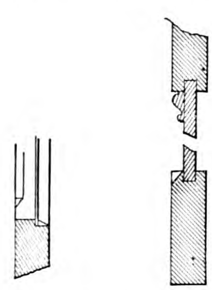

*Detail of Filling in Front Porch.—Scale, ¾ Inch to the Foot.*

divides boilers into three general kinds—namely, those externally heated, internally heated and both. The first part of the book considers the question of combustion, beginning with the combustion of coal, the gases produced and the temperatures and efficiency reached. This branch naturally includes the discussion of those losses due to the escape of a part of the heat of the coal before reaching the water in the boiler. The generation of steam and the questions affecting it next follow.




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

Then come various analyses of water and the influence on boilers by its chemical composition. The character of the scale deposited and the methods tending to relieve it are fully treated. The subject of latent heat is treated in a way which makes the meaning of the author extremely plain. The handling of the boiler from the admission of water and the starting of the fire is



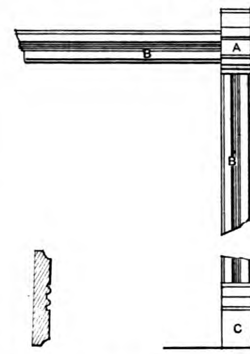
*Section at Glass. Section of Door-Panel. Scale, 1½ Inches to the Foot.*

treated in a practical way. The final pages of the book are devoted to explosions from gases and the safeguards used.

## English Farm-Houses.

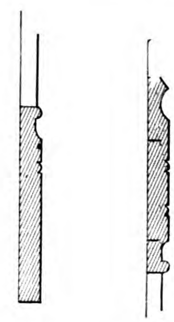
R. Jefferies, writing upon some phases of English architecture, draws the following contrast between city and suburban buildings:

The new towns or suburbs which spring up every year in the neighborhood of London are built upon much the same plan. Whole streets of houses present exact duplicates of each other, even to the number of steps up to the front door and the position of the scraper. In the country, where a new farm-house is erected about once in 20 years, the styles of architecture are as varied and as irregular as in



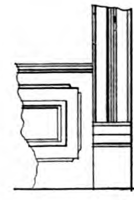

*Section of Architrave B.—Scale, 1½ Inches to the Foot.* *Detail of Trim, First Floor. — Scale, ½ Inch to the Foot.*

town they are prim and uniform. The great mass of farm-houses are old, and some are very picturesque. There was a farm-house I knew which was almost entitled to be taken as the type of an English rural homestead. It was built at a spot where the open wild down suddenly fell away into rich meadow-land. Here



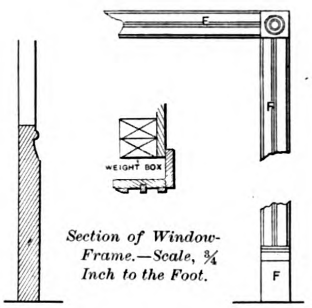
*Section Base-Block. Section Head-Block. Scale, 1½ Inches to the Foot.*

there was a narrow steep-sided valley or combe, and at the mouth of this, well sheltered on three sides from the north, the east and northeastern winds, stood the homestead. A spring arose some way behind, and close to the house widened into a pool, which was still further enlarged by means of a dam, forming a



*Detail of Panel Under Parlor Window.—Scale, ½ Inch to the Foot.*

small lake of the clearest water. This lake fed a mill-race lower down. The farm-yard and rick-barton were a little way up the narrow valley, on one side of which there was a rookery. The house itself was built in the pure Elizabethan style, with mullioned windows and innumerable gables roofed with tiles. Nor was it wanting in the traditions of the olden time. This fine old place was the homestead of a large farm comprising some of the best land of the district, both down and meadow. Another farm-house, still used for that purpose, stands upon the wildest part of the down and is built of flint and concrete. It was erected nearly 300 years ago and is of unusual size. The wood-work is all solid black oak, good enough for an earl's mansion. These are specimens of the highest class of farm-




*Section of Window-Frame.—Scale, ¾ Inch to the Foot.*

*Design for an Eight-Room House.*

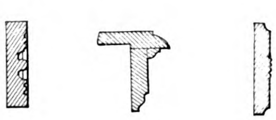
*Section of Base-Block. Scale, 1½ Inches to the Foot.* *Detail of Trim, Second Floor. — Scale, ½ Inch to the Foot.*

house. Immediately beneath them come the houses built in the early part of the present century. They vary in almost every architectural detail and the materials differ in each county, but the general arrangement is the same. They consist, as it were, of two distinct houses under one roof. The front is the dwelling-house proper, usually containing a kitchen, sitting-room and parlor. The back contains the wood-house (coal-house now), the brew-house—where the beer was brewed, which frequently also had an oven—and, most important of all, the dairy. All this part of the place is paved with stone flags, and the dairy is usually furnished with lattice-work in front of the windows, so that they can be left open to admit the cool air and not thieves.

## Effect of Time on Slacked Lime.

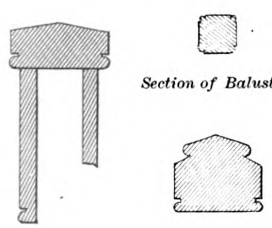
BY M. FARADAY.

Led by the statement that the keeping of the lime in a slacked condition for a couple of years is a great advantage to it, I took some specimens from the stores



*Sections of Turned Head-Block, Stool Finish and Architrave E.—Scale, 1½ Inches to the Foot.*

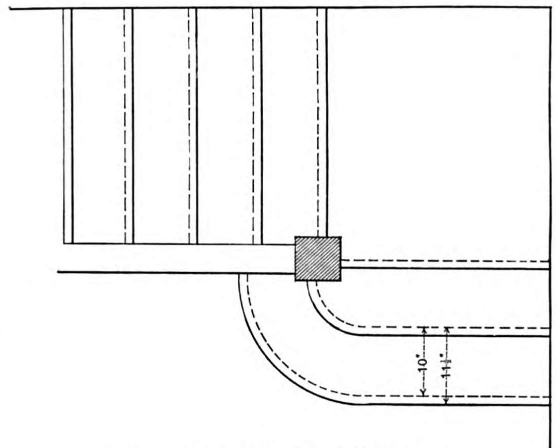
which have been so laid up at the Houses of Parliament for the purpose of examining them in this respect. It appears to me that this lime (which is in a state of paste) is in a very soft and smooth condition in comparison with what would probably be the condition of the lime recently slacked, a condition which seems to be due to its thorough disintegration as a mass and its separation particle from particle. On analyzing it I found that it contained a little carbonic acid, but not much, for in 100 parts of the dry substance there were but



*Section of Baluster.*

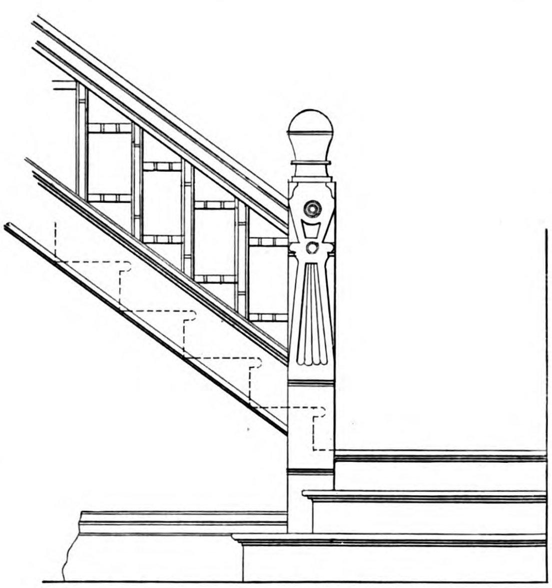
*Section of String. Section of Rail. Scale, 1½ Inches to the Foot.*

5¼ parts of carbonic acid; these 100 parts therefore would contain 88 parts of quick or uncarbonated lime and 12 parts of carbonated lime, which, considering the process of burning, carrying, slacking, &c., that it had to go through and the necessary time of exposure to air before it was




*Plan of Stairs.—Scale, ½ Inch to the Foot.*

laid up in store, is a very small proportion. I do not believe that the lime, which is more than 4 inches in from the exterior, has received any portion of carbonic acid during the two years of its inhumation. In respect to the effect of keeping lime for a time I am led to think, without, however, having formed any strong opinion on the subject, that the benefit is due to the fine texture which it gradually acquires, and as there is no doubt that if two surfaces were prepared, the one with fine sand and lime in particles comparatively coarse and the other with the same kind of sand and lime in particles comparatively far more perfectly divided, that these two would act very differently both as to the access of carbonic acid from the atmosphere and the transition of lime dissolved in the moisture of the mass from the interior toward the surface, so there is every reason to expect that there would be a difference in the degree of action upon the colors at that surface, and also in the time at which that action would come to a close.



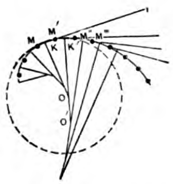
*Elevation of Stairs.—Scale, ½ Inch to the Foot.*

# MASONRY.

**Masonry and Stone-Cutting.**

*(Continued from page 132, July.)*

*Third System.*—The former are practical, but only approximately correct systems; the absolutely correct construction, where the joints are everywhere square, must be done as follows: Take a point $\pi$ (Fig. 66) on the bed-joint line G $\varepsilon$; the normal to the surface of the vault in that point will be $\pi\ \xi$ on plan drawn normal to the ellipse G $\varepsilon$, and on the elevation it will be projected on the ray O′ $\pi$ (Fig. 67), for in a surface of revolution as that of this vault all the normals




*Masonry and Stone-Cutting.—Fig. 68.—Showing Curve Drawn on a Plane.*

radiate from the axis. Next we have to find the point $\theta$ where the normal pierces the extrados of the vault, which is also a surface of revolution, but the axis of which is lower down in $O_2$. To do this we cut the extrados by a plane containing ray O′ $\pi'$, and perpendicular to the elevation; the section made by that plane will be an ellipse, the center $\omega$ of which is found by dropping from $O_2$ a perpendicular $O_2\,\omega'$ on the ray O′ $\pi'$. This ellipse is similar to the section made in the surface by a plane $O_2$ V′ parallel to the plane on the line $O_2\ \pi'$, and as the latter is a meridian ellipse of the surface identical to the springing-line of the extrados, with axes O $d$ and O $a$, we have only to join on plan V and $a$, and draw $\beta\ a$ parallel to it, by which we get the two axes of the section of extrados by the plane which contains the normal O′ $\pi'$ on elevation and $\pi\ \xi$ on plan. Then, by means of the axes found, we draw an ellipse or a portion thereof in the neighborhood of $\pi$; its intersection with the plan $\pi\ \xi$ of the normal will give the point $\theta$ required.

By applying the same method to a series of points, $\varepsilon$, $\lambda$, $\rho$, we get the intersection $\delta$, $\psi$, $\theta$, $\eta$ of the extrados by the surface of the bed-joint. This curve is not horizontal, but, as may be seen on elevation, it

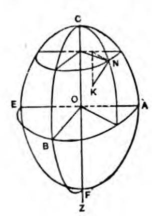



*Fig. 69.—An Ellipsoid.*

ascends from $\delta$ to $\gamma$. The bed-joint itself is a skew surface. The point $\gamma$ is found as follows: Revolve the meridian ellipse of the soffit, and bring thereby G to G″ (Fig. 66); draw G″ $\gamma''$ normal to the ellipse; $\gamma''$ is the point where the normal meets the section of the extrados by the same meridian plane; a section which is an ellipse, of which the horizontal axis is at level, $O_2$, and the vertical axis is equal to $O_2\,d'$. Turned down round O′, $O_2$ comes to O″ on plan, from which point draw axes equal to O $d$ and O $a$; then complete ellipse, the intersection of which with normal G″ is $\gamma''$. Rotate back $\gamma''$ and get $\gamma$ on plan and $\gamma'$ on elevation. All the bed-joints are obtained in the same way; the vertical joints will now cut the beds along straight lines, and not along hyperbolic curves as in the former constructions. The voussoir is then cut by preparing a prism as in Fig. 64, drawing thereon the vertical joints and the curves L′ P′ and M′ N′ as before. On the other hand, the curve $l'$ $p'$ is replaced by a raking curve which may be either drawn by means of a few points or by a development of the cylinder $\psi\,\theta$ (Fig. 66) on which it is drawn. The upper joint line $m'$ $n'$ will also be a raking curve, which may be obtained by cutting a narrow cylinder down to its level; but it is much more convenient to find the curve where the bed cuts the horizontal operation plane of the prism, and work from that as guiding line. The bed-joint is cut by means of a straight-edge placed on proper datum marks. The soffit and extrados are worked just as before.

*Elliptical Domes of Three Dimensions.*—In this case the springing-line is an ellipse, and the level of the crown is not at a hight above the springing-line equal to either the major or the minor axis of the ellipse of the springing. Thus in such a vault the cross-sections are both ellipses, as in Figs. 70, 71, 72. In arranging the joints of a vault we should aim at obtaining voussoirs the angles of which are all square, and the joints of which are ruled surfaces normal to the soffit of the vault. This can always be done by designing the jointing of the vault to follow the lines of curvature of its soffit. If (Fig. 68) we have a curve drawn on a plane and consider it as a broken line formed of straight pieces of equal length, the angle T M′ T″ comprised between the sides M M′ prolonged and M′ M″ measures the curvature of the curve in the point M′; the greater the angle T M′ T″ the sharper the curve; if the angle T M′ T″ be = O—in other words, if T M′ fall on T″ M′, then the curve would be flat at that point. We can also measure the curvature by the radius of the circle which would be tangent to both sides M M′ and M′ M″; this is called the osculating circle, from a Latin word which means kissing, because it touches the curve twice, whereas a tangent circle touches it only once. The radius of this circle is found in our figure by erecting perpendiculars, K O, K′ O, on the centers of the sides M M′ and M′ M″, but, of course, these sides being infinitely small, this is an operation which cannot be carried out in reality. As to the method of finding the radius of curvature and many other questions connected with our subject, I must refer the reader to the treatise of "Projective Geometry," by Cremona, published at Oxford, or what is still better, to the lectures on the subject given at University College and at the Guilds Institute.

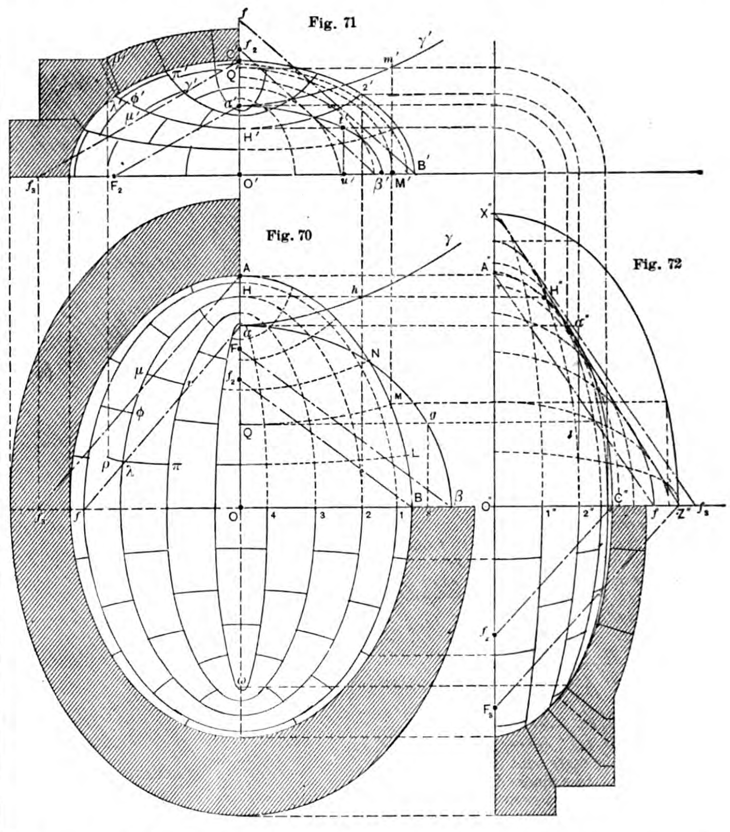



*Fig. 70.—Plan of Dome. Fig. 71.—Transverse Section of Dome. Fig. 72.—Longitudinal Section.*

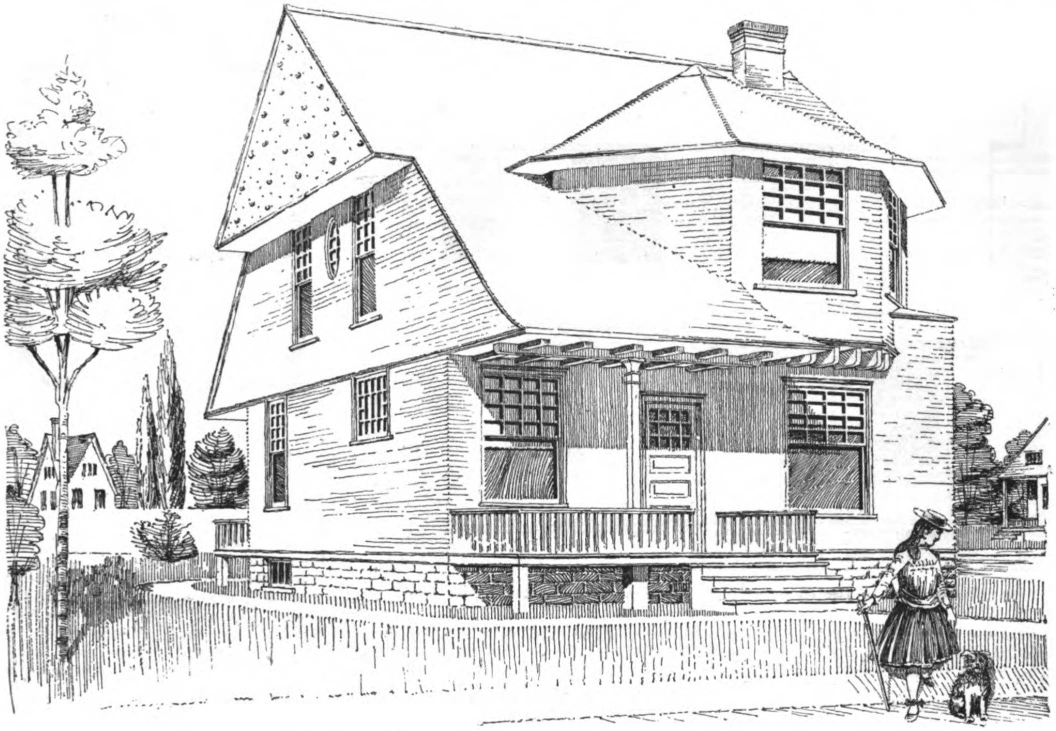
Now, if the curve considered, instead of being drawn on a plane, be drawn on a curved surface, it will have a double curvature, its own and that of the surface on which it is drawn. Suppose the curve in Fig. 68 be of double curvature or twisted: we can produce a plane through the two contiguous sides M M′, M′ M″; this is called the osculating plane to the curve in the point M′. In the point M″ the osculating plane would be a different plane from the former; it would contain the sides M′ M″, M″ M‴, and it would cut the former along the line M′M″. The angle comprised between these two osculating planes measures the camber or twist of the curve. As the osculating circles are contained in the osculating planes with twisted curves, the normals, such as K O, K′ O′ . . . drawn in the osculating planes, usually do not meet, but there are curves where each normal meets its neighbor, forming thereby a developable surface. This occurs for the lines of curvature of surfaces.

The surface of our elliptical dome is called an ellipsoid. In Fig. 69 let the ellipse C A F E be the narrowest section, and at right angles with this let the ellipse C B F be the widest section—that is, the half axis O B is taken larger than O A; then it is evident that at the apex C of the ellipsoid the curve of section E C A will be sharper than that of section F B C. If we take a series of sections of the ellipsoid by planes produced through its axis Z C, the curvature of these sections in the point C will be the sharpest with the section E C A and the flattest with the section F B C; the curvature of all the other sections will be comprised between these two limits. Now, if we erect in a point N a normal N K to the surface of the ellipsoid and produce through that normal a number of planes, among the sections of the ellipsoid by these planes one will show the greatest curvature in the point N, another the least, and, what is remarkable, these two planes will be at right angles. If in the direction of these planes we take on the ellipsoid points close to N, and again mark the directions of the greatest and least curvature, and then repeat the operation again and again with points contiguous to one another, we shall have drawn lines of curvature of the ellipsoid. These lines meet always at right angles, and hence are the best adapted for setting out the jointing of vaults, if absolute masonic perfection be required. How these lines are found depends on considerations belonging to the highest mathematics, and I must be content with pointing out the graphical constructions used without giving any reason for them.

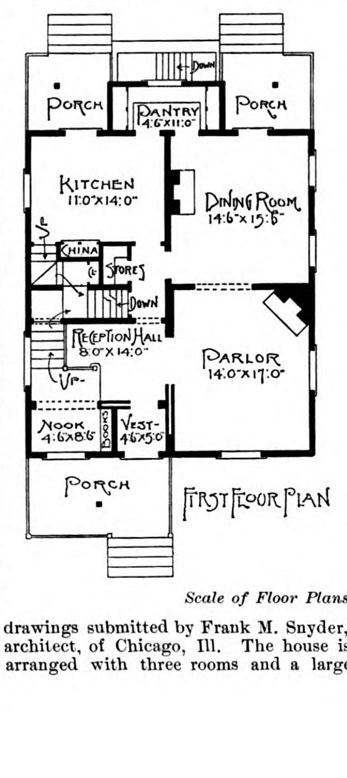
*(To be continued.)*

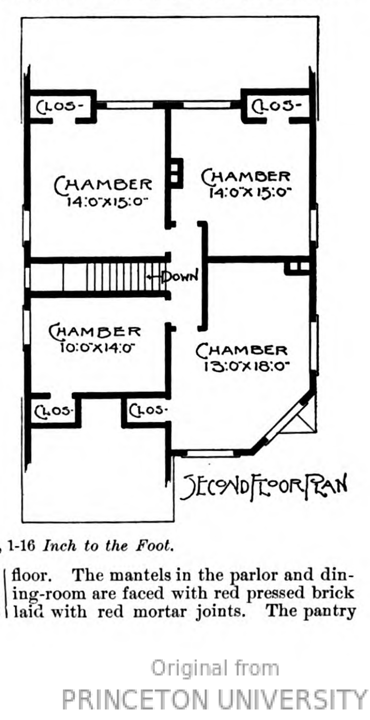
### Design for a Cheap House.

The perspective view, floor plans, elevations and miscellaneous details of a moderate-cost house shown on this and the following pages were reproduced from drawings submitted by Frank M. Snyder, architect, of Chicago, Ill. The house is arranged with three rooms and a large hall on the first floor and four sleeping-rooms upon the second floor. It will be noticed that the arrangement is convenient and the space well utilized. The hall, which is entered from the porch through a vestibule, is designed to be used as a reception-room. From it entrance is gained to the parlor and also the kitchen, which avoids the necessity of the servant passing through any room to reach the front door. The parlor and dining-room are separated by *portières* or folding-doors, or both, as may be desired. The main stairs rise from a central point and afford easy access to all the rooms on the second floor. The mantels in the parlor and dining-room are faced with red pressed brick laid with red mortar joints. The pantry



*Design for a Cheap House, by Frank M. Snyder, Architect, Chicago, Ill.—Perspective View.*




*Scale of Floor Plans, 1-16 Inch to the Foot.*

is fitted with cupboards, drawers and shelf with flour bin beneath, while the china closet is fitted with three drawers at the bottom and shelves with doors above.

*Design for a Cheap House.—Front Elevation.—Scale, ⅛ Inch to the Foot.*

From the author's specification we learn that the sills are to be 6 x 8 inches; girders, 8 x 8 inches; joists, 2 x 10 inches, 16 inches on centers; the ceiling joists, 2 x 6 inches, 24 inches on centers; rafters, 2 x 6 inches, 24 inches on centers, and studding 2 x 4 inches, 16 inches on centers, doubled at the corners and each side of doors and windows. The porch joists are to be 2 x 8 inches, 16 inches on centers, and plates 2 x 4 inches, doubled. The entire exterior is to be sheeted with ⅞-inch boards. The side walls above first-floor windows and roof are to be shingled, while below first-floor windows white pine siding is to be employed. The exterior is to be stained with Cabot's best creosote stain and then painted in the best possible manner. The front door, hard woodwork of stairs and mantel are to be filled with dark fiber, finished with two coats of hard oil varnish and rubbed to a dead finish.

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

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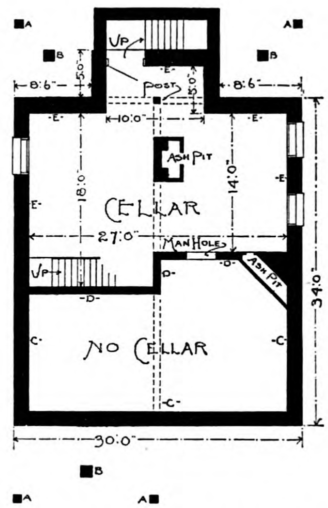
SOME OF THE Western papers have recently published an article describing the singular phenomenon of trees growing on the court-house tower at Greensburg, Ind.,



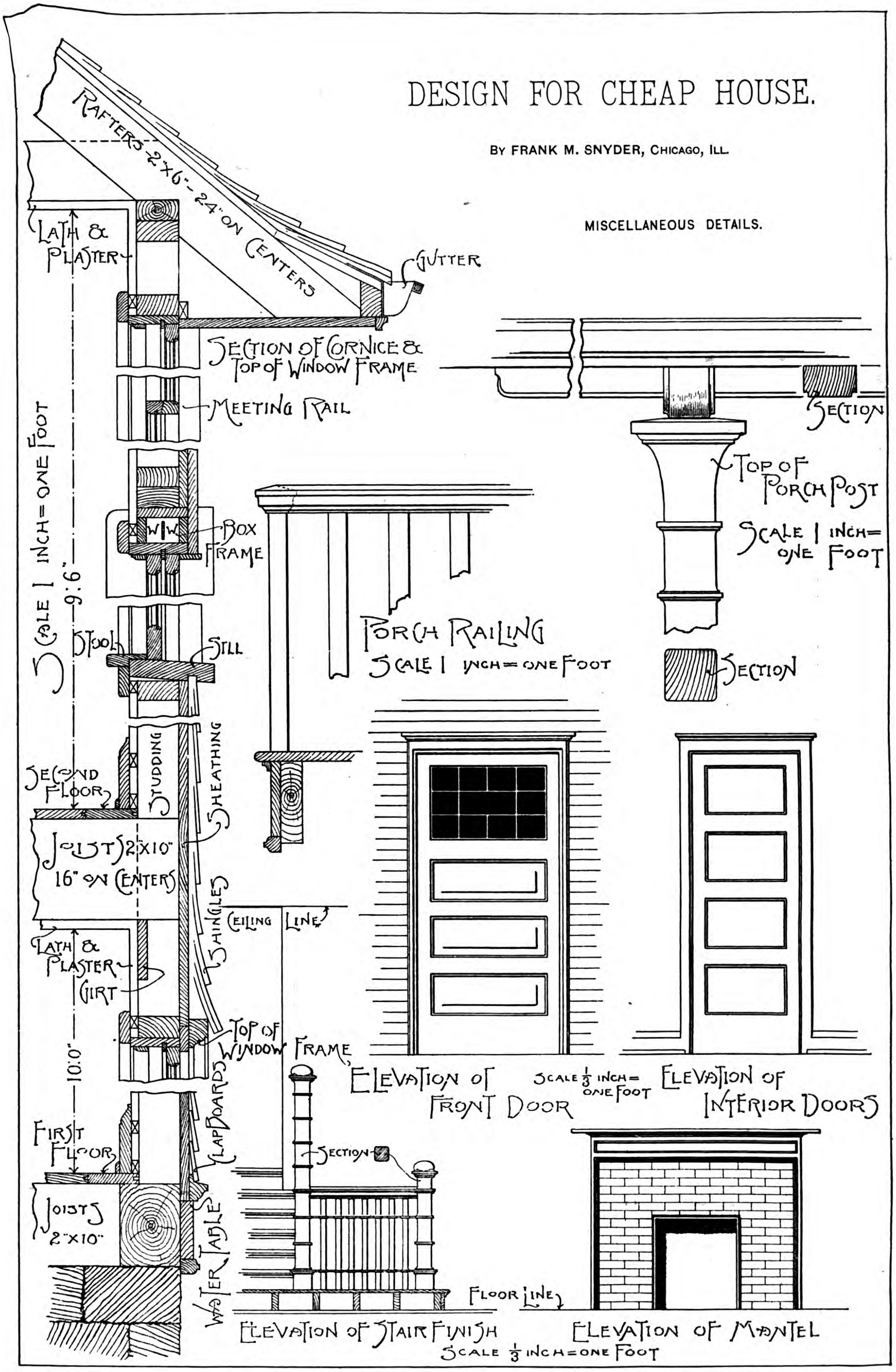

*Foundation Plan.—Scale, 1-16 Inch to Foot.*

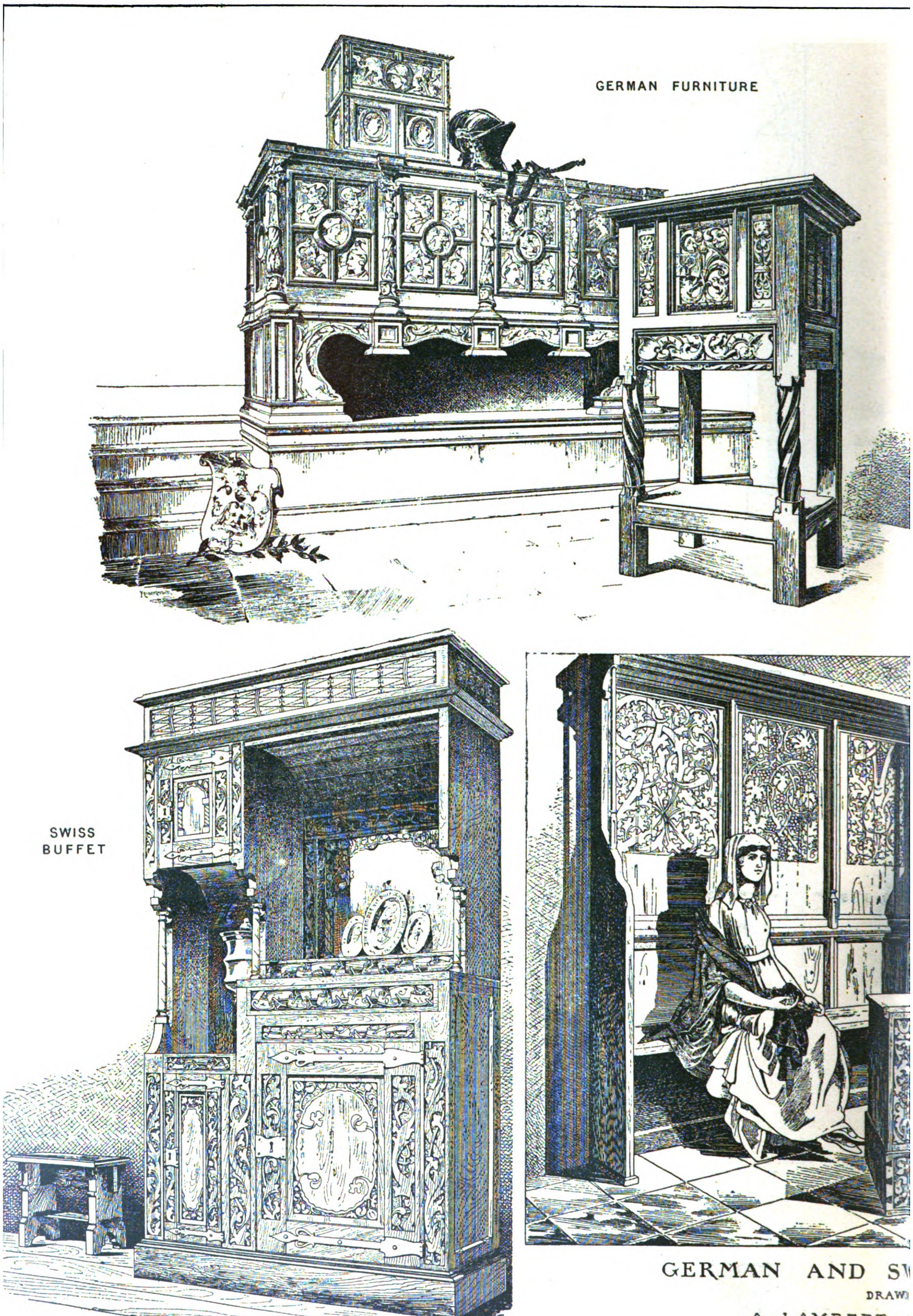
and the attention which has been given to the matter has incited the inhabitants of other places to look about for the purpose of discovering similar elevated forests in order not to be behind the Indiana town. The latest report comes from Biddeford, Maine, where there are two young trees growing out of the masonry of the French Catholic Church steeple in that place. Competent judges estimate that the tree upon the south side of the steeple is fully 8 feet in hight, while the other is about 6 feet. Both are green and healthy.

# DESIGN FOR CHEAP HOUSE.

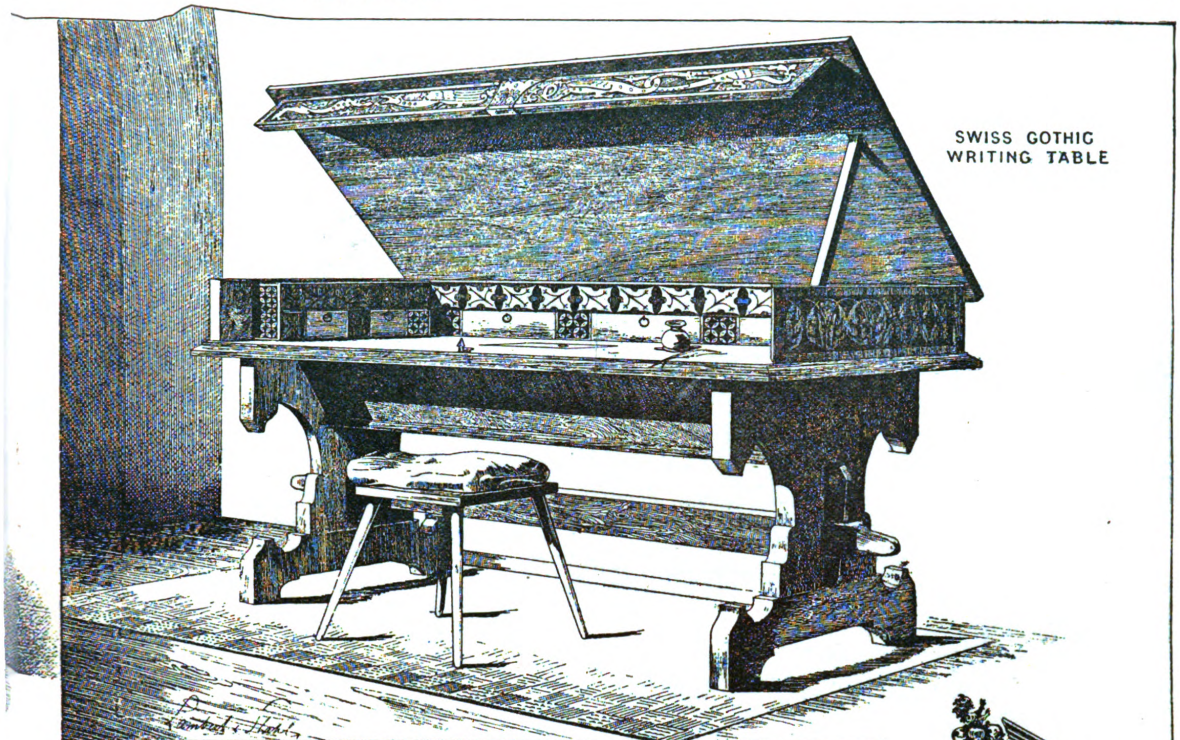
BY FRANK M. SNYDER, CHICAGO, ILL.

MISCELLANEOUS DETAILS.

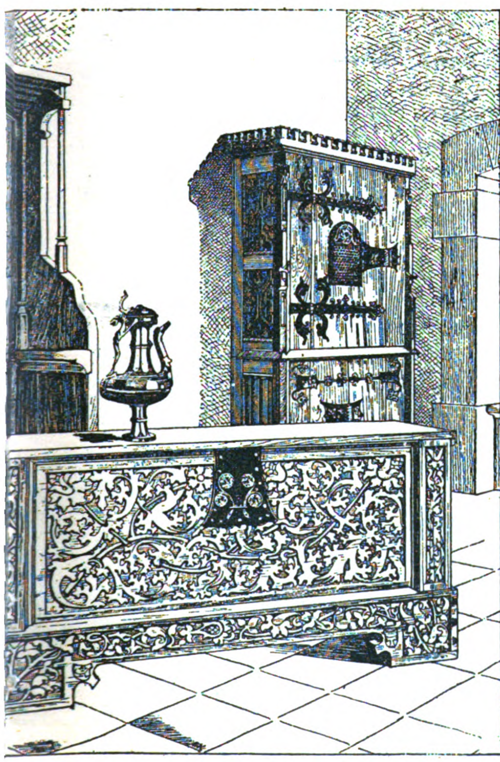


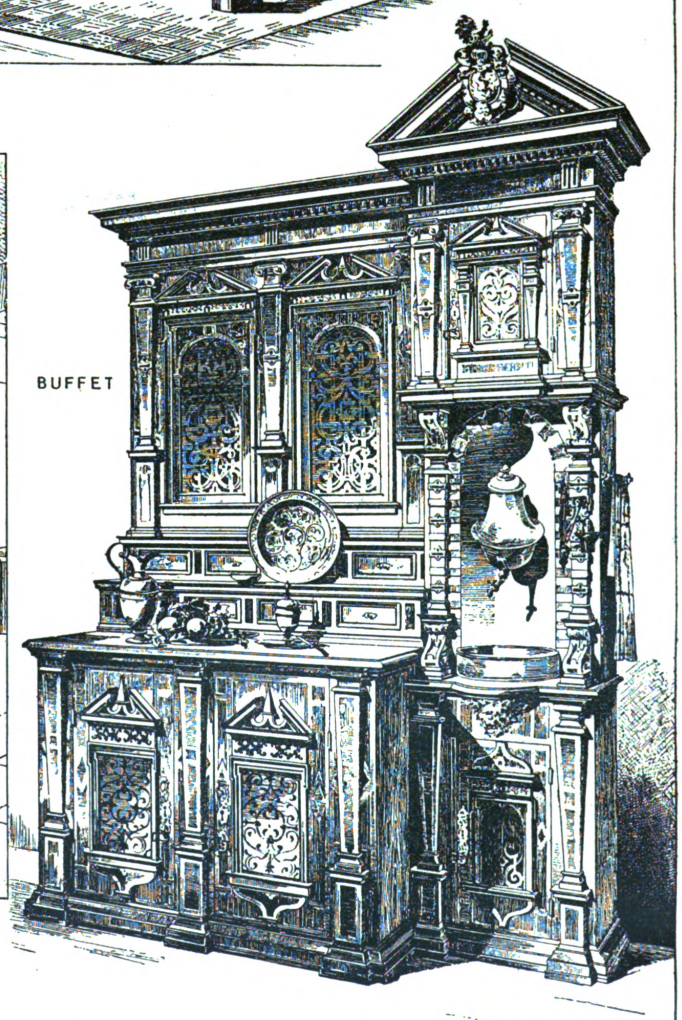



GERMAN AND SW
DRAW
A. LAMBERT
ARCHITECT



SWISS GOTHIC WRITING TABLE





BUFFET

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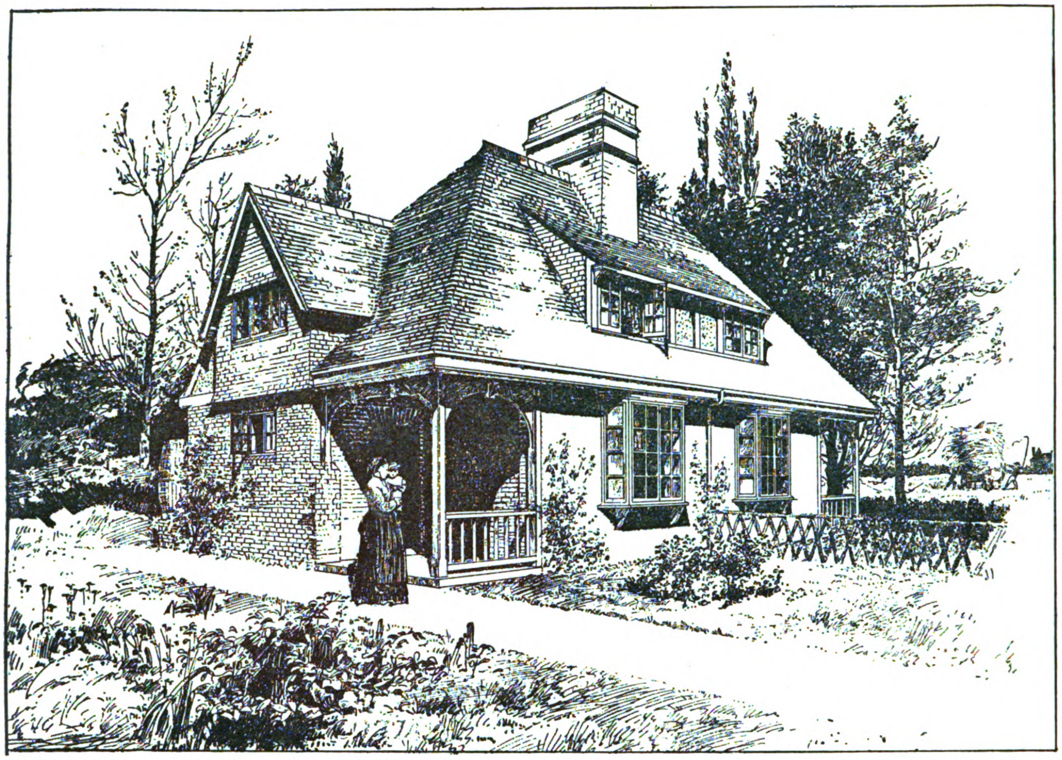
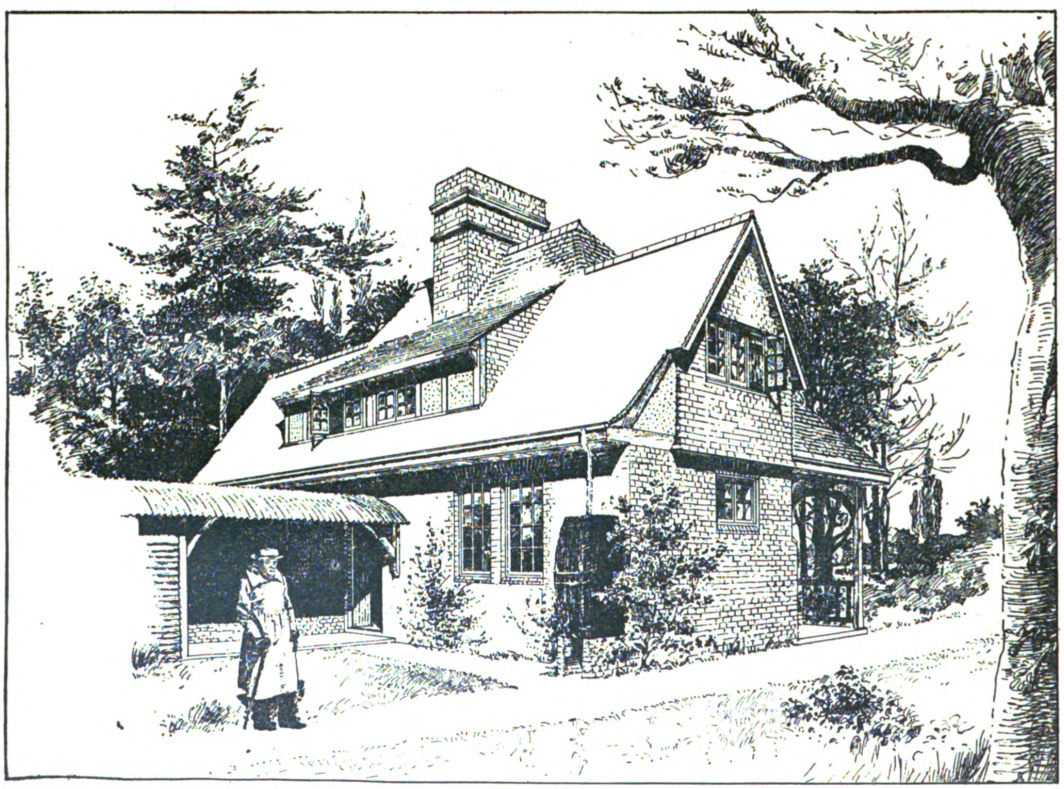


VIEW OF FRONT.



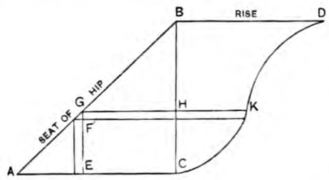
VIEW OF REAR.

AN ENGLISH DOUBLE COTTAGE.

# CORRESPONDENCE.

### Side Bevel of Jack Rafters.

*From* FRED LASCY, *Mechanics' Institute, San Francisco, Cal.*—I submit the following paper: To find the length and side bevel of jacks belonging to a hipped curved roof of which C D is the top line of one of the common rafters. In the diagram C B D is supposed to stand upright on rim B C. In shape all the jacks must be some part of the length of the common

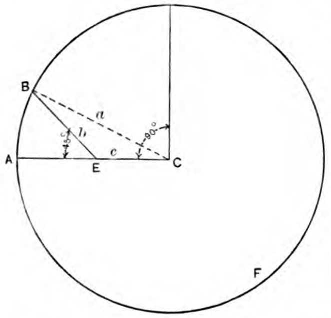



*Side Bevel of Jack Rafters.—Sketch Accompanying Letter from Fred Lascy.*

rafter measured from point C. On one common rafter lying on a flat surface with marked run and rise must be laid off all the jacks showing vertical cut, also long and short top edges opposite to each other. On run make C *h* equal to *e g* long seat line of this jack. At right angles to run draw *h k*, the vertical cut. Then C K is the long top edge of this jack. For the opposite short top edge draw a line parallel to the vertical cut at a distance back equal to *f g* taken from seat of jack. On top face of jack mark the side bevel from end of long edge to end of short edge. It is evident that when jack C K stands upright over its seat its beveled top end will fit against the hip face which stands over B C, because long top edge of jack stands over long seat line, and short top edge of jack stands over short seat line; only if A B C is an angle of 45° does *f g* equal thickness of jack. For each jack the side bevel will be different, but can be obtained in this manner.

### Measuring a Circle.

*From* A. S., *Columbus, Ohio.*—In answer to "C. S. N.," of Clinton, Iowa, whose query was published in the May number of *Carpentry and Building*, I would say that the first thing to do is to find the number of degrees in the arc A B in the sketch inclosed with the aid of a

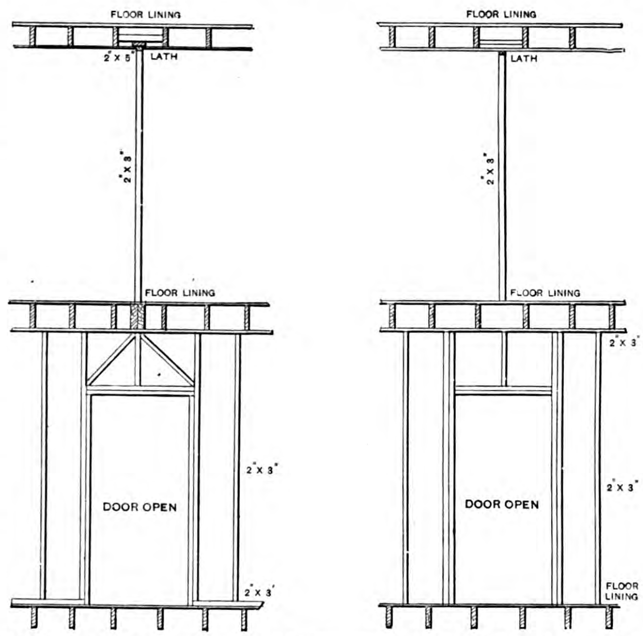



*Measuring a Circle.—Diagram Submitted by A. S.*

protractor, or degree scale. This, it will be observed, is the same as the one in the May number of *Carpentry and Building*, with the addition of the remainder of the circle, the dotted line B C and a few letters. Then, as the number of degrees in the whole circle is to the number of degrees in the arc A B, so is the area of the whole circle to the area of the sector A B C. From the sector A B C subtract the area of the tringle B C E, and the remainder will be the area of A B E. To find the area of the triangle, measure the length of each of the three sides, then from half the sum of all three sides subtract each side separately; multiply the half sum and the three remainders together. The square root of the product will be the area of the triangle. Or, find the length of the base and the altitude of the triangle and multiply the base by one-half the altitude, which will give the area.

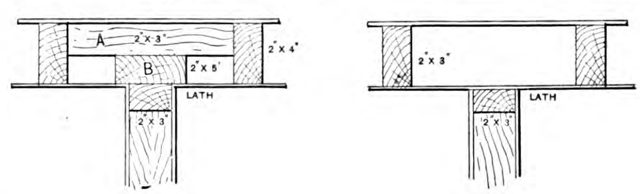
### Setting Inside Studding.

*From* J. D., *Winchester, N. H.*—For the benefit of interested readers of *Carpentry and Building* I send herewith some sketches, Figs. 1, 2, 3 and 4, showing the right and wrong way of setting inside




*Setting Inside Studding.—Figs. 1 and 2.—Diagrams Showing Right and Wrong Way.*

studding and the manner of making angles. If angles are made as indicated in Figs. 1 and 3 of the sketches plaster will not crack. The 2 x 3 inch piece indicated by A in Fig. 3 should be cut in every 2 feet in hight of partition and well




*Figs. 3 and 4.—Showing Right and Wrong Way of Setting Angle Studs.*

nailed, especially to the 2 x 5 inch B. When 2 x 3 inch studding is used in the main partition I would suggest employing 1 x 5 inch piece B, instead of a 2 x 5 inch. I have also shown in the sketches, Figs. 5 and 6, a portion of an actual building, clearly indicating the result of running main rafters down to the plate over a room. From an inspection of the sketch it will be seen that the effect is a very perceptible sag in the ceiling of the room. I find this frequently done in country towns and sometimes in cities. To my mind it always looks as though the builder did not know how to frame valley-rafters. I know of a case of this kind in the erection of a $4000 house, which was put up under the supervision of an architect. The proper method of framing such a roof would have been to put in valley-rafters on the dotted lines X X, Fig. 6, and stopped the rafters of the main building on the same.

### Marks on Slide-Rule.

*From* C. E. W., *Quincy, Mich.*—I do not agree with "S. F. B.," in the August issue, about the E and M scales on the slide-rule, although he does not say positively that he would use those scales in laying out an octagon. Applying a common square or rule to a stick as he describes, marking at 7 and 17, and running a line along each edge of the stick through these points will produce between the lines one face of an octagon. Why? Suppose the stick is 2 feet square, then the square would be applied square across and the marks at 7 and 17 would be 7 inches from each side and the face of the octagon would be 10 inches. When the corner is cut off to a line 7 inches from the corner each way another face of 10 inches is produced. If the stick is less than 2 feet square the square will be applied diagonally and the distance between the lines at 7 and 17 will be in the same proportion as before. Now, in regard to the E and M scales on the slide-rule. Take the figure 24 on the E scale; let that represent the base and perpendicular of a right-angled triangle. On the M scale directly over E 24 you find 34; that is the hypothenuse of the triangle. Take any other figures in the scales and the results are the same. These scales could be used to find the length of rafters or braces when the run and rise were equal.

*Note.*—Does our correspondent mean to be understood that 7 and 17 on the square give a mathematically-exact octagon, or one sufficiently accurate for all practical purposes?

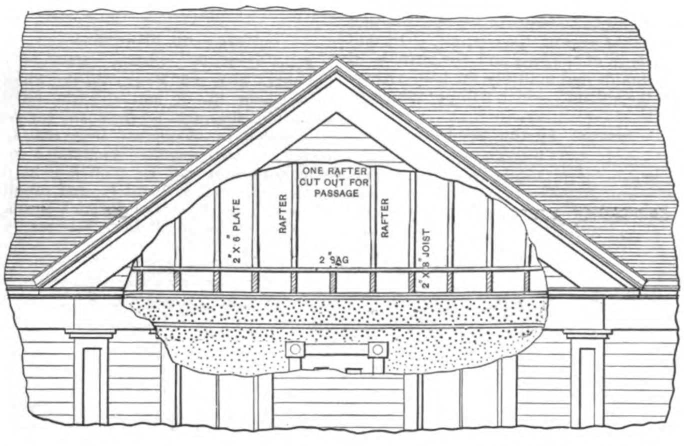



*Fig. 5.—Bad Construction, Showing Sag in Ceiling-Joists.—Scale, 3-16 Inch to the Foot.*

### Projection of Cornices.

*From* W. J. S., *Parker, Dak. Ter.*—I would like to inquire what is the general rule for the projection of cornices of a building and also window-caps.

*Note.*—This question has come up in the past, and we have stated in substance that there is no rule that is not furnished with abundant exceptions. Architecture is variously interpreted by different men. Styles differ and other considerations must be taken into account. There are one or two books on architectural proportions, but we do not know of architects and builders following them to any great extent. What it is necessary to do is to study a style thoroughly, then to interpret it according to the tastes of the architect and the surroundings of the building. The question that our correspondent asks is one that cannot be answered in a paragraph.

### Tackling.

*From* D. M. W., *Caledonia, Mich.*—In reply to "E. A. R.," of Ogdensburg, N. Y., whose inquiry appeared in the August number of *Carpentry and Building*, I would say that for the last ten years I have been using King's patent frame erector, which will raise any size or hight of bent. This device was described in the issue of *Carpentry and Building* for May, 1883 or 1884, I have forgotten which.

*Note.*—The erector referred to by our correspondent above is illustrated and described at length in the May number of *Carpentry and Building* for 1884.

### Green vs. Dry Plaster-Work.

*From* J. McG., *Kalamazoo, Mich.*—I notice that "W. H. H.," of Stuttgart, Ark., lays down the law in a manner from which I suppose, in his opinion, there is no appeal. Now, I am a plasterer as well as the correspondent referred to, but I differ with him in regard to the relative value of green and dry work. Green work is the cheapest possible form of plastering and is the principal cause of the large amount of inferior plastering done. The reason of its inferiority is this: In putting on the two coats at one time there is a great amount of water in the mortar which makes it porous, and it absorbs smoke and dirt with avidity. It also causes the lathe to show through. More than this, it is well known that the cause of mortar hardening is the absorption of carbonic-acid gas from the atmosphere to replace that driven from the limestone when burnt to make lime. In absorbing the gas it forms a thin, hard crust on the surface, which prevents penetrating the entire thickness of the wall, as is well known by everybody who has had experience in building. Frequently on breaking the outside crust the interior of the wall will run down in the form of dry sand. Now, as regards the superiority of dry work. By putting on the scratch coat there is a thin film of mortar, which the atmosphere readily penetrates and which hardens if left to become thoroughly dry. The brown coat then going on the dry foundation can be worked into a close, compact body, and being thin, with a hard body behind it, offers great resistance to blows from the surface, which is all that is required of plastering. Without referring to the difference it makes to the timbers of a building between thoroughly wetting them with two coats at one time and putting on one coat at a time with just half the amount of moisture, dry work is superior in every way, as persons who have had good work of each kind performed will testify.

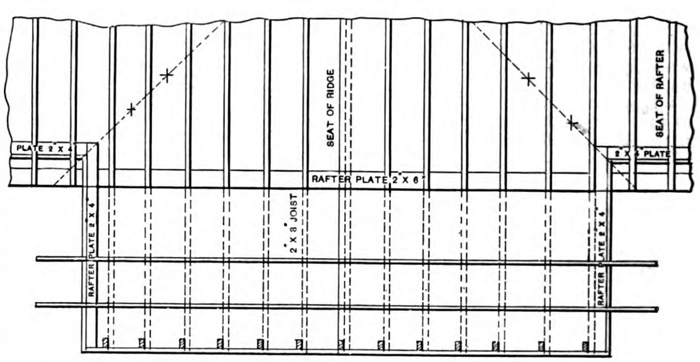



*Fig. 6.—Plan of Roof, Showing Plates, Ceiling-Joists and Seat of Rafters.—Scale, 3-16 Inch to the Foot.*

### Box Window-Frame.

*From* I. M. K., *Toronto, Canada.*—Will some of the practical readers of *Carpentry and Building* present drawings showing the method of constructing a box window frame and sash complete? I desire a half-circle head on quarter-circle plan and of any desired size and radius.

### Making Mullion Window-Frames.

*From* W. L. R., *Mount Carmel, Ill.*—Will some of the practical readers of *Carpentry and Building* give me the proper manner of making a twin or mullion window-frame? I desire to have the sash balanced with weights. Is the mullion between the windows wide enough to make two boxes, or are the pulleys attached at the bottom and run over the head of the windows to the outside and double weights used? A sketch showing the method of construction would be greatly appreciated.

### Design for a Bank-Barn.

*From* E. W., *East Portland, Ore.*—Will some of the readers of *Carpentry and Building* give me a good, convenient plan of a bank-barn? The size I want is about 30 x 60, the hight to correspond with the size. I especially desire the arrangement convenient. I wish it arranged so that I may keep my stock in the basement and do my feeding above, where I propose to keep my grain.

### Firmer Chisels.

*From* J. R. R., *Collingdale, Pa.*—Can some of the readers of *Carpentry and Building* tell me where the Motram firmer chisels can be bought?

*Note.*—Inquiries of the trade in New York fail to give us the desired information and therefore we refer the question to our readers for their attention.

### Anonymous Communications.

We have frequently explained to the readers of this journal that it is impossible for the Editor to notice anonymous communications. We do not demand a name for publication, but it is necessary as an evidence of good faith. We are led to these remarks at this time by the receipt of a letter which the writer evidently is ashamed to sign. It comes from some one who assumes the name of "Veteran." He has scratched out his real name on the letter-head and substituted the word above given. The letter is a criticism of the decision of the nineteenth competition, and we should have pleasure in publishing it were it accompanied by a name in evident good faith. As it is we are not certain that it does not proceed from a defeated competitor, and we have no other opportunity of reaching the author except by this public notice. Those of our readers who have anything to communicate, whether complimentary to the paper or otherwise, are invited to send their communications, using their initials or *nom de plume* as to them seems best, but always giving their name and address, not for publication, but for the editor's information.

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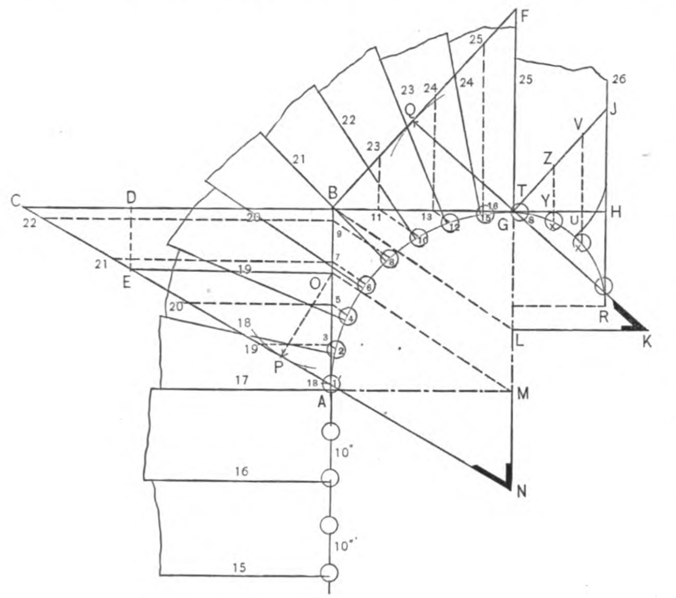
### Treatment of Hand-Railing.*

*From* J. H. MONCKTON, *Brooklyn, N. Y.* —The April number of *Carpentry and Building* comes to me with a treatment of hand-rail by J. V. H. Secor over a plan of stairs submitted by "J. H.," of London, England, which prompts me to discuss its leading points, if not its details, and also to present methods that will show how to do better work at less cost and labor. My first impression upon glancing from plan to elevation was that the thing might be intended as a funny piece of work—a joke—but, examining the text and diagrams more closely, I found to my astonishment that this correspondent gravely and actually recommends his fellow-mechanics to patch together this hand-rail in the manner shown by his diagrams on the supplementary sheet. On the plan, at the chord-line from G to A in the cylinder, a 6-inch portion of curved hand-rail is to be worked in one piece with the ramp, as also shown at the elevation and explained by the writer. This mixed arrangement of ramp and a piece of wreath in one is inexcusable on either a practical or scientific basis. Practically it makes another twisted piece of rail, involving much additional time and labor that can be saved. Just here it seems but fair to take a slight retrospective view of this writer, who, as I have shown, poses a pseudo-critic in the April number, in which, with regard to my treatment of hand-rail in the December number of *Carpentry and Building*, he holds forth as follows: "In going upstairs, when on the nineteenth step you are in advance of the rail on this step about 4 inches and the rail is nearly 3 inches higher than on the flyers." Here, with regard to the same points of rail, I will use his language alone, quoted with respect to his own elevation, as given in the April supplement. In going upstairs, when on the seventeenth step you are in advance of the rail on this step about 4 inches, and the rail is 4 inches higher than on the flyers. And this is true by measurement. But then it is Mr. Secor who has got this 4-inch mote in his eye, while he sees or affects to see a great beam in mine. Why does he not show his virtue in this, his own arrangement of hand-rail, while proclaiming me at fault? Because he could do it and would if there was anything in it. It is not difficult to see in a mental glass, as it were, a certain critic musing in a deep study, muttering: "This Monckton has given in *Carpentry and Building* too excellent and thorough a treatment in the discussion of one phase of the case presented by "J. H." I must go for him, and if I can do nothing else I must make it appear that in this, from beginning to end, he is all wrong and far below sasspareil." The upper or landing quarter, marked on the plan C E and on the elevation S O, is shown with a different pitch from that of the tangent below, and therefore necessarily a forced joint at S, or what he calls "a sprung joint." The writer tells us that "by running the other pitch up [that is, U T S of the elevation] it would be 4½ inches too high, hence the sprung joint." Forcing this upper quarter is equally as absurd and unnecessary as the little piece of wreath patched to the ramp is, and which will be clearly demonstrated by the drawings and explanations herewith given.




*Treatment of Hand-Railing.—Fig. 1.—Plan of Stairs with the Center Line of Rail at Front String and Cylinder Opening; the Balusters Placed on Each Step as Required.*

*Best Treatment of Hand-Railing.*—I propose through the following diagrams and explanations to show how to treat a hand-rail in the best, most simple and least expensive manner, over a plan as submitted and set forth in *Carpentry and Building* by "J. H.," of London, England. This plan and diagrams are made to the scale of drawings presented by Mr. Secor as they appeared on the supplemental page of this journal for April.

Fig. 1. Plan of stairs with the center line of rail at front string and cylinder opening; the balusters placed on each step as required. To prepare this plan for developing the center line of wreath and for finding the lengths of balusters, draw the tangents A B, B G, G H and H R to the center line of rail; prolong M G to N and F indefinitely; prolong G B to C indefinitely. After setting up the elevation at Fig. 2 and finding the inclination of tangents, the preparation of this plan as above mentioned will be completed.

Fig. 2. Elevation from plan for the purpose of establishing the inclination of tangents and developing the center line and central section of wreath, over the unfolded elevation of treads and rises,

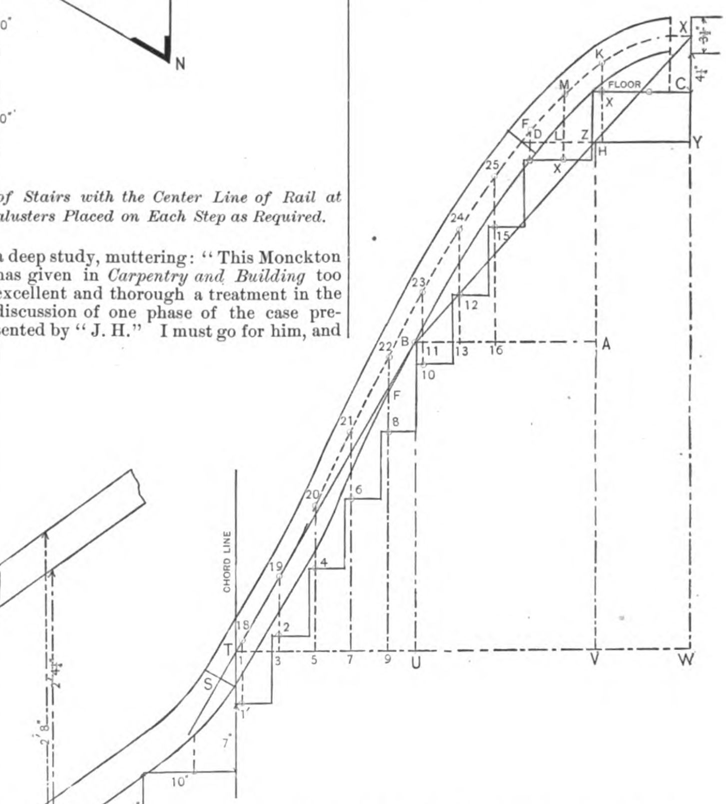



*Fig. 2.—Elevation Showing Exact Relation of Wreath to the Unfolded Elevation from which the Length of Balusters Under Wreath May be Obtained.*

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* Copyrighted 1889 by David Williams.

thereby showing the exact relation of wreath to the unfolded elevation from which the lengths of balusters under the wreath may be obtained. Set up the treads and rises from plan Fig. 1, beginning with the fifteenth rise. Ordinarily the treads at the center line of rail require to be taken in two parts to get more accurately the stretchout, but here in the first quarter the treads are so narrow and the curve of so large a radius it is not of sufficient practical importance to do so. Set off at any point from the chord line the lengths of plan tangents A B, B G and G H of Fig. 1, as at T U, U V and V W; parallel to the chord-line draw W X, V Z and U B indefinitely. Set up 4¼ inches to bottom of level rails. As it will be found on trial that a straight line cannot be drawn from X to the center of rail and fixed point above the floor to the chord-line at T, without bringing the wreath much too low with this common pitch over the winders, therefore on the line U B fix on a point B which may be raised or lowered at pleasure, then establish the point T, raising or lowering it also at pleasure so as to produce a suitable ramp curve and not bring the ramp or wreath too low on the steps; connect B T and B X; these give the inclination or pitches over the plan tangents. From T at right angles to the chord-line draw T U; from B draw B A at right angles to B U; from Z draw Z Y at right angles to Z A. Mark the center of balusters on each tread as placed on the plan Fig. 1, and through all of these centers draw lines indefinitely and parallel to the rise lines. What is yet required at this elevation will be resumed further on.

Fig. 1. To complete the preparation of this plan as before stated: Make H J equal Y X of Fig. 2; connect J G; make G F equal A Z of Fig. 2; connect F B; make B C equal U B of Fig. 2; connect C A. To find the direction of a level line common to both planes: Let B D equal G F; parallel to B A draw D E; parallel to C B draw E O; connect O M, which is the direction of level line sought. Parallel to O M through the center of each baluster draw lines touching the plan tangents A B and B G as at 2 3, 4 5, 6 7, &c. Parallel to B C draw lines 1 18, 3 19, 5 20, 7 21 and 9 22. Parallel to G F draw X V, X C, S T, 16 25, 13 24 and 11 23. *To find the angle required to square the wreath-piece at the joint over A:* Make M N equal O P, connect N A; then the bevel at N will contain the angle sought. *To find the angle required to square the wreath-piece at the joint over G:* From B parallel to O M draw B L; from L make L K at right angles to G L and equal to G Q; connect K G, then the bevel at K will contain the angle sought.

Fig. 2. To complete the unfoldment of the center line and central section of wreath, and ascertain the exact lengths of balusters: Make H K equal U V, Fig. 1; make L M equal Y Z, Fig. 1; make D F equal S T, Fig. 1; make 16 25 equal the same at Fig. 1, and in like manner measure all hights from plan tangents as numbered at Fig. 1 and place them at the corresponding numbers of this elevation; and through the points thus found at X K M F, 25, 24, 23, 22, 21, 20, 19, 18 and T trace the unfolded center line of wreath. Parallel to this line trace the top and bottom lines of the unfolded central section of wreath. To find the length of any baluster under the wreath—say, for example, the one marked 8: Measuring 3⅓ inches from 8 to F, add this measurement to the hight of short baluster on the flyers —2 feet 4¼ inches; then the length of this baluster will be 2 feet 7¾ inches at its center line from top of step to the bottom of rail. Make T S the length of straight wood intended to be added to the lower end of wreath-piece. Let the joint of ramp S be made at right angles to T B.

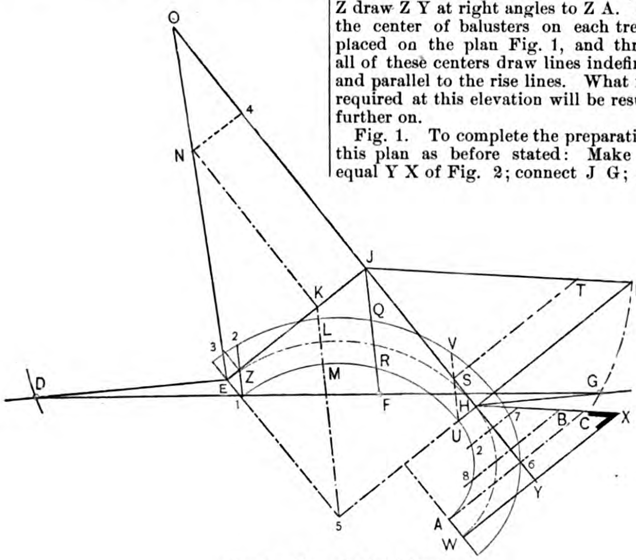


*Fig. 3.—Plan of Hand-Rail.*

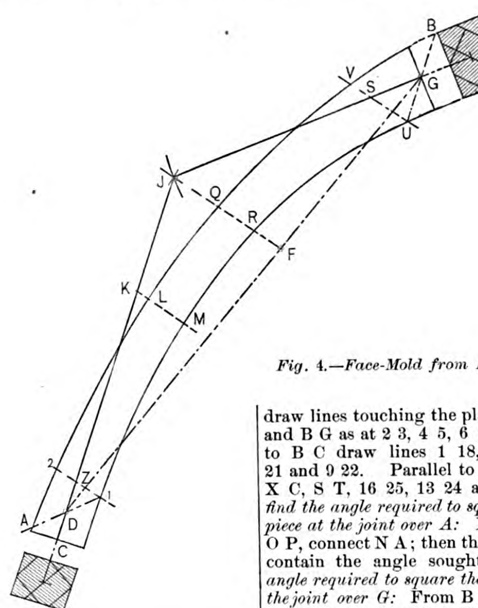


*Fig. 4.—Face-Mold from Plan of Rail.*

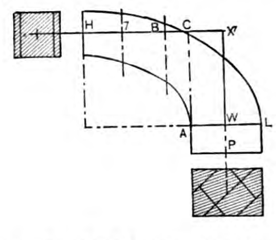


*Fig. 5.—Face-Mold Over Landing Quarter.*

Fig. 3. Plan of hand-rails the center line of which, together with the plan tangents E J, J H, H Y and Y W, are transferred from Fig. 1. The hights Y X, H P and J O are taken from Fig. 1. The direction of a level line common to both planes is found, as at Fig. 1, by making J 4 equal H P, drawing the line 4 N parallel to J E and the line N K parallel to O J; connect K 5, which is the line sought. At right angles to K 5 from E draw E D indefinitely, and also at right angles to K 5 from H draw H G indefinitely; set one foot of the compasses on J with O E for radius and describe an arc at D; again set one leg of the compasses on J and with the radius J P describe the arc P G; connect D G; then D G is the opening of the angle of tangents for the face-mold. From 1 parallel to K 5 draw 1 2; parallel to K 5 draw J F and U V; parallel to H P draw S T; parallel to K N draw Z 3; parallel to W X draw A C, 8 B and 2 7.

Fig. 4. Face-mold from plan of rail, Fig. 3, over the quarter-circle E H; also showing the squaring of the wreath-piece at the points. Draw a line G F D equal to the same at Fig. 3; make G J equal P J of Fig. 3; make F J equal the same at Fig. 3; connect G J, J D and J F; make G S equal P T of Fig. 3; make J K Z equal O N 3 of Fig. 3; make D C equal T S of Fig. 2; parallel to J F draw S V U, K L M and Z 2 1; make S V, S U equal the same at Fig. 3; make J Q R, K L M and Z 2 1 equal the same at Fig. 3; through D draw 1 A; make D A equal D 1; through G draw U B; make G B equal G U. Through the points of the curve thus found mark the curved edges of the face-mold. The joints C and G are made at right angles to the tangents; also these joints of the wreath-piece are made at right angles to the face of the plank. The angle for squaring the wreath-piece at the upper joint G is taken by the bevel K of Fig. 1, and for the lower joint C take the bevel N, Fig. 1.

Fig. 5. Face-mold over landing quarter, from plan of rails, Fig. 3, also showing the squaring of the wreath-piece at the joints: Draw the tangents X H and X W at right angles. Make X C, B 7 H equal the same at Fig. 3; make X W equal Y W

of Fig. 3; make W P straight wood, as required. Parallel to X W draw C A, and through B 7 H draw lines parallel to X W. The width of joint H is equal the width of rail. Measure all the points of curve at Fig. 3 from the line Y H and transfer them from the line X H. Make W L equal W A. Through the points of curve thus found trace the edges of the face-mold. The joints of this wreath-piece H and P are made at right angles to the face of plank. The angle for squaring the wreath-piece at joint P is taken by bevel X at Fig. 3. The sides of rail at joint H are made square from the face of the plank. I respectfully ask readers of *Carpentry and Building*, practical mechanics and interested readers of this subject to slowly and carefully read the text with the connecting reference letters or numbers used on the diagrams, and if necessary repeat the drawings for themselves at double the scale of measurements given, so as to fully comprehend the value, geometrical correctness and simplicity of the methods and treatment here presented.

### Dampness on Brick Walls.

*From* R. J. C., *Newark, N. J.*—Please inform me through *Carpentry and Building* if there is any cheap way to prevent the plastering and paper on the inside face of outside walls of brick buildings from becoming damp and falling off. Furring, lathing and plastering would be very expensive now, as the houses are finished and occupied. Neither would painting on the outside of the walls be feasible. The walls are 12 inches for one story, 8 inches for the second story and are made of common brick. I fear that the atmosphere on the inside would still cause sweating and dampness from the chilled walls. I would like to hear from some one who can suggest a remedy from outside if possible.

*Note.*—The closing sentence of our correspondent's letter is rather ambiguous; for we do not know whether he wants us to recommend a remedy for the trouble which will be applied to the outside of the walls, or whether he desires information from some one outside of this office. We will, however, give a few suggestions, and we will be glad to hear from any of our readers who can aid him further. The first idea that occurred to us was to seal the inside of the house with smooth boards and then to paper over that, or perhaps it would be better still to put a layer of roofing-felt between the boards and the brick walls. If the dampness penetrates from the outside the difficulty could be overcome by coating the wall with asphaltum or some such material as is used for the purpose. The best remedy, of course, is the one that he speaks of as being too expensive—namely, furring, lathing and plastering. Any cheaper method would be more or less inefficent.

### Grain-Spout Problem.

*From* C. E. W., *Quincy, Mich.*—I think it must be my turn now to send a solution of this problen, which seems to have been agitating a number of the readers of *Carpentry and Building*. As I usually solve such problems without drawing any lines, I will not depart from my established custom in this instance. Suppose the side of the spout to be 12 inches wide, it will then measure diagonally 17 inches. A board 12 inches wide cut to the pitch of 8 rise to 7 run will be 10.5 inches shorter on one side than on the other. As the spout is 17 inches across diagonally, then when it is cut to the proper pitch one corner will be 14.88 inches shorter than the opposite corner, and the other two corners, reaching as they do to a line midway between the short and long corners, will be 7.44 inches shorter than the long corner. Therefore the proper cut will be found by using the figures 7.44 and 12 on the square. This will be correct without regard to the rise of the spout. I also find corners for roof-boards for valleys and hips in the same way. The same principle also applies to the cuts of jack-rafters.

### Selecting a Superintendent.

*From* C. K. T., *Madison, Ohio.*—Respecting the question of "M. R. D.," published in the November issue of *Carpentry and Building* for 1888, and to which "W. T.," of Lincoln, Neb., referred in the August number of *Carpentry and Building*, I should be pleased to know what other readers of this paper think of such a plan as engaging a defeated competitor as superintendent. I should think he would make a rather severe one. The practice was never in vogue here, nor did I ever hear of such a thing.

### Wooden Cisterns.

*From* W. G. W., *Findlay, Ohio.*—I would like to learn through the columns of *Carpentry and Building* the best treatment for a white-pine cistern or tank set in the ground, to prevent the same from rendering the water foul. In this section of the country we are in the habit of using circular wooden cisterns of from 20 to 40 barrels capacity. These are sunk in the ground.

*Note.*—Perhaps some of our readers who have had experience in the direction named can suggest an answer to this correspondent's question. We assume that his inquiry refers to some treatment of the wood analogous to painting. Without doubt a coating of asphaltum could be made to serve the purpose well, although perhaps this is not just what is wanted. We trust our readers will give the question attention.

### The Sheeting Question.

*From* S. F. B., *Wellington, Ohio.*—The sheeting question, I admit, is getting old, but please give me one more chance in self-defense. I was hired some time since to build a house by the day. The owner had the studding sawed in the country, notwithstanding there was a mill within 50 rods of the building. I asked him to have the studding sized, but he refused to do it. I beg to ask what "W. R. L." would have done in such a case. I set the studding on a line on the outside, and then showed my employer what the result would be. He went at the studs with an axe and said he would know better next time.

### Estimating Buildings.

*From* J. A. A.—Being a reader of *Carpentry and Building* I desire to ask a question, the answer to which will be of some advantage to me. I am a carpenter and desire to learn the art of estimating ordinary buildings. I have no experience in figures, but am aware that different theories are held by different men concerning this work. My idea is to figure materials and then study how long it would take to put the work in place. I am advised by some that the proper way is to figure on certain percentages for labor. Still other contractors have a list stating how much is considered a day's work for a man and figure therefrom. Now, I cannot understand either of these plans and would be much obliged for some information on this point.

*Note.*—We think our correspondent's idea is much the best of the different plans suggested. It is comparatively easy to ascertain the materials necessary to build a given structure, but how much labor is required to put the structure in place depends upon various contingencies. It will be influenced first by the character of the workmen employed; next by the skill with which the work has been planned, so far as features of construction are concerned, and last, but not least, upon the intelligence of the management under which the men work day by day. Now, what our correspondent wants to know is not what others can do, but what he can do himself. We would advise him by all means to follow his own ideas and not be led into the quicksand of guess-work or of reliance upon percentages. In this connection we would say that there is a work published from the office of *Carpentry and Building* entitled "The Practical Estimator," and also estimate blanks accompanying the same, which we think will afford him much useful information.

### Arithmetic vs. Algebra.

*From* W. H. H. C., *Northfield, Vt.*—I like *Carpentry and Building* very much, but if some of the correspondents would solve their problems by means of common arithmetic instead of algebra it would be more interesting to some of us old fellows. Sixty years ago, when I went to school as a lad of 15 years, we did not hear much about algebra, and accordingly it is Greek to us at the present time. I recognize that we are in a go-ahead world and that some of us are going to get left, sure.

*Note.*—If our mathematical friends were asked to answer the letter which appears above we presume that some of them would say that simple arithmetic is all very well, but it is only simple arithmetic, and some calculations required in building construction, &c., go beyond the limits of simple arithmetic. Algebra and higher mathematics in general are only arithmetical principles carried further and expressed in the most concise form. To go through all the calculations in simple arithmetic required in connection with the estimate of the strength of a girder or roof would be equivalent to spelling the words in conversation or indicating them by clumsily-printed letters instead of putting them upon paper in neat chirography. These comparisons we think will indicate our conception of the advantage to the reader of inquiring into higher mathematics so far as he has the opportunity. We do not allow much matter of this kind to get into *Carpentry and Building*, but at least a little of it is necessary. We never print a formula but some one writes a letter like this.

### Questions in Framing.

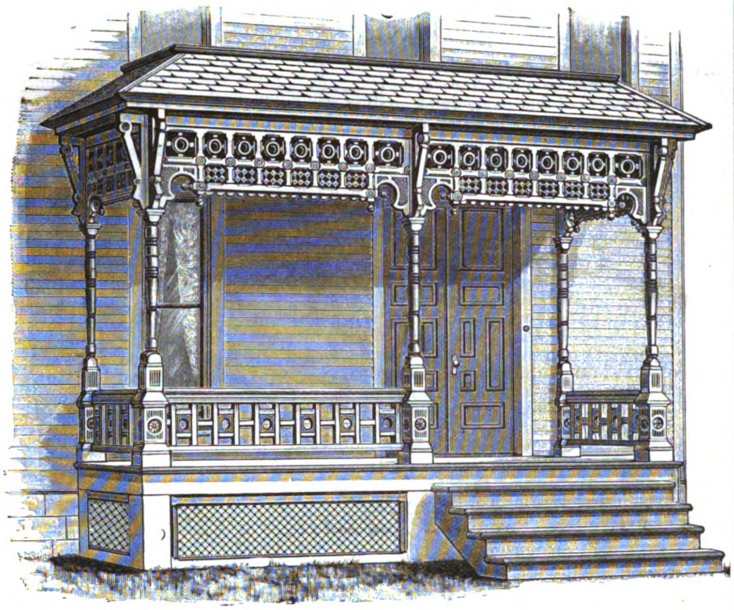
*From* C. J. G., *Lebanon Springs, N. Y.*—Will some of the kindly disposed readers of *Carpentry and Building* enlighten a tyro in the trade as to the proper size of timbers for framing out-buildings, say for a barn 24 x 36 feet, and measuring from 12 to 17 feet between sill and plate? Also a barn 40 x 60 feet, of the same hight. I desire also to ask which is the better way to put in braces—to frame them or to thoroughly spike? The latter mode seems to have the advantage of insuring absolutely tight joints on every brace.

### A Noble Tree.

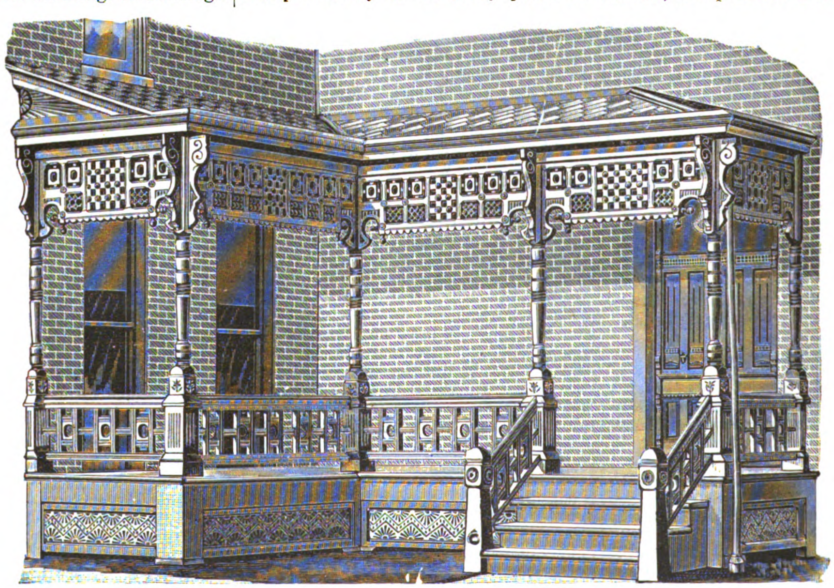
*From* JACK PLANE.—California produces some wonderful trees, of which there have been some stories told fully as large as the trees. The following account of what can be made from one tree, and after it is worked up, part is left, may be interesting to the reader: "A citizen of Elma, Cal., has just finished working up a fir tree which grew on his place. He received $12 for the bark; built a frame house 14 x 20 feet, 8 feet high, with kitchen 8 feet wide and 20 feet long; built a wood-shed 14 x 20 feet; made 330 fence-rails 10 feet long; made 334 railroad-ties and 500 boards 6 inches wide and 2 feet long and 15 cords of wood, all from one tree, and has part of the tree left."

## Designs for Verandas.

In the accompanying engravings we present two designs of verandas taken from an illustrated catalogue lately issued by the IXL Pump, Lumber and Mfg. Company, of Goshen, Ind. These designs, it will be observed, are very neat and effective and are specimens of what the company are shipping to various parts of the country. They are making a specialty of work of this kind, as well also as stairwork and various trimmings for buildings.



*Design of Veranda, Made by the IXL Pump, Lumber and Mfg. Company.*



*Another Style of Design of Veranda, Made by Same Company.*

The catalogue before us contains, among others, some handsome designs of gable ornaments. The company report a steady and growing demand for this style of work, and mention shipments as far East as the vicinity of New York and as far West as the Mississippi River.

## Mixing Mortar.

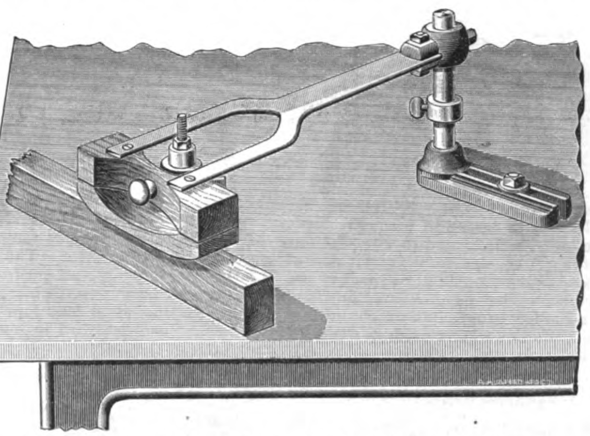
BY H. Y. SCOTT.

All are agreed as to the necessity of an intimate mixture of the ingredients of mortar, the only doubt being whether there is any further advantage attending it. Neglecting the advantage aimed at by Smeaton of introducing more sand without depriving the mortar of its plasticity, it seems probable that beating does approximate the particles of lime pastes, and particularly of the bulky pastes of rich limes, and thereby imparts greater density to their mortars and greater resistance, consequently, after induration. There is room for doubting, however, whether the increase in the hardness so produced would of itself, and without reference to the more perfect intermingling of the particles of lime and sand which beating must occasion, compensate for the labor of the process, unless done by machinery. Colonel Raucourt de Charleville has given a good reason for grinding or pounding being beneficial with hydraulic limes, and especially with puzzolanas and other earths of a like kind. The wretched mixing of the mortar used at Eastbourne, where particles of lime larger than peas and in great abundance escaped slacking before the mortar was introduced into the work, or the inspection of any hard mortar after setting, will show how little the sweat of the laborer has done toward moistening it, and how important it is not to trust to his care and diligence, or even to his powers of making a good mixture, whatever his will. Davy, indeed, prefers the ordinary or larrying method of making mortar, because the mixture of lime and sand can thereby be made more perfectly, whereas by the method of sprinkling there are, he states, always small particles of the lime that cannot be properly mixed, however much it may be chafed up. We may then assume that wherever the work is of sufficient extent to justify the first outlay on machinery, hand-made mortar should not be allowed. The cheapest good method of mixing is probably that now commonly adopted on large works, of grinding the ingredients together under an edge-stone. This is recommended not with the view of reducing the sand to a powder, but of breaking down all unslacked particles and of perfectly incorporating and condensing the ingredients. If the edge-stone system is too expensive to adopt, a pug mill forms the best substitute for it. The safest plan with strong hydraulic limes is undoubtedly to grind the lime to a fine powder before mixing it with the sand. Puzzolana and other like substances absolutely require to be ground very fine, as well as to be intimately mixed with the lime in order to develop their properties. When the lime is first ground to a powder and is then partly mixed with the sand before any water is added, as is done with cements, it is probable that much better hand mixtures could be made, but there is danger in permitting lime to be ground before it is brought on to the ground, and it is essential that it should be finely ground, for the over-burned particles which generally escape grinding are precisely those which most require it.

# NOVELTIES.

### The Victor Safety Spring.

Mr. George W. Gillespie, of Hartford, Conn., is introducing to the trade a safety spring designed for use on variety machines or edge molders, shown in general view in Fig. 1 of the illustrations. The object of the Victor spring is to hold the work firmly to the cutters, thus relieving the hands and arms of a constant strain which in time has been the cause of many painful accidents. The spring is so constructed that it may be used on either side and adjusted to the work in any position desired. The cut shows the relative position of the spring to the spindles. The device is well made, and wherever used has given entire satisfaction. With each spring is furnished a wrench and bolt.



*Novelties.—Fig. 1.—Victor Safety Spring, Made by G. W. Gillespie.*

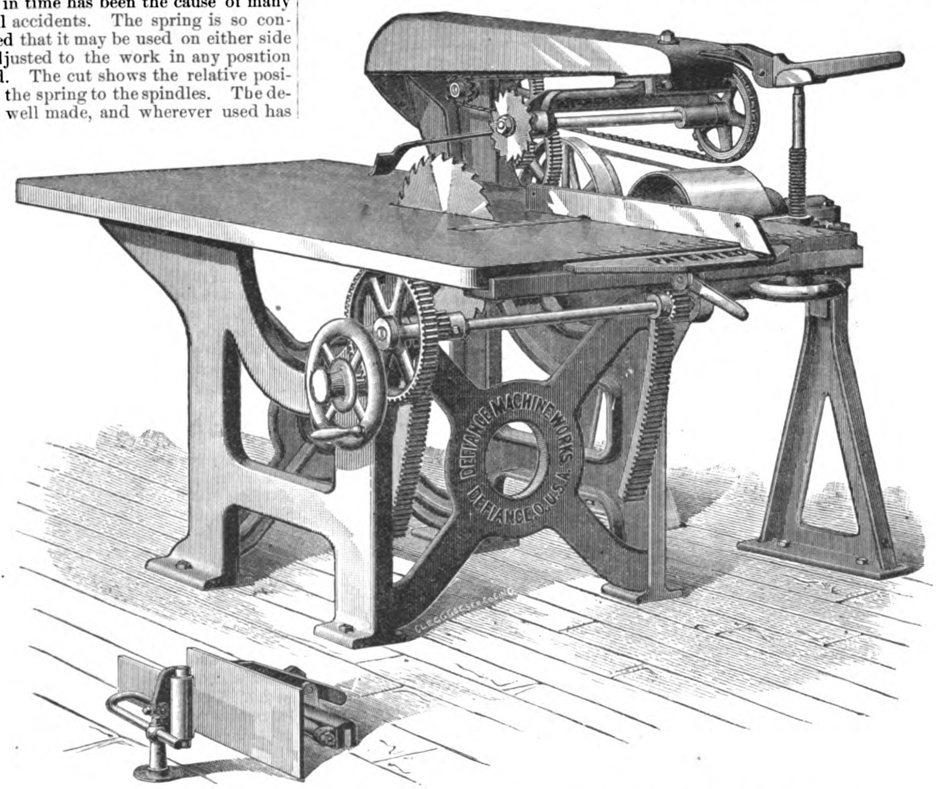


*Fig. 2.—Patent Self-Feed Rip-Saw, Manufactured by the Defiance Machine Works, Defiance, Ohio.*

### Self-Feeding Rip-Saw.

The Defiance Machine Works, of Defiance, Ohio, are introducing to the trade an improved design of self-feed rip-saw, intended for use in carriage factories, planing-mills, furniture establishments, &c. A general idea of the appearance of the machine may be gained from an inspection of Fig. 2 of the cuts. The frame is very heavy, being well braced, and is provided with a floor support occupying a space 6 feet by 4 feet 9 inches. The table is 72 x 39 inches, made of iron and cast in one piece. It is planed true and finished over the entire surface, being supplied with a roller at back end of table and an adjustable roller in advance of the saw. The back end of the table is attached to the frame on a $1\frac{1}{8}$-inch steel shaft, extending full width of the table, forming a very substantial hinge-joint. The table can be raised by means of a hand-wheel and gearing any desired hight, clear of the saw, giving free access to the mandrel. A friction-clamp attached to the hand-wheel is used for rigidly securing the table at any desired position when lifted. The feeding arrangement moves with the table, so that no disconnecting of its parts is necessary in making the adjustment. The arbor is $1\frac{1}{16}$ inches diameter, of hammered steel, running in genuine babbitt-metal self-lubricating bearings. The saw end of arbor can be arranged for holding one or a gang of saws, as may be preferred. When intended for the use of more than one saw the table is provided with an opening around the collars, and adjustable steel plates furnished to fill the space between the saws. The arbor boxes are provided with three bearings, one extending outside of the driving-pulley, which properly supports the arbor to withstand heavy labor without injury to the machine. The boxes are cast together in the form of a heavy bed-plate independent of the frame and can be adjusted for giving more or less lead to the saw, as well as assuring alignment of the bearings. The feed-arm is hinged to the back portion of the frame by the steel shaft $1\frac{15}{16}$ inches diameter, extending through both sides of the frame, with a bearing 22 inches long. The front portion of the arm rests upon an adjusting-screw attached to the table for raising, lowering or regulating the pressure of the feed-spur to thick or thin, hard or soft material. The projected end of the arm resting upon the adjusting-screw forms a hand-lever, which is provided with a knuckle-joint, thus allowing the feed to raise and lower 2 inches in an automatic manner to receive material of uneven thickness without any adjustment. By a downward pressure of the hand upon the lever the feed-spur can be lifted entirely off the material and the feed-stop while the machine is in motion. The feed-spur is driven by a train of cut-gear and link belt, which forms a positive motion, entirely overcoming the difficulty of slipping or feed-belts leaving the pulleys. It can be quickly changed to feed from 50 to 150 feet per minute, while the spur can be raised to feed material 12 inches in thickness. The bearings which support the feed-shaft are adjustable for keeping the kerf in alignment with the saw and giving the material a slight lead to the fence. The patent fence is planed true and fitted to a parallel guide running full width of the table. It can be adjusted instantly to various distances from the saw, to a scale cut in the front end of the table, which is divided into sixteenths of an inch. A friction-lever is used for binding the fence firmly to the parallel guide. The greatest range between the saw and face of fence is 20 inches. The largest saw that can be used is 24 inches diameter, which will cut through 10-inch material. The pulley on the arbor is 10 x 8 inches and should run 1800 revolutions per minute. A resawing attachment is furnished, which is attached when in use to the regular fence and movable with it. It can be beveled to any angle so as to split straight or beveled siding; with a 20-inch saw will split 7½ material. The weight of this machine complete is 2000 pounds.

### Swan's Drawing-Knife.

The Russell & Erwin Mfg. Company, of New York City, are introducing to the trade what is known as Swan's Patent Adjustable and Folding Handle Drawing-Knife, a general idea of the construction of which may be gained from an inspection of the accompanying illustrations. The particular feature of the knife to which the company direct attention is the adjustability of the handles. The position of these may be varied to suit almost any kind of work and thus enable the user to operate in places where it would be impossible with a knife as ordinarily made. Fig. 3 of the cuts shows the knife with one handle extended to the right while the other is detached, clearly indicating the manner in which the handle is secured to the knife. It will be noticed that the screw in the head of the handle is provided with a hole through its head as well as a slot. This enables the operator to adjust the handle by means of either a nail-set or a screw-driver, as may be most convenient. To adjust the handles to any position in the plane of the blade it is only necessary to loosen the screw and turn them to the right or left, while to adjust them to any position in a plane at right angles to the blade the screws at the ends of the knife are operated. Fig. 4 of the cuts shows the knife with the handles adjusted for ordinary work. When not in use the handles may be turned in upon the blade of the knife, as indicated in Fig. 5, thus protecting the edge from injury, and at the same time occupying less space in the tool-chest. The handles are provided with a shallow groove into which the edge of the knife sets when closed, as shown in the cut.

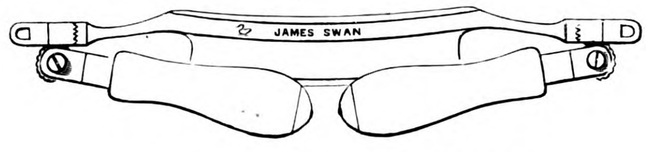
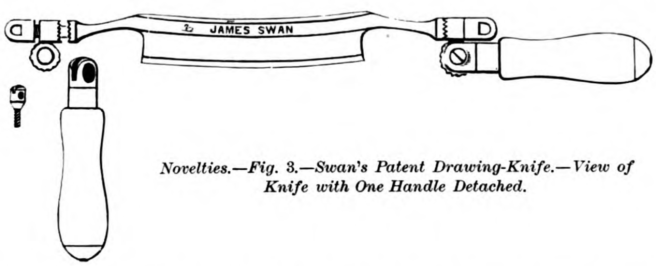



*Fig. 5.—Handles Turned in to Protect the Edge of Blade.*




*Novelties.—Fig. 3.—Swan's Patent Drawing-Knife.—View of Knife with One Handle Detached.*

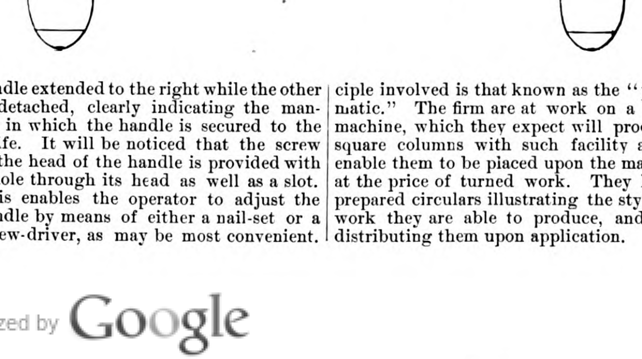



*Fig. 4.—Position of Handles for Ordinary Work.*

### "Square-Turned" Work.

For a long time past those engaged in the wood-working industry have given their attention to the production of what may be designated as "square-turned" work, but with varying success. One of the concerns that entered this particular field was F. A. Requarth & Co., of Dayton, Ohio, who at first manufactured several patterns of square and polygonal balusters with very satisfactory results. Improvements in the machinery employed, however, have been such that at present the firm are in a position to produce almost any design of square and polygonal columns that may be desired. The principle involved is that known as the "prismatic." The firm are at work on a new machine, which they expect will produce square columns with such facility as to enable them to be placed upon the market at the price of turned work. They have prepared circulars illustrating the style of work they are able to produce, and are distributing them upon application.

### The Prentice Metallic Hip Shingle.

The Metallic Hip Shingle Company, of Nos. 313 and 315 Adams street, Toledo, Ohio, are directing the attention of the building trades to the merits of the Prentice Metallic Hip Shingle, of which they are the sole manufacturers. These shingles are so constructed, the manufacturers state, that they afford complete protection to the hips and prevent any rain or snow getting into them. The claim is also made that the points cut from valley shingles may be put on the hips, thus effecting a saving of at least four shingles on each course laid. The cut, Fig. 6, shows one of these shingles detached and

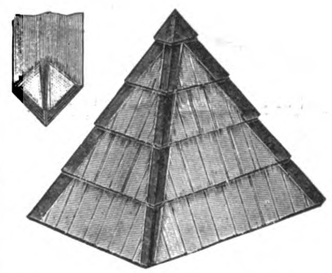
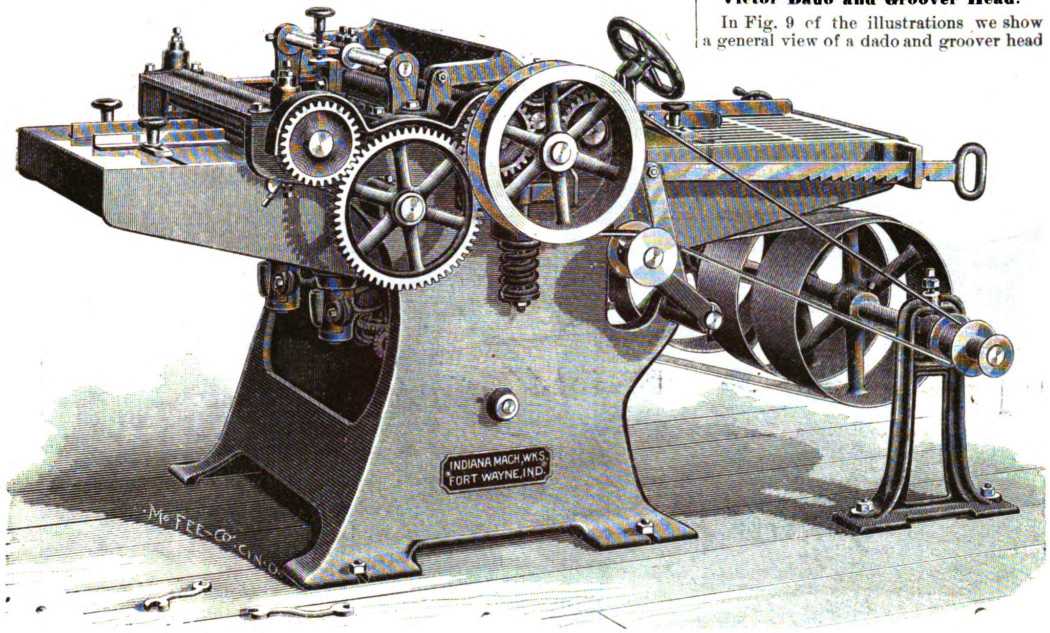


*Fig. 6.—Prentice Metallic Hip Shingle.*

the general appearance of a hip upon which the Prentice shingles are used. The claim is made that they may be readily put on old roofs; that they are rapidly put on, and that they constitute a covering for each course of shingles or slate, holding the latter firmly in place without exposing the nails. These shingles have been largely introduced throughout several of the Western States and appear to be rapidly gaining in favor in other sections.

### New Planer and Matcher.

In Fig. 7 we show a general view of a planer and matcher which the Indiana Machine Works, of Fort Wayne, Ind., are introducing to the trade. The frame is cast solid in one piece and is very strong and rigid. The bed is extra long and raises and lowers between heavy ways or guides provided with steel gibs. By means of adjusting-screws all wear may be readily taken up. The bed is controlled by a large hand-wheel conveniently placed, while an indicator shows the exact thickness the machine is set to plane. The platen under the main head is extra heavy and strong and independent of the bed proper. The matcher-heads raise and lower with the bed and may be easily removed for wide surfacing. The spindles are of steel and run in self-oiling boxes. They are flush with top of bed and need not be removed when using the full width of machine for surfacing only. The matcher-head is adjusted to different-width work from the front end of the machine by the small hand-wheel shown on the side of the bed. The machine is provided with six solid steel feed-rolls. All gears are cut from solid iron, the noise and back-lash incident to cast gears being avoided. The main cylinder, forged from the best refined crucible steel, is four-sided, slotted on two sides and is driven on one end by a wide flange pulley taking a 5-inch belt. The journals are long and run in self-oiling boxes provided with improved cap and lined with genuine babbitt metal. A pressure-bar is on each side of the knife, thereby enabling the machine to do fine smoothing and prevent tearing out. The machine will surface 25 inches wide or less, 6 inches thick or less and will match 11½ inches wide or less. The tight and loose pulleys are 10 x 6 and should run 900 revolutions per minute.




*Novelties.—Fig. 7.—IXL Planer and Matcher, Made by the Indiana Machine Works.*

### Hamsley Metal Shingles.

The Hamsley Metal Roofing Company, of 18 Cliff street, New York, have brought out a patent metal shingle possessing many interesting features. As to the construction of these shingles, it may be stated that they are stamped up out of a single piece of metal, with an embossing in the center so arranged as to turn the water upon the center of the shingle in the next lower row. The sides which underlap the succeeding shingles have a long straight rib with several curved ribs extending over the metal some 2 inches. The opposite sides have an edge ¼ inch wide turned at right angles. This construction is claimed by the manufacturers to produce a strong and substantial shingle that cannot be turned up after once in position even by the severest storm. In Fig. 8 is shown a general view of the Hamsley Metal Valley and the method of connecting the shingles therewith (1). An engraving of an enlarged section of the bending edge of the valley is presented (2), and shows the lower end of a shingle interlocked therewith. The illustration of the lower end of a valley-piece (3) indicates how the edge is bent over to facilitate the insertion of the upper piece into the next lower section. A very attractive circular has been issued of these goods, which is being sent to all applicants. The company are well equipped for business at the address above given, and with new tools and new dies are prepared to fully meet the wants of the trade.

### Victor Dado and Groover Head.

In Fig. 9 of the illustrations we show a general view of a dado and groover head which is being introduced to the trade under the name of Victor by George W. Gillespie, of Hartford, Conn. This tool has been brought out to meet a well-defined want of the shop, and is especially suited to the performance of accurate and speedy work. The manufacturer states that the construction of the tool is such that every cutter may be quickly brought to the cutting point by means of a thumb-gauge, and being perfectly balanced in every stage of operation will run at a very high speed. It is arranged for use on either right or left hand arbors, and can be made to fit any two sizes of arbors. It

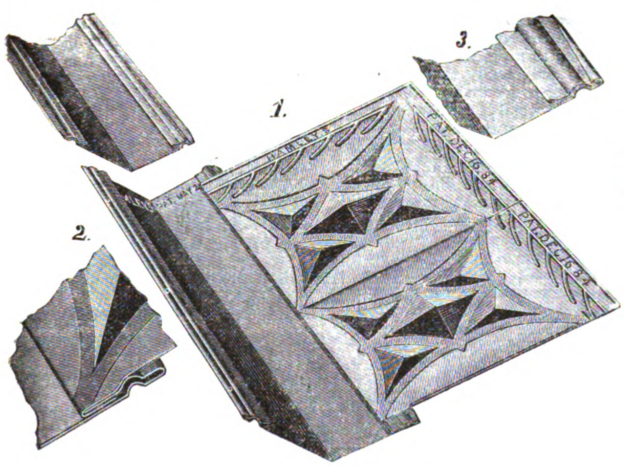



*Fig. 8.—Hamsley's Metal Valley.*

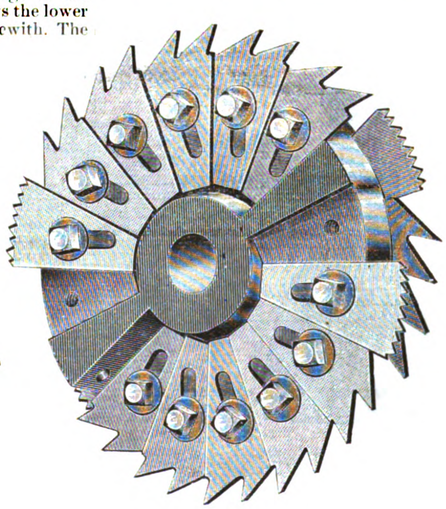
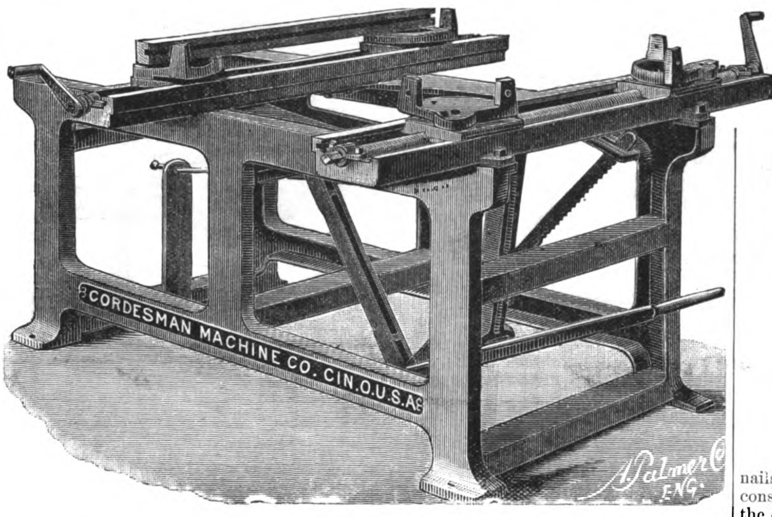


*Fig. 9.—Victor Dado and Groover Head.*

will cut any fraction from $\frac{3}{16}$ to $1\frac{3}{8}$ inches wide and $1\frac{1}{2}$ inches deep. The statement is made that the tool is free and easy in operation and gives very satisfactory results.

### New Sash-Clamp.

The Cordesman Machine Company, of Cincinnati, Ohio, have recently placed upon the market an improved sash-clamp, a general view of which we show in Fig. 10 of the accompanying illustrations. The machine is made entirely of iron and steel, and so constructed as to overcome many of the objections urged against clamps having a wood frame. The main frame of this machine is cast in one piece; the heavy top rails are planed and divided with long bearings on the main frame; the corner-blocks for holding the sash are pivoted to the traveling-blocks, which work on top of the heavy rails, and are operated in and out by a right-and-left-hand screw. This arrangement, the manufacturers claim, allows each to be moved an exact distance from the center and remain in a fixed position. After it is adjusted for one size and set square it maintains that position. Odd sizes of sash, it is stated, can be clamped almost as quickly as regular sizes. The machine has a capacity to work sash up to 3 feet 10 inches by 5 feet and down to 12 inches square. The machine is so constructed that it not only brings every joint up to its place, but makes the sash perfectly square, clamping the four sides at one operation by simply depressing the lever with the foot.




*Novelties.—Fig. 10.—Improved Sash-Clamp, Built by Cordesman Machine Company.*

### Clinch for Hammers and Hatchets.

The Diamond Wrench and Tool Company, Portland, Maine, have adopted a new method of securing the handles in their hammers and hatchets. It is illustrated in Fig. 11 of the accompanying cuts, one side of the head being cut away to show the mechanism by which the wedges are clinched and the handles locked into the eye of the tool. The wedges are described as made of the same width as the eye of the tool in which they are to be used, and have shoulders which fit into recesses in the eye of the hammer or hatchet, and when driven in the points strike the piece of steel that has been driven through the handle, and, following the curves, clinch in such a manner, it is claimed, that it is impossible for the handle to come out or work loose. This principle is also embodied in the screw-drivers made by the above firm.

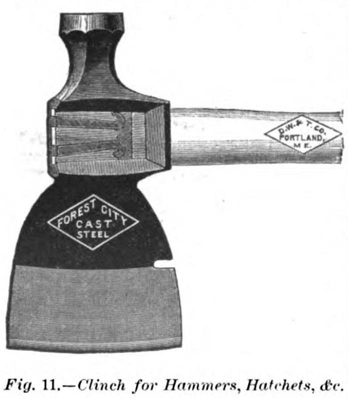



*Fig. 11.—Clinch for Hammers, Hatchets, &c.*

### Screw-Nail.

Screw-nails have been made with peculiar threads intended to facilitate the advance of a screw into the wood, and designed to be drawn from the wood like ordinary screws by turning, but their cost of manufacture prevented their wide adoption. In order to secure a good hold of a screw or nail in wood it is absolutely essential that the fibers of the wood should be as little broken up as possible by the entrance of the screw or nail. In driving a screw of the ordinary type into wood with a hammer the fibers are so broken up by the screw-threads that the holding capacity of the thread is greatly reduced, and even where threads of steep pitch are cut into wire the waste of material and reduced strength counterbalance to a great extent the holding capacity due to the spirally-formed threads. A nail or screw forces its way into the wood, and its holding power depends more directly upon the shape and condition of the walls of the cavity formed by its entrance than it does upon the tensile strength of the metal itself, which is generally more than sufficient to resist any direct strain brought upon it.

In Fig. 12 is shown a new screw-nail which has been recently patented by the American Screw Company, of Providence, R. I. This screw has the ability to form a cavity which, as to the strain upon it and its withdrawal, acts like a nut to a screw. The walls of this cavity are made up of the compressed fibers of the wood instead of disintegrated fibers, which result from driving ordinarily. The form of the threads of this screw and its four-sided point are plainly shown in the right-hand view of the engraving. These screws are made by special machinery designed for the purpose by the American Screw Company, and which forms the screw by swaging and rolling. This screw can be forced into wood by the blow of a hammer, makes its own nut as it descends into the wood into which it is driven, and may be withdrawn from the wood by turning with a screw-driver in the ordinary way. These screw-nails, it is stated, will be sold at a price considerably less than that charged for the ordinary screws.

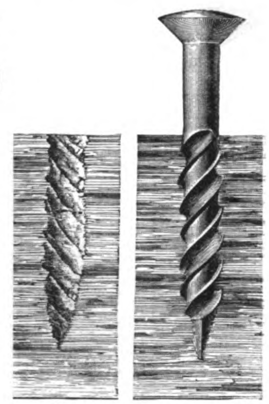


*Fig. 12.—New Screw-Nail.*

### The Nelson Cresttile Lightning-Conductor.

The Cresttile Conductor Company, Crawfordsville, Ind., are the sole manufacturers of the Nelson Cresttile Lightning-Conductor, illustrated in Fig. 13 of the accompanying cuts. This manufactured article is made of galvanized iron, folded and riveted together and cut and punched in any design. It is fastened on the comb

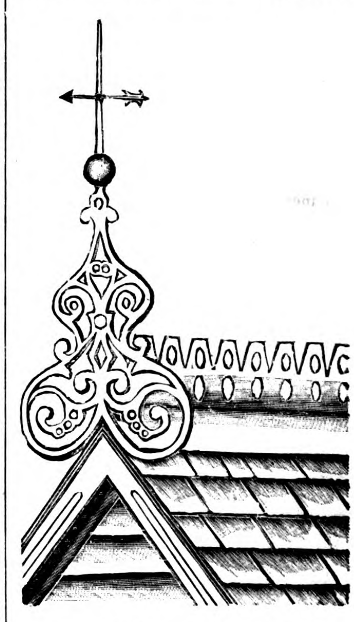


*Fig. 13.—The Nelson Cresttile Lightning-Conductor.*

of the roof by nailing, the same as an ordinary saddle-board. It furthermore requires no base to receive it. The Crest-tile conductors are attached to the valleys at the top of the house, and thus metallic connection is effected with the water-spouts, which, in turn, are connected with the moist earth by a metal ground connection. It is claimed to be more efficient than an ordinary lightning-rod and also serves as a protection to the comb of the house, because it keeps it dry. It is ornamental, and being of galvanized iron does not rust nor change color. Among the merits claimed for it is its cheapness, as it is said to cost less than the old rod and no more than the saddle-board and the wooden creasing, while at the same time it furnishes all these combined.

### The Canton Glass-Board.

The Canton Saw Company, Canton, Ohio, are putting on the market the glass-board shown in the illustrations herewith. Fig. 14 represents the board with raised

sizes—Nos. 1, 2, 3, 4 and 5, which are respectively 24 x 36 inches, 30 x 48 inches, 36 x 54 inches, 42 x 60 inches and 42 x 72 inches.

### Elevator Stop and Lock.

The "S. and B." elevator stop and lock is a simple device intended for automatically stopping and holding an elevator on a level with any floor in a building until released by the person using the same. The lock is designed particularly for freight elevators and is attached either to a bracket or standard. Fig. 16 shows the lock open and free to pass up or down the check-rope. To lock, the drop-latch is lifted with the finger, when the locking-jaws fly together. To unlock, pull either of the locking-jaws from the center to the side, which forces them into the position shown, the drop-latch falling of its own weight and holding the jaws open. At each floor two stops are attached to the check-rope which passes through the lock. In going up or down the tapering end of the first stop forces the jaws apart suffi

kitchen or dining-room, and allowed to remain there until required, thus serving as a substitute for the ordinary house-safe. There is no frame-work or obstruction of any kind above the floor, the top of the ap-

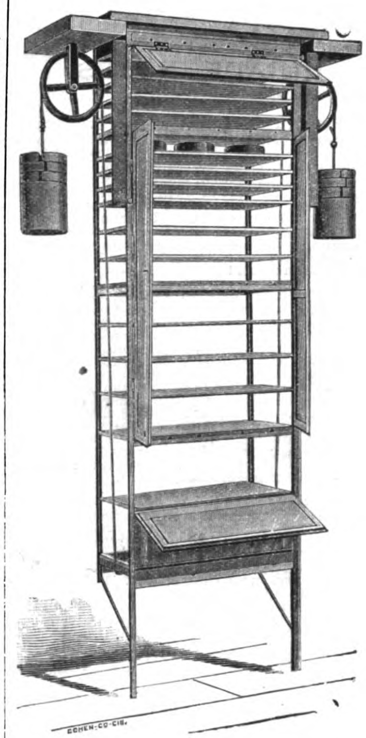
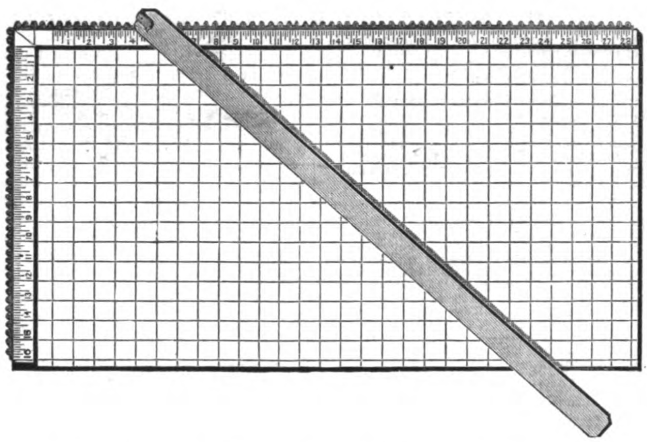


*Fig. 17.—Wright's Vertical Movable Kitchen Safe.*

paratus forming part of the floor in the room above, which may be covered with a rug in case the latter is carpeted, making it perceptible only when in actual use. The apparatus is constructed wholly of metal, with the exception of the shelves and the top. The makers state that there is no liability of its becoming out of order, and being constructed of the material mentioned it will not bind nor swell or be af-



*Novelties.—The Canton Glass-Board, with Rule.—Fig. 14.—General View.*

border and outer edges and rule in position for cutting at an angle. Fig. 15 shows a section of the rule, with holder, by which it is firmly held in position for cutting. The upper or center fastening shown in Fig. 15 cuts even inches and quarters of an inch, while the lower or curved one will cut only eighths of an inch. When lengths are to be cut by eighths it is only necessary to turn over the rule. The utility of the board in cutting window

ciently to allow it to pass through, and they then engage with the square end of the second stop, and move the check-rope sufficiently to bring the hoisting machinery to a stop. The lock is made entirely of

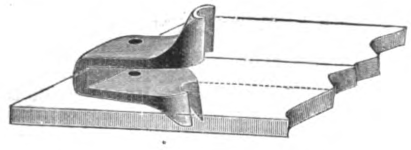


*Fig. 15.—Section of Rule, with Holder.*

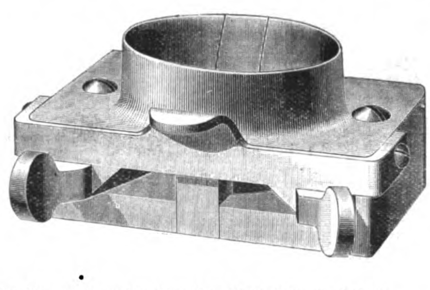


*Fig. 16.—Automatic Elevator Floor-Stop and Lock.*

glass into odd shapes and sizes is pointed out by the manufacturers. They also refer to the difficulty experienced in cutting glass by home-made boards, where a slip is liable to occur, and state that this is not possible in the use of their rule. The board is made of seasoned lumber in strips, which are shaped and put together by a new method, the strips being grooved into each other in the form of ⌶. The value of this new method in providing a substantial board and preventing warping is alluded to. The board is made in five

steel, has few parts and is very simple in its operation. It is supplied by F. W. Lowe, 83 Wendell street, Boston

### Wright's Patent Vertical Movable Kitchen Safe.

The C. B. McHenry Company, Aurora, Ind., are just placing upon the market the apparatus shown in Fig. 17 of the accompanying illustrations. It is designed as a conveyance for articles of food usually kept in the cellar or basement away from the

fected by changes in atmosphere or dampness Its balance adjustment is made from above, should the apparatus and load to be carried vary in weight, by means of the removable weight, shown at the side of the apparatus in the illustration. The apparatus can be placed in position in any part of the room desired, and it will work equally as well before as back of a door. The apparatus being counterbalanced, when required in the kitchen or dining-room pressure on a spring at once releases it, when it quickly ascends. After the articles required have been removed it is again readily lowered into the cellar. Four sizes are at present being regularly made, ranging in capacity from 60 to 300 pounds; special sizes are made to order. It is also pointed out by the manufacturers that this safe may be used as a dumb-waiter if desired.

## TRADE NOTES.

WILLIAM C. LEWIS & Co., wholesale dealers in building materials at Washington, D. C., have issued a circular in which they announce that having associated with them Mr. J. F. Young, Jr., late of Henry McShane & Co., they propose to add to their present business that of plumbing supplies. Mr. Young, who will have charge of the department, has a thorough knowledge of the wholesale plumbing-supply business and enjoys an extensive acquaintance among the jobbers of Washington, Baltimore and Richmond.

MAST, FOOS & Co., Springfield, Ohio, are busily engaged in the fencing and cresting departments of their establishment. Among contracts recently secured for fencing was one for 5000 feet for the new State capitol at Austin, Texas, to inclose the capitol grounds. This fence is to inclose one of the finest capitol buildings to be found in any State in the Union, and is composed of heavy ¾-inch square pickets, 4 feet high, with ⅝ x 2 inch channel railing placed in granite coping 20 inches wide. Both fencing and gates are of special design, the whole to be completed by January 1, 1890. The contract, we are informed, was taken in the face of the strongest competition.

"NOT WHAT WE SAY, but what others say," is the inscription upon the front cover of a neatly-printed little pamphlet just issued by the Jos. Dixon Crucible Company, of 68 Reade street, New York, and works at Jersey City, N. J. It is 3½ x 9 inches in size, printed in attractive style upon tinted paper. The contents are made up of testimonials from those who have used the company's productions, and give a very clear idea of the estimation in which these goods are held by the public at large.

THE CINCINNATI ARCHITECTURAL CLUB, recognizing the great benefit arising from an exhibition of architectural drawings and sketches and desirous of creating a healthy improvement in the public taste as regards architecture, propose a national exhibition of the work of the members of all sketch clubs and prominent craftsmen in America and Canada. The works exhibited will include water-color studies, India ink, pen and-ink sketches and perspective views. Ample wall space and an excellently lighted hall has been secured for the purpose. The exhibition will open on November 19 and will continue one week. Full particulars can be obtained from John Zettel, secretary, Room 81, No. 227 Main street, Cincinnati, Ohio.

I. & M. WOLFF & COLEMAN, Chicago, Ill., have just issued an interesting pamphlet relating to the Chicago Iron Clad Brick and Tile Dryer. The text presents a description somewhat in detail of the system of drying employed by this firm, illustrated with sectional views of heating-chamber, showing location and arrangement of steam-pipes. The statement is made that in the construction of this apparatus the firm have obtained simplicity and durability, at the same time producing a dryer that is nearly automatic in its operations. The pamphlet is of especial interest to those engaged in the manufacture of bricks.

"WINTER EVENINGS AND HOW TO SPEND THEM" is the name of an interesting pamphlet which is being distributed by the Brooklyn Young Men's Christian Association at the opening of their thirty-sixth season. Among the evening classes we notice that there is one in architectural drawing. The classes are intended to furnish lessons in linear drawing, applied to the various branches of constructive art, comprising the use and care of instruments and the application of geometrical problems with reference to practical mechanical and architectural details for every-day use. The instructor is Mr. Duvinage, and the lessons are given Wednesday evenings from 8 to 9.30. The class year is divided into two terms, running from October 14 to December 20, 1889, and from January 6 to March 6, 1890.

RICHARDSON BROTHERS, Newark, N. J., are directing the attention of the trade to the new improved Standard Miter-Box, for which many strong claims are made. It is constructed entirely of iron, and has a graduated circle on which any angle from zero to 70° may be secured. The saw and guide fold directly behind the backs, thus avoiding all trouble arising from the saw standing across the miter-box when not in use.

THE HAMSLEY METAL ROOFING COMPANY, 18 Cliff street, New York, are distributing among their friends in the trade an interesting pamphlet illustrating and describing the Hamsley Patent Metal Shingle. The pamphlet constitutes what might be termed a practical talk about metal shingles and roofing, and the information is presented in such a manner as to prove of interest to those engaged in the roofing trade.

F. P. BURCAW & Co., of 204 North Locust street, Hazleton, Pa., have introduced to the trade what they are pleased to call Burcaw's Positive Drop-Bottom Door-Strip and concave and convex interlocking wood strips, attention to which is elsewhere called in this issue. In the construction of these strips rubber and felt have been dispensed with, adding, it is claimed, materially to their durability. The parts are so arranged as to form close joints when the door or window is closed, thus preventing dust, rain or snow from entering. The strips are well made and are proving popular wherever used.

THE CLINTON WIRE CLOTH COMPANY, Clinton, Mass., and New York, have issued an illustrated catalogue devoted to wire lath, of which a full description is given, with illustrations showing its construction and use. Some interesting illustrations are made of tests applied to the wire lath and showing the advantages possessed by it. The catalogue is finely printed and represents this interesting line of goods in an attractive manner.

THE METALLIC HIP SHINGLE COMPANY, Toledo, Ohio, in their card in our advertising columns present an illustration of and direct attention to the Prentice Hip Shingle, of which they make a specialty. Particulars and prices furnished on application.

IN THEIR ADVERTISING SPACE this month the Defiance Machine Works, Defiance, Ohio, present an illustration of their Patent Proportional Knife-Balancing Machine.

A. J. ENGLISH COMPANY, with factory at Washington Court House, Ohio, and office at 284 Race street, Cincinnati, present a card in our advertising columns descriptive of their Automatic Gas Machine for lighting small towns, factories, public and private institutions, churches, residences, &c. They offer descriptive circulars on application.

THE LLOYD IRON ROOFING AND PAINT COMPANY, Chicago, Ill., in their advertisement in another part of this issue direct attention to various kinds of corrugated iron produced by them, two illustrations of which are presented. Reference is also made to Obelisk Metallic Paint and Cement.

THE YOUNG MEN'S INSTITUTE of the Young Men's Christian Association, Nos. 222 and 224 Bowery, New York City, have just issued a prospectus of their autumn and winter work, which contains much that is of interest to many of our readers. Considerable attention is devoted to educational matters, and the institute offers the opportunity of study in ten different lines. Among these may be mentioned mechanical drawing, free-hand drawing and technical instruction for carriage draftsmen and mechanics. The autumn classes begin on Monday, September 30.

*Artistic Japan* is the name of a monthly conducted by Mr. S. Bing, to which the attention of the public has recently been called. The publication is issued in parts, in attractive colored covers, which are varied monthly, and in addition to illustrated text contains 10 royal quarto plates, being reproductions of fine examples of Japanese art. The journal is devoted to arts and industries for the use of the artist, the amateur, the manufacturer and the artisan. A special notice which has recently been sent out from the American agency, No. 220 Fifth avenue, New York, contains the announcement that the American edition of *Artistic Japan* was only issued this year, and the numbers have been dated back to equal by one month the English, French and German editions. This accounts for the work being behind the date in this country, but it is understood the publication will soon appear simultaneously with the foreign editions. The American edition contains the same engravings and colored plates as the European editions, which are printed by M. Gillot, of Paris, under the personal superintendence of Mr. Bing.

## Concrete Buildings.

A writer in a recent issue of the *Mechanical News* presents the following particulars with reference to concrete buildings and how to erect them:

Concrete properly constructed is as strong as the hardest brick, and it is not too much to say that it might be employed with great advantage in four out of five cases where brick buildings are now built for the purposes of the manufacturer.

The proper method of mixing concrete and the raw materials and their proportions which should be used are not generally understood. The prevailing idea is that all concrete must necessarily be composed of gravel, sand and Portland cement; but this is not correct. While these materials, in proper proportions, efficiently mixed, produce a very excellent concrete, there are many others which answer admirably as substitutes. Of course it is necessary that cement or good hydraulic lime should be used, and the American Rosendale, if of good quality, answers exceedingly well. Sand is perhaps as good a material as can be had, so long as it is sharp and clean, but strong clay well burnt and ground to a fine powder will form a good substitute. In considering the materials of which concrete is composed it is convenient to look upon sand or its substitute as forming with the lime or cement a mortar which cements the rough "core" together. Gravel is certainly in many cases the most convenient core that can be obtained, but pieces of broken stone, brick or broken slag from the iron foundry and clinkers from the brick kiln will answer the purpose; in fact, any thoroughly hard, imperishable material will serve, so long as it is broken up into pieces which will pass through a ring not exceeding 2 inches in diameter.

The proportion of materials used will vary to a great extent with the special purposes for which the concrete is to be used. Two parts of sand, four parts of mortar to one of Rosendale cement will indicate in a measure the proportions which should be used to produce a good strong concrete. The method of mixing is practically the same wherever it is to be used. The hard material which is to form the core is first measured out and placed in a heap, and water is thrown upon it in order that a better adherence may be obtained between it and the mortar. The sand and lime are also measured out and mixed separately from the core into mortar, water being added gradually while the whole mass is turned over and over in order to produce a complete incorporation of the parts. The core is then added and the whole thoroughly mixed, when the concrete is ready for use. Care should be taken that no more water is added than is required to properly wet the whole of the materials.

The mixture having been effected, the building may then be built in either one of two ways. Blocks may be formed, or the walls may be erected solid. Where the former plan is followed, a suitable wooden box is constructed, measuring, say, 2 feet by 1 foot by 9 inches, and into it the concrete is placed and well rammed down. After having been allowed to set for some two days, the ultimate hardness of the mass is then increased by placing the box beneath water.

Perhaps the simpler method of erecting a concrete building, however, is that of erecting the solid walls rather than forming blocks. All that is required is vertical upright posts placed at the corners and at suitable intervals around the building, between which slide, in an upward direction, a number of boards connected together so as to form molds, between which the concrete is placed. In commencing such a building, these molds are of course placed on the ground and the concrete put in between them and rammed down in position all around the building. When it has set sufficiently, the boards are raised and another layer of concrete filled in, after which the surface beneath is roughened by means of a pick or other suitable device, and all dust and dirt swept off in order that a proper adherence may be had. In this way the building is brought up to its required hight, proper allowance being made for doors, windows and other openings. In order to prevent the concrete from adhering to the wooden molds, they should be covered or painted with a mixture formed by boiling shreds of soap in water until of the consistency of common paint. It is sometimes deemed an objection to the use of concrete in buildings that the surface is comparatively rough on the exterior of the wall, but this may be easily overcome by covering the surface with a layer of cement plaster (to which coloring material may be added if desired) and rendering it to a smooth surface

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



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## NOTES AND COMMENTS.

THE formal opening of the new quarters of the Philadelphia Builders' Exchange took place on the 29th of October. The building had been used by the members for some time, but it was not altogether completed at the time of the opening. The formal occasion of its opening, however, was a very pleasant and gratifying occasion to the members of the exchange. The entertainment was quite an ambitious affair and covered speech-making and the usual celebrations incident to such an occasion. The Philadelphia Builders' Exchange have good reason to feel gratified at what they have done during their short existence. The building thus formally opened is located on Seventh street, just south of Market, and opposite the Franklin Institute. The building is an attractive structure, fire-proof throughout and four stories in hight. Beginning with the basement, the visitor is introduced to a dry, well-lighted room, covering some 5000 square feet of floor-space. At the side is the hoisting machinery and boilers for heating the building, but there is left a large oblong room, nearly the entire size of the building proper. It is here that the Mechanical Trade Schools of the Builders' Exchange of Philadelphia will be established as soon as possible. It is the intention of the promoters of these schools that they shall provide instructions in each of the following trades: Carpentry, brick-laying, plastering, plumbing, painting, stone-cutting and blacksmithing. The Trade School Committee having the matter in charge consists of 21 members, or three representatives from each of the above-named trades. As soon as convenient these committees will meet and prepare for the earliest possible opening of the schools. Nothing as yet is definitely known, but it is the intention to divide the large basement space of the Exchange Building into sections for the accommodation of the seven different trades. The chairman of the Committee on Mechanical Trade Schools is George Watson, and the secretary William Harkness, Jr., 247 South Third street. Mr. Harkness is also general secretary of the exchange.

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GOING up the cellar stairs the visitor enters the first floor of the building. This is a large room 75 x 104 feet and will be devoted to a permanent exhibition, where will be shown all kinds of building materials and supplies connected with the building trades. The floor has already been spaced off and the platforms arranged for the exhibits, and so popular is the scheme that we understand nearly all the space has already been applied for, and it is hoped that the exhibits will begin to arrive within a few days. The space required for the exhibits will be rented out to patrons, and a significant feature of the plan is the arrangement by which all the people entering the building pass right through the exhibition-room, and thus the goods shown are certain to be noticed. The front of the second floor of the building is the large meeting-room of the exchange, extending the entire width of the building and sufficiently deep to make it well proportioned. Connected with it are offices and committee-rooms. The remainder of this floor, together with the floors above, are divided up into offices, which are rented to persons in the building trades. The building, which is owned entirely by members of the exchange, is very substantially constructed throughout, and while there is no attempt at superfluous ornamentation the style is simple and pleasing. A noticeable feature is the ample provision for light, there being a great deal of white tiling and glazed brick used and a large sky-light and window area. Communication is afforded by fast-running elevators, in addition to stairways. The lighting is to be done both by gas and electricity, and steam will provide heat during the winter months.

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THE Philadelphia Builders' Exchange has been one of, if not the most, successful of these organizations in the United States. Its inception dates from the fall of 1886, when a circular was addressed to various trades organizations of the city, with the result that in September a preliminary meeting was held and a resolution adopted to form an exchange. Several subsequent meetings were held and the charter was finally procured January 13, 1887. About the same time the Master Builders' Association of Boston were engaged in a movement to organize a national association of builders. For that purpose a conference was held early in January at the rooms of the Boston Exchange. It was resolved at this conference to hold a convention in Chicago, 1887, at which the exchange at Philadelphia were well represented and several officers of the national association were selected from their members. In the meantime the exchange had secured rooms and a formal opening was celebrated on April 7, 1887. Since then the organization has grown steadily in popular favor and now numbers about 300 members, including representatives from all the trades concerned in the building interests about Philadelphia.

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THE RAPIDLY INCREASING number of people who take an interest in manual training and all instruction other than mere book learning and theory must have had their attention directed recently to the new system of manual training introduced from Sweden and known as the Sloyd method. Prof. Carl Falleen, who is a graduate of the original Sloyd school in Sweden, came to this country a year or two ago for the purpose of introducing the new system of instruction here. For something over a year he has been in Boston, teaching at the North Bennett Industrial School, and his labors have met with most gratifying success. From Boston Professor Falleen went to Chicago. He is now in that city for the purpose of putting the Sloyd system in operation there. In a recent interview he gave a very interesting account of his method in comparison with the ordinary system of manual training. It seems that the manual training we are familiar with is of Russian origin, and according to Professor Falleen, the movement took a start here after the Centennial Exhibition, where the Russian exhibits brought the manual-training work to public notice. It is admitted that the system as practiced in Russia has undergone considerable modification now that it is transplanted here, but the underlying principle remains the same. It is in fact a method of teaching the use of tools without much regard to the results obtained. The young student is given blocks of wood and practiced with the various tools of the carpenter in succession, but the exercises he finishes and the work he does are not adapted to any useful purpose, the blocks of wood used being thrown away as the class progresses.

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WITH THE Sloyd system, however, a different idea is followed out, and that is to apply every exercise on some finished work. Each exercise makes a complete thing or is a step toward making a complete thing. The great value of this is that it awakens the interest of the student or child, and it is an axiom in all work of instruction that the results are proportional to the interest taken by the student. Furthermore, where the Russian system contains only straight-line exercises the Sloyd involves a good deal of free-hand work. The following paragraph from Professor Falleen's interview clearly illustrates the object of the system: "One peculiarity of the Sloyd is the use of the knife, which is its fundamental tool. The series of models is carefully chosen and so arranged as to give the child a progressive knowledge of the use of tools to make him understand the capabilities of his material and how to manipulate it in the best manner. The models are simple yet beautiful, adapted in details to the comprehension of the child and fitted to arouse in him a sense of artistic grace and fitness, and to teach lessons of thrift. The pupil learns to work in both hard and soft wood, using, for economy's sake, as little material as possible and making something of practical usefulness. No knick-knacks are allowed, and to create a love for sincere work and make care and skill necessary there is no painting or polishing. It should stand honestly for what it is as work. This emphasizes the necessity of the models being such as the pupil can finish without help, and, of course, demands that the series should progress gradually from easy to difficult, from simple to complex." Though the knife is the fundamental tool and the one mostly used, it must be remembered that the models should not require enough of time to weary a child with unfamiliar difficulties. After the preliminary work, models requiring greater time and a larger number of tools are substituted. A point emphasized by Professor Falleen is that all the work must be accurate and that no inexactness should be tolerated. Professor Falleen has come to this country at a most opportune time, when the general idea of manual training is just awakening to a full degree. Had he arrived when the old system was barricaded by long usage he would have found it hard work to introduce new ideas. As it is, Americans interested in the general subject are looking to be instructed and are glad to receive the suggestions that give promise of greater usefulness.

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FOR SOME years negotiations have been in progress between the two great architectural associations of the country, the American Institute and the Western Association, looking to a union on a national plan. A joint convention is to be held in Cincinnati on the 20th of the month to reach this organic union. At present each of the associations consists of 12 local bodies. With regard to the proposed consolidation Mr. A. J. Bloor, secretary of the American Institute, is reported to have said that he regarded a speedy union between the two federations to be certain, and that the step would have an important influence for good on the practice of architecture in this country. The general feeling is that Washington would be the most appropriate place for the home of the central organization. He said that architects were rushed to death with work, but that a large attendance was hoped for at Cincinnati, representing the leading men in the profession from the Philadelphia, New York, Boston and other chapters. The joint committee of arrangements consists of E. H. Kendall, Charles Crapsey, Normand S. Patton and Mr. A. J. Bloor.

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## THE PLATES.

In Plate XLI we show a perspective view and floor plans, designed by C. P. Robinson, architect, of Phillipsburg, Pa. It will be observed that the arrangement is such that both parlor and sitting-room may front on the street, making the house especially suited for a corner lot. The rooms are conveniently grouped about the main stairs, while the front apartments are connected by sliding-doors. Open fire-places are provided which afford a means of ventilation when not used for heating purposes. The attic is unfurnished, although ample room is provided for servants' apartments or a billiard-room. The cellar is excavated under half the house. The first story is 10 feet and the second 9 feet 6 inches.

In plates XLII and XLIII we give the elevations and details of a small china cabinet designed by Alexander Martin. A description somewhat in detail will be found on page 224.

In Plate XLIV we present several designs for hall chairs which will be found of general interest. They are of solid outline and substantially constructed, and were designed by Mr. W. Marsden.

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### Practical Paper-Hanging.

We add at this time to the series of articles which have appeared on this subject a communication published in the *Painter's Magazine* for June:

On beginning to paper a room measure the side wall from the ceiling to the top of the base-board and then cut on the figure nearest the length that will be long enough. This will vary according as the paper is a close or long match. After the paper is trimmed, either by machine or by hand, pasting is begun by pasting the side that is away from you before you move it. Then pull it toward you until it covers the edge of the board and finish pasting. If the paper is longer than your board, fold your paper over and pull the balance upon the board. By this method you avoid dragging the paper through paste left on the board.

A good paper-hanger can tell at a glance where he will commence to hang his paper, but the beginner should commence at that point in the room from whence he can hang the most strips by working away from the light, as by so doing your seams show less than if you worked toward the light. The natural way of hanging is to work from left to right, but a good paper-hanger can work either way. A room that is papered with good paper—*i. e.*, any grade above white blank—should be papered by both methods, running half way round by each method, always bearing in mind to work away from the light. Now we have come to a casing. Measure the width from the edge of the pattern to casing, paste your paper, fold perfectly even, mark the proper width, pull the paper over until it is clear of the other pieces, then take your straight-edge and paper-knife and cut or split it, as we call it. Take the piece that is left and match on it at top and bottom; if a window, then cut some shorter pieces to fill out with. If the last short piece does not come quite to the edge, so much the better, as you can then paste another longer, split off enough to fill out and match on the other piece. That is the proper way for a gilt room. Never under any circumstances let your paper lap over on the casing. Velvet paper should be applied with a roller, the hands being covered with a dry cloth. If the edges resist closing they may be struck lightly with a brush. The painter should ascertain beforehand if the edges come down to an exact level with each other. Should this not be the case the best course is to stripe the edges with the same color as the paper. So with any fine white lines that subsequently appear.

It is somewhat difficult to get wall paper properly to attach itself to an old whitewashed wall. The cause must be removed by scraping the whitewash off the wall and giving the surface a coat of glue size, taking care that it is strong. An excellent paste in such case is formed by mixing 1 pound of common sugar with each pailful of flour paste. If the old calcimine is not removed it is better to omit the sizing, as sizing would be apt to cause the calcimine to crack and break off. Where strong adhesiveness is required for particular portions of wall and ceiling surface a good method for preparing the paste is to boil the mixture of flour and water to a less consistence than ordinary paste, then adding to each quart ¼ ounce of pounded alum and lump-sugar and ⅓ ounce of rosin finely powdered, these being previously mixed in a brass or iron pot, which is set over a moderate fire and constantly stirred until it boils and thickens. Then put the paste to cool in a vessel which has the least possible surface for the paste to skin over, as before using the skin must be entirely removed. Should some adhesive liquid be required to reduce the consistence for fine purposes, gum-arabic water, otherwise glue dissolved in oil or water over a moderate fire, may be added.

In papering a ceiling have your scaffold (a pair of steps and a plank) put up; then strike a line, if a plain ceiling, 18 inches; if a small room, and you intend decorating it, 9 inches, away from the side wall, and run your first strip by it. This gives you a straight line by which to run borders if any are used. After the line is made for your stiling, strike another one just as far away from it as your extension is wide less 1 inch, and run your first strip of "field" by it. This method frequently saves the cutting of an extra strip of "field-paper."

In hanging the lighter grades of paper it is better to put them up just as pasted, but for heavier papers the best results will be obtained by letting them soak for a while. If you are doing your own pasting the following method is recommended: Paste a strip, fold and trim, then lay it on your scaffold if for ceiling or on your step-ladder if for side wall. Then paste your next strip, folding and trimming it, then hang strip No. 1, always keeping one strip pasted ahead of you. It is impossible for a blister to come under paper hung in this way.

If you have a paster let him keep one strip always ahead of you. In papering a ceiling learn to put it up without the help of your paster, as you can do it both easier and better. Take the strip after it is pasted, catch the end from which you start with your right hand, and let it unfold over your left, the end hanging down over the scaffold; then start the piece by bringing the end in right hand at the proper figure. Extend the left forward as far as you can conveniently reach, get the paper straight and fasten the end by running the back of your hand across it. Take your brush or roller and smooth the paper as far as your left hand. Then take up another section with your left hand in the same manner as before and proceed with the entire strip as described.

You will observe that after the first end is fastened you do not touch the paper with your right hand, but keep brush or roller on it instead, and as fast as you lift the paper to its place with the left hand smooth it down. Or you can, just as soon as you have the start made, let the brush or roller run in the middle of the strip until you have the length up; then fasten the edges.

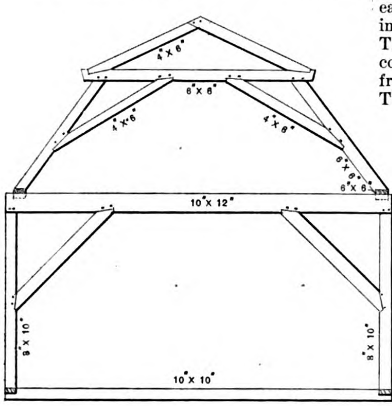
As stated, if your paster will keep the paper ready pasted that is all you want of him. If he must get on the scaffold every time with a strip of paper and you are obliged to wait till he has another strip ready he cannot be of much use.

In mixing plaster-of-paris for stopping cracks or holes about two-thirds whiting and one-third plaster are the best proportions. Mix this with water, to which add a little good vinegar, as that keeps it from "setting" so quickly and the mixture is just as good. Before you begin to use your plaster take a brush and wet all the places you intend plastering, and you will find your work much better when you get through.

## An Old Dutch Mill.

BY OWEN B. MAGINNIS.

In the valley of Sleepy Hollow, near the old Dutch church made famous by Washington Irving in his legend, there once stood an old wooden-trussed bridge, across which Ichabod Crane madly dashed in his wild race with the headless horseman. The bridge, now replaced by a substantial stone structure, spanned a small river, or




*An Old Dutch Mill.—Fig. 1.—Cross-Section of Mill, Showing Framing.*

rather the upper end of a dam, which supplied the power by an undershot water-wheel to an old Dutch grist-mill, which lies directly southwest from the bridge and close to the old stone manor-house. From the similarity in design between the mill, the church and the manor-house it would be safe to infer that the three were the work of that useful architect and colonist, Yost Van Houten, to whom Irving accredits Ichabod's school-house and the church. The mill is picturesquely hidden by weeping-willows, and its quaint and solid architecture takes one back to the time when the patient, healthful labor of the early settlers characterized the place. The mill in itself does credit to the mechanical abilities of the people of that day, according to the views of the writer, who had an opportunity of thoroughly examining the details of construction and the systematic manner in which it is put together. The result of this inspection clearly proved to the writer that the artisans of that day were by no means wanting in either tools or brains. On account of the extremely dilapidated condition into which the structure was falling the mill has lately been renovated by the owners, Messrs. Kingland, so that to-day the roof and shingles are new. The main details, however, clearly indicating the skill with which the structure was erected, remained intact.

The timbers of which the frame is constructed were hand-hewn into the necessary shape by means of the axe and adze. The logs were cut and hewn in the woods and dragged by oxen into the open space, where they were framed together in bents, each bent forming a complete frame, as indicated in Fig. 1 of the illustrations. The timbers were massive and of the most convenient size that could be obtained from the tree without much hewing. They were of white oak and of the following dimensions: The sills were 10 x 10 inches, halved together at the corners in the usual manner. The main posts were 8 x 10 inches, tenoned into the sills, mortised and gained on the angle for transverse braces and tenoned into the tie-beams above. The tie-beams were 10 x 12 inches, mortised on top of beams and mortised and gained for upper ends of main braces, which measured 8 x 8 inches and were draw-pinned into posts and tie-beams, as shown. Resting upon the upper edges of the beams and slightly gained in were the wall-plates, also of white oak and 6 x 6 inches, tieing the lower frames together in the manner indicated in the longitudinal section, Fig. 2. They were secured by wooden bolts made of oak and driven vertically through the plate into the beam. When erected the frames were braced lengthwise by pieces extending from the corner posts and counter-braces to the center of the length under the wall-plate and let into the posts their full thickness and width—that is, 4 x 6 inches. From the plates rose the principal rafters, mortised at their upper ends into the upper tie-beam and draw-pinned. They were also braced by the 4 x 6 inch pieces which are shown gained and spiked together. On top of the upper tie rested the top rafters, which also measured 4 x 6 inches and were gained into the beam at the foot, the joint at the peak being overlapped and pinned as represented. This joint is probably the most primitive in the structure, and shows that the Dutch carpenters feared that the timbers might slide on a butt-joint. The absence of nails in the frame is commendable, and modern framers would do well to copy the Dutch in this respect and trust less to the splitting qualities of nails. The entire frame was covered with cypress boards, ripped out with the pit-saw and shingled.

The old moss-eaten shingles, still covering one side, prove the durability of the shaved cedar shingles. These were of white cedar and run from 2 feet 6 inches to 3 feet long, averaging from 6 to 8 inches wide, and were originally, as near as I could judge, $\frac{3}{4}$ or 1 inch thick at the butt. They were laid 14 inches to the weather and fastened with hand-wrought nails. The vertical joints were well apart

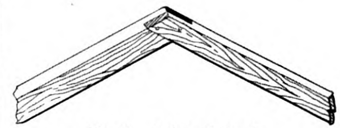


*Fig. 3.—Joint at Peak.*

to guard against leakage. The verge-boards were of pine, as was all other exterior wood. The flooring is evidently of later date than the frame, as it is of white pine boards from 12 to 16 inches wide and $1\frac{1}{2}$ inches thick, tongued and grooved together. From the resemblance to the flooring in Washington's Head-

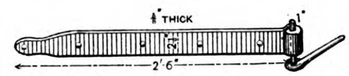



*Fig. 4.—View of Door-Hinge.*

quarters at Newburg and in other houses of that date it was likely laid during the Revolutionary period. The doors, as usual in Dutch houses, were composed of an upper and lower section, 2 inches thick, framed with flush panels and hung with strong, roughly-fashioned iron hinges secured to the door by heavy nails and staple, with hanger driven into the oaken door-post.

Owing to its extremely damp situation the old mill has stood the weather of two centuries admirably, and the interior timbers show no sign of rot. While it is all much deflected and strained, the fact that it still exists and that the timbers are in such a good state of preservation goes to show that the seventeenth-century colonists were more thorough in their building than are the highly-educated artisans of the nineteenth century.

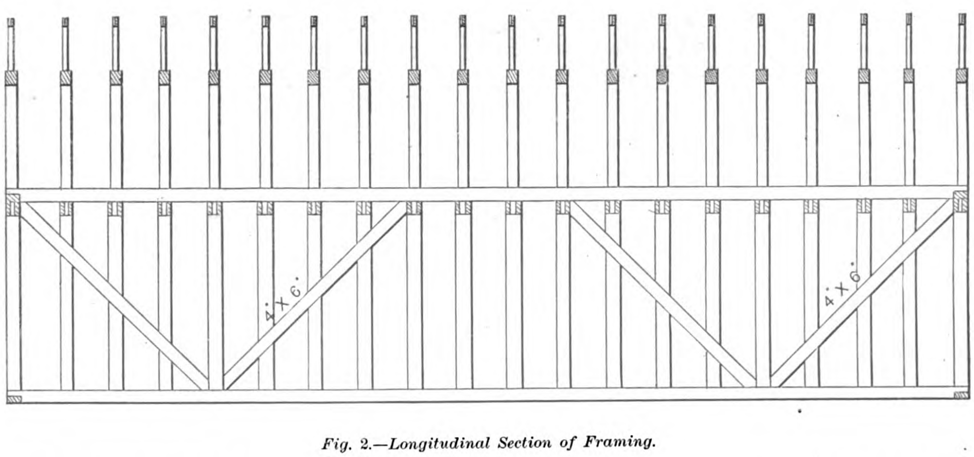



*Fig. 2.—Longitudinal Section of Framing.*

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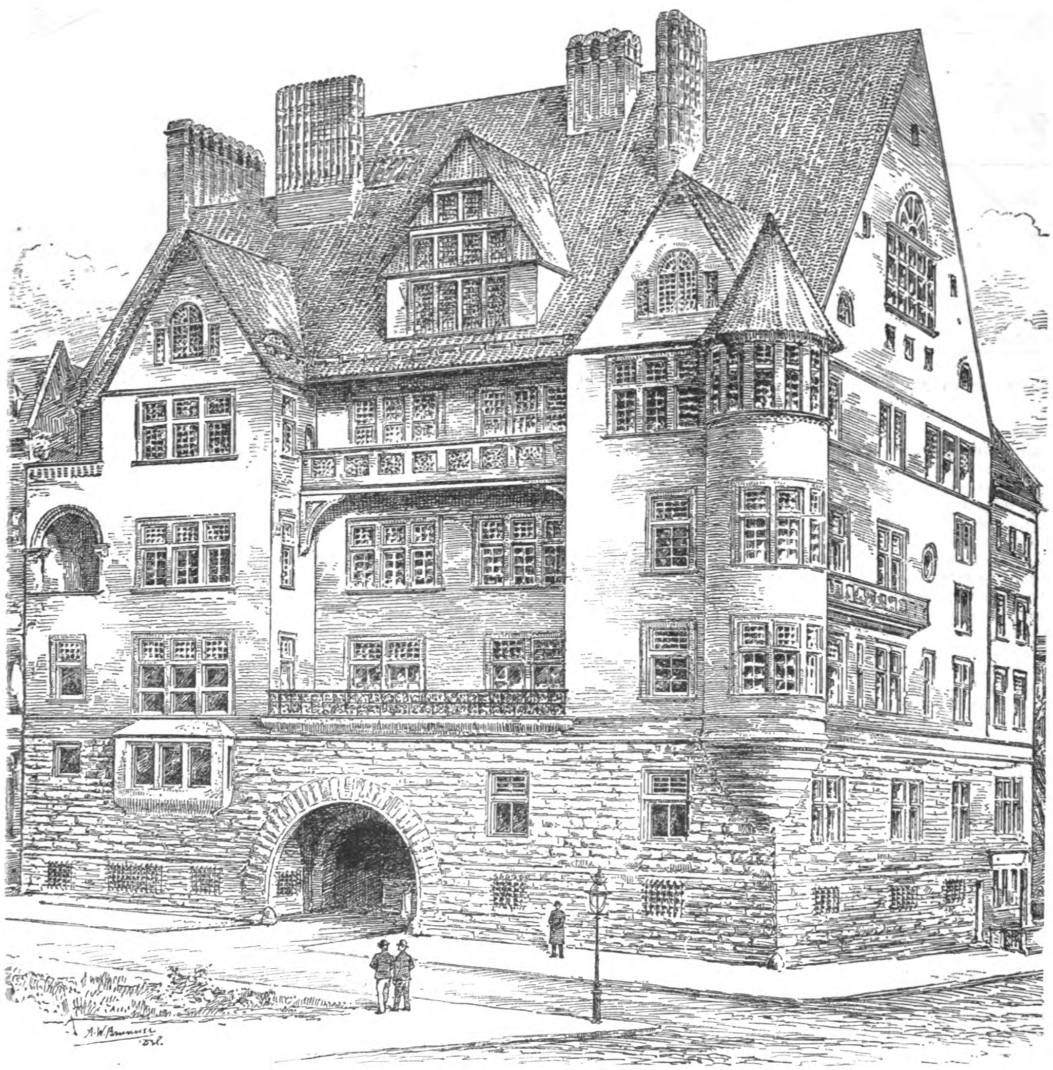
ONE OF THE remarkable features about architecture in New York at present is the rapidity with which buildings are completed, particularly the great office buildings in Wall street and elsewhere downtown. Formerly the construction of such buildings was a matter of years; now they are finished and occupied in a few months after the foundations are laid. Nine and ten story buildings which were only begun in June are now ready for their occupants.

### Residence of Charles L. Tiffany.

On this page we present to our readers a perspective view of the residence of Mr. Charles L. Tiffany, which is located at the corner of Seventy-second street and Madison avenue, New York City. It will be observed that the structure is remarkable not only for its size as a city residence, but also for its architectural features and the construction of the roof which covers it. The latter feature formed the basis of an illustrated article in these columns some time ago. The great archway in the rusticated basement leads to a central court lined with glazed brick. Above the basement the wall is composed of thin brick closely resembling the Roman, while the color differs materially from that ordinarily employed. The house was built from plans prepared by McKim, Mead & White, of New York City.

### A Blue-Grass Palace.

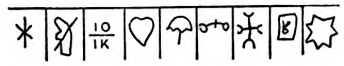
A unique conception among exhibition buildings is the so-called blue-grass palace which has been erected at Creston, Iowa. The corn palace is now an established autumnal institution at Sioux City, Iowa, and the dwellers in the blue-grass region of the same State have concluded that their own favorite natural product was equally worthy of public notoriety. As described in an exchange, the blue-grass palace is a strange creation of the unique and beautiful in art, in design and execution. One hundred feet square, and with its topmost spire rising 120 feet in hight, and standing out upon the summit of the highest point between Burlington and Omaha, it looks from a distance like one of the old castles to be seen along the Rhine. Of course the supporting structure is of heavy timbers, but all these are so completely covered over with grass and grains that no sign of wood is seen from without and only the floorways and the winding stairs are visible within; and the stalls and galleries and arches are beautified in every conceivable way by curious designs wrought from combinations of the many-colored growths from the field, the meadow and the garden. The blue grass seems to be the natural successor to the wild prairie-grass, and when the prairies are pastured for a few years, without sowing a seed, the tame grass takes the place of the wild, and from some peculiarity in the soil and climate, like the buffalo grass of Colorado, it ripens and cures on the field without losing its nutritive qualities. Hence farmers do not cut the blue grass at all, but after pasturing till about the 1st of June permit it to grow till fall, when it reaches a hight of some 2 feet, and then bends over and forms a heavy dry pasturage, upon which cattle and horses will thrive all winter; and then it is by six weeks the earliest pasturage of the spring.



L. L. Sagendorph, of Cincinnati, Ohio, has assigned to Charles N. Harder, of Philmont, N. Y., a one-half interest in a patent lately granted for a metallic ceiling and sheeting strip, the object of which is to properly retain metallic ceiling-plates in position without the necessity of first stripping the joist with ceiling-strips.

## Log-Marks.

The newspapers published in the towns along the Susquehanna, says an issue of the Philadelphia *Press*, present a curious appearance since the flood. Some of their pages look like the sides of a Chinese tea-box circular or extracts from a Hebrew Bible. The Harrisburg papers are especially afflicted with this surprising taste for puzzling cuts. Yesterday, for instance, a Harrisburg daily contained several columns of such pictorial jargon as Fig. 1. The law provides that the owner of the property upon which drifted logs or lumber accumulate shall file with the nearest justice of the peace a description of such



*Log-Marks.—Fig. 1.—Showing Sample of Log-Marks.*

lumber and advertise it, with the marks upon it, in a county paper for at least three weeks. The owner of such log can then recover it upon the payment of all costs and salvage to the person picking it up or upon whose land it lodges. If he does not recover it within three months the lumber becomes the property of the owners or tenants of the

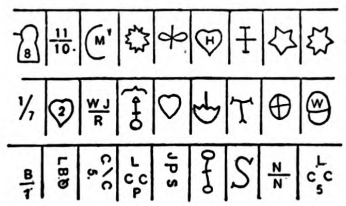


*Fig. 2.—Some of the Marks Used on Hemlock Logs.*

land upon which it is lodged. This is why the papers published along the Susquehanna are filled with these curious cuts. Each owner has his own peculiar brands for each kind of lumber, and it must be entirely different from that of any other lumber-owner. Fig. 2 shows some of the curious brands on the hemlock lumber found and advertised. The curious subscribers discovered upon reading the little explanation in small type accompany-

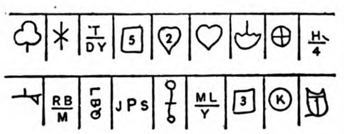


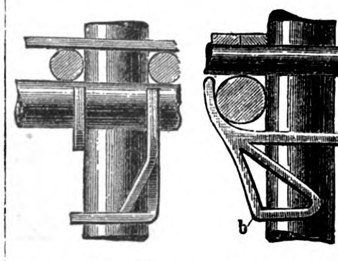
*Fig. 3.—Marks Used on Pine Logs.*

ing these apparently meaningless hieroglyphics that they are all about the lost saw-logs from the Williamsport boom, which, when it was burst by the flood, shot several hundreds of millions of feet of lumber down stream and stranded hundreds of thousands of logs upon the Susquehanna shores and upon the numerous islands in the river. Every one of these logs was branded so as to show to whom it belonged and is registered in the county court records under a general State law, so that when by any mischance it goes astray the man into whose possession it comes can find an owner for it. Each figure in the cut last mentioned represented the private brand of an oak-log owner and was put in the paper by the man upon whose property the logs so branded were found. An adjoining column was filled with brands of pine logs like Fig. 3. There is a somewhat different Maryland law, which protects the owners of branded logs and lumber which pass down the river and into Maryland waters. The salvage there is greater than in Pennsylvania, and the chances that a man who owns drift lumber at the mouth of the Susquehanna or in the Chesapeake Bay will get his property back are not nearly so good as when it is found in this State. The salvage in many cases of the logs stranded on the river since the flood will amount to several thousands of dollars. In some cases it will be greater than the value of the islands upon which the logs are lodged.

## Scaffold-Clamp.

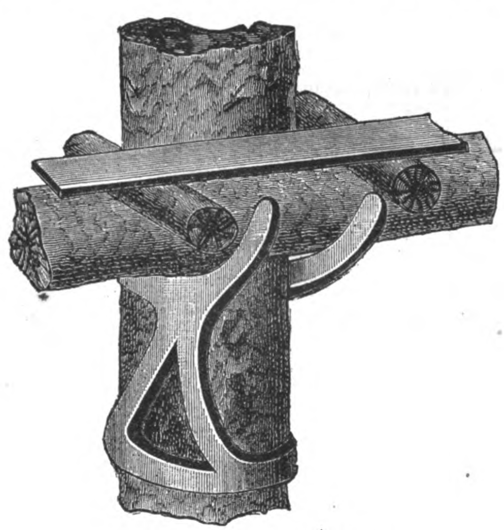
The accompanying engravings represent a contrivance which we are informed is in considerable use in Germany for fixing the cross poles to the uprights in scaffold-building. According to the description issued by the patentee, Ottoman Erfurth, Teuchern, Germany, the device has the following features: "The holder is made of one piece of iron and consists of a saddle-arm, clamp provided with spur and counter-arm provided with spur. It is fixed to the vertical pole by pushing it on sidewise and turning it with a jerk, the arms pointing in an upward direction. This can be done with one hand and in a few seconds. The holder fixes itself automatically, so that it is even superfluous to drive in the spurs with the hammer. The holder thus fixed to the post permits the horizontal beam to be placed on the projecting saddle-arms, and its weight will tend to press the holder against the vertical post in such a manner that the spur on one side and the counter-spur on the other side will both enter the wood and prevent the holder from sliding off. The holder is now made in two sizes—viz., 4¾ and 6¾ inches—and it may be pointed out that they can be used with equal security to posts of half their thickness."

Commenting on this the London *Builder* says: "We should hardly agree to the statement that the holder can be used with equal security on posts half the thickness of that which would fit the curve; it would have a grip, no doubt, but hardly such a good one. We have examined a specimen of the holder, which is of ample strength for its purpose, and the principle of the grip is of course much the same as that of the Lewis, applied in another form. The only question is whether the sudden lifting of a heavy weight off the scaffold might not give a shake to the supports at the same moment that it loosened the grip,



*Rear and Side Views of Scaffold Clamp*

with the result of a slip. It could not slip far on rough scaffold timber, but it might slip sufficiently to cause an accident if the spike did not suffice to hold it. We do not think it very likely it would fail in that way; but we should recommend a severe test before adopting it on large work. Its advantages, if proved to be secure, are obvious."



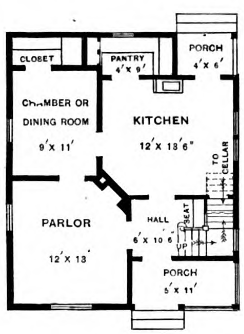
*Perspective View of Scaffold-Clamp.*

We are in receipt of the current circular of the Academy of Architecture and Building, 3066 South Ninth street, St. Louis, Mo., of which H. Maack is principal. This institute was founded in 1885, and, according to the circular, has enjoyed a prosperous existence. The aim of the institute is an excellent one, as it is intended to offer educational facilities to beginners in the building trades who desire to master all the principles of their work. Instruction is provided in mathematics, including arithmetic, geometry and trigonometry, while architecture and drawing occupy a large amount of the time. There is also special instruction in book-keeping, English literature, &c. The full course at the institute consists of three terms of 12 weeks each, the regular winter course beginning the first week in September and closing the end of February, daily sessions continuing from 8 a.m. to 5 p.m. The object of restricting the school year to the winter months is that young men may obtain instruction and be free during the busy summer months to follow their trades.

### A Cheap Frame House.

On this and the following pages we show the perspective, floor plans, elevations and details of a cheap frame house designed by Mr. W. A. Pearson, of Dayton, Ohio. It will be seen that the house, entrance to which is secured through a hall from which rise the main stairs, has six rooms, three being on the first and three on the second floor. One of the rooms on the first floor is so arranged that it may be used as a dining-room or chamber, as may be preferred. The kitchen is provided with the modern conveniences and from it opens a pantry 4 x 9 feet in size. From the architect's specifications we learn that the sills are 4 x 6 inches, halved together at corners and joints; that the joists are 2 x 8 inches for first and second stories, 16 inches on centers; that the collar-beams are 2 x 4 inches, firmly nailed to each rafter; the studding 2 x 4 inches, 16 inches on centers, doubled at corners and openings; the plates 2 x 4 inches, doubled and lapped at corners, well joined and spiked together; rafters 2 x 4 inches, 2 feet on centers, and hip and valley rafters 2 x 6 inches. The exterior walls are covered with patent siding and cut shingles, laid $5\frac{1}{2}$ inches to the weather. The roof is covered with shingles. The kitchen floor is of hard pine and all others white pine not more than 6 inches wide. The exterior wood and tin work are covered with two coats of linseed-oil and lead paint of whatever tints may be selected. The inside finish of parlor, hall, bedrooms and kitchen is of yellow pine, while the finish of pantry, closets and second floor is of poplar.

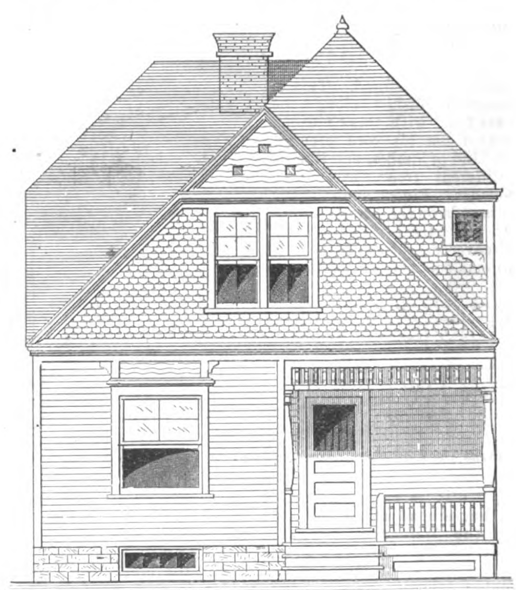
*A Cheap Frame House, Designed by W. A. Pearson, Dayton, Ohio.—Perspective View.*




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

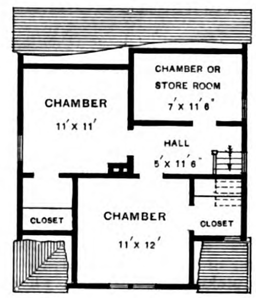
### The Speculative Builder and His Methods.

It is said upon authority that there are over 5000 buildings in course of erection in the city of New York at the present time. These, of course, are of every class, from the 12-story business palace of Charles Broadway Rouss to the home-maker's modest little two-story frame cottage in the district north of the Harlem River. It is in such times of activity as these, says Scott Thompson in a recent issue of *Harper's Weekly*, that the "speculative builder" expands himself, and just at this period he is spreading his personality and methods all over the city, from the Battery to Riverdale, though chiefly in the upper west side and the Harlem district.



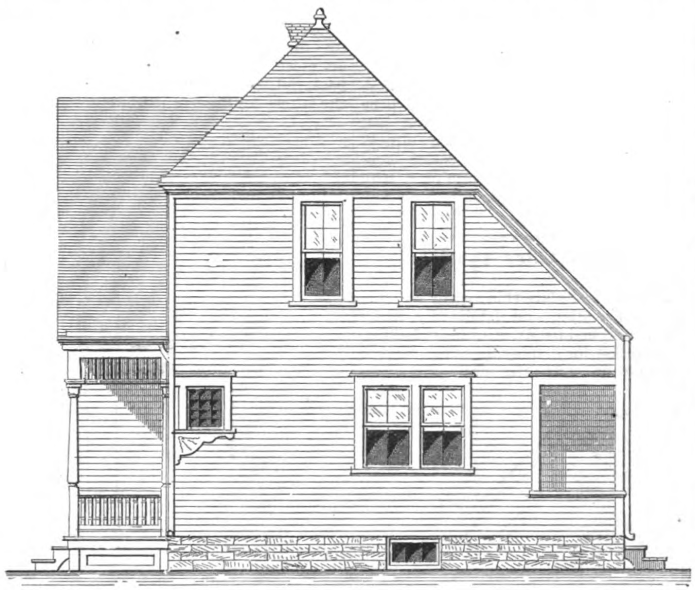
*Front Elevation.—Scale, ⅛ Inch to the Foot.*

There are two distinct classes of this ubiquitous individual as known at the Department of Buildings—one is called the "speculative builder," the other the "jerry builder." The first-named, as understood at the department, is the builder whose capital is either none at all or very small, whose intentions are good and building methods honest, but who is always taking big chances in borrowing money for his operations at exorbitant rates, thus keeping himself in the power of the money-lender. In prosperous times like the present, when fairly-built dwelling-houses are bought up almost as soon as completed, the officials do not look very sharply after this class of builder, as their time is pretty well occupied in watching the "jerrys," but when times get troublous with him, and houses do not sell, and the "banker" wants his money, it is then, if he happens to be carrying on other operations, that the building inspectors look well about them.



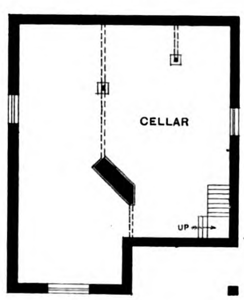

*Second-Floor Plan.—Scale, 1-16 Inch to Foot.*

But it is the "jerry builders" that keep the inspectors busy. Of that class was Charles A. Buddensiek, who is now serving out a sentence of ten years in Sing Sing for crushing the life out of a poor workman in the ruins of the "mud-mortar" structures that collapsed in West Sixty-second street about four years ago. Here was a man who for 12 years had been erecting tenements and other dwellings and in deliberation coolly ordering his workmen to violate all the laws of both the Building and Health departments, with which he was continually at loggerheads. In fact, throughout his 12 years of dishonest building, during which he is said to have accumulated a fortune of over $500,000, no less than 300 complaints were lodged against him in the Building Department for violations of the rules. He, unfortunately for himself, became a notorious example and had to suffer, though there were others just as guilty as



*A Cheap Frame House.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.*

he. There are still plenty of them. Their buildings do not fall down and rudely crush the victims to death, but stand erect, with their violations of all sanitary laws in the ventilating arrangements and in the plumbing, poisoning the inmates year after year with vitiated air and foul sewer-gases, bringing a typhoid death to many and a living death in lingering illness to others. This "jerry builder" may put cement and good sand in his mortar, may come up to the requirements of the law with his proportions of lime and plastering-hair, buy well-baked brick for his side walls and front, but he leaves out the traps in his sewer-pipes, he makes



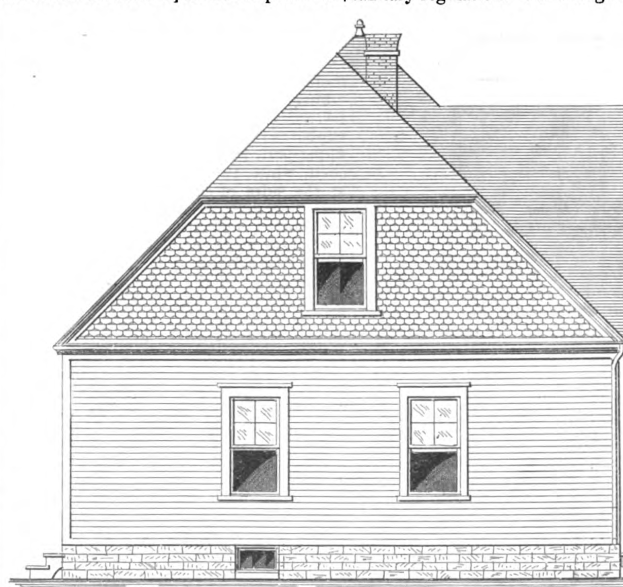

*Foundation Plan.—Scale, 1-16 Inch to Foot.*

sewer connections that are so small and inadequate that the sewage stays fast in the pipes, festering there and sending up its deadly germs to kill the infant and poison the adult. This is how the "jerry builder" commits murder by another method—a slower one than Buddensiek took, but as sure a one as was the brutal crushing out of the life of that scoundrel's victim.

How did this class of men arise in the midst of an enlightened community? Forty years ago, when the city first begun to take upon itself the distinctive features of metropolis, the "jerry builder" made his appearance on the current of business activity. In dwellings the high-stooped, square-front brick or brown-stone house was the prime favorite among all classes, and became accepted all over the country as the New York vernacular in architecture. It was through the opportunities offered for flimsy substitution in this class of building that the "jerry builder" became a factor in the community and incumbered Manhattan Island with his fragile structures. He is peculiarly a product of the New York speculative mania. He is, if it may so be called, a necessary evil that is always sure to be coincident with the rapid development of a city's population and material resources. He is a factor that may be largely productive of good or evil, the tendency depending greatly upon the moral integrity, as well as the business necessities, of the person or persons who may be in direction of the operations. The conditions that permit him to exist in New York, and just now to flourish generally, can have no place in the municipal economy of any other cities of the United States, with the possible exception of Philadelphia and Chicago, and even in these two cities they can only exist to a limited extent, and but temporarily at that, for though the "jerry builder" may develop in a crude sort of a way during periods of unwonted activity in building enterprise, he does not have a fair chance to arrive at that perfection of his art that his New York compeer often attains. Brooklyn is not mentioned in this connection, for the reason that the conditions which exist in New York are the same there, as for all practical purposes the two cities are about as one.

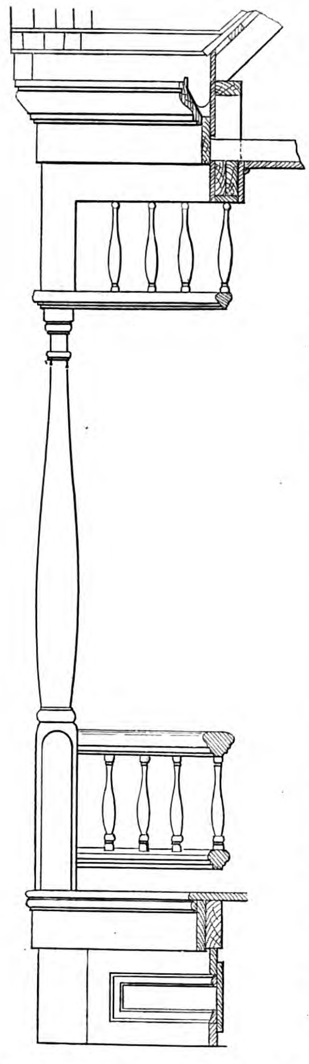
The causes that permit him to pursue his way and prosper in New York may be summed up in a general way under four headings: 1. The unsatisfied demands of an enormous, restless and ever-increasing population for homes of all classes suited to their individual needs and wants. 2. The greed of capital that is seeking a channel for remunerative investment; the competition that this greed enforces places the necessary means within reach of the unscrupulous and irresponsible builder for carrying to the end his nefarious enterprises. 3. The political and private corruption that exists in the various departments of the city Government with which this class of law-breaker is likely to come into conflict, and if he has a political "pull," enabling him to violate the laws with impunity, or if not that way, by smoothing his way with bribery, which guarantees him equal immunity from possible consequences. 4. The red tape of the law, which when honest enforcement of regulations is attempted by the officials of the department involved practically forbids prompt and decisive action on the part of the authorities when flagrant violations of the building or sanitary laws are discovered and the offender brought to answer.

An interesting case of evasion of the sanitary regulations was brought to light but a short time since in connection with a row of so-called first-class dwelling-houses on a street up-town, west of Central Park. The cellars for these houses had been blasted out of solid rock, involving



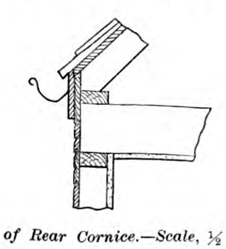
*Side (Left) Elevation.—Scale, 1/8 Inch to the Foot.*

an enormous expense to the builder. To make the connections for the street sewer called for a further expenditure of $300 for each house. This also involved blast-



*A Cheap Frame House.—Elevation and Section of Porch.—Scale, ½ Inch to the Foot.*

ing in each case; but instead of so doing, the contractor ran the waste-pipe from each house down under the cellar floor, and thence back under the yard to a point

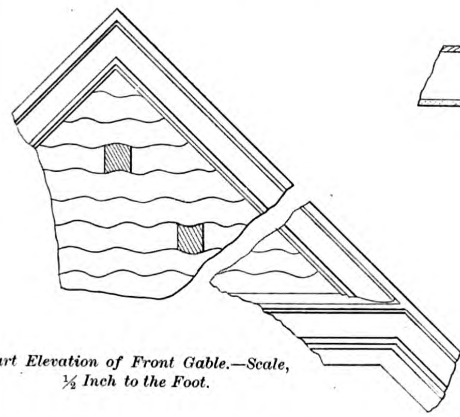


*Detail of Rear Cornice.—Scale, ½ Inch to the Foot.*

beyond the fence line, where the mouth of the "private sewer" was hidden under a pile of broken rock that ostensibly was there to make a foundation for the rear fences. This one item saved the builder nearly $2000, and when the roguery was discovered, some six months after, and then only after an investigation by the Board of Health into the cause of so much sickness in the row, it was found that the houses had been built by a well-known "jerry builder," but in the name of a "dummy," who was legally the responsible party and who could not be found when searched for. This could not possibly have been done without theconnivance of the sanitary inspector, but there is no record of any one ever having been brought to account for it. It was just such an arrangement as this, the employment of a "dummy" by Buddensiek in all his operations, that enabled him for so long to evade the legal consequences of his violations of the law.

## A Small China Cabinet.

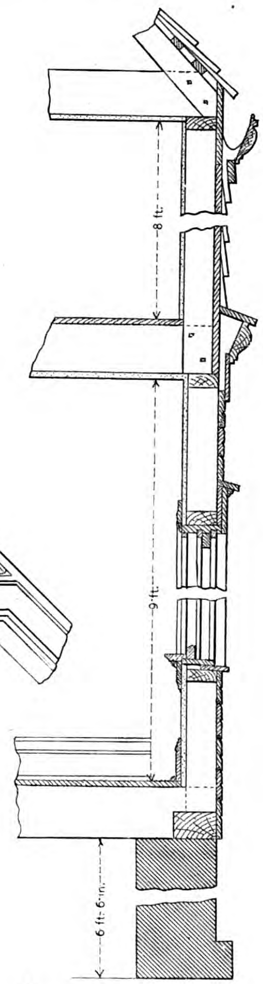
In our double plate this month we present the elevation and details of a small cabinet designed by Mr. Alexander Martin. It is intended for displaying china or other ornaments or curiosities while protecting



*Part Elevation of Front Gable.—Scale, ½ Inch to the Foot.*

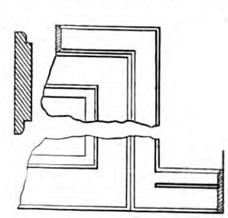
them from the constant dangers to which they are exposed by the frequent handling necessary in keeping them free from dust. The cabinet is a small one, measuring 3 feet across and 5 feet 9 inches high altogether, and is shown in Figs. 1 and 2, which are front and side views respectively. The accommodation consists of a cupboard with two glass doors in the upper part, the top being available as a shelf, while two small shelves are placed at the sides of cupboard. In the lower part there are two little drawers under the top, with a cupboard inclosed again with two glass doors, and near the floor there is a shelf for larger ornaments.

The gables of the under part are $\frac{3}{4}$ inch thick and are shaped as shown at *a*, Fig. 2. This shaping is simple, and the half of it is shown in Fig. 3, two-thirds full size. The dotted lines shown on the gable in Fig. 2 indicate where the shelves, &c., are raggled in. The top and bottom fore-edges to the drawers are mortised into the gables; the lower fore-edge is molded, as in Fig. 13, and the division between the drawers should be molded in the same way. A pine rail at the back is dovetailed from behind into the two gables. This rail should be $\frac{3}{4}$ inch thick and extend down to the lowest edge of bottom fore-edge, so that the center drawer runner may be supported by it. The bottom edge of this rail should be grooved to receive the back, as shown in Fig. 17; the fielding of the back being to the outside. The bottom of the cupboard and the bottom shelf should be raggled into the gables—one side of the raggle being dovetailed—see Fig. 14, where the upright is the gable and the horizontal piece is the shelf. This cupboard bottom may be of pine or deal, with a front of 1 inch or so wide, of walnut, as the inner surface is intended to be covered with velvet; but the lower shelf must, of course, be all walnut. Both should have their front edges molded, as in Fig. 13. The drawer runners and guides, grooved for dust-boards, are screwed to the gables, and the center ones are mortised between front fore edge and back rail. The drawers are made to suit the spaces for them; the fronts are checked




*Section Through Wall of Left Side—Scale, ½ Inch to the Foot.*

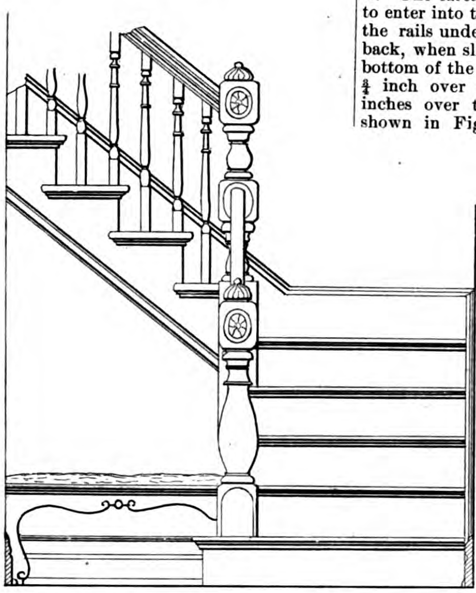
barely $\frac{1}{8}$ inch down and $\frac{5}{8}$ inch on, to form a raised panel. Then there is a thin plate glued in the center of the drawer-front on



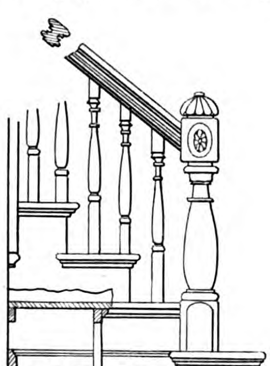
*Detail of Finish in Kitchen, Pantry and Second Floor.—Scale, ½ Inch to the Foot.*

which the brass handle is fixed This plate is $\frac{1}{12}$ inch in thickness and is shaped at each end as shown in Fig. 4, which also shows a section of the drawer-front with the check and also with this plate glued on. There should just be a little margin of the plain surface of the plate seen when the handle is on, so that the smaller the handle is the smaller will be the plate required.

The doors are framed up with stiles and rails $1\frac{1}{2}$ inches by $\frac{7}{8}$ inch, finished with a small sash-molding run off the edge. The astragals are shown in section in Fig. 11 and in elevation in Fig. 12, both drawn two-thirds full size. The relation of the door to the gable is shown in Fig. 10, where also the gable is seen checked to receive the carcase-back. The door-framing and astragals are shown with a check for the glass of only $\frac{1}{8}$ inch. This is quite enough for beveled glass as proposed to be used, for if made deeper there is a needless covering up of the bevel of the glass.



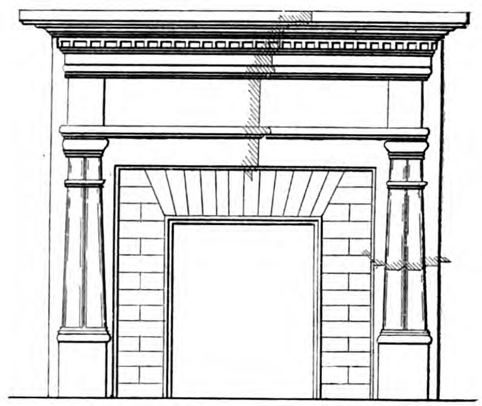
*A Cheap Frame House.—Elevation of Stairs, Showing First Landing.—Scale, ½ Inch to the Foot.*



*Elevation of Stairs.—Scale, ½ Inch to Foot.*

If it were decided, however, to use plain glass instead of beveled, the glass-check should be the size of the sash-molding—*i. e.*, $\frac{1}{4}$ inch. The division between doors is molded and set in, as shown in Fig. 15, this division forming at the same time the shutting-check of the door.

The shaping under cupboard doors is 3 inches wide at the broadest parts and $\frac{1}{2}$ inch thick. In the corners there is a $\frac{5}{8}$-inch hole bored just to give variety, and in the center there are three $\frac{1}{2}$-inch holes bored for the same purpose. This shaping being fitted and blocked in at the front, the lower shaping is prepared and fastened in at the back, resting on the shelf. This shaping is $3\frac{1}{2}$ inches broad by $1\frac{1}{2}$ inches thick, but has no holes bored in it. The carcase-back is fielded at the top to enter into the groove already made in the rails under the top (see Fig. 17) ; the back, when slid up, being screwed to the bottom of the cupboard. The top projects $\frac{3}{4}$ inch over the front and ends and $1\frac{1}{4}$ inches over the back, and is molded, as shown in Fig. 16. This is fastened by screws through from underneath the front core-edge and from the back rail, which is pocket-holed for that purpose.



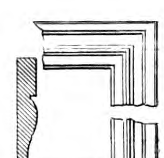
*Detail of Parlor Mantel.—Scale, ½ Inch to the Foot.*

The upper part rests on the top, the latter being cut to let the back posts down and bored to let the front pillars into it. These back posts are $1\frac{1}{4}$ inches square and are shaped at the top, as shown in Fig. 5. This is the side view of the top of post and not the front view. Into these two posts are mortised two rails, each $1\frac{3}{4}$ inches by $\frac{7}{8}$ inch thick, and with a sash molding run on the edge, as shown in Fig 18. The shelf, which also forms the bottom of cupboard, runs all the length of the back and has the corner taken off at each end, as shown in Fig. 19, which is a plan of end of shelf drawn to same scale as Figs. 1 and 2. This shelf is molded on front and shaped ends, as section given at top of pillar in Fig. 8, and it is fixed against the topmost of the two rails already in the back, with the top surface of the shelf and the top edge of the rail in a line with each other. This makes the lower rail appear broader than the top one, but it is done purposely, as the rail at the bottom ought always to be so when there is not a base molding carried right along. Fig. 9 shows an alternative pillar.

The gables to the cupboard are $\frac{5}{8}$ inch thich and molded on the edge, as the drawer fore-edge and shelves in the lower part were done (see Fig. 13). The gables should have a couple of mortises through the shelf, running up to the under side of the top member of the cornice, and have two pine rails, $1\frac{1}{4}$ x $\frac{7}{8}$ inch, mortised into them, one at the front and one at the back. The front one should be slipped on its bottom edge with walnut, as shown, although the cornice-molding covers it on the face. Fig. 7 is a section of the cornice-molding and door-framing, B being the pine rail with its under edge slipped with walnut, A the cornice-molding planted on front of B and carried round the gables, C the top to be put on above all, screwed from behind B before the back is put in the cupboard, and D the door-framing. The gables before being fastened together, however, should be checked at back to receive the back of the cupboard, $\frac{1}{2}$ inch thick, of pine, in exactly the same way that the lower cupboard had its back fixed to the gables (see Fig. 10).

The side rails above shelf are mortised into the posts and cupboard gables and rest on the top of the rail in a line with the shelf. These side rails are $5\frac{1}{2}$ inches broad and $\frac{5}{8}$ inch thick and are shaped on their top edges, as shown in Fig. 6. Below the shaping is shown a molding exactly the same as is used on other parts of the work. The shaping of these rails should be carefully done, so that the lines are flowing and graceful.

Coming back, then, to the cornice of the cupboard, the top C, Fig. 7, is molded, as shown, on front and ends and is screwed down from below through the front and back rails. The back is then fitted in very loosely and fastened temporarily. The ledge at the back of the top is simply to add a finish to the whole and is $\frac{5}{8}$ inch thick, with moldings planted on it to form the pediment. A section of the molding used is given in Fig. 20. This ledge is fixed on the top with a couple of dowels. It would be as well to put a thin shelf $\frac{1}{4}$ inch thick inside the cupboard and supported on two fillets screwed to the gables. Brass drop-handles go on the drawers, and as they are the only handles required they should be neat and good ones. One thing should have been mentioned with regard to the locks—they should be of such a size that the key-hole will come exactly in the center of the plain surface of the stile. The cupboards require to be lined to complete their appearance.

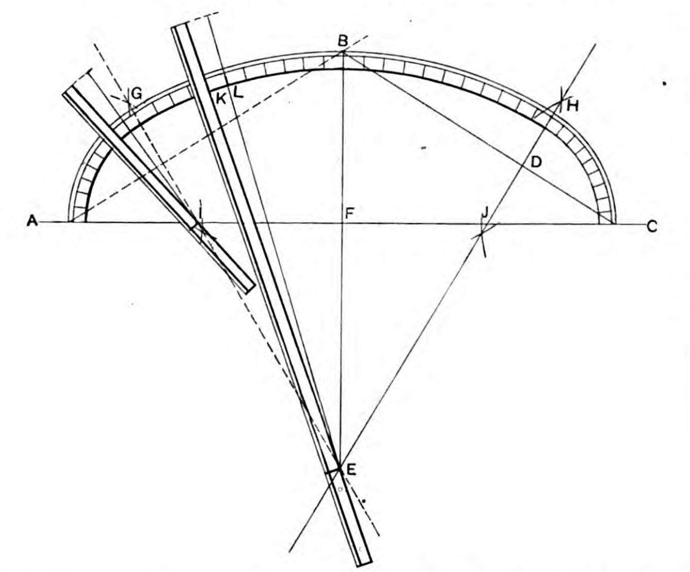


*Detail of Finish in Parlor and Hall.—Scale, ½ Inch to the Foot.*

# CORRESPONDENCE.

### Saw-Kerfs for Bending an Elliptical Head Jamb.

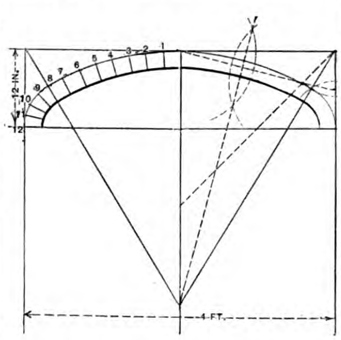
*From* H. J. B., *Louisville, Ky.*—I notice in the issue of *Carpentry and Building* for August a request from "J. C. Y." for a method of obtaining the saw-kerfs for bending an elliptic-head jamb. In reply I take the liberty of offering the following method: Referring to the sketch inclosed,




*Method of Obtaining the Saw-Kerfs for an Elliptical Head Jamb Suggested by H. J. B.*

let A C be the major axis and B F the minor axis of ellipses. Connect B C and set off one-third of the same at D; drop a line square to B C through the point D indefinitely and continue the minor axis B F until both intersect at E. Now, from the center thus obtained the part of the ellipses from G to H can be struck. Then complete from centers I J. The solid wood between cuts is obtained as follows: Take a piece of stuff the same thickness as that out of which the head is bent, mark the thickness of veneer with the gauge, make one kerf with the same saw that is to be used on the head, lay a strip on the plan, keeping the kerf opposite the center E or I, fasten down and with a straight strip slowly close the kerf. It will then be at E L and gives K L, the amount of solid wood between the kerfs. I offer this method in the hope that my experience in this direction may be of benefit to other readers of the paper.

*From* S. A., *Paterson, N. J.*—In reply to "J. C. Y.," Springfield, D. T., how to form the saw-kerfs for an elliptic-head jamb I send the following: He can please himself as to the manner of striking the elliptical curve. I know of no other method of marking the saw-kerfs than by assuming them on the outside of the elliptical curve, as they can be used for developing the length required to go around the sweep. Having assumed the number suitable for bending the piece around the curve (Fig. 1), strike lines across to points of construction in the elliptical curve. I think this method to be best for a sketch, as by lengthening the conjugate diameter the lines do not lie so close together. Fig. 2 of the sketches shows the development of jamb-head, giving the full length from spring to crown. This is merely the circumference of half the elliptic stretched out on a horizontal plane, using the same angle and points for radiating lines as in the elliptic. By setting a bevel to the lines on Fig. 2 he can mark them on the edge of jamb-head and square across. As I have left all the points of construction on the sketch I do not think it necessary to give further explanation. As the methods of constructing the elliptic by the trammel and intersecting lines or the three points and a piece of cord are more universally used than any other method, I will not occupy space by explaining in detail the construction of the elliptical curve. As the correspondent will lay out his sweep full size he will be able to lay down more lines, for the more saw-kerfs at the spring of the curve the better the result. After passing that point kerfs from 1½ to 2 inches will be sufficient if the




*Saw-Kerfs for Bending an Elliptical Head Jamb.—Fig. 1.—Method Suggested by S. A.*

span is 4 feet or over. A far better method is to cut out sweeps from 1½ to 3 inches wide glued and veneered outside with canvas on the back

### The Standard Perch.

*From* H. F. W., *Medford, Ore.*—Will some of the readers of *Carpentry and Building* kindly tell me the measurement of the standard perch as used generally by stone-masons? In all the engineering books and others of reference that I have examined the dimensions are given thus: 18 inches wide or thick, 12 inches high, 16 feet 6 inches long, equal 24.75 cubic feet. The masons in this vicinity measure the perch thus: 1 foot by 1 foot by 16 feet 6 inches, equal 16½ cubic feet. Some of them claim that this is the measurement used in portions of the Eastern States. It may be so, but I claim that it is not correct. If it is correct why not make it universal.

### Rake Molding Intersecting a Level Molding.

*From* J. N. B., Jr., *Burlington, Pa.*—I would like to have some of the readers of *Carpentry and Building* tell me if it is possible for a rake molding to be cut or mitered so as to intersect or member with a level molding of the same size and profile. If this can be done I should like to have them explain the method in the paper. It appears possible to me, but I am not certain how to accomplish it.

### Splicing Studding.

*From* W. L. R., *Mt. Carmel, Ill.*—In reply to "S. B. B.," of Appleton, Wis., who asks concerning the best place to splice studding in a three-story hotel, permit me to say that I would not splice them at all. I would build each story separately, one on top of the other. It makes a stiffer and stronger building than

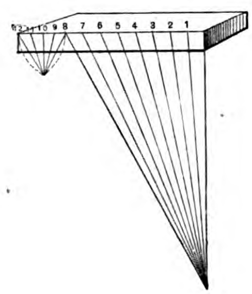



*Fig. 2.—Development of Head Jamb.*

when long studs are employed. He might travel for a month in this part of the country and never find a two-story house on a single length of studding. If he desires I will give to the readers of *Carpentry and Building* a sketch of how such work is done here.

*Note.*—The subject is of general interest to Eastern readers of the paper, and we shall be glad to receive a sketch of the kind referred to by the correspondent above.

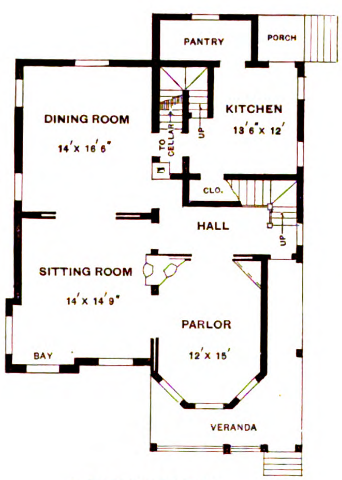
### Chimneys Above Roofs.

*From* P. F. D., *Fairport, N. Y.*—The condition of dwelling-house chimneys above the roof a few years after construction, especially in cases where coal has been employed as a fuel, leads me to conclude that the average mason does not possess the knowledge necessary to cause an arrest of the destructive power of coal gas. Permit me to ask would the use of Portland cement mortar obviate the difficulty? I would like to submit to the practical readers of *Carpentry and Building* the query, Is it possible to construct a chimney in such a way as to endure as well above the roof as below it? If it is possible I should be much pleased to know the method of procedure.

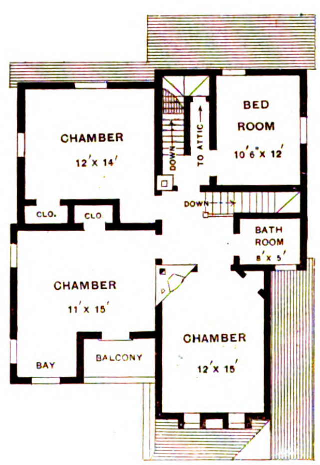
### Æolian Harp.

*From* W. H. P., *Lowell, Mass.*—I presume that among your many readers there are some who have made æolian harps. I have often wished to make one for myself, and now having to make one for a friend I desire to know the best method of con-

PERSPECTIVE VIEW.




FIRST-FLOOR PLAN.




SECOND-FLOOR PLAN.

Scale, 1-16 Inch to the Foot.

# STUDY IN HOUSE DESIGN.

By C. P. Robinson, Architect, Phillipsburg, Pa.

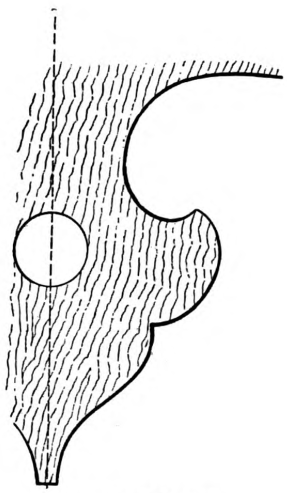


Fig. 3.—Fret-Work at *a*, Fig. 2.

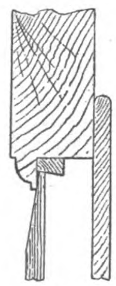


Fig. 18.—Section of Rail Carrying Glass in Back of Cabinet between Top and Bottom Portions.

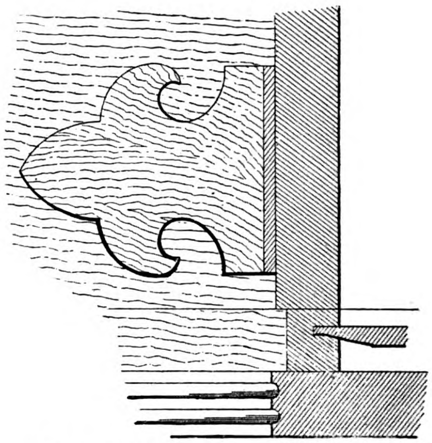


Fig. 4.—Section of Drawer-Front with Shape of Handle-Plate.

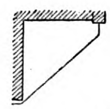


Fig. 19.—Plan of End of Shelf forming Bottom of Top Cupboard.

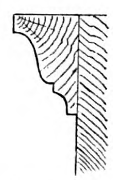


Fig. 20.—Section of Molding on Pediment.

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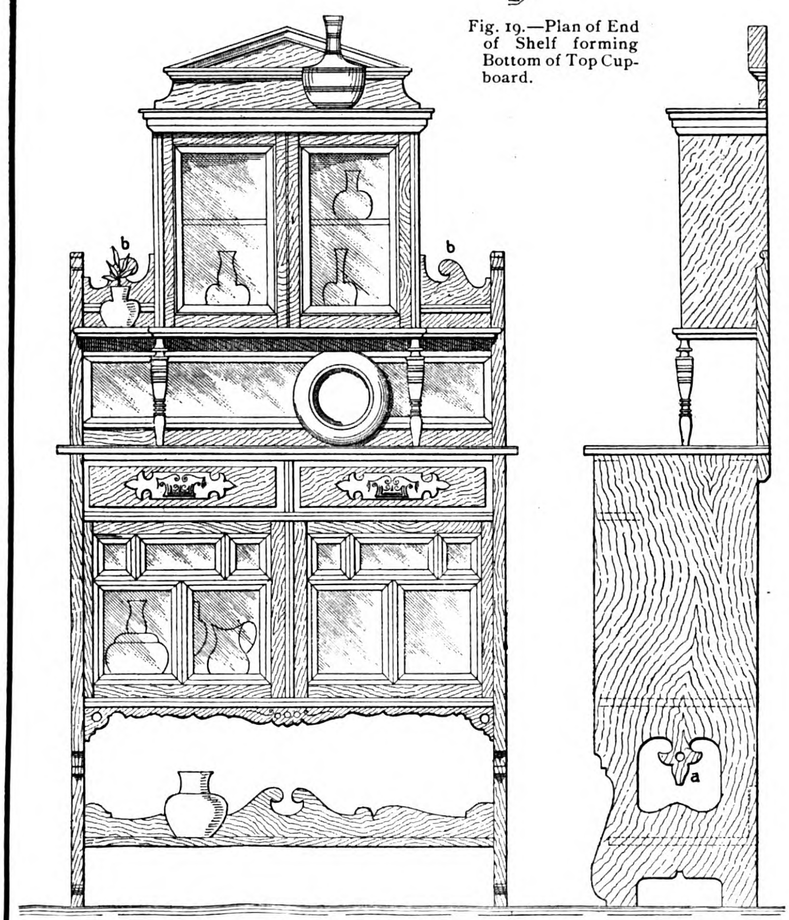
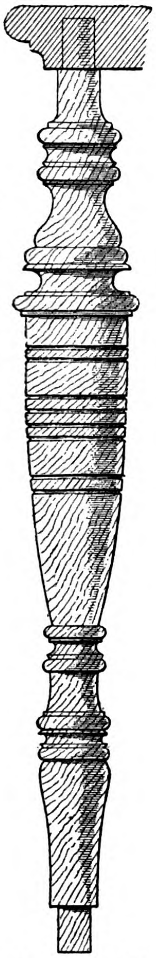



Figs. 1 and 2.—Front and Side View of Cabinet. Scale 1 Inch to the Foot.

# Elevations . and De

For Description see reading-mat

DESIGNED BY



ig. 8.—Turned Pillars Supporting Shelf.

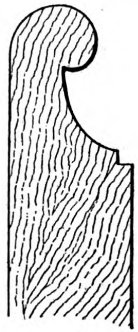


Fig. 5.—Side View of Top of Back Posts.

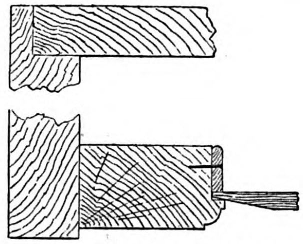


Fig. 10.—Showing Relation of Door to Gable; also Gable Checked to Receive Carcase Back.

Fig. 9.—Alternative Design for Pillars.

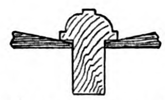


Fig. 11.—Section of Door-Rail.

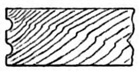


Fig. 13.—Molding on Front Edge of Shelf.

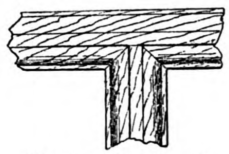


Fig. 12.—Elevation of Fig. 11.

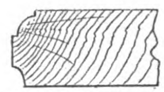


Fig. 16.—Molding on Edges of Top of Lower Part of Cabinet.

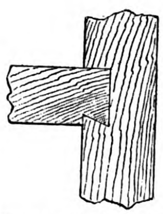


Fig. 14.—Shelves Dovetail Raggled into Gables.

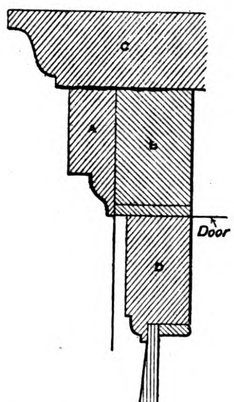



Fig. 7.—Section of Cornice-Molding and Door-Frame.

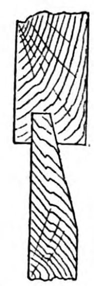


Fig. 17.—Carcase Back fitted into Top Rail.

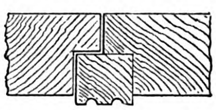


Fig. 15.—Section of Division between Doors.

# ails of a Small Cabinet.

ter pages. Scale of Details, two-thirds full size.

.LEXANDER MARTIN.

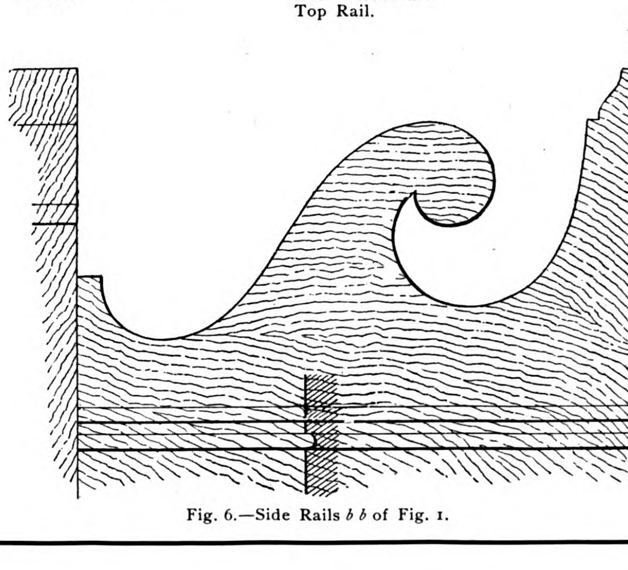
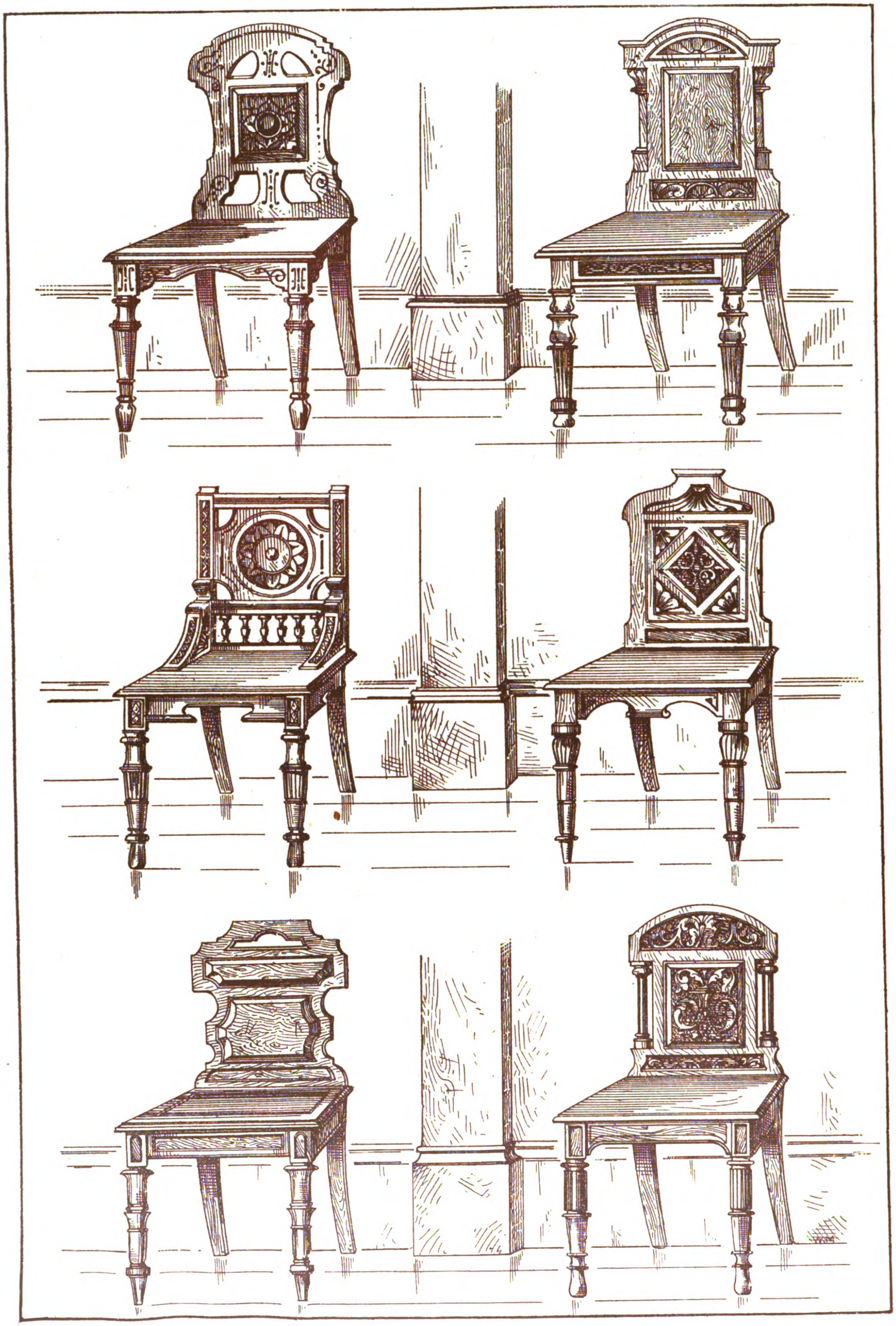


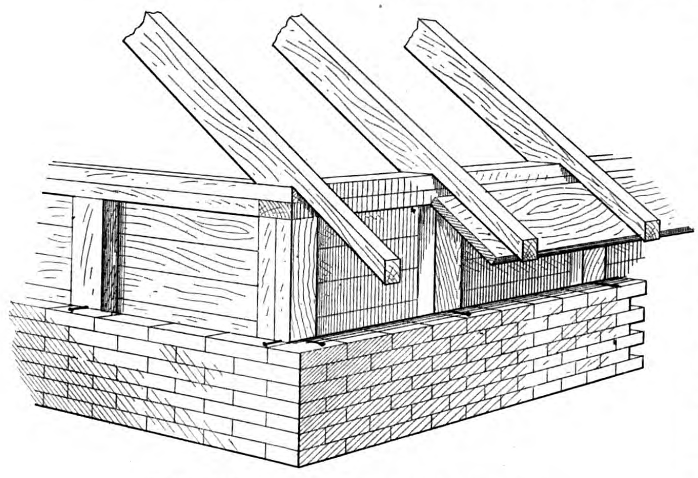
Fig. 6.—Side Rails *b b* of Fig. 1.



DESIGNS FOR HALL CHAIRS.

BY W. MARSDEN.

structing them. Encyclopedias give indefinite information. What I would like to know is the proper thickness of wood for the sides, top, ends and bottom; also



*Sectional Perspective View of Brick-Veneered House.*

the best kind to use? What is the correct proportion of depth and width and what length gives the most harmonious sounds? Should the openings be made similar to those in a guitar or violin?

### Brick Veneering.

*From* G. W. A., *Three Oaks, Mich.*—In answer to "R. M. C.," who writes in a recent issue of *Carpentry and Building* with regard to brick veneering, I would say that having put up a great many veneered buildings in Southern Michigan and Northern Indiana, and thinking that our method of construction may be of benefit to him, as well as others, I offer the following particulars:

We first make our foundation 9 inches larger than the frame. We then put up the frame in the same manner as for siding, sheeting on the inside, because we think it best to nail to studding. By reference to the sketch which I send herewith the reader will readily understand the manner of nailing on top of brick for the purpose of anchoring the brick to the frame. We then lay our brick ½ inch from the studding, nailing every five across with a 20 finishing nail. I do not think it necessary to build brick between studs, as the nails will hold the brick firmly. We do not, as a rule, put paper outside, although it is done here sometimes. Brick-veneered houses are no more rat harbors than a frame house, as the space between studs is the same. "R. M. C." asked if they are the kind of a house to build in the country. In reply I would say that about nine-tenths of the best houses built in town or country here are veneered.

### Problem in Hand-Railing.

*From* J. V. H. Secor, *New York.*—I desire to submit the following problem to the readers of *Carpentry and Building:* The conditions include a plan of stairs starting with a curve over five swell steps, the rail to have tangents of two pitches and an easing on each end, requiring but one spring bevel to square the wreath, and will be applied at the bottom end. Referring to the plan, Fig. 1, from Q as the center draw Q A extended some length; describe the curve from A to C as the center line of the rail; draw the inside and the outside line of the rail as shown at C′ C′. The five lower steps are spaced equal in the curve from X to A, then one of 8 inches and then the regular straight treads of 9 inches. Make the upper joint of the wreath at some point over the 8-inch tread, as shown in the elevation. Draw the mold for the rail to hang 3 feet 9½ inches from the floor to the under side of the rail; draw A B F for the floor line and one tangent; A B is one tangent and B C will be the other. The point C will be the face of the newel. At right angles to A F draw the dotted line E C, thus establishing the plane that will work the wreath by one bevel. Draw A D equal to B C and C D equal to A B, giving the point D; from D draw D J at right angles to the tangent B C.

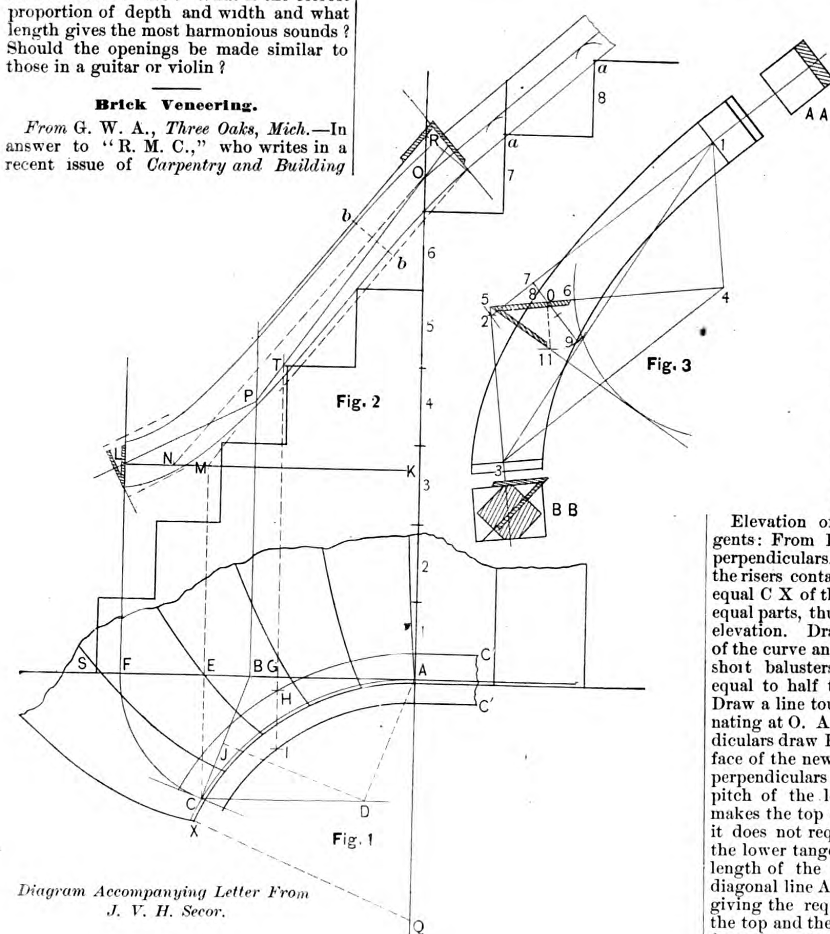



*Diagram Accompanying Letter From J. V. H. Secor.*

Elevation of the risers and the tangents: From B E F, in Fig. 2, erect perpendiculars. On the line Q A set up the risers contained in the curve. Let S F equal C X of the plan; divide X A in five equal parts, thus locating the risers in the elevation. Draw the two treads outside of the curve and locate the position of the short balusters *a a;* describe the arcs equal to half the thickness of the rail. Draw a line touching these points terminating at O. At right angles to the perpendiculars draw K L. At E L will be the face of the newel. Now draw the dotted perpendiculars C E M; connect O M for the pitch of the long tangent. This method makes the top end at O to be flat, so that it does not require any spring bevel. For the lower tangent P L: To find the major length of the mold, let K N equal the diagonal line A C of the plan; connect O N, giving the required length. Now draw the top and the bottom line of the rail and form the easings; keep the bottom line of the rail as near the center of the short balusters as is consistent with a graceful easing. Having determined this, we must next find how thick a plank we will require from which to work the rail; *b b* indicates this, as it will admit of the easings being made within the limits of the plank.

The lower end is shown in like manner by the dotted lines. At R is the bevel to apply from the top face of the plank to make the joint to connect with the straight rail. At L is the bevel which is to be applied from the butt after the inside is shaped out and will then be ready to have the easing-lines marked on the inside face of the wreath. Having the joints made this is easily accomplished by squaring from the joints and forming the easings within the limits of the plank, as shown in the elevation.

To draw the face-mold for the wreath: Referring to Fig. 3, let 1 3 equal N O, Fig. 2, as the major length; let 1 5 and 3 4 equal O M; let 1 4 and 3 5 equal L P. Connect these points and we have the parallelogram. To find the bevel for squaring the lower end of the wreath: At right angles to the tangent 2 3 draw 4 5; with the compasses take the length of the dotted line J D of the plan Fig. 1; set one foot in 4 and describe the curve at 6 extended. From 5 draw a line touching the curve; then the angle at 5 is the bevel sought. For the width of the mold at the end 3: Let O 11 be the width of the rail as taken at $c' c'$ on the plan, Fig. 1, then 5 11 will be the width for the mold at the end 3. The top end will be the same width as the rail. To establish a central point through which to draw the curves: Let 2 7 equal P T. At right angles to the tangent 1 2 draw 7 8 9 equal to G H I. Having the points, finish the mold by drawing the curves, using a flexible strip for the purpose. Section A A shows how the overwood is taken off by the shading along the top face of the wreath. At B B is the application of the bevel for squaring the wreath at the lower end. The heavy lines at the top end of the mold are the extra length required to make the bevel joint, as shown at R in the elevation. This wreath is what is known as a forced easement, because of its bevel joints, and is a very practical way of accomplishing results which in other methods would require more pieces and is a saving of bolts, and the time is also quite an item. We can establish in this or in any mold that is drawn as many points as are required, and can also show the section as it is in the plank, or in other words give the bevel all along the wreath in as many places as might be desirable to prove any certain point.

*From* JAS. H. MONCKTON, *Brooklyn, N. Y.*—The February number of *Carpentry and Building* favors its readers with several diagrams accompanied with explanations from "J. B.," of Omaha, Neb., in answer to drawings and questions that appeared in the August number from "J. H.," of London, England. "J. B." writes: "I have endeavored to show how to find the mold independent of unfolding the tangent. I have never seen any other than the tangent method presented in *Carpentry and Building*. . . . The plan referred to may require a few minutes more time to find the molds than by the tangent method, but is, I think, preferable." As unfolding tangents is simply to extend two tangents in one straight line, to be independent of that is not much as I see it, and as he still makes use of plan tangents and the usual tangents with three face-molds he does not himself present any other method but that of the tangent method in *Carpentry and Building*. "J. B." tells us: "In the method employed I have unfolded the circle." What circle we are not told, but on examination we find that he has set up in the elevation, Fig. 1, the eight treads contained in the large quarter-circle of the plan submitted by "J. H.," of London. Along the angle of these treads and rises a straight line is drawn to the center of ramp; then at the chord-line two other lines are drawn, one from the top and the other from the bottom of the ramp. Both of these last-mentioned lines are drawn converging to the single line at the center of the elevation. What these two lines are for we are not told, but between them a ramp is formed and shaded from the chord-line down. Below the chord-line a line is drawn across the curve of the ramp and marked "joint." The only clew as to the position and direction of this joint, as given at this particular point, is to direct the curve and mark the joint, which directions are as good as a guess. This intended joint still leaves some ramp-curve below it, so that it can hardly be claimed that the intention is to form the whole ramp in the end of the wreath-piece. Besides, there is not enough length of wood left on either of the face-molds given to include even this upper portion of the ramp and force its joint. The smaller quarter-circle of which the cylinder is composed is not unfolded, unless using its level tangent (in addition to the larger quarter as set up for the elevation) is considered that unfoldment. The face-mold for the landing quarter is given as if by guess, with a shaded bevel just above it and no explanations whatever. For face-mold, Fig. 2, with not a single reference-letter on it, the direction given is: "Make the under side of the rail in the center of balustrade the mold, Fig. 2." This direction may be simple to "J. B.," but to one studying his method it is most difficult. In my dictionary (Worcester's) the definition of balustrade is given as "a range of balusters joined by a rail on the top." But this does not help me, for nothing of the kind is presented in the diagrams of "J. B.," and if there were how I or any other person could "make the under side of the rail in the center of balustrade the face-mold, Fig. 2," I give up. Further on "J. B." writes: "The hight is $a\ b$ of Fig. 1." Possibly he means the hight used for face-mold, Fig. 2, but does not tell us if it is that hight. Then it is taken from the center of the wreath-piece at the upper end, $b$, Fig. 1, to the bottom of the ramp $a$ at the chord-line. But why it is taken this way instead of the usual way, from centers, nothing is said, and we are not informed as to the value or special use of such a singular departure. Again, "J. B." says: "But suppose we would like to lift the rail a little higher, as $c$; then $b\ c$ is the hight, Fig. 3; but $d$ is a fixed point. This makes unequal tangents on the mold and two bevels are required." I look in vain for the fixed point mentioned and an explanation of how it is made use of in drawing the face-mold. Nor is there any explanation in this connection of how the angles are found to set the bevels for squaring this wreath-piece. I find, too, that when the hight $b\ c$ is taken, that from $c$ up the elevation, the line drawn touching the angle of four treads and rises is straight, and therefore see no reason why the face-mold, Fig. 3, should not be of a common pitch. "J. B." also informs us that "the joint is not made square with the plank." What joint? No particular joint is designated and we are left to guess. If we should decide what joint we are not told what governs it if not made square from face of plank, all of which could have been easily and intelligibly stated. Then, again, we are told by "J. B." to "take a thick piece of paper and cut it out as shown." Where is this shown? He might have marked by reference-letters the proposed shape to cut out this thick piece of paper and in what figure to find it. And what is this thick piece of paper—cut out in any shape—for? No mention is made either of its purpose or its application. Following this direction to "take a thick piece of paper and cut it out as shown," we are told by "J. B." to "make a line on the inside of rail for the spring by drawing a line on the mold parallel to the major axis." Isn't that a very peculiar and impossible order? Think of it! We are told to "make a line on the inside of rail for the spring by drawing a line on the mold parallel to the major axis." Why, it seems to me that if we were to cover the face-mold all over with lines parallel to the major axis neither one nor all of those lines would make a single line on the inside of rail for the spring or for anything else. Then, again, "J. B." tells us: "Sliding the mold up and down we get the spring-line correct." Indeed! Why, how is that? What governs it in this sliding up and down? Where must we slide it? No instruction is given where to slide this face-mold or how to slide it; but just to "slide it up and down." Surely we would never get any "spring-line correct" by simply sliding the face-mold up and down. And what do we want of this "spring-line?" No mention is made of its use or application to any practical purpose whatever. Now, "J. B" informs us that "by making a joint on the minor axis of the mold we can use a thicker piece to form the easing." What easing he does not tell us; but, exercising a little of our native guess, it would appear that "J. B" in choosing the words "we can use," &c., actually means to direct that the wreath-piece—either using face-mold Fig. 2 or Fig. 3—be got out in two pieces, to be jointed at the minor axis, and using the lower piece with increased thickness work a portion of the ramp as well as that portion of the wreath out of it. In these days we have "crazy-quilt architecture," and I suppose that we—or at least some of us—ought to accept crazy-quilt hand-railing. By his diagrams and such explanations as he has vouchsafed "J. B." starts out to help "J. H.," of London, and claims not only to introduce to the readers of *Carpentry and Building* something superior to the tangent method, but also to determine, as he puts it, "the lengths of all the balustrades with the greatest nicety." He adds: "It is so simple one cannot forget it, even though he may be out of practice for several years." And then exultingly he asks: "Can this be said of any of the best standard works at present treating on hand-railing?" As "J. B." asks this question, I would suggest that he study—just a little—these best standard works referred to and learn the exact extent of that branch of knowledge to-day.

### Removing Stains from Brick-Work.

*From* S. P. L., *San Antonio, Texas.*—I desire to ask through the columns of *Carpentry and Building* what will remove from pressed brick-work the stains caused by using black mortar. A heavy rainstorm which occurred before the mortar was dry caused it to run, and the wall has the appearance of blue mud or stains from stone copings or tin.

### Building Contracts.

*From* W. K. H., *Chase City, Va.*—The books and periodicals on architecture give forms for building contracts, but I have tried to find one without objectionable features and failed. The principal objection to all forms that I have seen is that those who formulated them seem to take it for granted that all contractors are rascals and need special binding. The effort appears to be to prevent the contractor from swindling the proprietor, while very little attention is paid to protecting the contractor against the rascality of the proprietor. Another objection is that these forms place both parties to the contract too much within the power of the architect. The architect is made arbitrator and can do great harm to both the proprietor and contractor. In practice I find that contracts written in as few words as possible, without ambiguous terms and without any "whereases" and "wheretores," or repeating in every second line "parties of the first part" or "parties of the second part," &c., are best. Away with all forms which imply that the proprietor is a monument of virtue to be protected against the scoundrelism of the contractor, and that the architect is the only sensible man concerned.

### Shingle Clapboards.

*From* J. Y. F., *Fulton, N. Y.*—In reply to "W. H. K.," of Alton, Ill., I desire to say that I always make my own clapboard shingles, as it is much cheaper. I take as wide a clapboard as I can get and saw the face of it enough to mark it. I then notch the boards, or one can bore them if he so desires. The shingles can only be used on the side of a house or on a very steep roof. If the groove is made more than $\frac{1}{8}$ inch deep the boards are likely to break in handling.

### Green Lumber for Roof-Sheathing.

*From* BUCKEYE, *Sheffield, Ala.*—If green sheathing 6 inches wide be used under a tin roof, when the sheathing dries out will it not cause the tin to buckle or slip the seams? A contractor informed me he used the sheathing direct from the mill, and green at that, and never knew a bad job resulting from the green lumber—not even a buckle in the tin after the shrinkage had taken place. I contend that in order to do good work dry lumber, dressed and matched, is essential.

*Answer.*—We have always been in favor of a good foundation upon which to lay a tin roof, and as many roofs are injured by the condensation of moisture on the under side, it would appear that dry lumber, matched and dressed, would be less liable to shrink and thus allow the vapor from below an opportunity of condensing on the under side of the tin than would the green lumber our correspondent mentions. Annother correspondent whose communication is now before us states his case as follows: "About two years ago I put on a tin roof, and it seems to be rusting on the under side wherever a wide crack or knot-hole in the roof-boards allows the air or moisture in the air to get at the tin." From our correspondent's experience it would appear desirable to have the sheathing under a tin roof that was liable to be injured by condensation as tight as possible. Thus much said, we should be pleased to have our readers give their ideas on the subject or relate what their experience has been with green lumber for roof-sheathing.

### Moving and Raising Brick Buildings.

*From* C. H. F., *Schwenksville, Pa.*—Will some of the practical readers of *Carpentry and Building* give me a method for moving and raising brick buildings? As I have some work of this kind to do I desire to have a plan which will accomplish it successfully. I have heard of a man who moves and raises buildings of every kind, who lives in Chester, but I do not know his correct address. What I desire is some practical information on the general subject of moving and raising brick buildings.

### Slaters' Tools.

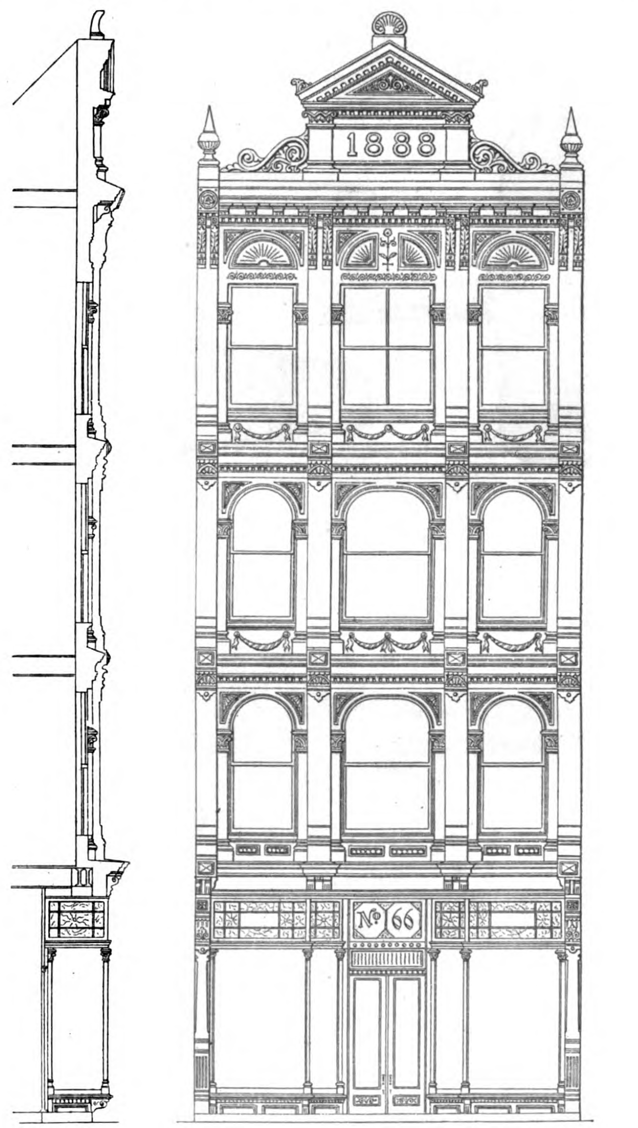
*From* C. M., *Sheldon, La.*—I desire to inquire where slaters' tools can be purchased. Also how to repair a slate roof where one individual slate has been broken. How do slaters go to work to make a good job of putting in place a new slate for one that is old broken? How or is the new slate fastened?

*Note.*—Slaters' tools, while formerly a scarce article, can at present be purchased through many if not all the roofing-supply houses Many dealers in tinners' stock and tinners' machines and tools now carry them, and they are also supplied by slate dealers and agents for slaters' supplies. This general answer, we think, will give our correspondent all the information he requires.

With reference to repairing a slate roof, the method of proceeding depends somewhat upon circumstances. One of the tools which forms a part of a slate-roofer's equipment is flat and thin and has a hooked or barbed end. It is adapted for reaching up under a slate and hooking the barb around the nail in a way to cut the nail off when it is pulled vigorously. So much for taking the slate out. With the old slate removed it is a simple matter to devise some means for fastening the new in place. This may be a wire or a strip of metal to be fastened above and the ends turned up over the bottom of the new slate. Still other methods are employed. We take it that our correspondent does not expect us to explain the entire art of slate-roofing in this connection, but only to suggest a method that might be employed under the circumstances which he describes.

### Galvanized-Iron Front.

There is a new fashion coming into vogue at the present time, or perhaps it is a revival of an old fashion—namely, that of constructing entire fronts out of galvanized sheet-iron. The structures that are being put at the present time in this form are models of elegance and beauty compared with similar work done only a few years ago. Accounts of work of this kind reach us from various parts of the country, but perhaps as handsome work as is done in this line anywhere is to be found in the immediate vicinity of New York. The engraving presented herewith shows the elevation and sectional view of the front of a building located at No. 66 Newark avenue, Jersey City, the entire exterior of which is of galvanized iron, erected a short time since by Jacob Ringle & Son, of Jersey City. Our engraving, which is a reduced



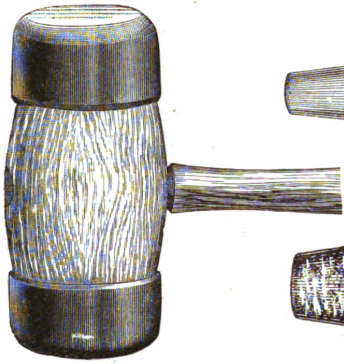

*Galvanized-Iron Front, 66 Newark Ave., Jersey City.—Scale, 1-10 Inch to the Foot.*

*fac-simile* of a larger drawing, is a faithful representation of the work, and shows at once the neatness and elegance which can be secured in work of this kind. A happy display of architectural foliage in the form of zinc-work is employed in combination with plain moldings. The construction in the matter of fastening and joints is as good as the design is satisfactory.

## NOVELTIES.

### Rawhide-Bound Mallets.

C. E. Jennings & Co., 79 and 81 Reade street, New York, are putting on the market, as sole agents for the manufacturers,



*Novelties.—Fig. 1.—Rawhide-Bound Mallet.*

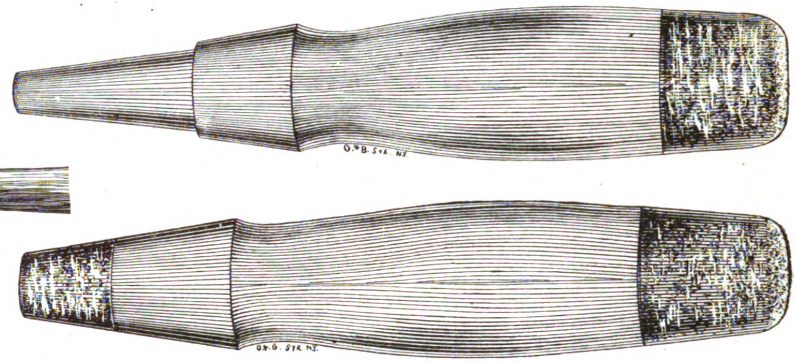


*Fig. 2.—Chisel Handles.*

a line of rawhide-bound mallets, shown in Fig. 1, and chisel-handles, which are represented in Fig. 2 of the cuts. It will be

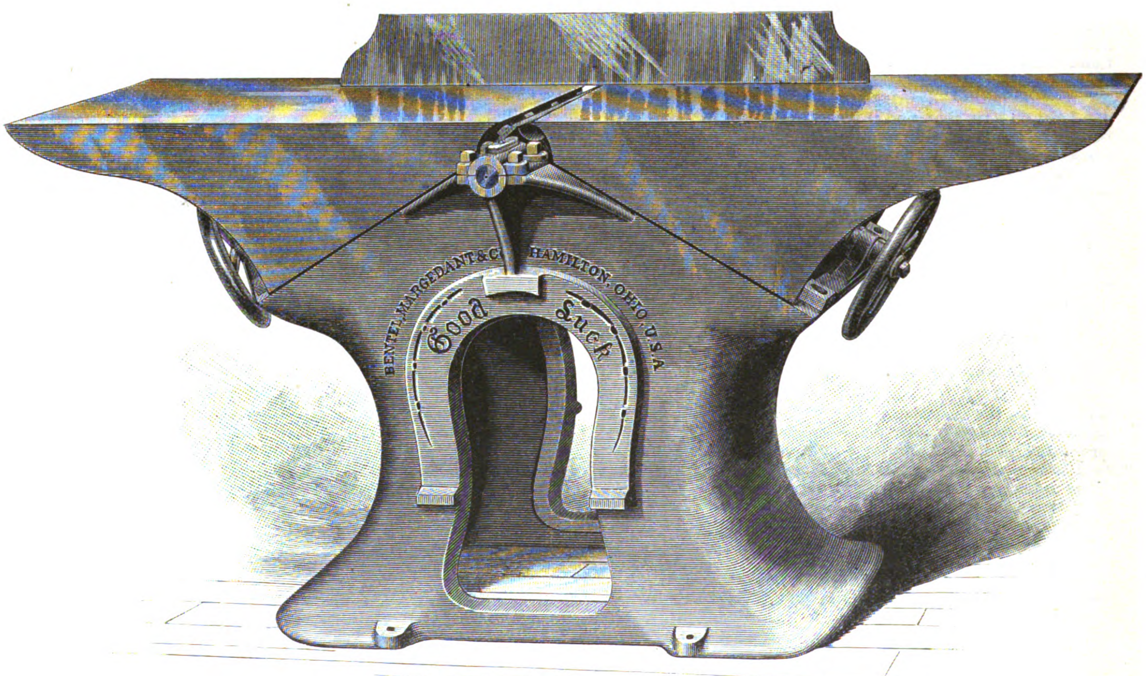
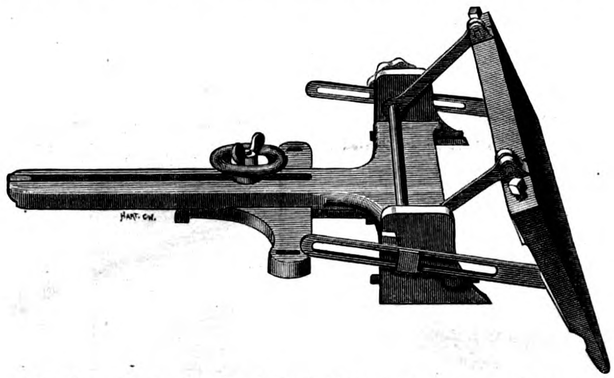



*Fig. 3.—Good Luck Hand Planer and Jointer, Made by the Bentel & Margedant Company.*

perceived that the rawhide entirely covers the faces of the mallet, and that in the chisel handles it is similarly applied to the ends of the handle, and also, as in Fig. 2, forms a ferrule. This construction of the mallets from the spring of the hide is referred to as cushioning the blow and preventing jarring, thus greatly relieving the arm of the user, and this is referred to as especially the case when used in connection with a rawhide-bound chisel-handle. The smoothness of the mallet face and durability of the rawhide are other points that are made in connection with it. The mallet is made with a $2\frac{1}{2}$-inch face and the chisel-handles are made of assorted sizes, both for tanged tinners and for socket firmer and framing chisels.

### Good Luck Hand Planer and Jointer.

The Bentel & Margedant Company, of Hamilton, Ohio, are introducing to the trade a hand planer and jointer which they are pleased to designate as the Good Luck. The frame of this machine is cast in one piece and is of such a form as to insure substantial support on the floor and carry the tables in the best way for resisting vibration and jar. The table slides are of the well-known class of V-slides, provided with gibs to adjust and take up the wear. The hand-wheel and screw shown on each end of the machine in Fig. 3 of the accompanying illustrations adjusts the tables horizontally and in relative position to each other and to the cutter-head. The movement is oblique, thus keeping outside of the radius of the cutting-line of the knives. The table is 3 feet in length, giving a table surface of 6 feet 2 inches, including the opening between the two tables. The tables are cast in one piece, rendering them strong and durable. In Fig. 4 is presented a view of the fence employed in connection with this machine. It is adjustable over the whole surface of the table, and can be quickly set at an angle while the machine is in motion. In Fig. 5 is shown the patent triangular shear-knife cutter-head which the company employ in connection with this planer. The statement is made that while the knives are perfectly straight they produce a shearing or draw cut by reason of their position at an angle. It is said that very knotty and cross-grained material can be planed without splintering or tearing and that the knives require less sharpening than the



*Novelties.—Fig. 4.—Good Luck Hand Planer.—View of Fence Employed.*

common two-knife heads. This machine is built in four sizes, 12, 16, 20 and 24 inches wide. It is also constructed with an addition of an adjustable vertical side

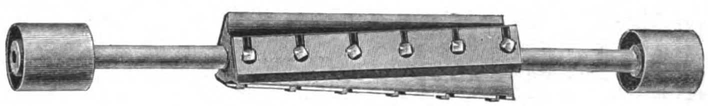


*Fig. 5.—Triangular Shear-Knife Cutter-Head.*

cutter-head. The tight pulley is 10 inches diameter and has a 5½-inch face. The weight of the 24-inch machine is about 1400 pounds.

### Olmsted's Improved Miter-Box No. 6.

L. H. Olmsted, Corona, N. J., has recently added to his assortment of miter-boxes the one which is represented in Fig. 6 of the accompanying cuts, which, it will be observed, possesses new features. It is constructed entirely of iron and steel, and a board is secured to the bottom of the inside to place the work upon. To the frame A is attached a swinging-bar, B, which swings on a pivot at the back of the frame. This swinging-bar is constructed with four uprights; to the top of these uprights is attached four irons, C C, which serve as guides for the saw. The two right-hand irons are fastened permanently; the two other irons are slotted where the screws pass through them and can be moved up to and from the fixed irons, thereby adjusting the space between the irons to fit any thickness of saw-blade. These saw-guides are made sufficiently high and broad to make a good bearing upon the saw-blade, and the space between them being open only sufficient to allow the saw to move freely, it is assured that perfect work can be done with this box, for the saw will be held in a perfectly upright position and an ordinary cross-cut saw can be used as well as a back saw, for the blade cannot spring in this box. The saw-guides are for the purpose of preventing the saw from coming in contact with the slots in the swinging-bar. Underneath the frame and in front are seven segments of a circle, marked D in the illustration. Each one of these segments is notched and made fast to the frame by screws. The holes through which these screws pass are elongated to allow the segments to be moved latterly. Attached to the swinging-bar B is a lever, E, which moves freely in two slots, one end being secured by a pivot, and is actuated by a steel spring; this lever is fitted to the notches in the segments, and by moving the swinging-bar the lever will be sprung into either of the notches desired and thereby hold it fast. These segments with notches are adjusted to an absolutely true gauge, to hold the saw-guides at the angle indicated by figures and marks on the frame over each notch, which are right angle, one-eighth, one-sixth, one-fourth, and are easily readjusted if desired by loosening the screws. To saw at other angles than those indicated by the notches, the saw-guides are placed at the angle desired and the screw F at front end of swinging-bar tightened. The pointed springs G on the back are used to press into the work to hold it fast while sawing. These boxes are described as made in the best workmanship, and are well finished, painted and varnished. They will work 4 inches wide at the miter and 6 inches wide at right angles. Each box is packed in a strong wooden case. Among the advantages claimed for this miter-box is the

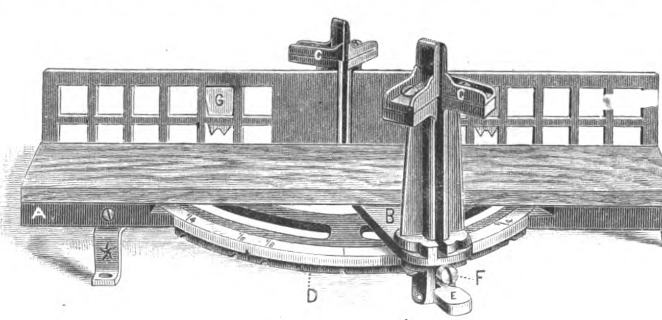



*Fig. 6.—Olmsted's Improved Miter-Box No. 6.*

fact that any saw can be used in it, as the adjustable saw-guides fit any saw. The adjustable notches for the various angles are also referred to, as well as the accuracy of the box.

### The Bolton Hot-Water Heater.

For some time past the Detroit Heating and Lighting Company, of Detroit, Mich., have been at work incorporating improvements in the Bolton Hot-Water Heater, designed for use in warming buildings, and now offer the trade a construction which they claim effects very satisfactory results in operation. Fig. 8 of the cuts represents a broken view of this heater, from which a very good idea of its features may be gathered. It consists essentially of a cast-iron top and base connected by wrought-iron pipes, the entire inner space above the fire being filled with the pendant tubes. These pipes are arranged

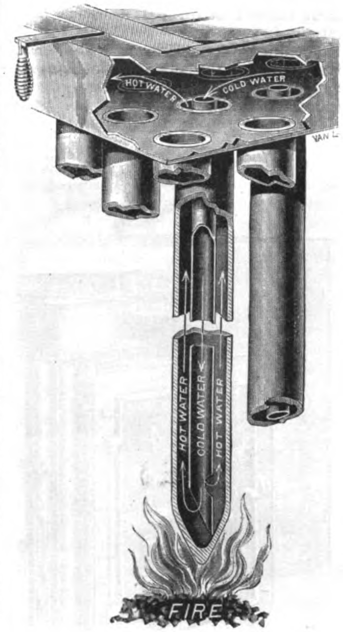
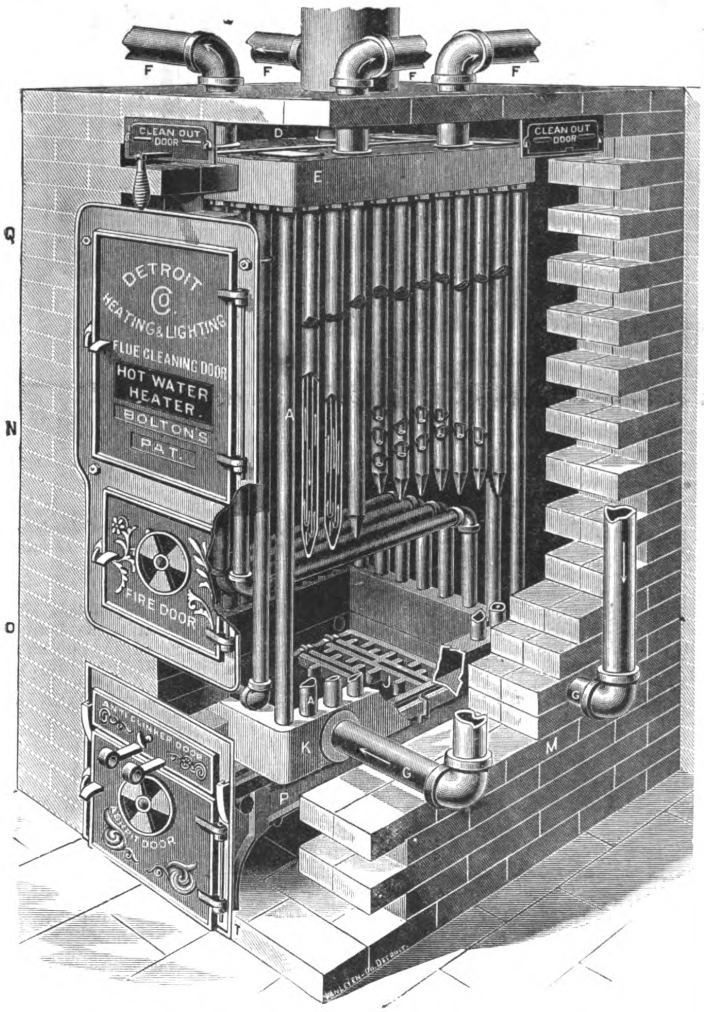



*Fig 7.—The Bolton Hot Water Heater.—Enlarged View of Drop-Tube, Showing Circulating-Pipe.*

similar to those in certain fire-engines, and as evidence of their durability the Detroit Heating and Lighting Company publish a letter from the Silsby Mfg. Company, in which they state that the drop-tube boiler gives general satisfaction, and that a set of water-flues they have found usually last 12 to 15 years. The cast-iron chamber forming the top of the boiler is pierced with flue-holes for the escape of smoke and gas, while the lower chamber surrounds the grate. All the pipes are vertical except one row, which passes almost horizontally from back to front and forms the top of the fire-pot. Above these horizontal pipes the vertical drop-tubes are arranged as shown in Fig. 8. By referring to Fig. 7 the construction of these tubes will be seen. They consist of wrought-iron pipes closed at the bottom, with a second smaller pipe within. As the illustration shows, the lower end of this circulating pipe is cut diagonally across one side, while opposite is a hole permitting circulation into the outer tube. The pipes which connect the lower and upper chambers are screwed into each and secured at the top with lock-nuts, while the drop-tubes are simply screwed into the under side of the cast-iron top. The manufacturers claim that owing to the free circulation of the water and the fact that the same volume of water is maintained in the system during the entire season there is no danger of sediment collecting in the tubes. In case it should be found necessary to make repairs to the heater every heater is supplied and the arms which project in front, as shown in Fig. 8, permit the fire to be thoroughly shaken. The same manufacturers also make a boiler with three fire-pots. The single Bolton heaters are made in five sizes, capable of supplying from 450 to 960 square feet of radiating-surface; the double heaters in three sizes supply from 1260 to 2240 square feet, while the three-fire-pot heaters in two sizes will supply from 2730 to 3450 square feet of radiating-surface. The New York agents for the Bolton Hot-Water Heater are Bramhall, Deane & Co., shown in the illustration, and up and down by the movable gables shown by the dotted lines. The door contains five




*Novelties.—Fig. 8.—Broken View of The Bolton Hot-Water Heater.*

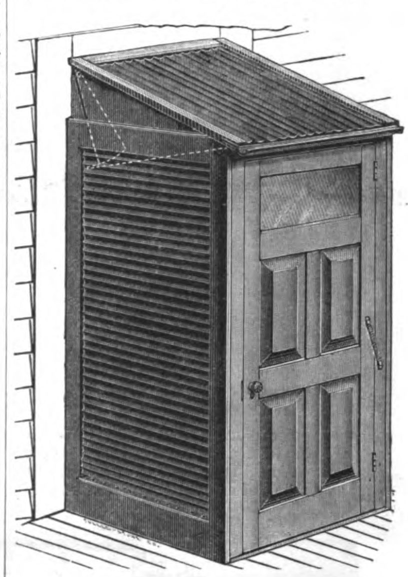


*Fig. 9.—Leonard's Patent Portable Storm-House.*

panels, the upper being of glass. The frame-work is of white pine, mortised together, and is painted two coats and two colors. The storm-house is hooked to the door-frame, and a screw through the threshold fastens it securely. For shipment or storage the house is folded as shown in Fig. 10. The sides are hinged to

pipe and tube can be removed and replaced through the large door in the front of the heater or by removing the entire front of the heater. To do this it is only necessary to screw down the lock-nuts at the top of the perpendicular pipes in front and then unscrew the pipe from the elbow. When these pipes are removed access is obtained to the tubes, which can be removed very readily with a small pair of tongs and replaced by the same means. When the pipes are heated the water in the outside pendant tubes rises and its place is filled with cooler water flowing down in the inside or circulating tubes. An improved feature in the present form of the heater is the cast-iron support (P), Fig. 8, instead of the plates set in the brick-work on which the boiler formerly rested. The grate with which the Bolton 264 Water street, and Gilbert & Barker Mfg. Company, 10 Dey street. The Detroit Heating and Lighting Company also have a branch house at 88 Lake street, Chicago.

### Leonard's Patent Portable Storm-House.

The Grand Rapids Refrigerator Company, Grand Rapids, Mich., are manufacturing the storm-house represented in the illustrations herewith given, Fig. 9 showing the house in position and Fig. 10 giving a view of its appearance when folded. The sides and roof of the house are made of corrugated iron, thus giving strength, durability and at the same time lightness to the construction. It is adjustable sidewise by a double hinge not

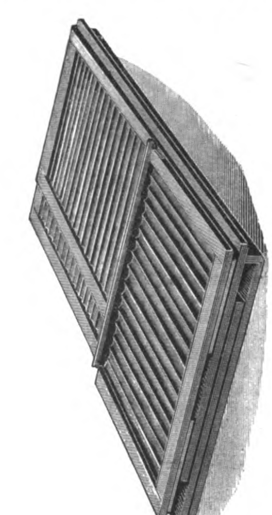
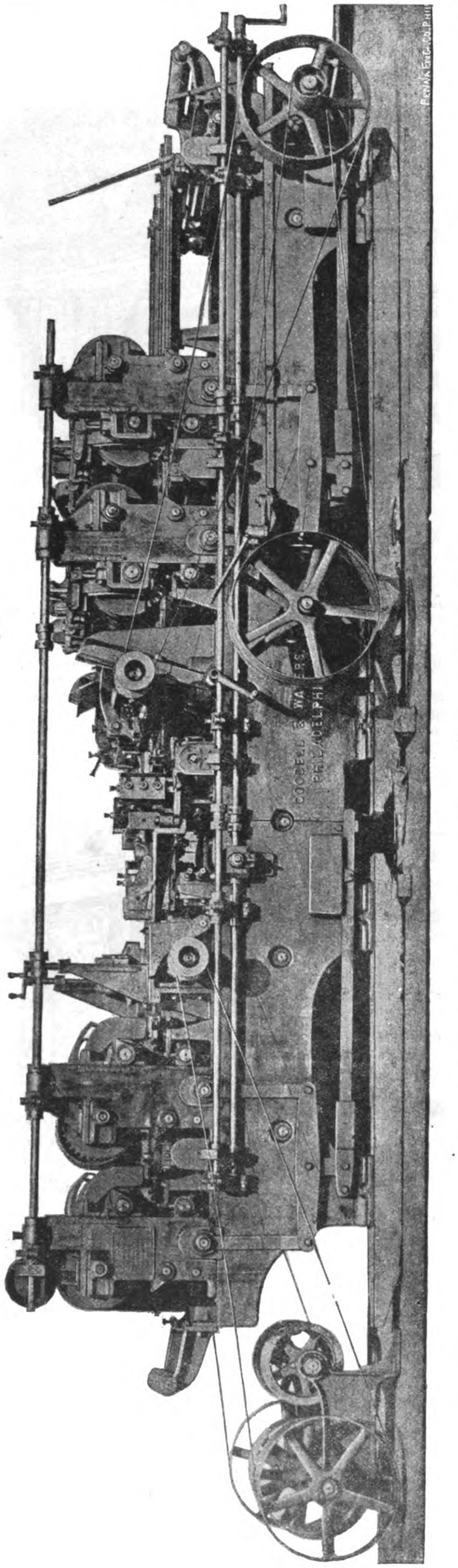


*Fig. 10.—Leonard's Patent Portable Storm-House, Folded.*

the front and fold inward. The gables are hinged to the roof and also fold inward. It is obvious, therefore, that the storm-house is of small compass when folded, being only 6 inches through. Two sizes of these storm-houses are made—Nos. 401 and 402. The former is 7 feet in hight, 39 inches wide and 32 inches deep, and the latter 96 inches high, 63 inches wide and 32 inches deep. The roof of No. 401 is adjustable from 7 feet to 8 feet in hight, that of No. 402 being adjustable from 8 feet 3



*Novelties.—Fig. 11.—Extra-Heavy Planer and Matcher, Built by Goodell & Waters.*

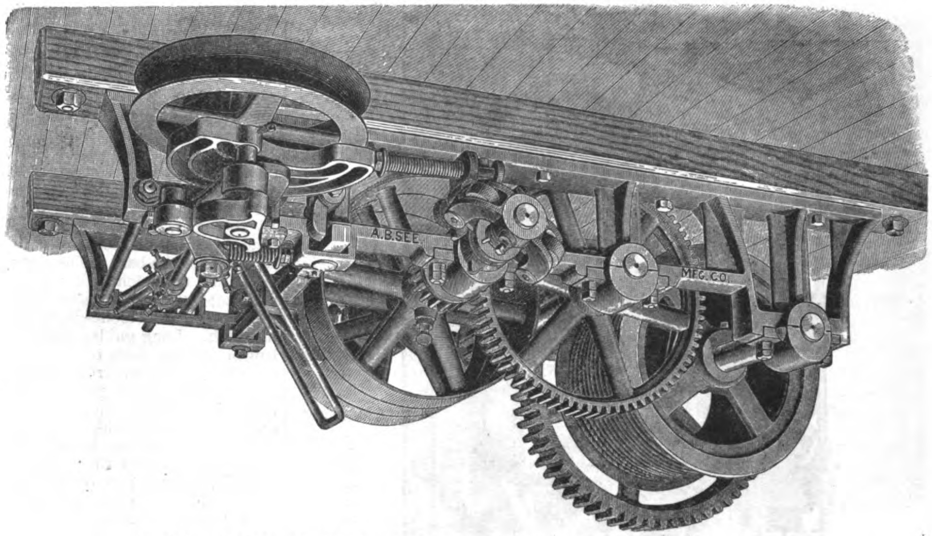
inches to 9 feet 3 inches in hight. The manufacturers of these storm-houses allude to the ease with which they may be placed in position and their inexpensiveness. Their durability is also emphasized. These storm-houses are sold in this market by C. F. Guyon & Co., agents for the manufacturers, 99 Reade street, New York.

### Extra-Heavy Planer and Matcher.

Goodell & Waters, of 3101 Chestnut street, Philadelphia, have just brought out and are offering the trade a planer and matcher which they claim is the largest planing-machine ever constructed. It has been designed to meet the requirements for a variety of work and is substantial in all its parts. It has two pairs of side-heads, two sets of sectional rolls and sectional pressure-bars. The statement is made that the machine has a capacity for working two pieces at one time, ranging from ½ inch to 6 inches thick by 8 inches in width. Long guides extend the entire length on both sides of the machine and are adjusted for different widths by hand-cranks conveniently placed at the infeeding end of the machine. This enables the operator to readily change the guides for various sizes without loosening the bolts or occupying much time. When not required the extra pair of side-guides may be moved to one side, and the machine is then ready to work its full capacity—namely, 30 x 8 inches. The machine is run with one pair of side-heads if desired, and can work 8, 10 or 12 inches thick. Material 14 inches or 24 inches wide of the same thickness can be worked with 6 or 8 inch feed-rolls. The under cylinder may be placed next to the matcher-heads or outside of the feed-rolls, as may be preferred. The facilities for oiling and protecting the gearing from dirt and chips are very complete and constitute a feature to which the manufacturers direct attention. The feed-rolls are raised together at one time by power. For the purpose of adjusting to thick material the first two rolls may be raised by means of an ingenious device incorporated in the machine. The matcher-heads and top and under cylinders are so arranged that they may be adjusted at either side. The largest machine of this class, working 30 x 12 inches, the manufacturers state is especially adapted for use in car-shops and establishments where heavy timber is used. The weight of the machine is given as 23,000 pounds.

### Double-Geared Belt Elevator.

The A. B. See Mfg. Company, of 116 120 Front street, Brooklyn, N. Y., are introducing to the trade an iron-frame double-geared belt elevator, a general view of which is afforded by Fig. 12 of the accompanying illustrations. The statement is made that this machine has been recently designed and reconstructed throughout and that all the mechanical arrangements have been greatly simplified. The side frames are made of iron, with long and wide foot-pieces for the purpose of giving rigidity to the machine when bolted to the floor-timbers. The bearings for the shafting, brake-bar and shipper rods are connected together and also to the foot-pieces in such a manner as to render it impossible for any of the working parts to become loose. Steel shafting is employed, which runs in extra long babbitted boxes, which are self-oiling and provided with large oil-reservoirs. The brake-bar is of wrought-iron, provided with iron brake-shoe, and is connected to the operating-cam and to the safety-governor in a very strong manner. The shipper-cam is inclosed by the operating-drum and is so constructed that each belt is shipped separately. The cam operating the brake is provided with a central stop, which prevents the belts from running on loose pulleys while hoisting. The object of the speed-governor is to prevent the elevator-car from running at a speed too great for safety, as would likely




*Novelties.—Fig. 12.—Double-Geared Belt Elevator, Made by A. B. See Mfg. Company.*

be the case should a belt break. When the governor acts a heavy coil spring is used to throw on the brake, instantly stopping the machinery. A device is also employed which stops the machine and puts on the brake whenever the platform is obstructed in such a manner as to cause the cable to unwind. The automatic-stop motion which is employed is an attachment that stops the car at the upper and lower landings in addition to the arrangement provided for that purpose on the car itself. This machine, the manufacturers state, can be used either as a floor or ceiling machine, but is usually fastened to the ceiling, as it is less in the way. Six sizes of the elevator are made, having a maximum load ranging from 1000 to 8000 pounds.

**Improved Sash-Chain.**

In the accompanying illustration we show four varieties of knitted brass and steel chain which has recently been placed upon the market by the W. C.

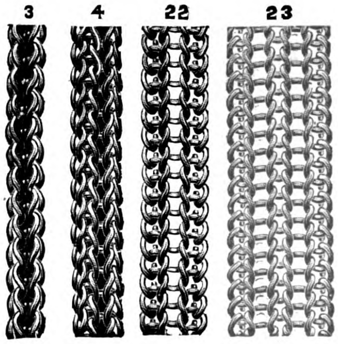



*Fig. 13.—Samples of Knitted Chain, Made by W. C. Edge Company.*

Edge Company, 46 Greene street, Newark, N. J. These goods are designed for use as sash-chains, saddlery-hardware trimmings, draperies and ornamental purposes, and the manufacturers state are cheap, durable and effective. The chain is guaranteed to stand a strain of from 70 to 250 pounds, according to the style and purpose for which it is to be employed. The company make a great variety of styles, the illustrations indicating in a very general way only what they are able to accomplish. To those desiring them the company will furnish upon application cards to which are attached four samples of the chain which they are manufacturing. Upon the card will be found the tensile strength of the samples and other information of general interest concerning them.

**Sash and Door Relisher.**

The improved Sash and Door Relisher which we show in Fig. 14 of the accompanying illustrations has recently been introduced to the trade by the Egan Company, of Cincinnati, Ohio, who claim that it is constructed upon entirely new principles. The main saw-mandrel is made of the best quality steel, is of large diameter and runs in self-oiling boxes lined with

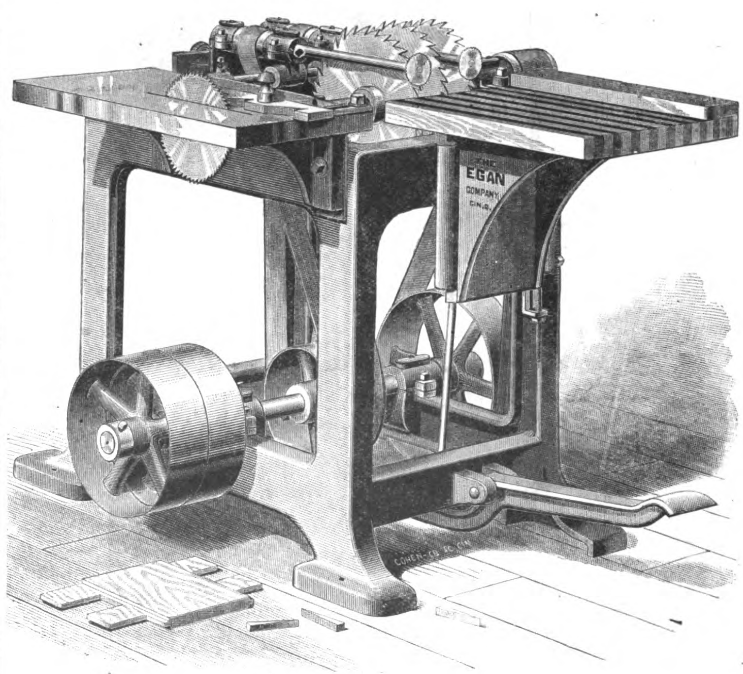
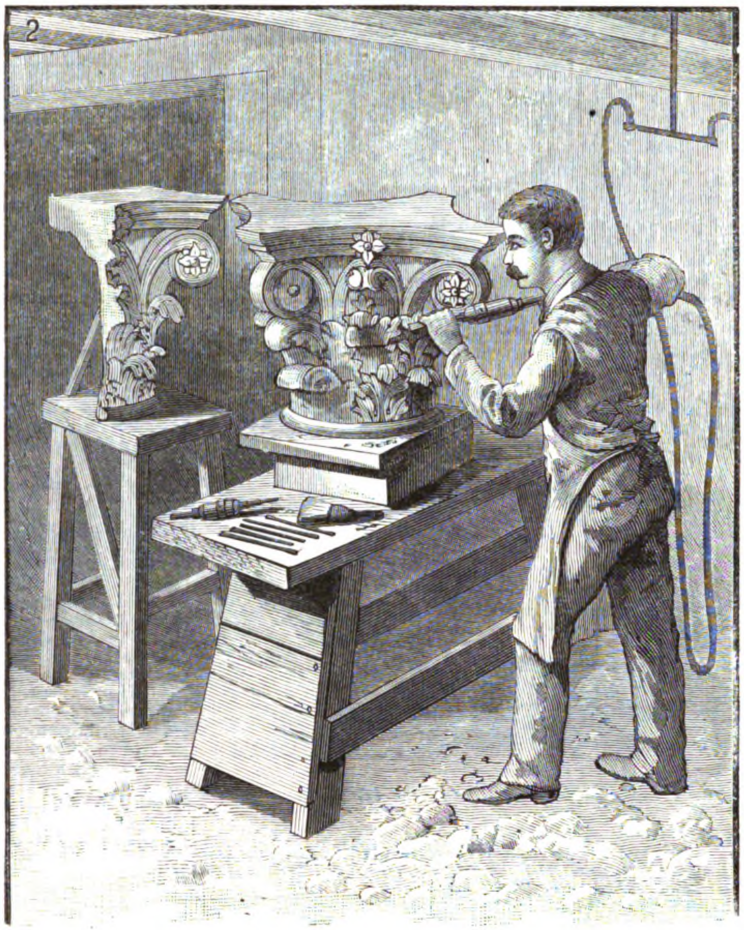



*Fig. 14.—Sash and Door Relisher, Made by the Egan Company.*

babbitt-metal. There are three saws on the mandrel for cutting into the tenon, which can be easily and rapidly adjusted to suit the desired distance. The saws for cutting the wedges are also placed on the main mandrel and operate in connection with the adjustable table. The arrangement is such that this table can be raised or lowered, and when desired to take off the saws can be swung out of the way. A patent wedge-cutting device is also furnished to cut any taper desired. The two mandrels with small relishing-saws attached are made so that the changing of saws from one size to another can be rapidly performed. Each mandrel is run with a separate belt, and both are made to swing out of the way when a change of relishing-saws is desired. All the mandrels and saws are driven from one counter-shaft, which is placed on the machine below, a separate pulley being provided for each belt. The table is raised and lowered by means of a treadle and works in planed ways.



*Novelties.—Fig. 15.—The Mac Coy Pneumatic Tool.*

### Mac Coy's Pneumatic Tool.

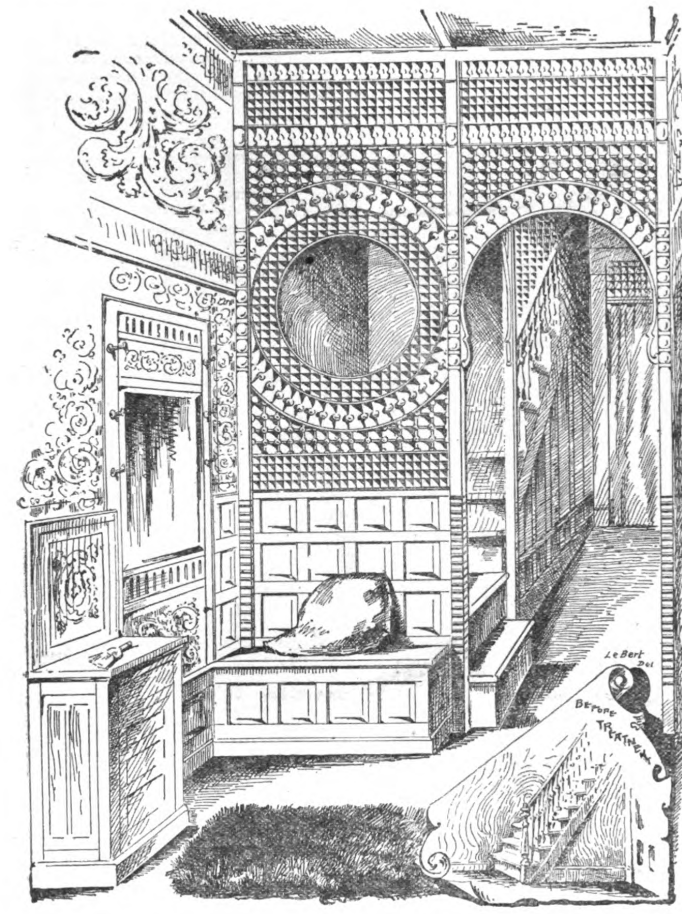
The American Pneumatic Tool Company, of 431 Eleventh avenue, New York City, have lately placed upon the market a pneumatic tool designed for a variety of uses, including cutting marble, granite and other stone, swashing for *repoussé* chasing, planishing sheet metal, dressing mill-stones, die-sinking and the like. The tool consists of a cylinder within which is a reciprocating piston. This acts as a hammer, delivering its blows on a detached tool-holder which projects through the lower end of the cylinder. The device is operated by either compressed air or steam under a pressure of about 40 pounds and can be made to deliver several thousand strokes per minute. To one end of the cylinder is connected a flexible tube, through which the compressed air is applied. At the other end is the tool-holder, which is normally pressed upward or within the tool by a spring. Into this holder is inserted the bit, chisel or hammer, the selection of which is, of course, governed by the kind of work to be performed. Fig. 15 of the engravings shows the tool as employed in cutting stone or marble. Inside of the cylindrical case is a working cylinder, formed with grooves on its outer surface and passages leading from the tube to one slotted chamber on the outside of the working cylinder and terminating in inlet-ports leading to the interior of the working cylinder. A second slotted chamber in the outer surface of the working cylinder extends from eduction-ports through the cylinder and ends in a passageway leading to the atmosphere through the upper end of the cylinder.

In the piston and arranged to work across it is a piston-valve operated by the pressure of air admitted through a port in the side of the cylinder. The valve is formed of a cylindrical plug having two annular grooves separated by a collar, and is fitted in a transverse seat in the piston; in its travel it covers and uncovers the admission and exhaust ports leading to the ends of the working cylinder. As above stated, the piston is not connected to the tool-holder, but strikes it as would a hammer. The upper or inner end of the tool-holder has an enlarged head, which fits loosely in the head of the working cylinder and receives the blows of the piston. As the latter rises and falls in the cylinder it closes the ports and thereby incloses a portion of the air, which forms an elastic cushion, which relieves the tool of the shock which would otherwise result at the end of each stroke. The hammer has a very short stroke, and as there is an appreciable difference in the diameters of the hammer and its metallic cylinder, an air-chamber is formed around the hammer, which reduces the friction to such a point that it is almost entirely absent, and as a consequence no power is here lost, the wear is exceedingly small and the remarkable rapidity above mentioned is made possible. The action of the tool is plainly described in the following paragraph, which we take from the letters patent covering the invention:

"No one has ever before planed marble or metal with a stroke machine, so far as I can learn. The successive strokes of the bit or tool are so very rapid that there is not time between them for the tool to rebound or quit contact with the material; and, furthermore, when each stroke does work, and thereby imparts mechanical energy, the tendency or ability to rebound has departed from the tool with that energy, and the tool thus makes a practically continuous progressive movement and planes the material, a result not accomplished by any machine heretofore patented or constructed."

### Hall Decoration.

At the present day it appears to be much the fashion to remodel old dwellings and bring them up so far as possible to the modern idea of interior and exterior construction and decoration. Considerable attention on the part of architects and builders has been given to this particular branch, the field offered being one in which a great deal of artistic taste can be displayed. One of the means employed for decorating the interior of such dwellings is what may be called Moorish or Japanese lattice or fret work, which is used with very pleasing effect. As an example of what may be accomplished in this direction we present herewith several engravings taken from an exceedingly interesting little work issued by Messrs. Cutting & De Laney, of 194–198 Washington street, Buffalo, N. Y., showing the manner in which a hall may be treated. The order for the work called for the remodeling of the hall-way in a dwelling-house in Buffalo, and in the lower right-hand corner of Fig. 1 is shown the appearance of the old hall and stair-way before treatment. The larger portion of the figure shows the hall after it was treated by the firm above mentioned. We learn that the stair-way was so arranged that there was considerable room between the bottom stair and the front door, which permitted a much more pleasing effect than would otherwise have been the case. In Fig. 2 of the illustrations is shown another way of treating the hall, the space between front door and stairs not allowing room for a seat. Referring to Fig. 3 of the cuts, No. 1 is the plan of the original hall-way, No. 2 shows the manner in which it was rebuilt, while No. 3 gives an indication of how it would have been done had the bottom of the stairs been too near the front door. It will be observed that in Fig. 1 the seat is shown in front of the stairs, while in No. 3 of Fig. 3 the seat is placed at the side of the stairs. The elevation shown in Fig. 2 is of No. 3 of Fig. 3. Another illustration of the manner in which an old hall may be treated by the use of decorative lattice-work is shown in Fig. 4 of the cuts. The small engraving at the left gives an appearance of the hall before treatment, while the larger view shows the stair-way after the decorative lattice-work has been added. The members of the firm referred to are professional artists and designers and give their attention wholly to work of the class indicated. The work is made in sections finished to match the wood-work and can be readily put in place by any one who thoroughly understands the use of a screw-driver. It will be remembered that some years ago we called the attention of our readers to some of the various styles of Japanese lattice-work which this firm were producing, and presented numerous illustrations clearly indicating what they were able to do in this direction. The engravings given herewith are supplementary thereto, and will, we have no doubt, be found of general interest to a large class engaged in the building trade.




*Hall Decoration.—Fig. 1.—Hall Before and After Treatment.*

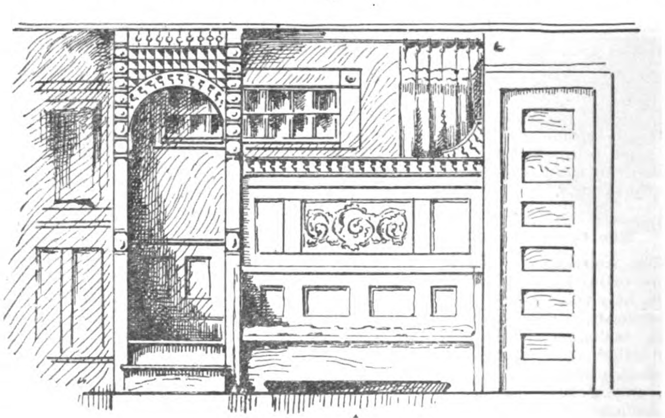


*Fig. 2.—Alternative Treatment of Hall Shown in Fig. 1.*

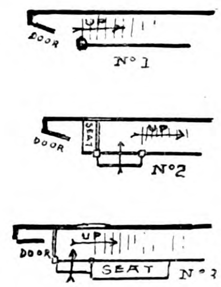



*Fig. 3.—Different Plans of the Hall Treated.*

### Ventilation.

We take the following essay on ventilation from a little pamphlet recently issued by the George H. Hess Company, of Chicago:

The science of ventilating in connection with heating has been sadly neglected until late years, when several methods have come into use, all of them open, more or less, to very serious objections. The idea that ventilation may be secured by opening doors or windows is a thing of the past. Such procedure creates drafts of cold air without displacing the foul air, besides being a constant source of danger to the occupants of the room. One method, popular with some, is so devised that the foul and cold air taken from the different rooms to be ventilated must be collected and carried down from all rooms, to one central or gathering room, usually in the basement of the building. An upright flue heated by a smoke-pipe, or other method, connects with this gathering-room, and into this flue must all the foul air find its way, thence up and out of the building. To obtain results the advocates of such a system often find it necessary to raise all floors 2 inches or more off the joists by means of furring strips placed across the joists, also that the walls of all rooms be furred out back of the plaster. In such manner must the furring be done that there will exist a free circulation of air between walls and between floors and ceilings, literally honey-combing the entire building with concealed air passages, all connected and extending continuously over so many circuitous routes, and the friction caused by the roughness of the ducts over which it passes is so great, that much power is required, and must even frequently fail to remove the proper quantity of foul air from the rooms. We find, then, not only the additional expense of heat, and often of engines and fans, but we can cite cases where even these appliances have failed to do the work. Such a method is unnatural, and cannot be more than partially successful.

Another not uncommon method is to conduct foul air from all rooms to one central flue without passing it first to a

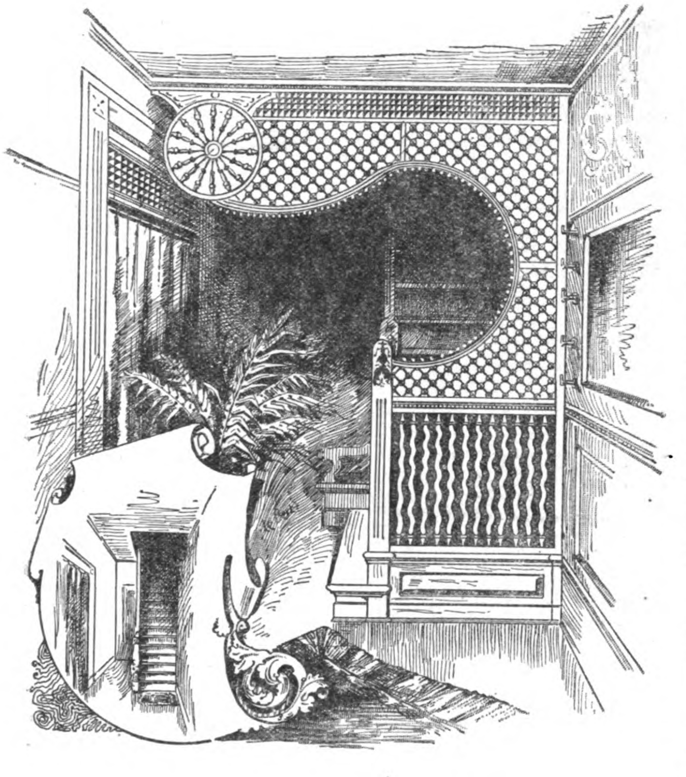


*Fig. 4.—Another Example of Hall Treatment.*

from foundation to roof, converting the building into a veritable fire-trap. A fire once started, finding no obstruction, would quickly reach every part of the building, inevitably resulting in its entire destruction. The danger of this feature in a building crowded with human beings can be more readily imagined than described. Even as a means of ventilating this system cannot be reliable. As the rooms are all connected each to the others by these concealed air passages, so must the cause of disturbance in one room affect all. The pressure of the wind on any side of the house must necessarily be felt in rooms on that side, retarding the inflow of fresh air through its proper sources, and checking the exit of foul air from the rooms on the other side. Under the most favorable circumstances this system cannot ventilate the rooms equally. Those nearest the central flue are over-ventilated, while those further from it are not ventilated sufficiently, owing to the difficulty of carrying the air so far. In no case can this system ventilate without the assistance of power to increase the flow of air in the large or central flue, either by placing a heater in the flue or by the aid of fans. The foul air from the room is carried so far, gathering-room. The same condition of honey-combed walls and floors may exist, but is not found so often in connection with this method. This method is used by other firms, and often by ourselves, usually in old buildings, and, while often successful, frequently requires additional power in the flue, and is open to some extent to the same objections regarding wind pressure as the first system described. Up to a recent date these systems were better and more nearly correct than those preceding them, though imperfect and their application full of difficulties. To overcome these difficulties, and to effect ventilation by a system which will be absolutely reliable at all times, under all conditions of wind and weather, and inexpensive in its application has been our privilege. To properly ventilate apartments the inlets for fresh air and outlets for foul and vitiated air must be large, but distributed in such a manner that no draft can be created, although the movement in the atmosphere must be rapid and continual. The principle involved is simple—viz.: Pure warm air is light and will remain at the ceiling; foul and cold air, being heavy, remains at the floor. They will not mingle.

## TRADE NOTES.

The Barstow Stove Company, Providence, R. I., are distributing to their friends in the trade a circular consisting of a single sheet folded three times, the front page of which is prettily printed with the announcement of the company, while the back page contains a *fac-simile* of an order received from Japan. The middle page contains a likeness of an Oriental rejoicing in the name of Hi-Hi. Within the circular the three pages read in one, and the text is chiefly concerned with relating the history of the aforesaid Hi-Hi, who is reputed to be one of the wise men of archaic Japan. The picture and biography of this Japanese of ancient reputation will be of little account, except in its bearing upon a square-hole Eastern coin, one of which is tied with colored silk to every one of the circulars. These coins are fabled to have been left by the necromancer Hi-Hi, and are warranted to bring a variety of blessings to the happy possessor—or in other words to each lucky recipient of one of the Barstow Stove Company's circulars.

In their advertisement this month the Bridgeport Gun Implement Company, of 17 and 19 Maiden lane, New York, direct the attention of the trade to the Forstner Bit, which they claim can be guided in any direction regardless of grain or knots. Illustrated price-lists of this bit will be forwarded upon application to the company.

Cross & Speirs, of Waterbury, Conn., are meeting with gratifying success in the demand for Wright's Patent Non-Friction Band Saw-Guide which they manufacture. In their advertisement this month they present a letter from the superintendent of the case department of the Waterbury Clock Company, showing the esteem in which this device is held by those who have used it.

Edwin W. Abbe, of New Britain, Conn., directs attention elsewhere in this issue to Abbe's Patent Sash-Cord Fastener, which has recently been introduced to the trade. This is a device for fastening braided and other cords to the sash and weights without the necesity of tying knots. It is made in two sizes, No. 1 taking Nos. 7 and 8 cord and No. 2 taking Nos. 9 and 10 cord.

The Persian Glass Enamel Company, of 446 Canal street, New York, are directing the attention of the building trade to their Persian Enameled Art Glass, which is designed to be used in places where stained glass is ordinarily employed. The statement is made that large plates of glass can be treated without the use of lead, and elaborate designs worked upon the surface in translucent or opake enamels, producing a very artistic effect. It is stated that ceilings and side walls can be made by the use of enameled glass, as well as wainscoting, tiling and border work. The company have issued an interesting little pamphlet on the subject, which they are distributing upon application.

The J. L. Mott Iron Works, of 86–90 Beekman street, New York, have just issued from the press an exceedingly well-printed pamphlet, which the company desire to be considered as a supplement to Catalogue G of 1888, and that it be placed within the cover of said catalogue. The pamphlet shows a variety of the company's specialties, including baths of various descriptions, and presents a ground-plan of the Russian and Turkish bath apartments in the Alcazar, St. Augustine, Fla., and also of a Russian and Turkish bathing establishment in New York City. Attention is also given to a great variety of wash-bowls, which will be found of more than ordinary interest.

J. E. Kline, Jr., formerly secretary and treasurer of the E. D. Albro Company, Cincinnati, Ohio, and president of the Cincinnati Furniture Exchange, has purchased an extensive plant in Louisville, Ky., which he will operate under the name of Louisville Veneer Mills. The product will be all kinds of veneer for furniture and interior decoration.

Chas. A. Strelinger & Co.'s exhibit was among the most prominent and a distinctive feature among the exhibits at the Detroit International Fair. Inclosed in a space of 25 x 20 feet, arranged with good taste, were examples of an extensive line of wood and metal workers' and machinists' tools. In the center of the floor-space were specimens of lathes, band-saws and the larger kinds of machine tools, and upon a base around the inclosure were show-cases containing an infinite variety of tools and goods pertaining to the display. An admired feature of this exhibit was a cloth-covered base 12 x 18 feet, upon which were displayed in excellent taste a great number of the smaller articles of machinists' and wood-working tools. This was inclosed in a beautiful frame, in the center of which were several electric lights arranged with good effect.

We are indebted to the Raritan Hollow and Porous Brick Company, 115 Broadway, New York, for a copy of the third edition of their illustrated catalogue entitled "Fire-Proof Building Materials." In the preface to the pamphlet it is stated that all the facts and figures contained are based on actual experience and can readily be substantiated. The first 15 pages of the book contain a list of buildings in New York City, Government buildings and miscellaneous structures in various parts of the country, the fire-proofing material for which was furnished by the Raritan Hollow and Porous Brick Company. In the remainder of the pamphlet, some 40 pages, the general uses and applications of the products of the above company are treated of very thoroughly. The descriptive text is full, and a number of very neat illustrations add to the attractiveness and usefulness of the circular. All who are interested in the subject of fire-proof construction will do well to obtain a copy of this valuable pamphlet.

I. P. Frink, 551 Pearl street, issues a type-written circular extolling the merits of Frink's Improved Reflectors. The circular intimates that a well-lighted sanctuary is very important to the success of church-work, and concludes the argument with the following pithy line: "Those who reflect before they buy will buy the Frink Reflector."

That St. Louis is making a strong bid for the World's Fair of 1892 is evident from the literature which is being distributed by the various committees in charge of the matter. We have just received a number of circulars setting forth some of the reasons in favor of the selection of St. Louis for this great fair, and a map showing the advantages for the purpose possessed by that city over any other in the country.

The Buckeye Portland Cement Company, of Bellefontaine, Ohio, favor us with a copy of an interesting little pamphlet which they are distributing among their friends in the trade. It is of a size convenient for examination and is printed in an attractive style upon a good quality of paper. The contents relate to the Buckeye Portland Cement, manufactured by the company, and a great deal of useful information on the subject of cement is presented. The frontispiece consists of a bird's-eye view of the company's works at Harper, Logan County, Ohio. A feature of the pamphlet is a number of tests of the cement by experts in various sections of the country.

The New England Artistic Carving Company, of Boston, Mass., have recently distributed among their friends in the trade a number of sheets showing engravings of some of their fancy turned balusters which they carry in stock. The variety presented is an interesting one, and in addition to the engravings of the balusters dimensions and brief descriptive text are presented.

John Zettel, secretary of the Cincinnati Architectural Club, sends us a circular announcing an additional medal offered by the Wayne Hardware Company for the best design and drawings of the hardware necessary to complete a door. This competition, as previously announced in these columns, will be open to both members and non-members of sketch clubs.

We have received from Berry Brothers, manufacturers of varnish, at Detroit, Mich., a neat little pamphlet entitled "Our Story." The text is set in the form of verses and is illustrated in a comical vein. The last page presents an explanation of the contents of the pamphlet, and says that the Gum Cottage, about which the verses have been written and which is exhibited at the Detroit Exposition, is 16 x 16 feet in plan and 18 feet in hight, 20,000 pounds of gum being used in its construction. The outer walls of the cottage are composed of the various gums used in the manufacture of the firm's varnishes, and are collected from almost every known portion of the globe.

Messrs. J. A. Fay & Co., of Cincinnati, Ohio, are in receipt of advices from Paris to the effect that they have been awarded the Grand Prize for wood-working machinery at the Paris Exposition. This award is very gratifying to the company referred to, as it was made in the face of strong competition from English, French and German manufacturers.

The Stanley Rule and Level Company, New Britain, Conn., announce that they have added three substantial improvements to their No. 45 Beading, Rabbet and Slitting Plane, and that these improvements are incorporated in the tools which they are now sending out. The improvements consist of an extra pair of short arms which enable the plane to be worked to better advantage, it is claimed, than with the larger arms, an extra gauge, which in beading matched stuff furnishes a bearing against the edge of the board above the tongue instead of against the tongue itself, while the third improvement consists of the outer side of the fence having a smooth surface so that in center beading the cutter may be used to make a bead 8 inches from the edge of the board instead of 5 inches as heretofore. The company state that they will send to any carpenter who desires them, by mail, on receipt of 10 cents in postage-stamps, an extra pair of short arms and the extra gauge.

C. Powell Karr, of 23 Warren street, New York, sends us a prospectus of a course of studies in architectural engineering and decorative art for students who desire to prepare themselves for this particular branch of work. Instructions will be given by mail, a series of studies being assigned once a week from the following subjects: Draftsmanship, mathematics and miscellaneous work, technology, design and architectural and decorative art. A list of the text-books studied or referred to is presented, together with particulars as to terms, assignment of study, &c. Full particulars can be obtained on application by letter to Mr. Karr.

The Bridgeport Wood Finishing Company, New Milford, Conn., with New York offices at 240 Pearl street, inform us that in the suit in the Eastern District of the Bridgeport Wood Finishing Company vs. New York Wood Finishing Company and others for infringement of the Wheeler patent, covering the use of ground silex, quartz, feldspar, &c., in wood filler, subpœnas have been served on all the defendants, citing them to answer on the first Monday of November, 1889. We are further informed that an application for an injunction during the pendency of the suit will be made to the court.

The Gurney Hot-Water Heating Company, of Boston, Mass., announce that owing to the rapid growth of their business and the necessity for more commodious accommodations they will remove on November 15 to 163 Franklin street, corner of Congress street, where they will have their offices on the first floor. These will be heated by hot water, showing the practical operation of the Gurney Heater and the new Gurney Radiator, while a full line of samples will be on exhibition.

Illustrations and descriptive particulars of Olmsted's Miter-Boxes are presented in the card of the manufacturer, L. H. Olmsted, Corona, N. J. The statement is made that the article is sold by all hardware dealers and that circulars are sent on application.

Joshua Britton & Sons, Stoughton, Mass., in their space in another part of this issue present an engraving of their specialty, Henry's Patent Combination Haft, with an enumeration of the contents of the same. The price of the article is also given.

The Star Steam Heater Company, Harrisburg, Pa., present in their card this month a cut of their Star Gas-Burner Steam and Hot-Water Heater, with brief description. Correspondence of architects, builders and heating engineers is solicited.

E. L. Deane, of Holyoke, Mass., is introducing what he is pleased to call Deane's Patent Adjustable T-Square. It is so constructed that it may be instantly made to conform to any drawing and securely locked in position.

The trade will regret to learn of the death of Mr. Isaac R. Joslin, vice-president of the S. A. Woods Machine Company, of 91 Liberty street, which occurred at his home, in New York City, on the 20th of October. Mr. Joslin was born in Stoddard, N. H., 57 years ago, and started in life at a machine-shop in Keene at the age of 17. In 1869 he came to New York and established the headquarters for the S. A. Woods Machine Company, whose factory was, as at present, in Boston, devoted to the manufacture of wood-working machinery. Through the enterprise and ability of Mr. Joslin a large business was built up, and the home factory now gives employment to several hundred hands, while the firm has branches in Chicago and Michigan.

The Joseph Dixon Crucible Company, of Jersey City, N. J., are offering the building trade an architect's and draftsman's pencil for which they make many claims. In their announcement elsewhere in this issue they point out some of the features possessed by this pencil.

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Warren Webster & Co., of Philadelphia, Pa., are directing the attention of the trade to two important features incorporated in the Webster Vacuum Exhaust Steam Economizer, which they manufacture. These are simplicity of construction and entire departure in principle when compared with pressure, coil or tubular-feed water-heaters as applied for obtaining hot and purified feed-water for steam-boilers or manufacturing purposes. In operation this economizer is said to give very satisfactory results, and the number of testimonials which the manufacturers have received show in some degree the estimation in which it is held by those who have used it.

The many friends of Mr. C. Powell Karr will be interested in learning that, beginning with November 1, he will take the position of associate and art editor of *Building*, the office of which is at 23 Warren street, New York. Mr. Karr is well known to our readers from his numerous contributions on different topics, and in his new sphere all will wish him every success.

The American Institute Fair was duly opened on the 2d of October with interesting ceremonies. The exhibition this year is fully up to the standard of years past, the display covering a wide range of industries. H. A. Berry, 39 Dey street, the general Eastern agent of the Prescott Hardware Mfg. Company, makes an attractive exhibit of the Prescott Door-Hangers, which were recently illustrated in these columns. The Gurney Hot-Water Heater Company, of 237 Franklin street, Boston, Mass., show the Gurney Hot-Water Heater, which embodies many interesting features. The exhibit of the National Sheet Metal Roofing Company, of 510 to 520 East Twentieth street, New York, occupies an advantageous site and is made up of their leading specialties. They show samples of Walters' Patent Metallic Shingles, Cooper's Patent Queen Anne Shingles and Cooper's Patent Broad-Ribbed Roofing. Mr. J. H. Havens, with office at Fifty-sixth street and Eleventh avenue, New York, exhibits his Combination Band-Saw Filer and Setter, made under patents granted to W. H. Parry. The machine is in daily operation and demonstrates in a very comprehensive manner its utility for the purpose named. Among the other attractive exhibits may be mentioned that of the E. C. Stearns & Co., Syracuse, N.Y.; Backus Portable Steam Heater Company, 22 Park place, New York; Stewart Ceramic Company, of 312 Pearl street, New York; the American Patent Portable House Mfg. Company, of 48 Wall street, New York; George Hayes, 71 Eighth avenue, New York, and the Vassar Burglar Alarm Mfg. Company, of 56 Warren street, New York.

J. & T. Kydd, of 83 Walker street, New York, are agents for New York City and Brooklyn for what is known as the Nassau Plastering Fiber, a material designed as a substitute for hair in making mortar. From an announcement which the firm have made to the trade we learn that this fiber is claimed to be stronger than hair, making a more enduring plastering; that it is clean and economical; floats readily, giving a better surface for finishing; that it can be banked for any length of time without injury, and that it is cheaper than hair. It is also stated that hot lime cannot injure it. This fiber is offered to the trade in bales weighing from 60 to 100 pounds each. The agents above referred to announce that they will send upon application a sample of the Nassau Plastering Fiber to all who may desire it.

The Canton Steel Roofing Company, of Canton, Ohio, state that their trade for the first half of October was the best in their history. Included among the large contracts executed during the month was one for 730 squares of pressed beaded ceiling for a Lincoln, Neb., apartment store, said to be one of the largest in the West. They state that they are not affected by the active condition of the iron and sheet-steel markets, as their large future contracts enable them to obtain prompt shipments and fill orders on short notice.

James E. Nicholson, of 145 West Forty-third street, New York City, invites the attention of the building trades to a sectional or extension ladder possessing many features of interest. The main side pieces of the ladder are furnished with splice pieces, which are pivoted loosely to the round which comes next the top of the section. Each of the splice pieces is provided with a recess designed to receive a pin in the main sides of the ladder, and also with a slot through which works a locking round during the operation of detaching the sections from each other. When it is desired to place the ladder in position for use the splice pieces are pressed against the main sections until the pins engage firmly with the recesses already referred to, the locking-key is turned and the ladder is ready for use. The object of the inventor has been to provide a sectional ladder which may readily and rapidly be put together and which may be employed for a variety of purposes.

We have received from W. R. Ostrander & Co., 21-25 Ann street, New York, a copy of the seventh edition of their revised catalogue of Speaking-Tube Hardware, Gongs, Bell-Ringers' Hardware, Electric Bells and Supplies, Pneumatic Call-Bells, Oral, Electric, Mechanical and Pneumatic Annunciators. The catalogue consists of over 100 pages of profusely-illustrated letterpress, bound in paper covers of typographical design. The firm announce that since the sixth edition of their catalogue was issued they have added a large number of goods to their assortment, and with their enlarged factory and ample facilities are enabled to fill orders promptly. The work is issued in a very attractive form and will no doubt be found of interest and value to those engaged in the building trade.

## NEW PUBLICATIONS.

**Perspective.** A series of elementary lectures by Ada Cone. Size, $7\frac{1}{2}$ x 5 inches; 62 pages. Published by W. T. Comstock. Price $1.

In the book before us we have a very simple and easily-comprehended account of the principles of perspective. The author has brought to her task a long, critical study of art, years of experience in instructing adults and children, besides the gift of a born teacher, which enables her to present a difficult subject clearly to untrained minds. An especially attractive feature about the book is the simplicity and the freedom from superfluous words and ambiguous explanations. While it is not a lengthy treatise, the book is quite sufficient to meet the wants of all ordinary inquirers, and will be exceedingly useful as a hand-book to teachers or as a preliminary manual to the student. Even apart from those who need a knowledge of the perspective in the pursuit of their calling, whatever it may be, the majority of intelligent people will find a comprehension of the principles of perspective of great value and assistance to them. In fact, the rudimentary part of perspective should be a portion of every one's education.

# CARPENTRY AND BUILDING

A MONTHLY JOURNAL.



VOLUME XI. NEW YORK, DECEMBER, 1889. NUMBER 12

## NOTES AND COMMENTS.

IT IS ONE of the paradoxes of human nature that the poorest-paid workers do not strike and do not agitate for shorter hours of labor. Those who are well paid for their work and are employed the fewest number of hours manifest by strikes and agitation the strongest desire to further improve their condition. Those who make cheap clothing, the poor sewing women, whose earnings are worse than beggarly, because a beggar would scorn his business if it yielded such returns, would create the greatest sensation that has taken place in the working world if they were to strike. Sometimes, though not often, workingmen are goaded to strike through desperation because their wages are too meager to live on, but the great majority of strikes and labor troubles occur among those who have been able to lay by a little fund, and in many cases a pretty handsome fund. It is this last class of workingmen who are chiefly instrumental for the agitation now being carried on in favor of an eight-hour day. The last convention of the American Federation of Labor, which was held at St. Louis, pronounced in favor of the establishment of an eight-hour workday on May 1, 1890, and it is expected that the next convention, which will meet at Boston on the 10th of December, will take decisive steps to secure its realization. The American Federation of Labor is now the most powerful labor organization in existence since the decadence of the Knights of Labor, and it is to be hoped that its leaders will not be so shortsighted as to seriously attempt to force a general settlement of this question at the time mentioned. The eight-hour movement has been making progress, advancing along lines of least resistance, and will probably continue to gain in occupations in which its introduction will not work hardships to employers or injuries to business. The genius of the age is in favor of alleviating the condition of those who are obliged to support themselves by labor. But an attempt to crowd the settlement of this stupendous question into a few months and to take effect on a fixed day will be as futile as all such efforts have been in the past.

ON EVERY HAND there are indications that the public are beginning to have more and more regard for the science of sanitary engineering. Not the least valuable testimony to this conviction is the increasing disregard which is shown for those who, without possessing the necessary qualifications, would yet try to pass for sanitary engineers. As the people appreciate the dangers arising from the ignorance of those who ought to know about such matters, they will encourage and support every means for properly educating sanitary engineers. Some of the technical schools have already seen the need of instruction in this branch of engineering, and we are very glad to notice that the Massachusetts Institute of Technology, Boston, Mass., have also made arrangements for this department. The course will be open to the students of the present first-year class, and while the line of study is essentially the same as in civil engineering, it differs from the regular course in this subject in some particulars. There is, for instance, reduced time devoted to railroads and bridges and an entire omission of the mechanical engineering subjects of mechanisms, machinery and motors; also of astronomy, &c. The time gained by the omission of these subjects is principally devoted to courses in chemistry and biology. It is the intention to give the students such training in these sciences as shall fit them to interpret the results of sanitary chemistry and sanitary biology and to co-operate with chemists and biologists in professional work. In the fourth year instruction is given in heating and ventilation. The course in sanitary and hydraulic engineering, which is now partly optional, is required in full for those students who would graduate as sanitary engineers. The Institute of Technology distributes circulars giving the course in this department in detail, and any one who takes interest in the matter will do well to write for a copy of the circular to H. W. Tyler, secretary of the institute.

THE DANGER from overhead wires carrying currents of electricity for lighting and for purposes of power is very generally recognized by our readers. In *The Metal Worker* a short time since there appeared the following bearing upon this point: "Cleveland does not expect to have any more circuses—that is, shows of the itinerant variety. The city may get up a circus of its own some time in the future—in fact, there have been one or two partial rehearsals already. But outside shows are not to be allowed the use of the streets of the city. To keep the shows out and reserve all the grand and lofty tumbling and the performances of electrified horses to the city itself, the streets have been carefully overspread with an ingenious net-work of wires some 20 feet above the ground. Looking up, one is reminded of the ropes and nets that are stretched on the occasion of a trapeze performance. The wires are so low down that the Goddess of Liberty in her chariot could never go under, and to guard further against invasion the wires are all charged with deadly currents of electricity. Better protection against the inroads of traveling shows like circuses could hardly be desired, and the city fathers are to be congratulated upon their happy forethought. Meanwhile the street-car companies are putting motors into their cars, intending to utilize a part of the electric current these wires carry for driving their cars, thus dispensing with horses. Occasionally a portion of the wires falls to the ground, resulting in the death of a horse or two. This, of course, helps the car companies to get rid of their surplus animals. No men, I believe, have been killed yet, but as they follow New York fashions out there I suppose that will come along in due time. Iron posts set in the edge of the sidewalks serve to support the network of wires already mentioned, and the local newspapers are pathetic in their appeals to the public not to touch the posts for fear of disaster."

ACCORDING TO the statistics which have recently been made public the building operations in the city of Philadelphia for the first ten months of 1889 surpass any corresponding period of previous years. During the time named there were 9201 new buildings erected at an estimated cost of $28,127,000, while for the year 1888 there were 8264 new buildings erected in the city named. Of the new structures erected during the first ten months of the present year 6630 were two-story houses, 1884 three-story houses, 68 were factories, 67 store buildings and 18 churches. The number of four-story buildings erected is 35, as compared with 13 during 1888. From an inspection of the statistics available it is found that there has also been a falling off in the erection of large office buildings.

THE READERS of the technical press are pretty generally familiar with the system of heating by water under pressure that was inaugurated at Boston some two years or so ago. Our recollection of the system was that it distributed water by pumps through street-mains at a pressure of 300 pounds or more to the square inch and at a temperature of 400° or 500° F. To secure steam for heating or power purposes there was a special device by which the superheated water taken from the main by a small pipe into the house was permitted to expand into steam. The pressure was brought down to the desired amount by suitable valve arrangements. When the scheme was first broached and discussion on its probable efficiency arose some of the papers intimated that it was not likely to be a success, and pointed out in support of this view the experience of the steam companies in New York and the extreme difficulty they had in keeping tight their return mains which held water. The Boston system, however, was favorably commented upon by engineers of considerable eminence, and was reported as progressing prosperously from time to time after the plant began running. Little more was said about it until recently, when the Boston Heating Company issued a circular to their customers stating that it had been decided by the Board of Directors to temporarily suspend operations on account of the necessity of making an examination of the under-ground system and especially of the return-main. We are not given full particulars of the condition of the company, but the daily papers in commenting upon them intimate that they will never resume operations. In fact, current rumor says that the obligations of the company are far greater than their ability to pay, and that the plant is practically useless, the conduits being rusted out and in a dangerous condition. Therefore, if rumor be true, this is the ending of an enterprise that in the opinion of many promised great success and was to revolutionize the systems of power and heat distribution in cities. There seems to be no real reason why a system of power and heat distribution by hot water or steam is not feasible, but yet experience would seem to teach the contrary, and it is possible that the next company to start operations in this direction will follow one of the foreign systems and use either compressed air or vacuum for power. The problem of heating a large area from a central plant, however, is still to be solved.

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ONE OF THE MOST important industries in and around the city of Pittsburgh, where clay of good quality is abundant and fuel is cheap, is that of brick-making. At the present time it is stated that about 50 firms are engaged in the business, manufacturing large quantities of both fire and building brick. For a year or two past some of the manufacturers have been making use of natural gas and are said to find it preferable to any other fuel, being more economical, baking the brick more evenly and giving them a better color. The oldest works in that vicinity engaged in making brick were established in 1836. At the present time three or four establishments are in course of construction, one of which is intended to be the largest plant in the city with a capacity of 60,000 brick per day. The firms engaged in the production of fire-brick and tile exclusively number about a dozen, the oldest of which was established in 1849. The brick manufactured in Pittsburgh and vicinity is said to have a good reputation for color, shape and durability and finds a ready market.

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A POLYTECHNIC school, to be known as the Lewis Institute, is to be established in Chicago. The fund for its establishment was devised some ten years since by Allen Lewis, of that city, who left his property at his death in the hands of trustees to be devoted to the erection and sustenance of a polytechnic school and its necessary appurtenances when the estate should amount to $800,000. The fund now amounts to over $1,000,000, and it is the intention of the trustees to erect a building next year and open the school as early as practicable. Girls are to be instructed in certain branches of art and young men are to receive instruction which will be useful to them in earning a living. According to the terms of the bequest, the trustees are to provide a large lecture room or hall and fine reading room or rooms and all necessary study-rooms to carry out the plan; the building, when completed, together with the premises, to be forever devoted to the purposes specified and thereafter to be known as the Lewis Institute; and upon its completion the trustees are to invest not over $50,000 in the procuring of books, papers and pamphlets for the library and the necessary fixtures, designs and apparatus for the studies and other rooms. The trustees are also to procure all necessary librarians and teachers. The design of the founder of this institute was most commendable, and if the trustees carry out his wishes in a wise and judicious manner, Chicago will in coming years have in it an educational institutition of very great value.

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THE ANNOUNCEMENT is made that early in December a department of architecture will be organized in connection with the Pratt Institute, located in Brooklyn, N. Y. It appears that a number of the leading architects in New York and Brooklyn are interested in founding the department and will be influential in shaping its policy. The promoters of the enterprise expect that it will be the means of bringing together into relations of social and mutual helpfulness a large number of architects and students of architecture. From particulars which have come to our knowledge we learn that it is the purpose to have a course of lectures on architecture and to provide systematic instruction in elementary and advanced architectural drawing, as well as direct the work of making a museum of architectural design in connection with the museums of art and science to be erected in that city.

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FROM REPORTS regularly sent out it is apparent that building operations are not by any means dull in the larger cities of the Northwest. The number of building permits recently granted in Minneapolis and St. Paul are conclusive evidence of the activity of building operations in that section of the country, and show that considerable work will be in progress long after cold weather sets in. While the permits granted cover, for the most part, buildings designed for dwelling purposes, there are several business blocks projected involving a large expenditure. The present tendency, however, seems to be in the direction of small structures, costing all the way from $3000 to $10,000, rather than in the direction of large apartment and tenement houses, involving the expenditure of more liberal sums. Experience seems to show that not only is the cheaper class of buildings most in demand, but that these make greater returns on the capital invested than structures involving larger amounts.

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THE SHEFFIELD SCIENTIFIC SCHOOL, at New Haven, has come into complete possession of the Sheffield mansion, formerly occupied by the founder of that institution, and the structure forms a complete laboratory.

## THE PLATES.

In Plate XLV we show a chimney-piece in the Museum de Cluny, Paris, and designed by Hugues Lallemand. It forms a part of a collection of some examples of Renaissance work, and was taken from a house at Chalons-sur-Marne, where the great fire of 40 years ago brought about so much demolition and led to such frightful restoration of the old architecture of the town. The example which we give shows a curious and singularly elaborated detail of execution, the work dating back to about 1562. The central *cartouche* is said to contain for its subject "Christ at the Fountain," the Virgin and Child being represented in the middle of the sculpture, with children grouped curiously in front of buildings to the back of the representation. The hight of the chimney-piece is about 10 feet 6 inches and nearly 10 feet wide.

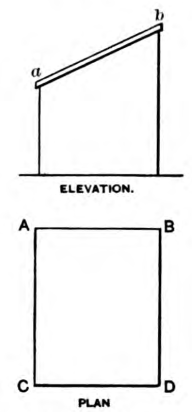
A triumphal arch, which will take a high place among similar monuments of the world, is that now in process of construction on the Prospect Park Plaza, Brooklyn, N. Y. The corner-stone of this arch, which is to be erected in honor and in memory of the defenders of the Union, was laid with imposing ceremonies on October 30. The idea of erecting a memorial arch was conceived some time ago by public-spirited men in Brooklyn, and two years since the Legislature passed an act to authorize the erection of the monument. Amendments to the law made the Mayor, the chairman of the G. A. R. Memorial Committee and the president of the Board of Aldermen, Brooklyn, a commission to build the monument at a cost not to exceed $250,000. In plates XLVI and XLVII we show a perspective view of the arch as it will appear when completed. The total hight will be 71 feet, total width 80 feet and the total depth 45 feet. The hight of the arch will be 48 feet 6 inches, while the width of the arch will be 37 feet. The entire structure of the arch rests upon a course of polished Quincy granite 3 feet high. The main angle of this course forms the corner-stone. The material above this course will probably be of a lighter-colored stone of the same quality. There are four pedestals, two of which face the entrance to Prospect Park, while the other two face the fountain on the plaza. These will support groups of statuary colossal in size. On the ends of the arch abutments are recesses for figures in bass-relief. Directly opposite these on the inside under the arch will be equestrian figures in nearly full relief, which will be in bronze. The under side of the arch will be finished with coffered bevels. The keystone will be carved with the seal of the United States. In the spandrels over the arch, on the fountain side, will be the seals of the city of Brooklyn and State of New York, and on the two spandrels on the opposite face will be female figures of Victory carved in the stone. In the panels above the cornice will be disks encircled with wreaths and inscribed with the names of battles. The parapet line will be formed with eagles resting on globes. In each of the flanking abutments will be stairways extending from the drive-level to the top of the arch, one flight being for ascent and one for descent. This work is being done under the superintendence of Architect John H. Duncan, while Robert Van Buren, of the Department of City Works, is engineer in charge.

In Plate XLVIII we present a carved chimney-piece designed by Mr. G. Faulkner Armitage, and located in the council-room of the British section of the Paris Exposition, constituting one of the principal features of that apartment. The illustration shows the grate, fender and various ornaments exactly as they appear in the council-room.

## Measurement of Roofs.

BY TRIANGLE.

It is often necessary for the mechanic to estimate from the architects' plans and specifications the amount of material required to cover the various shaped roofs that are used on modern buildings. In order to do this the mechanic should possess a knowledge of drawing and of the principles of construction, beside being acquainted with the properties of geometrical figures. The rules applicable in this case are for the mensuration of sur-




*Measurement of Roofs.—Fig. 1.—Elevation and Plan of Shed Roof.*

faces, and while almost every one has some general knowledge on the subject, mechanics are often bewildered when called upon to estimate the area of irregular surfaces, especially those of a roof, as the plans may not show the exact shape, which is to be determined by measuring a number of drawings, as the plans and elevations. There are generally some allowances to be made that are peculiar to the

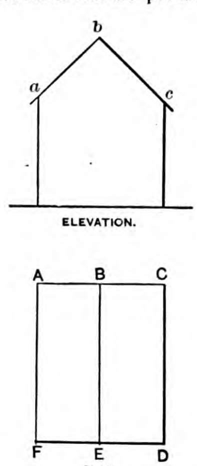



*Fig. 2.—Elevation and Plan of Gabled Roof.*

roofing business. If the roof surfaces as shown by the various drawings are estimated correctly the estimate might not indicate the amount of roofing required, as some parts of a roof may be so situated that the material is to be bent up at right angles against an upright part of the building or extend under the slate or shingles of a connecting roof. The roof of a building may be largely broken by hips and valleys, causing the parts to be of various shapes; there may be towers, dormer windows and other eccentricities of architecture that are to be covered or worked about in some way. The mechanic should familiarize himself with architects' drawings so as to be able to understand what is required to be done; this is something of great importance when the work is to

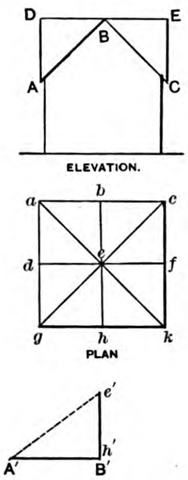



*Fig. 3.—Roof Formed of Four Gables.*

be done by contract, for any part of the work that has been omitted from the estimate will probably have to be done without recompense.

In Fig. 1 is shown one of the most simple forms of roof met with in ordinary construction, being a pent or shed roof. The dimensions of the building are shown in plan and the pitch of the roof in elevation. While this is one of the most simple forms of roof used, it shows one of the principles of measurement—that the size of the roof cannot be obtained from the plans alone. B D on the plan gives the length of the building and *a b* on elevation the width of the roof. It is hardly necessary to state that the surface of the roof is obtained by multiplying the length of the building B D by the rafter *a b*. With as simple a roof as this it would be necessary to know how the edge of the

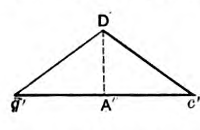



*Fig. 4.—Second Method of Obtaining Length of Valleys.*

roof were to be finished in order to determine the size of covering. In Fig. 2 is shown another form of roof, the surface being almost as simple to calculate as the one previously shown. This is called a gable roof, the line of junction of the rafters at *b* being called the comb. In this as in the previous example the length of the building is obtained from the plan and the length of the rafters from the elevation. To obtain the surface of the roof the length of the building C D is multiplied by the length of the rafter *a b*, which gives the surface of one-half of the roof, and twice this amount gives the surface of the whole roof. If desired, the length of the rafters *a b* and *b c* can be added together and multiplied by the length C D, which will give the same result.

Another form of roof is shown in Fig. 3. It is erected on a rectangular plan, the four sides of which are equal, and the roof having two slopes, producing four valleys. This form of construction presents a gable to each of the four fronts. An inspection of the plan shows that there are eight parts of the roof similar to *g h e*, and if we were to get the area of the figure showd by *g h e* and multiply it by eight it would not give the surface of the roof; yet the mistake has been made by some, when figuring from drawings, of taking the dimensions entirely

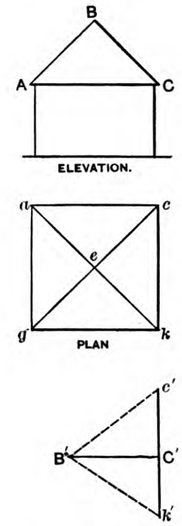



*Fig. 5.—Another Form of Roof for Building Shown in Fig. 3.*

from the plan, instead of comparing the plan with the elevation. For example, to obtain the shape of *g h e* of plan one dimension, *h e*, is taken from the plan, as it is the length of the ridge,

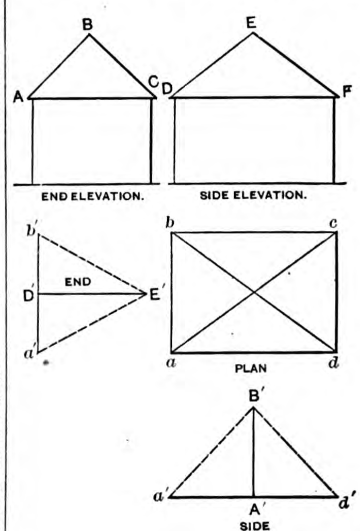
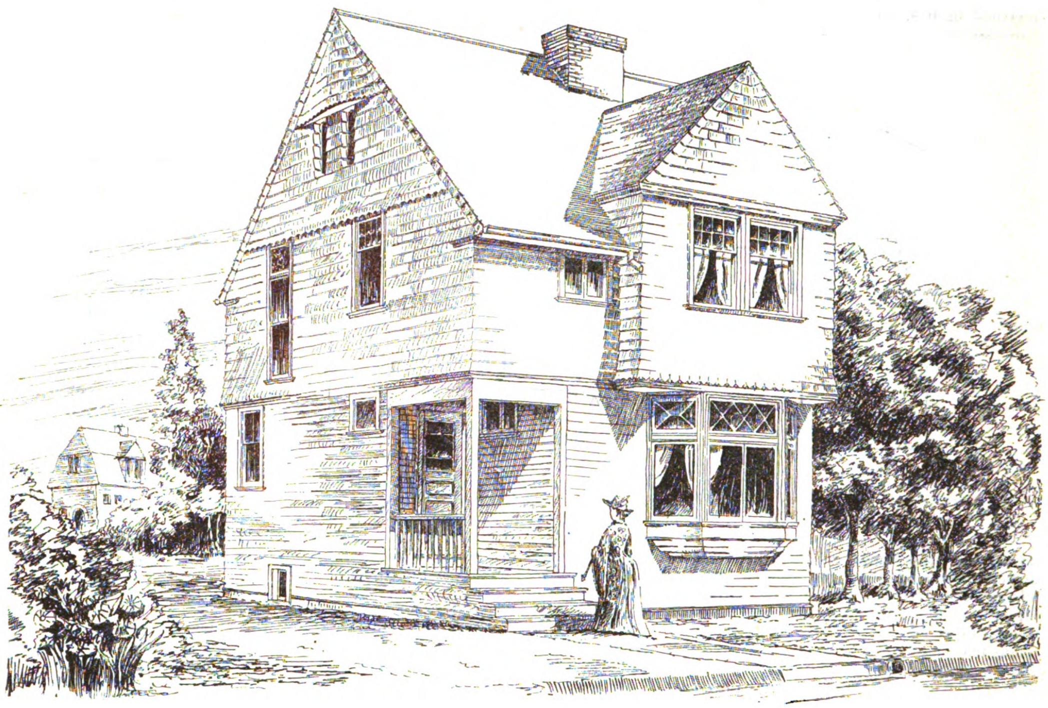


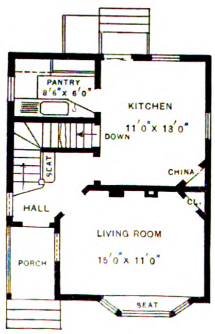

*Fig. 6.—End and Side Elevations of Building with Hipped Roof.*

but *h g* does not give the length of gable; that is obtained from the elevation. To obtain the surface of the part of roof shown on plan by *g h e* we take the length A B in elevation, which is the length of gable, and at right angles to it at B' draw the line *h e* of plan, which is the length of ridge; then by connecting A′ $e'$ we have the surface of one-eighth of the roof, or the part shown on plan by $g\ h\ e$. If the roof was to be covered with slate and it was necessary to determine the length of the valleys we could proceed in the same manner; the distance from A′ to $e'$ would be the length of valley, and, as the drawing is supposed to have been made to scale, the distance from A to $e$ could be easily determined. Another method of determining the length of the valleys is shown in Fig. 4. Draw the line $g'$ $e'$, in length equal to $g\ e$ in plan, and from the middle point A′ draw E′ D′ equal in length to A D in elevation; then $g'$ D′ and D′ $e'$ represent the length of valleys. In Fig. 5 is shown the plan and elevation of a hip roof, A B C being the elevation and $a\ b\ c\ d$ the plan, which is the same in size as the one shown in Fig. 3. To get the surface of one of the sides of this roof draw the line $c'$ $k'$, equal in length to $c\ k$, and from the middle point of $c\ k$ draw C′ B′, the length of rafter; then C′ K′ B′ is the surface of roof shown by $c\ k\ e$ in plan. If we wish to determine the length of the hip we proceed in the same manner as in Fig. 4 for obtaining the length of valleys. As $g'$ $c'$ is the distance from one corner of the roof to another, and A′ D′ the hight of roof, $g'$ D′ or D′ $c'$ must give the length of hip, so the lengths of hips and valleys are the same. In Fig. 6 we show the plan and front and side elevations of a building which in its general characteristics corresponds with Fig. 5, being of the same width, but of greater length. To obtain the surface of the end of roof we proceed in the same manner as in Fig. 5, but as the rafters are longer the shape will be different. Draw the line $a'$ $b'$ equal in length to $a\ b$ of plan and D′ E′ equal to D E in elevation, so $a'$ E′ $b'$ is equal in surface to one of the ends of the roof. The side surface is obtained in a similar manner, $a'$ $d'$ being equal to $a\ d$ of plan, and A′ B′ to A B of elevation of end, so $a'$ $d'$ B′ represents one of the sides of the roof. In Figs. 3, 5 and 6 it has been shown how to draw figures having the same surface as corresponding parts of the roofs, but it is necessary in estimating work to be enabled to get the area of these triangular figures and of such others as may occur. This leads us at once into a consideration of triangles and their properties and the correct way to proceed to obtain their areas. This will be the subject of a succeeding chapter. To obtain the area of a triangle, as shown in Fig. 5 by B′ $c'$ $k'$ multiply the base by the altitude and take one-half of the product, or, what is the same thing, multiply the base by one-half the altitude. For figuring the roof shown in Fig. 3 we multiply the length A B by the length $h\ e$. Take one-half of the product and multiply it by the number of triangles in the entire roof, of which there are eight.

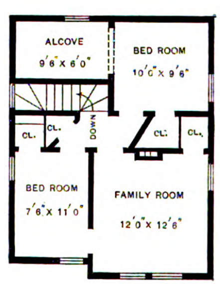
As the roof shown in Fig. 5 has four sides, to get the surface we multiply the base of triangle $c'$ $k'$ by the altitude B′ C′, one-half the product being the area of the triangle B′ $c'$ $k'$, or one side of the roof, and four times this amount will be the surface of the entire roof. The roof shown in Fig 6 has two sides and two ends, the areas of which are obtained as are those in Fig. 5. From what has been shown re-



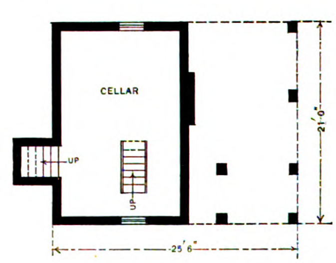
*Design for a Cheap House.—Perspective View.—F. O. Cloyes, Architect, Chicago, Ill.*




First Floor.




Second Floor.




Foundation.

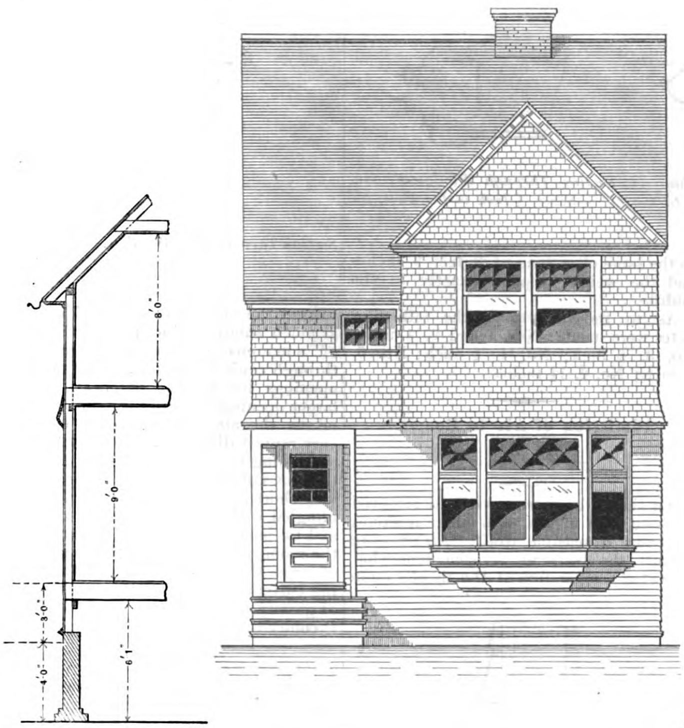
*Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

garding the estimating of roofs from drawings it will be seen that both plans and elevations are required, and as we proceed with the subject we will endeavor to show how these are to be used together in the best manner, and also to show how lacking dimensions may be obtained from them by comparing one with the other.

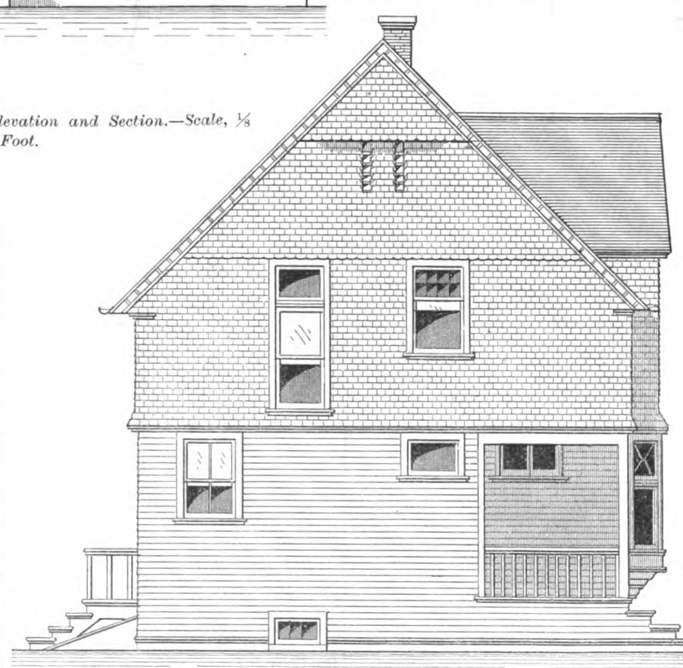
*(To be continued.)*

### Design for a Cheap House.

This month we lay before our readers the plans, elevations and details of a low-cost house, designed by F. O. Cloyes, of Chicago, Ill. The plans, it will be noticed, provide for a kitchen and living-room upon the first floor, three chambers, one of which is provided with an alcove of good size, upon the second floor, and a store-room in the attic. The design of the author of the plans has been to use the kitchen as a dining-room and to perform the rougher part of the housework in the large pantry in which is located the sink. In this way some of the undesirable features of a combination kitchen and dining-room will be avoided. The kitchen is shut off from direct communication with the living-room, yet the arrangement of doors is such as to make it convenient to it. The front entrance to the house, as well as to the second story, may be reached from either the kitchen or living-room without being obliged to pass from one to the other. The pantry is provided with convenient shelves, there being a cupboard above and drawers and a flour-bin below. Provision is made for ample closet-room in connection with all the chambers and the available space is well utilized. The cellar is excavated under only a portion of the house. The cistern, which is conveniently located, is specified to have a capacity of 40 barrels.




*Design for a Cheap House.—Front Elevation and Section.—Scale, 1/8 Inch to the Foot.*



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

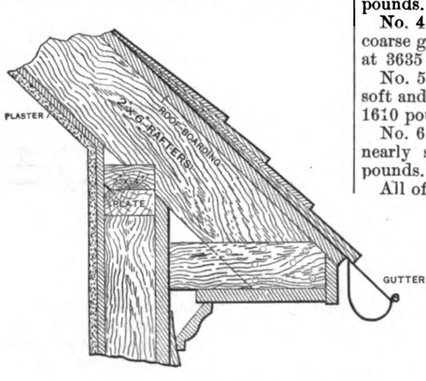
## NEW PUBLICATIONS.

HINTS ON HOUSE-BUILDING. By Robert Grimshaw; 77 pages; size, 6 x 4. Revised edition. Published by Practical Publishing Company. Price 50 cents.

The name of the author of this little book, or as he terms it "booklet," is quite well known in this country, for he writes often and his works or "worklets" cover a variety of topics. It is not an easy matter to review the diminutive specimen before us, for the simple reason that it contains very little to talk about. According to the author's confession, there is in it neither science nor fine writing, but it is simply a desultory sort of discourse to the intending house-owner on the general points to bear in mind in planning. There is really nothing objectionable in the book, however much it may lack in practical utility, and in fact many of the hints are of a kind to prove exceedingly acceptable to the impracticable man who forgets the arrangement of conveniences in a house until after the structure is completed and it is too late to supply the omissions.

DICTIONARY OF ELECTRICAL WORDS, TERMS AND PHRASES. By Edwin J. Houston. Published by the W. J. Johnston Company, Limited. Illustrated. Price $2.50.

The compiler of this dictionary in his preface states that he was led to engage in the work by reason of the fact that there are so many terms now employed, especially in electricity, which cannot be found in any of the dictionaries as to make necessary a technical dictionary. He was also influenced by the fact that the same terms are used frequently by different writers in conflicting senses and with entirely different meanings. In carrying out his work he adopted the following plan: 1, a concise definition of the word, term or phrase; 2, a brief statement of the principles of the sciences involved in the definition, and, 3, where possible and advisable a cut of the apparatus described or employed in connection with a word or phrase. The carrying out of this plan has resulted in a book which is in a certain sense a combination of the technical dictionary and a treatise, of course as elementary as possible, upon the principles of the science defined by the words. In order to insure as far as possible, where the meaning is at best conflicting, the accurate and precise definition of the words given, the standard works and periodicals have been carefully consulted and some of the leading exponents have been kindly asked to assist. Looking through the work, we find that it is principally devoted to those terms and phrases which have come up with the science of electricity. In addition to this, we find out that the branch of mechanics upon which the execution of electrical machinery depends is freely brought in and described wherever it has been found necessary. The book certainly fills a gap which has existed for a long time, and ought to serve as an aid to doing away with the present promiscuous use of electrical terms.

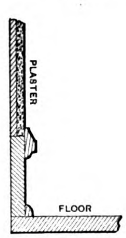



*Design for a Cheap House.—Details.—Section Through Main Cornice.—Scale, 1 Inch to the Foot.*

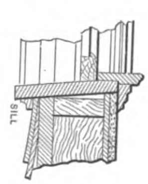
## Strength of Fir.

A late issue of the Tacoma *Daily Ledger* is authority for the following record of tests of various woods, recently made at the car-shops of the Northern Pacific Railway:

The timber tested was subjected to an actual breaking on sticks 2 x 4 inches and 4 feet long to centers, being one-fourth as long, thick and wide as an actual stringer as used by the railroad company in its trestle-bridges. The test is important, as there seems to have been but little information on that subject, and the impression has been that ordinary oak was stronger than fir. The tests show, however, that yellow fir is actually one-third stronger than Eastern oak and more than one-half stronger than Eastern white pine. The breaking weight, placed squarely in the middle of each stick, was as follows:




*Section Through Base.—Scale, 1 Inch to Foot.*




*Section Through Sill.—Scale, 1 Inch to Foot.*

No. 1. Old piece of yellow fir from yard, having decayed ends, six years in the weather, 3063 pounds.

No. 2. New soft piece fine-grain yellow fir, similar to the best flooring timber, 3062 pounds.

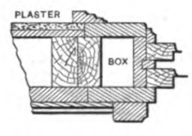
No. 3. Old piece yellow fir, coarse grain and hard, broke short at 4320 pounds.

No. 4. New piece from the butt of tree, coarse grain, broke with a stringy fracture at 3635 pounds.

No. 5. New piece Michigan white pine, soft and clear, broke short at a weight of 1610 pounds.

No. 6. New piece Michigan oak, broke nearly short off at a weight of 2458 pounds.

All of the pieces of wood were subjected to the same clear span of 3 feet 9 inches and the weight applied exactly in the middle.



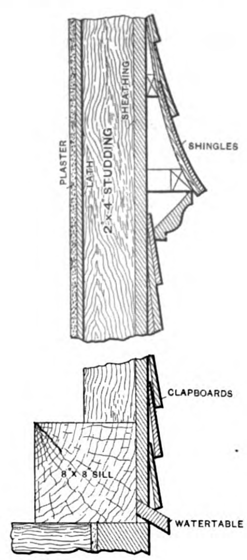

*Section Through Window-Frame.—Scale, 1 Inch to the Foot.*

As to the deflections, the following notes were made: Nos. 1 and 2, $\frac{1}{4}$ inch; No. 3, $\frac{5}{8}$ inch; No. 4, $\frac{5}{8}$ inch; No. 5, $\frac{1}{4}$ inch; No. 6, $1\frac{1}{8}$ inches.

## Admission of Air to Rooms.*

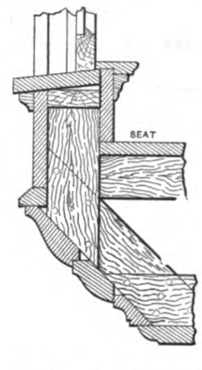
BY D. GALTON.

Air should be introduced and removed at those parts of the room where it would not cause a sensible draft. Air flowing against the body at or even somewhat above the temperature of the air of a room




*Section Through Belt Course.—Scale, 1 Inch to the Foot.*

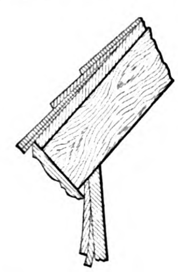
will cause an inconvenient draft, from the fact that as it removes the moisture of the body it causes evaporation or a sensation of cold. Air should never as a rule be introduced at or close to the floor-level. The openings would be liable to be fouled with sweepings and dirt. The air, unless very much above the temperature of the air of the room, would produce a sensation of cold to the feet. It may be regarded as an axiom in ventilating and warming that the feet should be kept warm and the head be kept cool. The orifices at which air is admitted should be above the level of the heads of persons occupying the room; the current of inflowing air should be directed




*Section Through Bay Window.—Scale, 1 Inch to the Foot.*

toward the ceiling, and should either be as much subdivided as possible by means of numerous orifices or be admitted through conical openings, with the smaller openings toward the outer air and the larger openings toward the room, by which means the air of the entering current is very rapidly dispersed. Air admitted near the ceiling very soon ceases to exist as a distinct current, and will be found at a very short distance from the inlet to have mingled with the general mass of the air and to have attained the temperature of the room, partly owing to the larger mass of air in the room with which the inflowing current mingles, partly to the action of gravity in cases where the inflowing air is colder than the air in the room.

THE CINCINNATI CORRUGATING COMPANY, of Piqua, Ohio, have just issued an interesting catalogue of their specialties. It is a neat work of 40 pages of letterpress, carefully printed in two colors and bound in colored paper covers of typographical design. It is profusely illustrated with engravings showing numerous styles of corrugated work, and indicates in a very clear manner what this company are able to accomplish in the direction referred to. The frontispiece of the pamphlet consists of a bird's-eye view of the company's corrugating-works and rolling-mills at Piqua. In their announcement to the trade they review the causes which led them to remove their plant from Cincinnati to Piqua and enumerate some of the facilities which they at present enjoy.



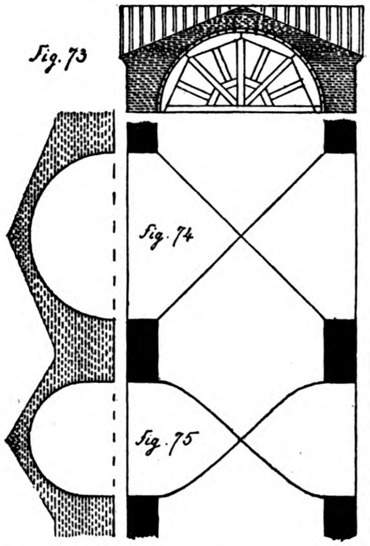
*Detail of Front Gable Cornice.—Scale, 1 Inch to the Foot.*

# MASONRY.

### Masonry and Stone-Cutting.

*(Continued from page 203, October.)*

In Fig. 70 we have the plan of the dome; its springing-line is an ellipse with major axis O A and minor axis O B. The cross-section (Fig. 71) is an ellipse with O B for major axis and O′ C′ as minor axis. These two sections completely determine the surface of the dome; the third section is simply taken from the other




*Masonry and Stone-Cutting.—Figs. 73, 74 and 75.—Roman Vaulting.*

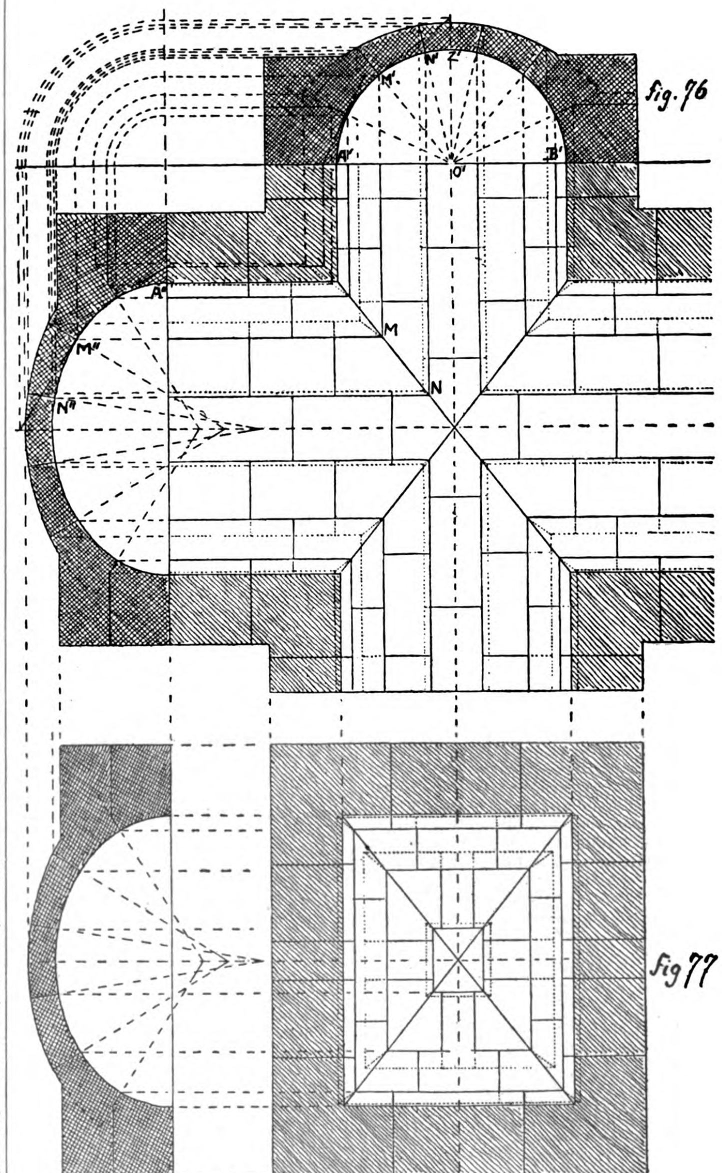
two. The extrados of the dome is formed of an ellipsoid similar to the first, but the springing-line of which, if completed, would be at a lower level.

To get the lines of curvature we first mark the foci $F_1$, $F_2$, $F_3$ of the three sections. Then we draw as auxiliary constructional figures the ellipse $a\ \beta$ and the hyperbola $a\ \gamma$ (Fig. 70). To do this we produce O $f$ = O F, O $f_3$ = O″ $F_3$, then draw A $f_3$ and a parallel $f\ a$, which gives the point $a$. To get $\beta$ we produce O $f_2$ = O′ $F_2$, then draw B $f_2$ and a parallel F $\beta$; O $a$ and O $\beta$ are the axis of the auxiliary ellipse and hyperbola, by means of which we draw these curves. Now take any point $h$ of the hyperbola $a\ \gamma$ and drop-lines $h$ H and $h$ 2; these will be the lengths of the axes of an ellipse which is the projection of a line of curvature of the ellipsoid. Again, drop from any point $q$ of the ellipse $a\ \beta$ the lines Q $q$ and Q $s$; these will be the axes of a hyperbola, Q M, which is the projection of a line of curvature at right angles with the former line. The point $a$ is called "umbilicus" (Latin for navel), because there the curvature of the surface is the same in all directions, just as at the crown of a spherical cupola.

To get a proper division in the coursing of the stones, we begin the operations by dividing the cross-section in voussoirs, then drop these points on plan and deduce therefrom the ellipses of the bed-joints. To get its elevation, find the level of its extreme points, such as H, by means of section (Fig. 72), then place at that level H′ (Fig. 71). By drawing H $t'$ and $t'\ u'$ to the auxiliary ellipse on that section we get the axes of the hyperbola H′ 2′ projection of the joint line. To get a proper division for the vertical joints, we divide the springing-line in equal lengths B L M N . . . then mark M′ elevation of M and drawing the co-ordinates M′ $m'$ and M′ Q′ of the auxiliary hyperbola $a'\ \gamma'$ we have the axes of the ellipse M′ Q′ formed by the elevation of the joint line M Q on plan. By a similar operation we can draw the projection of the lines of curvature on the longitudinal section (Fig. 72); but this is not required for setting out the work.

The auxiliary hyperbolas and ellipses for drawing the jointing on the sections are obtained by the same operations we have used on plan. In Fig. 71 take O′ $f_3$ = O″ $F_3$ of Fig. 72, then join $f_3$ C′ and draw parallel $F_3\ a$, which gives the axis O′ $a'$. For the other axis take O′ $f_2$ = O′ $F_2$ and O′ $f$ = O F on plan; then join $f$ B′ and draw parallel $f_2\ \beta'$, which gives the axis O′ $\beta'$. In Fig. 72 O″ $f_2$ = O′ $F_2$ $F_3$ Z″ is parallel to $f_2$ C″, and gives the axis O″ Z″ of the auxiliary ellipse. Again, O″ $f$ = O F on plan, O″ $f_3$ = O″ $F_3$; $f_3$ X″ parallel to $f$ A″ gives the axis O″ X″ of the auxiliary ellipse. The projections of both systems of joints are here ellipses tangent to line X″ Z″, which touches the umbilicus $a''$ of the ellipsoid.

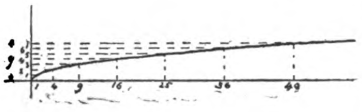
*Surface of the Joints.*—Consider the stone the soffit of which is projected on plan in $\lambda\ \mu\ v\ \pi$. As the surface of the joints are formed of normals to the soffit, we must determine the projections of these normals. Find, therefore, the plane tangent to the soffit in the point $(\lambda\ \lambda')$; it is the plane which contains the tangent to curves $\lambda\ \mu$ and $\lambda\ \pi$. We can easily draw these tangents on elevation and plan, as their projections are tangents to conic curves of which we have the axes. Then the normal has to be drawn perpendicular to the tangent plane; its intersection $\rho$ with the extrados is found as in the third method of the former elliptical vault. The same operations are repeated for other normals starting from points $\phi$, $\mu$ . . . which give the joint line of the bed on the extrados. In the same way are found the




*Figs. 76 and 77.—Italian Vaulting.*

limits of the other bed, those also of the cross joints; and all these surfaces meet perfectly along every edge of the stone.

The working of the stone is begun by a prism, the base of which is taken from the plan, and the hight of which is equal to the difference of levels of the highest and



*Masonry and Stone-Cutting.—Fig. 78.—Curve Represented by Equation $x = y^2$.*

lowest points of the voussoir. By prolonging the generators of the surfaces of the joints we find their intersections with the faces of the operation prism, guided by which the workman can easily work the surfaces of the joints with the help of a straight-edge. As these surfaces are developable, a joint mold can be placed on them by which their outlines are marked; the latter are the guiding lines for working the soffit and the extrados of the stone.

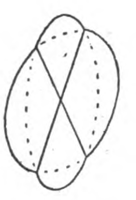


*Fig. 79 A.—Plan of Two Elliptical Domes Rising to Same Level at the Crown.*

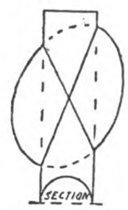



*Fig. 79 B.—Plan of Intersection of Elliptical Dome and Barrel-Vault.*

Notwithstanding the perfection of construction obtained by this arrangement of the jointing, it is seldom used on account of the difficult geometrical operations entailed. Masons usually work the joints of this vault conical and with horizontal joint lines, as shown in former problem. Nevertheless it is a problem well worth the consideration of architects, as it may be the key to novel systems of decoration and designs for vaulting oblong rooms either with stone, wood or metal cofferings. As a

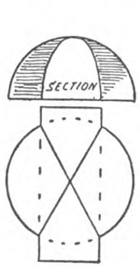



*Fig. 79 C.—Plan of Intersection of Cupola by Barrel-Vault of Elliptical Section.*

question of artistic importance, I beg to point out that when the vertical axis of the dome is either greater or smaller than either of the two axes of the springing-line, then there are two umbilici, $a$ and $\omega$ (Fig. 70), which are vantage-points for suspending chandeliers; but when the length of the vertical axis is comprised between the lengths of the two other axes, then there are four umbilici placed on the springing-line. In the last case, the cross-section is like the left-hand side of Fig. 71, taking the center line $O'f$ as horizontal springing-line. Under the umbilici would be the proper places for columns or supports to the vault. I beg also to observe that in barrel vaults, spherical and other domes on circular plan, the joint lines follow the lines of curvature, and that artists usually instinctively follow the direction of the lines of curvature in etching and in decoration, for these lines give the true character of the surface to which they belong.

GROINS.

The essential difference between the classic and Gothic architectures lies in the construction of the groins of intersecting vaults. In the Roman and Italian styles the form of the vaulting surface is first settled, and the profile of the groin follows from it as a matter of necessity. In Gothic architecture, on the contrary, groins with transverse and longitudinal ribs are first built up as a kind of skeleton vaulting; then afterward the intervening spaces are filled up by a vaulting which has to adapt itself to the ribs. Wherever this system of construction is employed the vaulting is really in Gothic style, even when the

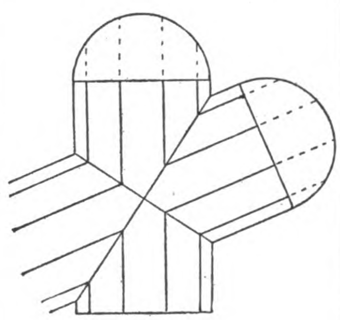


*Fig. 80.—Showing Vaults Meeting at an Oblique Angle.*

arches are semicircular. We shall at first study only the classic style of vaulting, as it gives rise to interesting geometrical operations, and we shall reserve Gothic vaults to a special chapter at the end of the course, where they will appear more as questions of construction and architecture than exactly of stone-cutting.

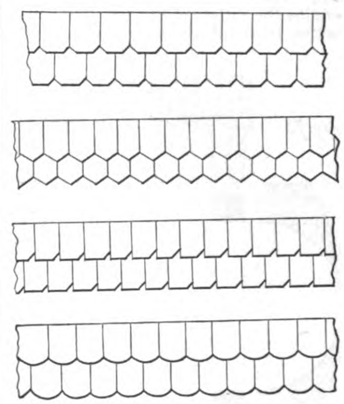
The Roman vaulting, which Italian vaulting imitates, is properly not vaulting at all. The Romans erected centerings giving the form of the soffit of their so-called vaults, and (Fig. 73) simply filled the space above these centerings with horizontal courses of small rubble masonry. The Roman vault consisted, therefore, of one homogeneous mass of masonry or a block of concrete. To produce intersecting vaults, as in the halls of their bathing establishments, the Romans made a complete centering to the main vaults and on it placed the centers of the cross vaults; then they filled the space above the centering as described above. The groins were consequently simply the intersections of the surfaces of the two vaults. When both vaults were of equal diameter the groins were (Fig. 74) contained in vertical planes. But when the vaults were of unequal span the Romans made both vaults circular and stilted the narrower one so as to bring its crown on the same level as that of the wider vault; then the groin formed waving lines (Fig. 75).

*(To be continued.)*

## CORRESPONDENCE.

### Shingle Clapboards.

*From* J. W. K., *Cleveland, Ohio.*—In reply to "W. H. K.," whose communication regarding clapboards made to represent shingles appeared in a recent number of *Carpentry and Building*, I send a few



*Sketches of Shingle Clapboarding Submitted by J. W. K.*

sketches of the styles prevailing in this section of the country. They can be made with a saw and chisel, or with a draw-knife, the dividing lines being cut with a saw about $\frac{1}{16}$ inch deep. They are put on so as to have about 4-inch face and are notched out about 1 inch.

### Boring Holes in a Hand-Rail.

*From* B. & Co., *Mount Vernon, Ohio.*—We desire to learn what is the best way to bore the holes in a hand-rail. Is there any better method than the following? Lay off the rail so as to get the center of each hole for a baluster. Take a piece of pine board and slightly bevel the edge, and then with a clamp firmly secure it to the rail, so that the edge will come to the point made for the center of the hole. When this is accomplished bore the holes. By placing the board on the rail a resistance is offered so that the point of the bit will not slip and mar the rail. The object in beveling the board is to permit the point of the bit to enter before the jaws commence cutting. We heard of this plan a few days ago and thought it might be of service to readers of *Carpentry and Building.*

### Galvanized-Iron Smoke-Flues.

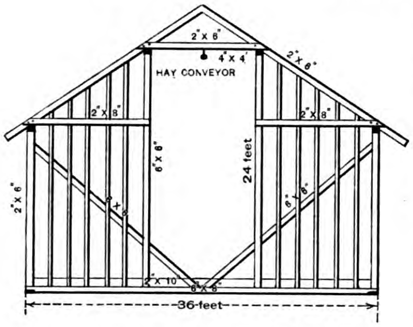
*From* S. S. B., *Appleton, Wis.*—I would like to ask the readers of *Carpentry and Building* for their opinion regarding the use of galvanized-iron pipes as a lining for chimney-flues—that is, building in galvanized-iron pipes in chimneys to be used for smoke-flues. I claim that in most cases the pipes rust out in from three to five years, and as the brick around said pipes are apt to be laid without the joints being close or well filled with mortar, and are not plastered on the inside, the origin of many fires laid to "defective flues" is the result of using galvanized-iron pipes for smoke-flues.

### Building a Greenhouse.

*From* E. P. H., *Woodville, Pa.*—I have been a reader of *Carpentry and Building* for several years, and have found many valuable suggestions in its columns; in fact, I would not like to do without it now. I have a greenhouse to build this summer, and as that is something new in my line I desire to ask my brother "chips" for information as to the best and cheapest style of building for that purpose. Any suggestions from those who have had experience in this particular line of business will be duly appreciated.

### Framing a Barn.

*From* J. R. T., *Lake Benton, Minn.*—I read *Carpentry and Building* and like it very much. I am greatly interested in some of the questions asked and also in the answers given thereto. Now, I want




*Framing a Barn.—Fig. 1.—End View.*

to submit the plan of a barn-frame which I am building and would like to ask some of the Eastern farmers what they think of it. It is 36 x 72 feet in size on an 8-foot basement. It is 16 feet high, studded with 2 x 6 inch stuff, 2 feet from center. The joists are 2 x 10 inches in the base-

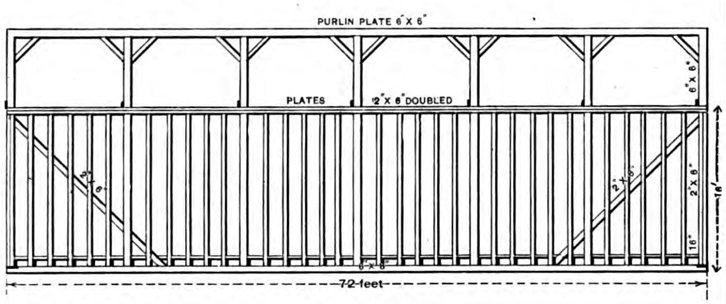



*Fig. 2.—Side Elevation.*

ment, the rafters 2 x 6 and the barn is sheeted with drop-siding. The center is left clear for hay-carriers; the roof is one-third pitch and shingled.

### Slaters' Tools.

*From* CHARLES E. LITTLE, *No.* 59 *Fulton street, New York.*—I notice in the November issue of *Carpentry and Building* the request of a correspondent who asks where he can buy slaters' tools. In reply, I would say that I keep a full line of these goods in stock and can furnish them on short notice.

### Perpetual Motion.

*From* J. A. A., *Cleveland, Ohio.*—I have a question to ask you which I wish you would answer if in your power. I would like to work out and perfect perpetual motion. I have several ideas but I do not know which to carry out. If I was better situated I would work at all of them; but there are some doubts which I cannot clear away as to what perpetual motion is. I have, for instance, a plan to make a machine working with the assistance of a spring which, however, it will not be necessary to wind up. Would that be considered perpetual motion? I have another idea of a machine working with hidden power. Which of these would be perpetual motion, if either?

*Note.*—It is a very simple matter to tell our correspondent what perpetual motion is, or rather what the conception of it involves. We do hope, however, that he will not go the way of so many bright people in the past and uselessly waste his time endeavoring to obtain the unobtainable. If the machine using the spring works we think he could claim perpetual motion, while on the other hand the invisible-power one would have no just title to the claim. The search, however, for perpetual motion has long since been given up, and it has been proved beyond all question that the thing is impossible. People imbued with the idea that they can accomplish it, however, are not inclined to take advice, so we do not know whether this bit of wisdom from us will be of any service. The only machine that ever approached the ideal one for perpetual motion was invented some years ago, and its simple construction will commend it to all who are interested in the subject. We hardly think an illustration of it is necessary. The principle was as follows: From a hub fastened on a well-greased axle radiated a number of arms like the spokes of a wheel. To the ends of these spokes were attached weights labeled with the figure 9. On starting the wheel revolving it was quickly discovered that on one side there was a succession of 9-pound weights descending, which being turned upside down were transmuted into 6-pound weights on the other side of the wheel where they rose. Equilibrium was thus never established, and so far as we have any personal knowledge to the contrary the same wheel may still be revolving. We think our correspondent will comprehend our idea, and we advise him to put it into practice before he launches forth into any extravagant notions of his own.

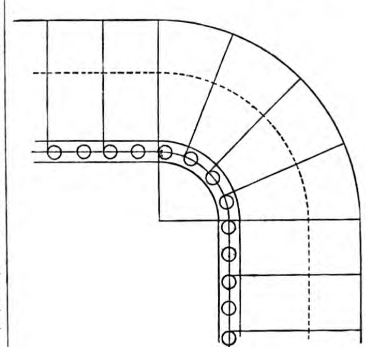
### Hanging Sliding-Doors.

*From* H. W. S., *Elizabethville, Pa.*—I would like to learn from the readers of *Carpentry and Building* the right way to hang sliding-doors on rollers above. I do not like to hang them before the partition is plastered. It seems to me that carpenters and builders need information in this direction, and I think that those who have good ideas on the subject will confer a favor on the trade by making them known.

*Note.*—We shall be glad to allow our columns to be used in a discussion of the subject to which our correspondent refers. In passing, however, we would remind him and others that the sliding-door manufacturers have gathered an immense fund of information upon this subject and are ready to draw upon it for the benefit of any who apply. It may not be opposed to the interest of those who are hanging sliding-doors to correspond with all the sliding-door manufacturers who are advertised in our columns and obtain their circulars. It would be strange, indeed, if some information could not be picked up that is worth while.

### Question in Hand-Railing.

*From* J. C., *Cedar Rapids, Iowa.*—I venture to propose a question which I trust "J. H.," of London, England, will kindly answer. Referring to the accompanying sketch, which is the best possible way according to my idea of constructing a rail from the quarter circle and to make the wreath in one piece to connect the straight rail at both ends, I desire to ask if he will furnish complete drawings for



*Sketch Submitted by J. C.*

face-mold, falling-mold, spring-bevels, bevels for joint and in fact every line necessary to complete the work. The risers are 7 inches. I would also be glad to have any of the readers of *Carpentry and Building* reply to this question.

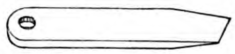
### Schools of Architecture.

*From* E. S., *New York.*—I would be very much indebted to you if you would inform me through *Carpentry and Building* what trade schools in this city teach architectural drawing. The class at Cooper Union is full and I do not know of any other place of instruction.

*Answer.*—We do not know of any trade schools that teach architectural drawing in this city. The colleges have architectural courses, but this, we presume, is not what our correspondent desires. The only answer that will be at all satisfactory which we can offer is to refer our correspondent to the Metropolitan Art Schools, Central Park, opposite East Eighty-second street, New York. At this school there are classes in architectural drawing, and we believe that only a moderate charge is made for instruction. Architectural classes evenings are conducted by different branches of the Y. M. C. A. in this vicinity, also by different mechanics' organizations.

### Putting in Shutter-Eyes.

*From* SHUTTER-MAKER.—Iron shutters are sometimes required to be placed on buildings when there has been no provision made for them—that is, the eyes have not been put in the walls. Regarding the method to pursue for putting in the eyes, much will depend upon circumstances. If said walls are of stone the eyes should be put in before the shutters are made, or at least the hinges put on, as it sometimes happens that when the mortar is cut out of a joint the stones are found to be so near together that there is not room for the eye; in such a case another joint must be selected. In Fig. 1 is shown a form of eye that is adapted to driving. It is made from $1\frac{1}{2}$ x $\frac{1}{4}$ inch iron, and should be about 7 inches long for ordinary open-



*Putting in Shutter-Eyes.—Fig. 1.—Eye for Driving.*

ings, with a $\frac{5}{8}$-inch hole in one end, the other being drawn out like a wedge, as shown. In Fig. 2 is shown three forms of chisels that are adapted to cutting out the mortar-joint for driving the eye. In order to do a good job the mortise should be cut in the mortar-joint as true as possible, and only a trifle wider than the eye, but

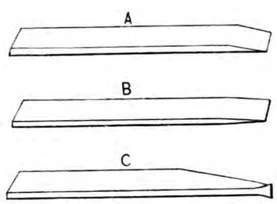



*Fig. 2.—Chisels for Cutting Out Mortar-Joint.*

without the mortar is very hard it should be cut out between the brick and pieces of thin board put in above and below the eye so it will hold when driven. For this purpose pieces of cigar-boxes are very convenient. The chisels should be made out of $\frac{3}{16}$ x 1 inch steel and be about 8 inches long. A and B are used for top and

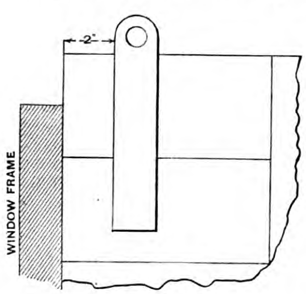



*Fig. 3.—Position of Driven Eye.*

bottom of mortise and C for side. When driving the eyes a round punch should be put in the hole to prevent its being closed by the force of the hammer-blows. In Fig. 3 is shown the position of eye after being driven. The edge of the eye should be about 2 inches from the edge of brick for ordinary shutters. When large doors are to be hung the driven eye may not be considered sufficiently strong; then the bolt-eye, as shown in Fig. 4, can be used to advantage. This is really the best form of eye that can be put in, as it passes through the wall and is secured by a nut; the washer D should be slipped on before placing the bolt in the wall. In order to make the holes in the brick for these bolts, something similar to a twist-drill is used, which can be made by flattening the end of a steel rod for about 2 inches and then twisting it like an auger when it is to be tempered. This kind of drill can be used in the common brace, and will drill a hole in mortar and brick very rapidly. If it is necessary for the bolt to pass through the


*Fig. 4.—Bolt-Eye for Wall.*

wood-work of the window-frame, the hole can be bored by means of a common bit lengthened by having a piece of iron welded to it, so as to be long enough to reach through the brick.

*Fig. 5.—Twist-Drill.*

When the eyes are to be put in a veneered wall they can be made from skein-bolts, the square head being cut off or drawn out and the end of bolt turned as shown in Fig. 6. A suitable hole is drilled in the mortar-joint and the bolt screwed into the

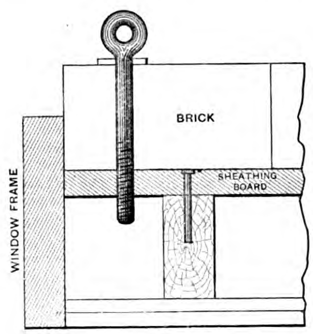



*Fig. 6.—Screw-Eye for Veneered Wall.*

sheathing-board as shown. A washer can be used for the outside, as with the bolt shown in Fig. 4. Another form of eye for veneered buildings is shown in Fig. 7. It is fastened to the door or window-frame

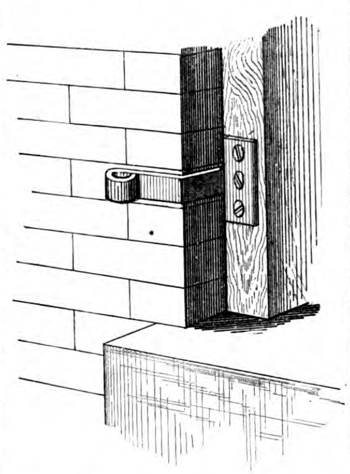


*Fig. 7.—Eye Fastened to Door-Frame.*

by means of screws, and may do for light shutters or could be used in connection with the eye in Fig. 6 in case a heavy door was to be hung on a veneered building. Another way of making the shutter-eyes more firm is shown in Fig. 8. The strip of metal shown is a piece of band iron spiked to the brick, through which the eye passes. This makes a good support

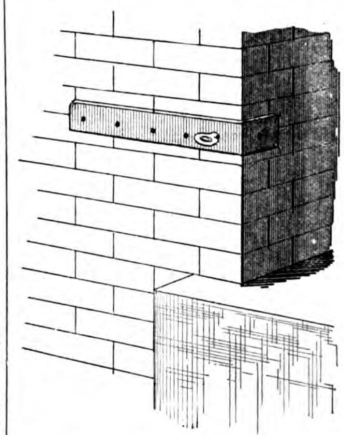
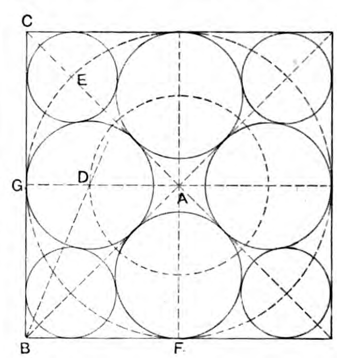


*Fig. 8.—Strap for Holding Bolt-Eye.*

for the eye when the door is open or closed.

## Geometrical Problem.

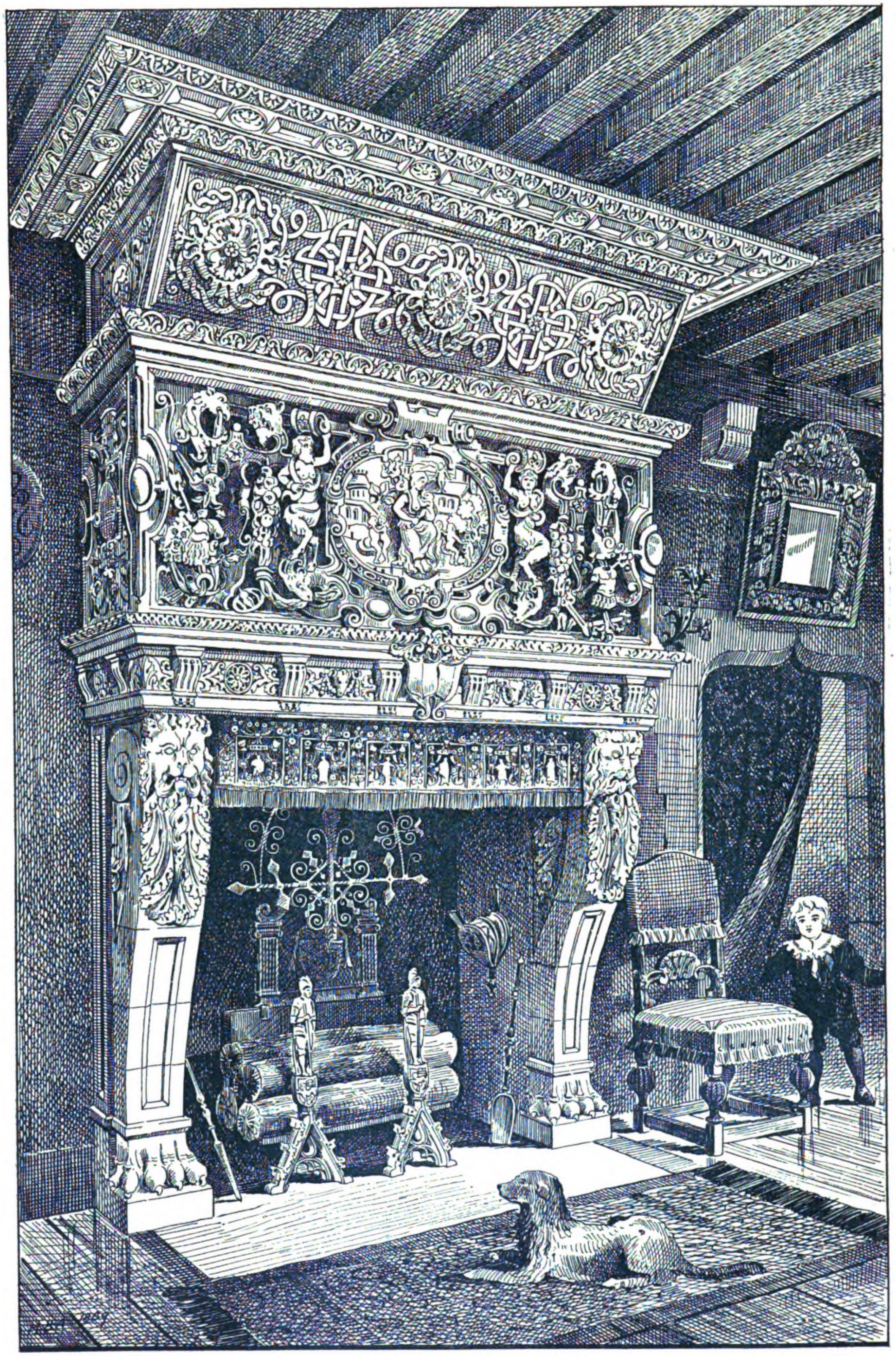
*From* W. H. C., *Orillia, Ont.*—I send an answer to "W. E. R.'s" problem in the August issue, which I trust will be of interest. Referring to the sketch, draw the diagonals of the square and bisect it twice, as shown by the lines A F and A D.




*Sketch of Geometrical Problem Submitted by W. H. C.*

On center A draw a circle within the square tangential to the sides of the square, and where the circle intersects the diagonals, as at E, will be the centers of the circles on the corners. Bisect the angle A B C by A D, and at the intersection in D is the center for one of the larger circles. From this locate the other centers. On D as a center, with D G radius, strike the circle as shown, and the three others in similar position. On E strike the smaller circles tangential to the sides and adjacent circles.

*From* S. A., *Paterson, N. J.*—In reply to "W. E. R.," of Newark, N. J., who requests information as to the proper method of constructing eight circles in a square having 2-inch sides, each circle to be tangential to adjacent circles and adjacent sides of the square, I would offer the following: Construct the square and bisect each side of it, mak-



Chimney Piece in the Museum de Cluny, Paris.

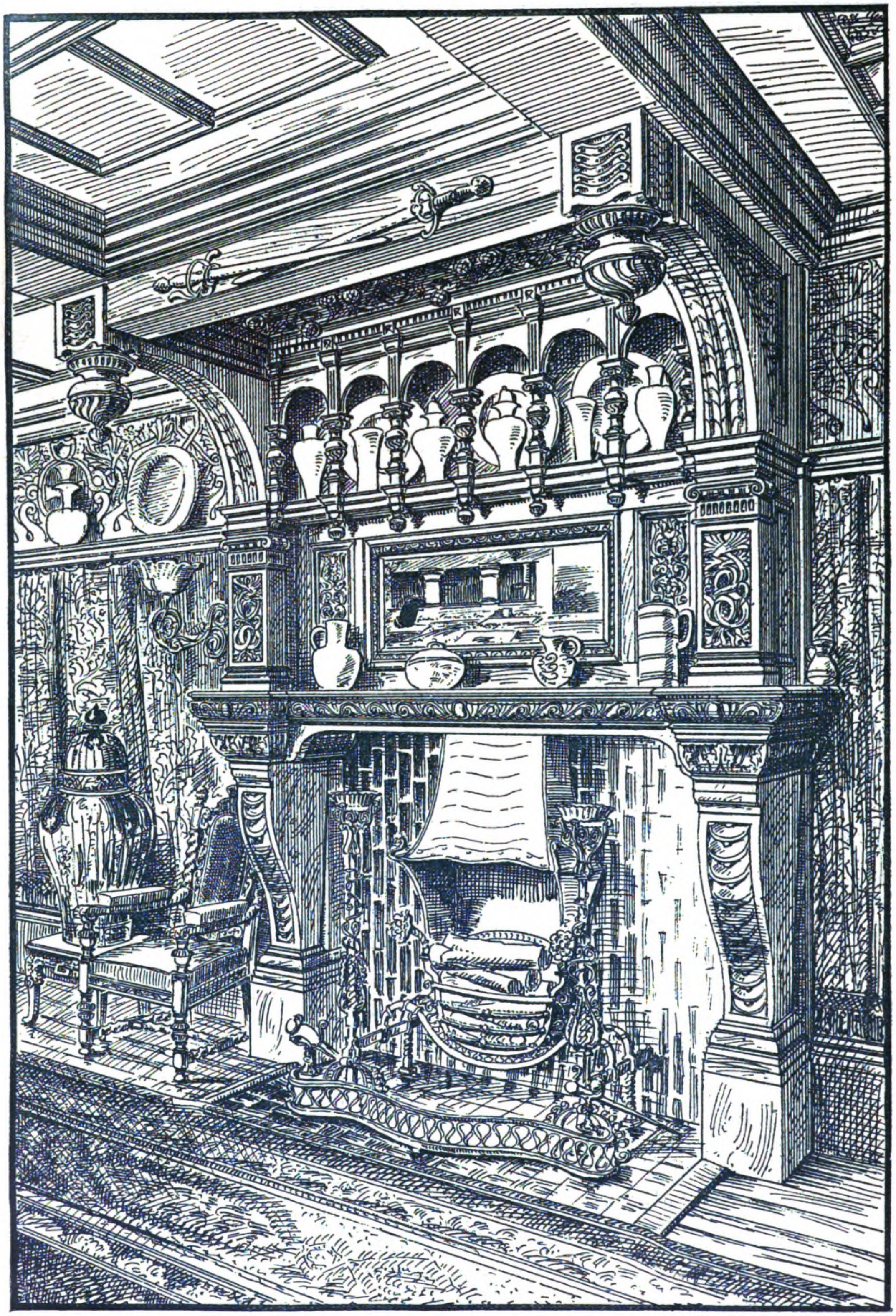
Designed by HUGUES LALLEMAND.

# · TRIUMPHAL · ARCH ·

## · SOLDIERS · AND · SAILORS · MONUMENT ·
## · BROOKLYN ·

· DIMENSIONS

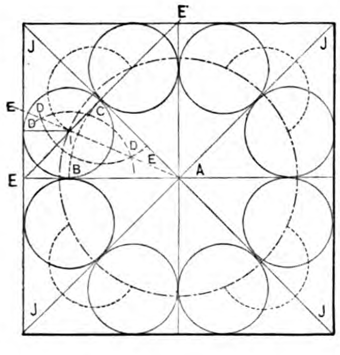
| | |
|---|---|
| · TOTAL HEIGHT | - 71 - FT - 0 - INS · |
| · TOTAL WIDTH | - 80 - FT - 0 - INS · |
| · TOTAL DEPTH | - 45 - FT - 0 - INS · |
| · HEIGHT OF ARCH | - 48 - FT - 6 - INS · |
| · WIDTH OF ARCH | - 37 - FT - 0 - INS · |



CARVED CHIMNEY PIECE.

DESIGNED BY G. FAULKNER ARMITAGE.

ing four squares. Draw diagonals through the given square, which forms the square into eight triangles. Bisect one of the triangles, as at E E E E, by setting one point of the compass in the extremity of the triangle at A. Then with any radius describe the arc B C. Bisect B C by setting one point of the compass at B, and with any radius greater than one-half describe intersecting arcs O O. Then the line E E passes through the arc O O to the extremity of the triangle at A. Another line cutting E E at I will be the center of a circle tangential to one side of the square




*Method Suggested by S. A.*

and each side of the triangle. Then take the compass and set one leg at A with radius A I and describe a circle containing the centers of required circles in its circumference where the diagonals J J J J cut the circumference as center with radius P I. Describe the semicircles, and where they intersect the circle of circumference will be the centers of required circles with the same radius D I, which is tangential to the sides of the square.

*From* E. L., *Omaha, Neb.*—In reply to "W. E. R.," who in the August number of *Carpentry and Building* asks "how to strike eight circles in square so that each circle shall be tangential to adjacent circles and adjacent sides of the square," I submit the following: Referring to the

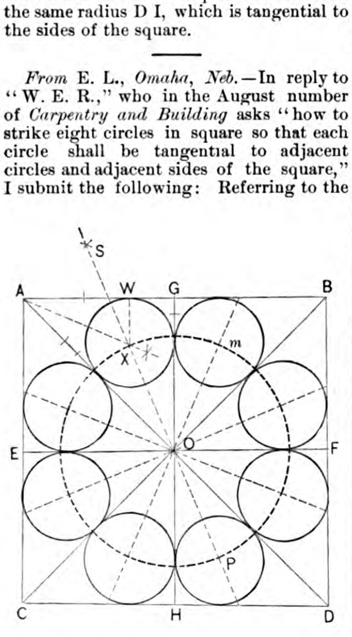



*Diagram Accompanying Letter from E. L.*

sketch, draw in the square A B C D the diagonals A D and B C; also the lines E F and G H, thereby dividing the square into eight equal parts. Bisect the angles A O G, G O B, B O F, &c. Next bisect the angle O A G, intersecting the line O S in the point X. From O as center with radius O X describe the circle X *m* P. The intersections of these circles with their alternate lines, starting from the point X, gives the centers for the eight required circles. To find the radius for these circles erect a perpendicular from X to the line A B, giving the point W. The radius is X W. This is applicable to all sizes of squares.

#### Shingle Clap-Boarding.

*From* J. H. M., *Winchester, Ind.*—In reply to "W. H. K.," Alton, Ill., whose inquiry appeared in the September number of *Carpentry and Building*, I would say that I have used a great deal of the kind of clap-boarding referred to. The correspondent "W. H. K." can have it made at almost any planing-mill. The notches are first cut out with a jig or band saw, and the groove across is formed by running the board over a cut-off saw, having the table raised until the saw will cut only about $\frac{1}{8}$ inch deep to represent the joint. If a reasonable amount of care is used in handling it one need not be troubled by the joints breaking off. We use what we call $\frac{1}{2}$-inch siding. Poplar is the best. I like cut siding better than shingles, as it makes a more even appearance. We use it principally in forming belts and in the gable finish of houses. Of course it can be made in different styles, the points being round, octagon, square, &c., as may be preferred.

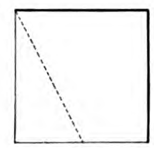
#### Treatment of a Sagging Floor.

*From* ARTUS, *Philadelphia, Pa.*—The problem of raising a floor and ceiling to a level surface and to prevent their sagging is of frequent occurrence, and a few particulars of the successful method adopted in a case of this kind may not be without interest to the readers of *Carpentry and Building*. The Utopian Club, of this city, some time since rented premises located on Locust street, below Fifteenth, and had them remodeled for the purpose of meeting their requirements. Among the alterations made to the old building was that of pulling away several partitions in the third story for the purpose of forming a billiard-room. Soon after this had been done it was found that the floor, deprived of its customary support, sagged to the extent of nearly $2\frac{1}{2}$ inches, rendering the apartment unfit for a billiard-room and considerably disfiguring the ceiling below. The problem which presented itself was how to get the floor back to a level surface. A number of local builders were consulted and various schemes proposed, such as putting in iron girders, trussing the joists, &c. These were all objectionable, for the reason that they necessitated the hacking away of the ceiling. This was particularly undesirable, for the reason that it was very handsomely frescoed. No one seemed to be able to suggest an adequate plan which would straighten the floor without disturbing the ceiling, until a local architect (who, by the way, was a member of the club) undertook to accomplish the task.

This gentleman proceeded to straighten the floor by the use of a number of jack-screws, placing thick layers of old carpet, sacking, &c., beneath the ends of the uprights. The object of this was to prevent the ceiling from being injured. When it was quite level he proceeded to nail 1-inch floor-boards diagonally across the old floor-covering, carefully nailing them at every joist. When this was accomplished a second layer of floor-boards was nailed at right angles to the first, while a third layer was placed in the reverse order on top. This gave four layers of flooring-boards all strongly nailed to the joists and to one another, with the result that they kept the whole floor perfectly level as was desired. It may be added that quite recently a member of the Engineers' Club of this city, at a meeting of that body, referring to the case, desired to know whether any member could suggest a formula by which the strength of such a system of construction could be arrived at or even approximated. There was no one who could throw any light on the subject. Perhaps some of the readers of *Carpentry and Building* can suggest means of arriving at the strength of the system described above. If so I should be glad to see their views in print.

#### Japanese Puzzle.

*From* E. P. H., *Woodville, Pa.*—In the February number of *Carpentry and Building* I notice a Japanese puzzle. As the subject is one in which I am more or less



*Japanese Puzzle.—Fig. 1.—Showing How to Cut the Square.*

interested, I take the liberty of sending one somewhat similar. First cut five squares of any convenient size; then cut from the center of one side to an opposite

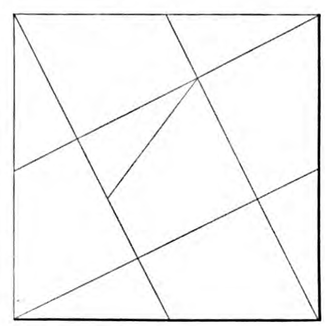


*Fig. 2.—Pieces Arranged in a Square.*

corner, as shown in Fig. 1 of the sketches. After this has been done arrange the pieces so as to form one complete square, as shown in Fig. 2.

#### Marks on a Steel Square.

*From* J. L. F., *Norwalk, Conn.*—Will the editor of *Carpentry and Building* kindly give me an explanation of the marks on a steel square? The subject is one which is of great interest to me, and I have no doubt would prove entertaining to other readers of the paper.

*Answer.*—The question of our correspondent brings up a subject which has received extended consideration in these columns in years past, but as the list of readers of *Carpentry and Building* at the present time includes many who were not subscribers at the time the topic was discussed, we take pleasure in repeating in substance what we have formerly said in relation to the marks and scales upon the steel square: A matter demanding prior attention is the names of the parts of the square itself. The long arm of the square is called the blade. The short arm is called the tongue. The junction between the blade and tongue is called the heel. The blade of the square is 24 inches long and the tongue from 14 to 18 inches. The blade in good squares is 2 inches, while the tongue is $1\frac{1}{2}$ inches wide. With inferior tools the tongue is sometimes narrower.

In the accompanying engravings Figs. 1 and 2 show a steel square of the best grade, being known in the hardware trade as No. 100. The cut shows the tool and all its divisions at one-fourth full size. The first marks which attract attention, and which are also the best known, are the divisions into inches and fractions of inches. The heel of the square is the point from which it is most convenient to measure, both along the blade and also on the tongue, and hence in numbering the inches the figures commence at the heel, running toward the end of the blade and tongue respectively. The inch marks along the inside edges of the square commence numbering likewise with the interior angle. Since the width of the blade is in even inches, the inch marks upon the two edges of the tongue correspond, but because the width of the tongue is in other than even inches, the inch marks along the two edges of the blade do not correspond. Commencing at the end of the blade upon the face (Fig. 1) and corresponding to the inch divisions marked along the outer edge is a set of figures by which the distance from the end of the blade may be read, which adapts this part of the tool for use in measuring the depth of mortises, &c. The different edges of the square are variously divided into fractions of inches. The outside edges, as shown in Fig. 1, are divided into sixteenths, while the inside edges are divided into eighths. The outside edges, as shown in Fig. 2, are divided into twelfths, while the inside edges are divided into eighths.

The fine lines upon the tongue ruled longitudinally between the inch marks 2 and 4 divide an inch into tenths. The diagonal lines which cross them between 2 and 3 are also $\frac{1}{10}$ inch apart, thus enabling the operator to obtain divisions of hundredths of an inch. The use of this scale is precisely similar to that of

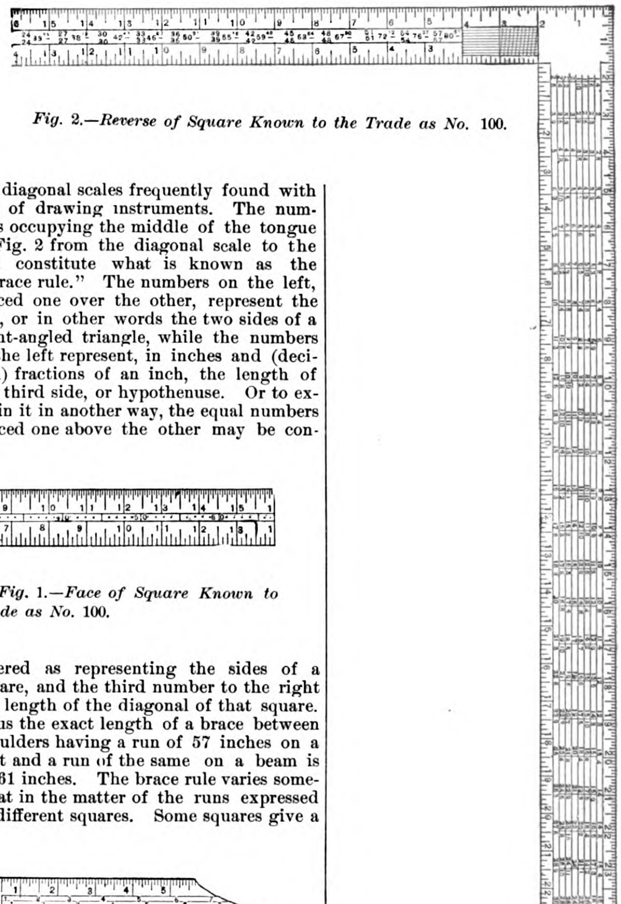
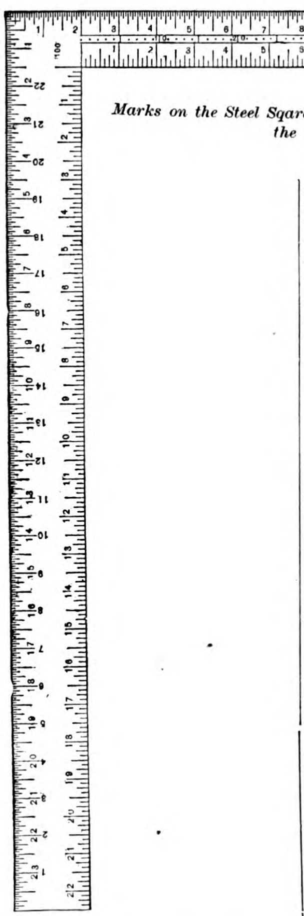


*Fig. 2.—Reverse of Square Known to the Trade as No. 100.*

the diagonal scales frequently found with sets of drawing instruments. The numbers occupying the middle of the tongue in Fig. 2 from the diagonal scale to the end constitute what is known as the "brace rule." The numbers on the left, placed one over the other, represent the run, or in other words the two sides of a right-angled triangle, while the numbers to the left represent, in inches and (decimal) fractions of an inch, the length of the third side, or hypothenuse. Or to explain it in another way, the equal numbers placed one above the other may be con-



*Marks on the Steel Sqare.—Fig. 1.—Face of Square Known to the Trade as No. 100.*

sidered as representing the sides of a square, and the third number to the right the length of the diagonal of that square. Thus the exact length of a brace between shoulders having a run of 57 inches on a post and a run of the same on a beam is 80.61 inches. The brace rule varies somewhat in the matter of the runs expressed in different squares. Some squares give a

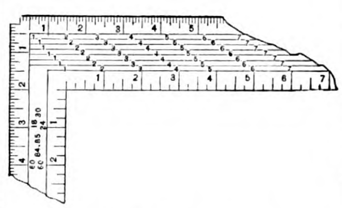


*Fig. 3.—Face of Square, Showing Old Style of Board Measure.*

few brace lengths of which the runs upon the post and beam are not equal. For example, $\begin{smallmatrix}\mathbf{18}\\\mathbf{24}\end{smallmatrix}$ **30** will be found, among others.

The parallel rows of figures along the blade in Fig. 2 constitute what is called board measure. The manner of using it is as follows: Under 12 of the inch marks along the outer edge of the blade will be found the figures 8, 9, 10, 11, 12, 13, 14 and 15, which represent the length of the board or plank to be measured. The contents in feet and inches will be found under the several inch marks along the outer edge of the blade, corresponding to the width of the piece being measured. We can make this plainer by a simple illustration. Suppose we desire to ascertain the contents of a board 14 feet long and 10 inches wide. Find 14 under 12 of the inch marks along the edge. Follow the space in which it is placed back to the figures under 10 of the inch marks, where will be seen 11.8, which is read 11 feet and 8 inches. In like manner if the board is 16 inches wide the result (under 16 of the inch marks) is found to be 18.8, or 18 feet and 8 inches. In the same way the measure of boards of any width from 2 inches up to 24 inches and of either of the lengths above enumerated may be quickly and accurately determined. By combining figures lengths may be calculated which are in excess of those above given. For example, if we have a board 20 feet long we double the answer in the 10 feet row, and for a piece of timber 25 feet long we add the figures in the 12 and 13 feet rows together. This rule is calculated, as its name indicates, for board measure or for surfaces 1 inch in thickness. It may be advantageously used, however, upon timber by multiplying the result of the face-measure of one side of a piece by its depth in inches. To illustrate, suppose it be required to measure a piece of timber 25 feet long, 10 x 14 inches in size. For the length we will take 12 and 13 feet. For the width we will take 10 inches and multiply the result by 14. By the rule a board 12 feet long and 10 inches wide contains 10 feet, and one 13 feet long and 10 inches wide, 10 feet 10 inches. Therefore a board 25 feet long and 10 inches wide must contain 20 feet and 10 inches. In the timber above described, however, we have what is equivalent to 14 such boards, and therefore we multiply this result by 14, which gives 291 feet and 8 inches, the board measure.

On some squares the board rule is arranged in the shape indicated by Fig. 3 of the accompanying engravings—that is, the numbers representing contents instead of being feet and inches are even feet, and instead of being placed in regular rows under the several inch marks are arranged diagonally, as in the cut. The use of this form of the rule is the same as that of the one above described save that all the answers give the nearest approximate even number of feet, instead of expressing the actual contents in feet and inches. However, by the position of the numbers either a little to the left or right of the line under the inch mark indicating the width, the operator is supposed to determine in his mind the fractional part of a foot contained. From all the information we have been able to obtain concerning the origin and use of this rule, which at present is almost entirely superseded by the later and better form above described, it seems that it came into existence at a time when fractional parts of a foot in measuring lumber were disregarded and when things generally were conducted upon a broader and more liberal basis than at present. It does not answer at the present day to calculate a board at 18 feet when in reality it contains 18 feet 8 inches.

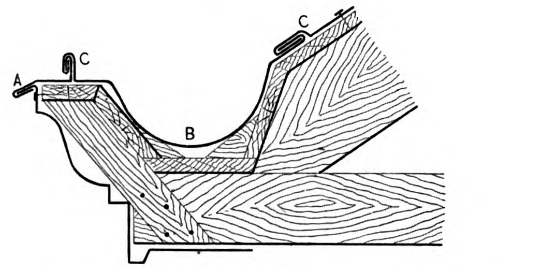
Along the center of the tongue upon the face, as shown in Fig. 1, will be noticed a number of dots and a row of figures numbering them by tens. This is known as the "octagonal scale," the use of which is as follows: Suppose it is required to reduce a square timber, say, for example, 12 x 12 inches, to octagon shape. First draw a center line along each face, which, of course, will be 6 inches from the several edges. With the compasses take twelve of the divisions in the octagon scale and set off this space on the faces of the timber, measuring each way from the center lines. The points thus obtained will be correct for the gauge lines. The rule always to be observed is as follows: Set off from each side of the center line upon each face as many spaces by the octagon scale as the timber is inches square. For timbers larger in size than the number of divisions in the scale the measurements by it may be doubled or trebled, as the case may be.

We have here described the marks and scales upon one of the best grades of steel squares in use, but we have not described all that is to be found upon the many different makes of squares which, in the hands of our readers, are being daily employed in workshops and upon buildings.

Our correspondent does not indicate what square he is using, and therefore we have no means of determining whether we have answered his query satisfactorily or otherwise. We hope he and all others of our readers who are at all interested in this subject will, as they read this article, examine their own squares, and at convenience send us specific questions concerning anything they find thereon not here anticipated.

### Specification for Copper-Work.

*From* J. F. W., *Cincinnati.*—All gutters in the main cornice, valleys, saddles, behind flues and all flashings are to be of 16-ounce copper. Counter flashings to be of sheet-lead built into the wall by the bricklayer, and to extend at least 2 inches into the brick-work. The gutters in the main cornice are to be constructed as shown in Fig. 1. The strip A is to hook on to the metal cornice with a standing edge. The gutter proper is to be formed circular in section and is to lock on to the strip A as on a standing-seam roof. The roof-strip C is to run up under the slate and is to be separate from the gutter and to lock on to the gutter B with a ½-inch single lock. Copper cleats are to be used for holding the gutter in position. No nails are to be driven through the copper-work under any circumstances, and cleats must be used wherever a fastening is necessary.




*Specification for Copper-Work.—Fig. 1.—Cross-Section Through Gutter, Showing Cornice-Strip, Roof-Strip and Connections with Gutter-Lining.*

Cross-seams are to be heavily soldered, and to this end the copper is to be tinned on both sides before the lock edges are made. The roof-strip C is to be locked on to the gutter as above specified and is not to be soldered, but the joint is to be left open so as to allow for expansion. The contractor for copper-work will see to it that no green sheathing is used by the carpenters in providing the gutter-bed. Valley cross-seams are to be made in the same manner as above specified, and valleys are to be fastened as indicated in Fig. 2, using

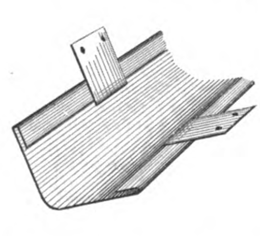


*Fig. 2.—Cross-Section Through Valley, Showing Cleats.*

cleats. In no case are nails to be driven through the metal of the valley proper. The cross-seams on steep valleys do not need to be soldered, but wherever any seams are made on any flat parts the copper must be tinned before being locked and then well soldered, using heavy irons. Acid may be used in tinning the copper, but in case it is employed it must be thoroughly washed off. Rosin alone is to be used in soldering the seams.

### Strength of Timber.

*From* J. S. H., *Albany, N. Y.*—Will you please oblige a reader of *Carpentry and Building* by stating through the columns of the paper the proper method of finding the size of timber to carry a given weight in a certain distance? This is a thing concerning which I think every carpenter should be informed.

*Answer.*—The inquiry of our correspondent was submitted to Mr. C. Powell Karr, C.E., of this city, who furnishes the following answer:

The center breaking load of any rectangular beam is equal to its depth squared, multiplied by its breadth, by its co-efficient of rupture, the product to be divided by the clear span of the beam. *Precaution.*—One-half the weight of the clear length of the beam. The co-efficient of rupture is the average quiescent breaking load in pounds, including one-half the weight of the beam itself, for a beam 1 inch square, 1 foot clear length between the supports. To find the breadth of a horizontal rectangular beam supported at both ends, to break under a given quiescent center load, multiply the center load in pounds by the span in feet. Multiply the square of the depth in inches by the co-efficient of rupture of the material. Divide the first product by the last. The quotient will be the breadth approximately. Calculate the weight of a beam having this breadth, then as the center load is to one-half this weight, so is the breadth found to a new breadth to be added to it. It will still be somewhat too small owing to the omitted weight of the breadth added. This can be found and added. If the load is to be borne safely, first multiply it by the factor of safety desired. By the New York Building laws this factor is 3 for transverse strength of beams. If in either case equally distributed, take one-half the distributed load as a center load and proceed as before. If one end of the beam is fixed and the load is at the other end, multiply the load by 4 and consider it as applied at the center of the beam, and proceed as before. To find the depth when the breadth is given, multiply the load in pounds by the span in feet. Multiply the breadth in inches by the co-efficient of rupture of the material. Divide the first product by the last; take the square root of the quotient for an approximate depth. Calculate the weight of a beam having the depth just found; add one-half of it to the given center load, and with this new load repeat the calculation. This will give a depth sufficiently accurate for practical purposes. If the load is to be borne safely or to be equally distributed or loaded at one end, do as before suggested. According to Trautwine, the co-efficients of rupture are as follows:

| | | | |
|---|---|---|---|
| Amer. white ash | 650 | Oak, English | 550 |
| Swamp ash | 400 | Oak, Amer. white | 600 |
| Black ash | 600 | Oak, Amer. red | 850 |
| Beech | 850 | Oak, live | 600 |
| Birch, Amer. black | 550 | Pine, white | 450 |
| Birch, Am. yellow | 850 | Pine, yellow | 500 |
| Chestnut | 450 | Pine, pitch | 550 |
| Elm, Amer. white | 650 | Pine, Georgia | 850 |
| Elm, Cana'n rock | 800 | Poplar | 550 |
| Hemlock | 500 | Spruce | 450 |
| Hickory | 800 | Spruce, black | 550 |
| Iron wood | 600 | Sycamore | 500 |
| Locust | 700 | Tamarack | 400 |
| Larch | 400 | Walnut | 550 |
| Maple, black | 750 | Willow | 350 |
| Maple, soft | 750 | | |

One-third part of these constants should be taken in practice.

### For Architects and Builders.

*From* Jack Plane.—It is not every day one encounters a story that will please the architect or builder, for most anecdotes relating to the building profession are at the expense of the "profesh," but the following account of a mishap that mis-happened to one of the "know-alls," of which there are many, is too good to be lost. The builders tell a rather interesting story of a Buffalo capitalist, says a writer in the Chicago *Herald*, who was pretty summarily taken down for trying to set himself up as the end of all things in whatever he undertook. No matter what was on foot, if he went into it he must have all the say and nobody else was allowed even a side remark. Not long ago he built a fine brick house. In this undertaking, as in all others, he was boss and all hands, dictating to builders, architects and all without the slightest hesitation. At last they grew very tired of the browbeating they had to stand, and let him have his way whether it was right or wrong. The house was finished, and shortly afterward the owner set about building furnaçe fires to test his heating apparatus, when behold, there wasn't a chimney in the house!

## Construction of Panel-Work.

BY OWEN B. MAGINNIS.

The increasing use of hard-wood-work decoratively in interior finish, as well as its employment for wainscoting, has induced the writer to submit a few remarks which may be of possible service to builders in constructing this kind of work. As all competent carpenters and builders understand the proper method of laying out and constructing square frame-work, little need be said on this point. It is well to ascertain, however, beforehand that all the parts correspond, and the work will be still further facilitated by obtaining a detail in elevation and section from the architect; neglect to do this often causes serious trouble. A case has lately come to my notice where a piece of pitched paneling, similar to that shown in Fig. 1 of the illustrations, made to fit on top of a stair-string, did not come on the same line as the piece on the floor below. The proper bevel can be set by which to lay out all the shoulders.

The shoulders being on an angle, the tenons will differ somewhat in form from those in square framing. The proper shape for the bottom rail-tenon at the lower acute angle of the rail is shown in the lower part of Fig. 1 of the sketches. An inspection of the cut will readily show that the shoulders are cut on the bevel and the tenon sawn square with it. This al-

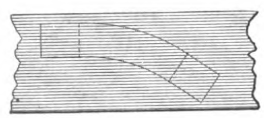


*Fig. 2.—Circular Piece of Rail Cut from Solid Block.*

lows the tenon to enter the mortise in the stile at right angles, which I consider gives the greatest strength. For the reason just stated a similar framing must be cut at the upper and opposite angle. The tenons required for the obtuse angles can be cheaply made in the manner shown in the upper part of Fig. 1, and if not sufficiently strong the bottom edge of the tenon may be made square to the shoulder with the mortise the same size. Fig. 1 illustrates a very convenient way of joining the piece on the string to that on the floor below and landing above by the use of only one stile for each. The vertical pieces are of uniform width, but the tenon on the mullions must also be treated for the pitch by cutting one side to the shoulder, so that they will enter the mortises in the rails, as shown by the dotted lines.

When stair-strings are made with a ramp at the foot and top easement at landing, for the purpose of giving a more graceful appearance to the stairs, the wainscoting joints with the rail. The dotted lines shown in Fig. 2 indicate the lines of the joints on the radius, which will connect with the top rail at A, Fig. 3, when put together. The halved joints require to be well glued and screwed from the back. The ends of the panels require to be on

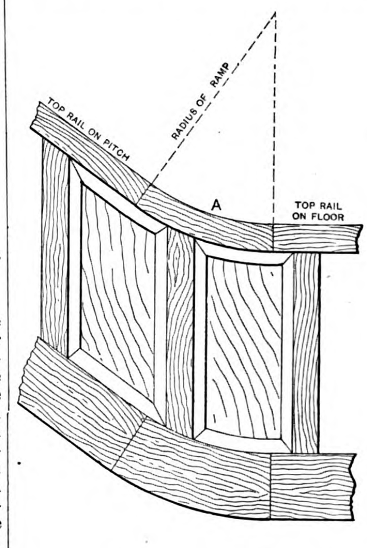
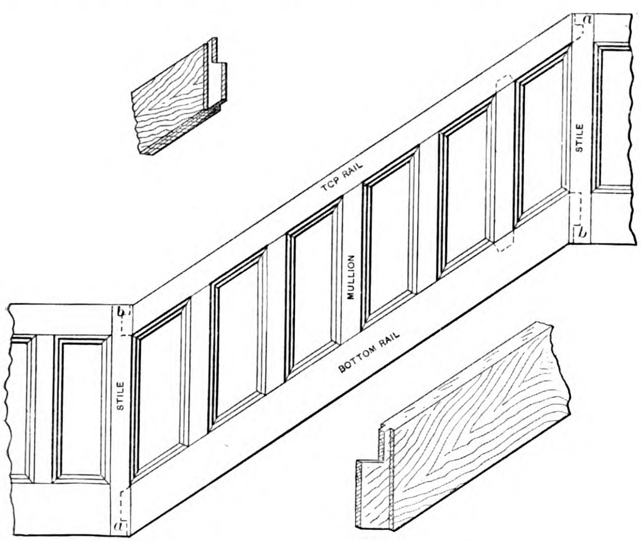



*Fig. 3.—Position of Curved Piece in Rail.*

the sweep, likewise top and bottom moldings, all of which can be executed with facility on a variety machine. Fig. 4 shows the skeleton framing of the top easement on the reverse curve, indicating the manner in which the joints may be made vertical if desired.

It is possible that some readers may not be entirely familiar with the method at present in vogue of putting in panels and moldings in work which shows upon one side only. The old method of accomplish-




*Construction of Panel-Work.—Fig. 1.—Specimen of Pitched Paneling, Showing Method of Joining the Piece on the String to that on the Floor Below and Landing Above.*

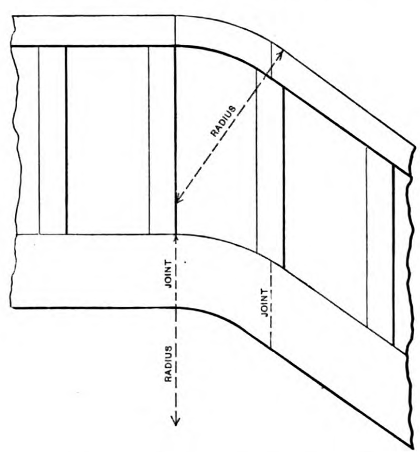



*Fig. 4.—Skeleton Framing of Top Easement, Showing How Joints may be Made Vertical.*

manner in which to lay out paneled framing on the pitch is to set out the whole piece full size on a bench or board floor. If desired, however, one rail and one stile may be laid out, with the shoulders of the rail on the bevel necessary to place the stiles, mullions, &c., plumb, when the entire framed piece is pitched in position, as represented in the sketch. From this a should follow the curvature of the string. This will necessitate the rail being curved. In addition to the pitched framing already mentioned a circular piece of rail is cut out of a solid board on the desired sweep, as shown in Fig. 2 of the illustrations. In executing this work sufficient over-length on each end should be allowed for the purpose of making halved ing this was to cut out the stuff thick enough to allow the edges to be plowed for the panels. This plan, however, has been superseded by the system indicated in Fig. 5 of the cuts. The framing is glued together with the edges square, and when the face has been cleaned off it is turned over on the bench and the back joints neatly leveled across. After this has been done rabbeted pine fillets are glued and nailed around each panel, and when the glue is set the piece is turned over again and the moldings mitered and nailed into the framing and down on the fillets. Before trimming off and sand-papering the framing is turned once more and the panels fitted to their proper places. A slight pressure is put upon them for the purpose of pressing their faces close to the molding. It can either be applied by an elastic shore from the ceiling, made out of a strip of ash or oak, or by means of hand-screws, the work being laid on horses for the purpose. Points or small triangles, made of pieces of iron $\frac{1}{16}$ inch thick and about $\frac{3}{4}$ inch long on the side, are driven into the soft pine in such a way as to retain the panels in position. If the panels be thick they can be beveled to suit the fillets. The wall furring for this kind of wainscoting should be put on so that it will clear the fillets and allow the back to come close against it.


*Fig. 5.—Method of Putting in Panels and Moldings.*

A peculiar geometrical variation, and one that should be remembered in constructing paneled stair-strings or plating them on, is represented in Figs. 6 and 7 of the engravings. Fig. 6 shows a sketch of a string whose grade is equal to an angle of 45° or a miter with a small square panel placed in the center of its length and fitting the corresponding ends of the main panels, following the outline of the square for the purpose of increasing its decorative effect. It should be so arranged that the ends of the main panel are on the angle of 45°, each having one horizontal and one vertical side on top and bottom and of equal length. If, however, the pitch of the stairs be less than 45°, then the horizontal and vertical sides will be of unequal length. The horizontal side will be longer than the vertical and will grow longer in proportion as the pitch becomes less than 45°. The central panel must be of rectangular form, as shown in Fig. 7, and the angle or miter which the horizontal side makes with the pitch will be less than that which the vertical side makes in the same proportion. Similarly if the pitch be on an angle greater than 45°, of course the vertical sides will be longer than the horizontal and the central panel will be oblong in form. The miter made by the horizontal line with the pitch line will then be less than that made by the vertical. This rule should be adhered to in making frame strings or plating moldings or panels for the purpose of insuring their geometrical and mechanical correctness.

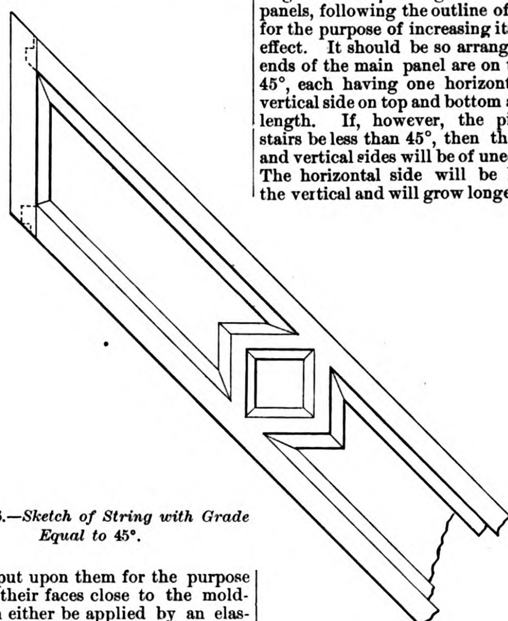


*Fig. 6.—Sketch of String with Grade Equal to 45°.*

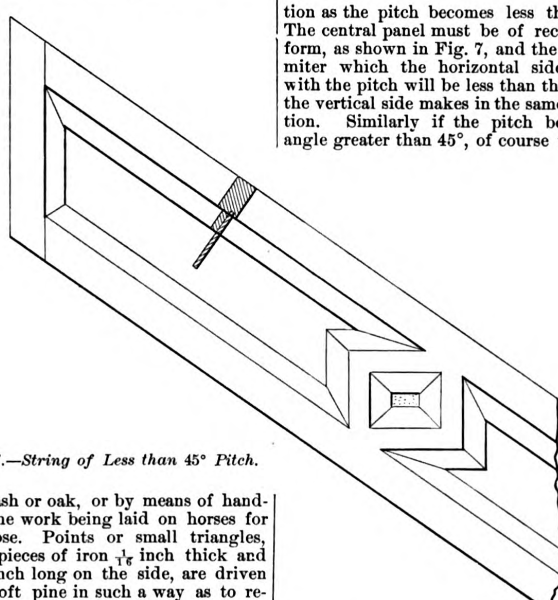


*Fig. 7.—String of Less than 45° Pitch.*

Fig. 8 will explain to the reader how a piece of paneling, the plan of which is a segment of a circle, can be constructed. After bending and building up the rails in a number of thicknesses, as described in the June number of *Carpentry and Building*, they are mortised and tenoned, and the stiles and mullions are either built up or run in the machine in long lengths to the sweep of the sectional arc and then framed to suit. Panels can best be glued as well as bent on the drum, but the fillets can be cut from the solid plank

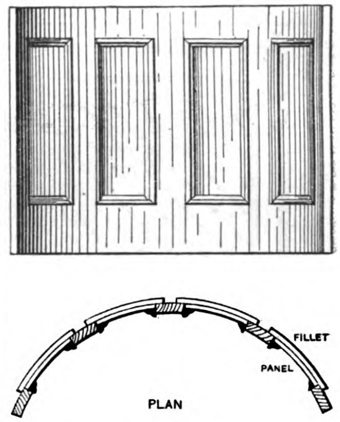



*Fig. 8.—Method of Constructing Paneling the Plan of which is a Segment of a Circle.*

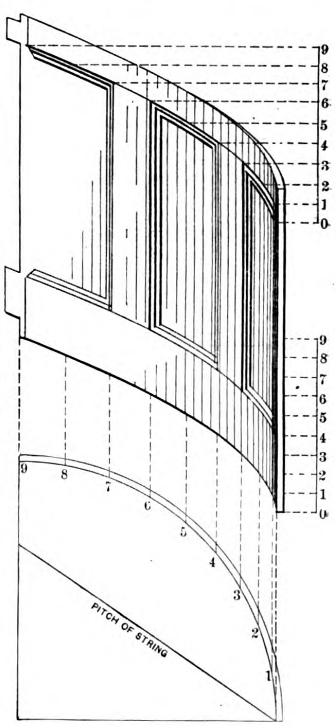



*Fig. 9.—Method of Making Circular Paneling.*

with a band-saw and rabbeted on a variety machine. Moldings can be made in the same manner. When it is required to make circular or quarter-circular panel work on the pitch the safest and cheapest method, according to my mind, is to set out the plan and pitch either full size or half size as indicated in Fig. 9 of the en-

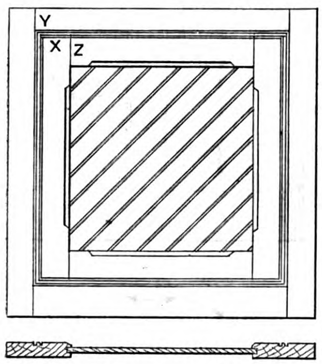



*Fig. 10.—Combined Door and Frame and Longitudinal Section Through Panel.*

gravings. From this it is comparatively easy to develop the stretchout of the rail as in the case of stair-building and then to build up in glued veneers to the requisite thickness by bending them on the pitch on an elongated drum in the manner shown in Figs. 4 and 5 of the article in the June issue of the paper. The method employed in developing the stretchout of the rail is one which I have deduced from "Newland's Carpenters' and Joiners' Assistant." The projected elevation in Fig. 9 shows the completed piece with the rails tenoned for the upper stile. The mullions can be obtained as indicated in Fig. 8, but the shoulders demand very careful fitting, as they too are on the pitch and twist as they rise.

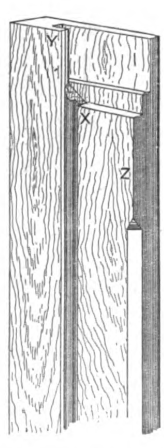



*Fig. 11.—Stile Shown in Perspective.*

A short time ago the writer was called upon to construct a piece of square framing similar to that shown in Fig. 10 and representing a combined door and frame. It formed part of the front of a kitchen dresser, and was made in the manner indicated so that it would correspond with the rest of the front, which was the ordinary closet frame and doors of this design. This false piece was used to conceal a flour barrel and was fastened with hooks and eyes, so that the empty barrel might be removed and replaced by another. Its construction is peculiar and worthy of more than passing attention. Two stiles, similar to that shown in Fig. 11, were made equal in width to that of the door

*Fig. 12.—Section Through Stile and Rail.*

and frame stiles combined. These were laid out for mortising and plowing for the rails, which were also equal to the width of the door and frame rails. After this a scratch-head was run in the center to break the open joint, as it were. The pieces were then mortised, tenoned and plowed for the panels and were additionally framed as follows: The stiles were sawn into square and chiseled out in a sort of half, as far as the inside quirk-line of the bead. The bead was mitered from the intersection of the cut or kerf, from which, on the outside vertical quirk, an upright shoulder was formed to the end of the stile. The tenons on the rail were cut in

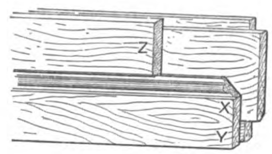



*Fig. 13.—Method of Cutting Tenons on the Rails.*

like manner, except that the shoulders were cut across the grain in order to abut against the edges of the stiles, as shown in Fig. 13. The pieces were put together in the usual way, well glued and wedged. Referring to Fig. 13, the letters X Y Z denote how and where each fitted end goes when ready to put together. From this description I have no doubt that the readers of *Carpentry and Building* will be able to construct a similar piece of panel.

In order to develop the rail the simple plan followed by Newland, on page 73 of his "Carpenters' and Joiners' Assistant," will be found applicable, where he says:

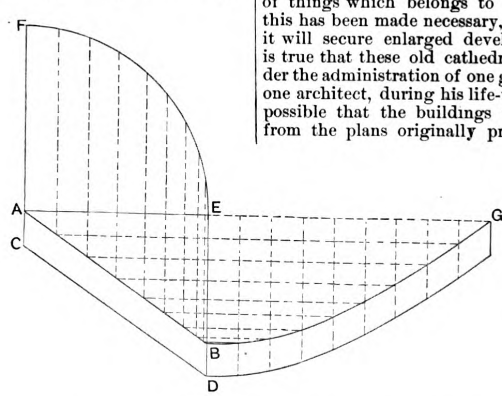



*Fig. 15.—Sketch Showing Method of Development.*

"To find the covering of a semi-cylindric surface contained between two parallel planes perpendicular to the generating section." Now, in this case, referring to Fig. 15, A B and C D are the parallel planes or the top and bottom edges of the rail. E F is the generating section, or in common language the plan. In order to find the covering or stretchout, which will bend around the sweep E F, at the same time rise on the pitch or the parallel planes A B and C D proceed as follows: Produce A E infinitely and divide the quarter-circle on plan into nine equal parts. From this division, at right angles to A E, draw lines until they cut A B and C D. Next

*Fig. 14.—Top Edge of Rail Before Chamfering.*

lay off on E G the divided spaces on E F. Drop from E G perpendicular lines and from the point of intersection on A B draw lines parallel to A G until they cut those from E G. A line traced through the points of intersection will be the upper line of the required shape. The bottom line may be obtained in the same manner.

## Carving in Stone.

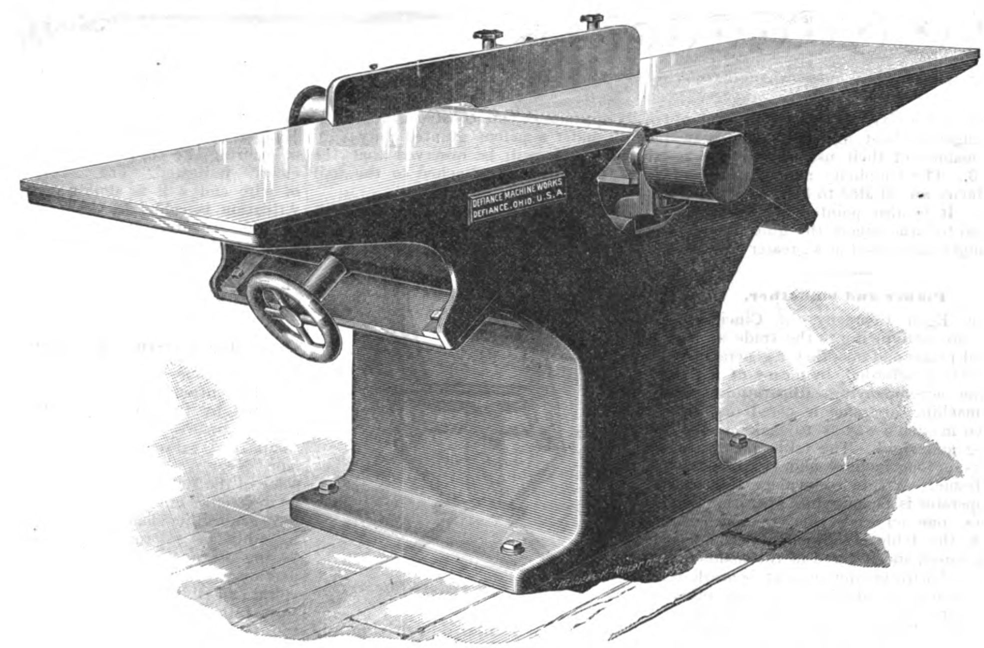
The following interesting paragraph relative to the subject indicated by the above title we take from a recent issue of *Stone:*

In the olden times, during the years when the better class of the old cathedrals were built, the workmen were responsible for many of the beautiful details of carving, molding and otherwise. During later years this thing has been controlled more largely by the architect, until it has come to pass that his duties have expanded to such an extent as to lead to disastrous results. There is thus a tendency to return to first principles. Architects are taking into their offices specialists in iron-work, in stone, carvers in the ornamental details of design. This first made its appearance in stone-carving and work of that kind, and suggested a higher field of usefulness, and it is altogether satisfactory to the workmen who have to do with these things. There is less that is mechanical in such an occupation; it offers more for mind, and altogether makes his work pleasanter. There is certainly more satisfaction in originating a piece of carved work than in carrying out some one else's designs, and in the mutiplicity of things which belongs to an architect this has been made necessary, and in time it will secure enlarged development. It is true that these old cathedrals were under the administration of one general head, one architect, during his life-time, or it is possible that the buildings were erected from the plans originally prepared, and that the whole work was carried out according to the original idea, but the multiplicity of detail, the amount of work to be done and the particular skill required in its execution suggested as a proper course the leaving of a great many details in the hands of the workman, whose only object and only inducement was to do the right and proper thing.

# NOVELTIES.

### Jointing and Hand-Planing Machine.

The Defiance Machine Works, of Defiance, Ohio, are introducing to the trade the jointing and hand-planing machine shown in general view in Fig. 1 of the illustrations. The frame of this machine is cast in one piece and is very rigid and substantial. The tables measure 7 feet, and are fitted to the frame in such a way as to slide in planed and scraped angular ways at an angle of 30°. They are provided with gibs to take up the wear. The hand-wheel and screw shown in the end of the machine is for adjusting the table horizontally in order to regulate the depth of cut. The end of the tables at the throat form an opening 1¾ inches wide when the machine is set for ordinary planing, at all positions keeping outside the radius of the cutting line of the knives. The cylinder is of forged steel and is balanced by the Seymore patent centrifugal system. It is tested to 7000 revolutions per minute. The journal-boxes are lined with babbitt-metal, supplied with cups and self-oiling chambers. Both boxes are cast together, being connected by a heavy plate. The bottom of the plate is planed true, while the sides are at an angle of 45°. The machine is built in four sizes—namely, 8, 12, 16 and 24 inches wide. It is adapted to a wide range of purposes and is calculated to satisfactorily perform straight planing, squaring up, taking out of wind, cornering, chamfering, beveling and making glued joints. It is well adapted to meet the general requirements of sash, door, furniture, car and agricultural implement manufacturers.




*Novelties.—Fig. 1.—Jointing and Hand-Planing Machine, Made by the Defiance Machine Works.*

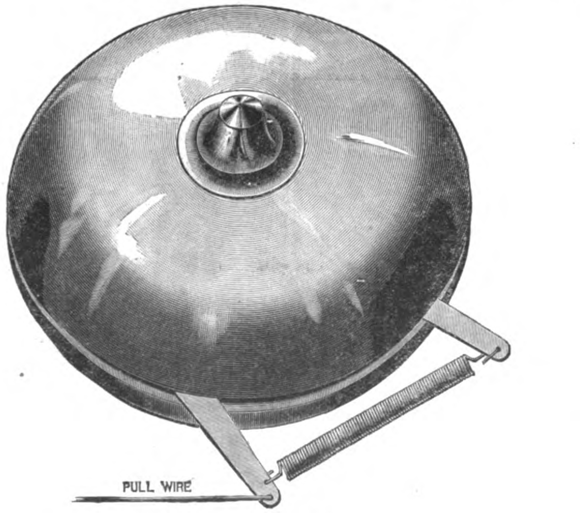



*Fig. 2.—Distance Bell.*

### Distance Bell.

The latest addition to the line of bells manufactured by the New Departure Bell Company, Bristol, Conn., for whom John H. Graham & Co., 113 Chambers street, New York, are general agents, is represented in Fig. 2 of the cuts. The sound produced by this bell is similar to that of an electric bell. This bell can be placed over the door or in any part of the house where it can be connected with wires leading from as many doors as may be desired, and is operated by a bell-pull. The manufacturers call particular attention to the fact that it is self-winding, this being accomplished by ingenious mechanism. The company also manufacture two styles of corner-cranks for use with these bells. In these cranks one arm is a little longer than the other, so that when the longer arm, to which the wire is attached, is placed toward the bell enough motion is gained to take up all the slack in the pull wire. The bell is made in one size, 4-inch, either bronze or nickel.

### Dobson's Auger-Guide.

Figs. 3 and 4 of the accompanying illustrations represent Dobson's Auger-

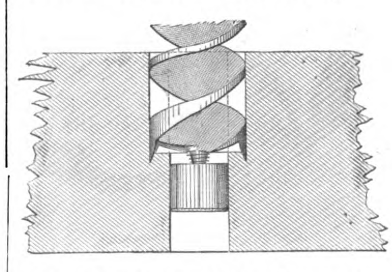


*Fig. 3.—Dobson's Auger-Guide.—Manner of Use.*

Guide and its use. It is put on the market by C. E. Jennings & Co., 79 and 81 Reade street, New York. This simple contrivance is used in cases where it is necessary to rebore or counterbore to a larger size any hole which has previously been made. In order to accomplish this a guide of proper size to fit the hole to be enlarged is placed upon the screw-point of the auger. For this purpose a set of guides, shown in Fig. 4, is furnished, in which there are 12 sizes, from $\frac{1}{4}$ to $1\frac{5}{8}$ inch. They are made of solid brass, with a soft metal center, so that they may accommodate themselves to the screw-point of the auger without injury to the screw. The manner of their use is indicated in Fig. 3. The simplicity and efficiency of the device are alluded to by the manufacturers. It is also pointed out that when applied to lathe-augers the guide permits the auger to be used at a greater speed.

*Novelties.—Fig. 4.—Dobson's Auger-Guide.—Sizes Furnished.*

### Planer and Smoother.

The Egan Company, of Cincinnati, Ohio, are introducing to the trade an improved planer and smoother, a general view of which is afforded by means of Fig. 5 of the accompanying illustrations. In this machine the frame is cored out and braced in such a way as to make it very strong and rigid. The table raises and lowers on long inclines and is gibbed on the frame. Within convenient reach of the operator is a hand-wheel operating two screws, one on each side, by means of which the table is adjusted. The bed being raised and lowered in this manner is furnished with greater support beneath it than could be obtained by any other means and is claimed to be free from vibration. The feed-rolls, of which there are four, are large in diameter and powerfully geared. The pressure on the rolls is regulated by means of adjustable weights. The cylinder is four-sided, so that two or four knives may be used as preferred. It is belted from both sides and the feed controlled by the speed of the cylinder. On each side of the cylinder are pressure-bars arranged in such a way as to work to the circle of the head, insuring smooth work even in cross-grained and knotty material.

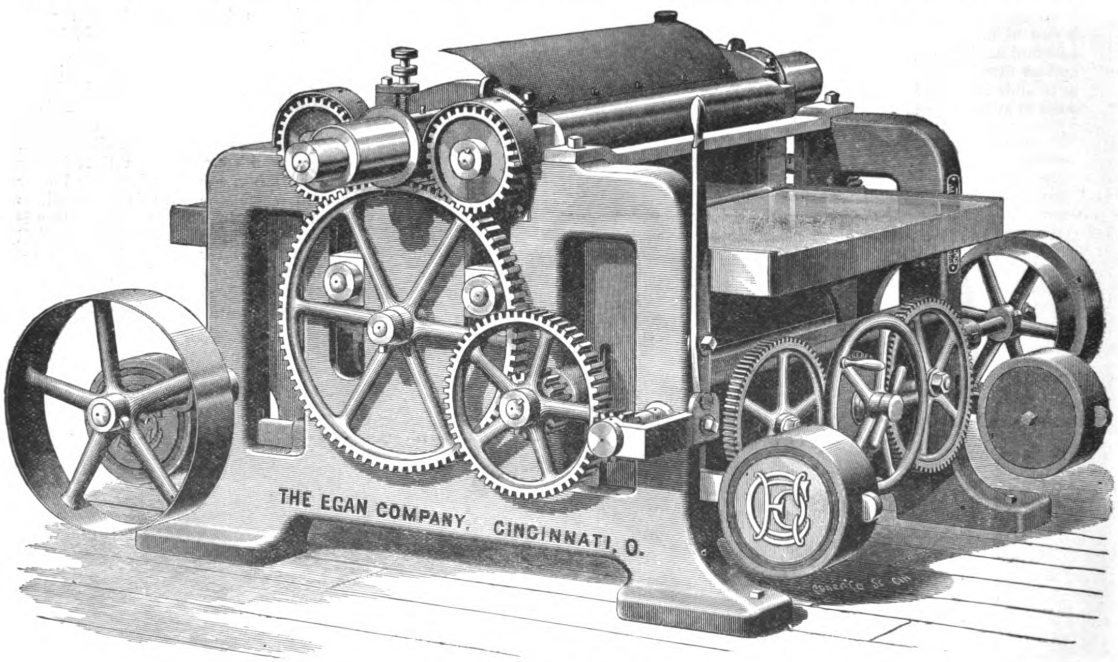



*Fig. 5.—Planer and Smoother, Made by the Egan Company.*

### Crown Picture-Fixtures.

The Brinkerhoff Company, Auburn, N. Y., are manufacturing the picture-nail shown in Fig. 6, which gives a clear idea of its appearance and construction. It is made under a patent granted July 2 of this year. It will be observed that the head is permanently attached to the nail and thus cannot be injured by driving, and it is also pointed out that the difficulty heretofore experienced from mutilating the screw-threads or the head-engaging portions of the nail by driving is avoided. The wire coils are referred to as serving two important functions: One is to keep the picture-wire from lying against the wall-paper; the other is that when the wire is placed between the coils near the inner end of the head the picture is prevented from getting crooked on the wall. The heads are finished in brass and nickel to match wall decorations. The design and attractive appearance of the spirally-coiled head of the nail are referred to by the makers. It is made in two sizes and finished in brass and nickel. The same company are also making the Crown Picture-Hanger, shown in Fig. 7, the manner of securing the cord to the device being clearly indicated. The hanger is made of wire and will fit almost any molding. Attention is called by the manufacturers to the beauty, finish, efficiency and strength of this hanger, as well as the low price at which it is sold. It is made in one size, $1\frac{1}{2}$-inch, and is finished in brass or copper.

*Fig. 6.—The Crown Picture-Nail.*

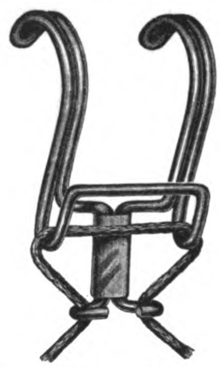
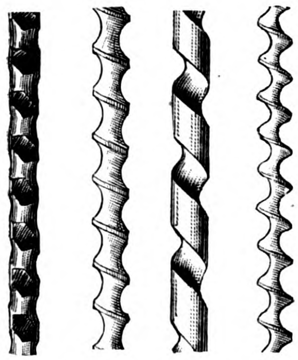


*Fig. 7.—The Crown Picture-Hanger.*

### The Forstner Auger-Bit.

In our issue for December, 1885, we called attention to this bit, which is manufactured by the Bridgeport Gun Implement Company, with works at Bridgeport, Conn., and salesroom at No. 17 Maiden lane, New York City, and pointed out some of the various uses to which it could be devoted. Since that time the company have made other changes in the device, and in addition to round, oval or square boring are now able to employ it in connection with a turning-lathe for producing spiral and ribbon molding of any shape or form. In the manufacture of this molding, four samples of which are shown in Fig. 8 of the cuts, the bit is held in a chuck in an ordinary turning lathe, while the stock to be operated upon is placed in a special socket having bushings to accommodate different diameter of material. This special socket is used in the place of what is ordinarily known as a tool-holder and is provided with adjustments which enable the wood to be held at different pitches to secure varying designs. When the proper pitch for any particular design is obtained the piece of stock can be firmly secured at that pitch by means of a thumb-screw. As the piece of wood is fed through the socket it is turned with the



*Novelties.—Fig. 8.—Work Done with Forstner Bit.*

hand, producing spirals similar to those shown in the engravings. The work turned out by this means is adapted for a variety of purposes and is meeting with a gratifying demand. As produced the strips are round in cross-section, but they may be cut in half lengthwise or in quarters, according to the purpose to which the molding is to be applied.

### Improved Band-Saw Guide.

In Fig. 9 of the accompanying illustrations we present a general view of an improved band-saw guide invented by R. McChesney, and which is being placed upon the market by Goodell & Waters,

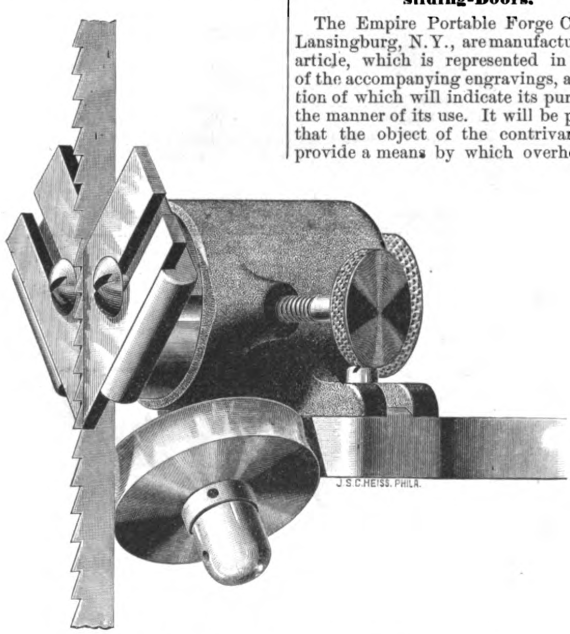



*Fig. 9.—Improved Band-Saw Guide, Made by Goodell & Waters.*

3101 Chestnut street, Philadelphia, Pa. The construction of this device is such that friction is greatly reduced, and the adjustment for saws of different widths a very simple operation. In its downward motion the saw revolves the wheel forming the back guide, and which is set on an angle, preventing cramping or twisting of the blade. The manufacturers state that the wheel, running on a ball bearing, requires no oil, does not heat and is always in proper adjustment. With each guide is provided wood and metal side-pieces, which are readily set for different-gauged saws. The statement is made that the revolving wheel referred to keeps the saw firmly up to its work and has a tendency to straighten the blade at the back. The thumb-screw clearly shown in the illustration adjusts the jaws for saws of different widths. The device is made as upper and lower guides, and is applicable to any make of machine and also to large band-resaws.

### Martin's Guides and Foot-Lock for Sliding-Doors.

The Empire Portable Forge Company, Lansingburg, N.Y., are manufacturing this article, which is represented in Fig. 10 of the accompanying engravings, an inspection of which will indicate its purpose and the manner of its use. It will be perceived that the object of the contrivance is to provide a means by which overhead sliding-doors can be made to shut closely and the warp and spring of their lower ends overcome. The floor-plate is referred to as only $\frac{5}{16}$ inch thick, beveled each way, and is screwed to the floor midway between the doors, the bolts being mortised flush in the faces of the doors at their lower ends. The bolts are set by the machine-screw in the face so that they will project below the lower edge of the door just far

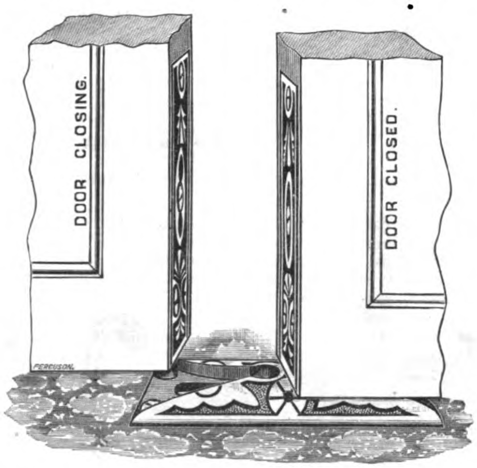
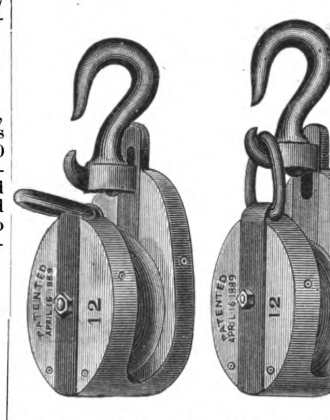



*Fig. 10.—Martin's Guides and Foot-Lock for Sliding-Doors.*

enough to catch in the guiding-groove of the floor-plate, but not long enough to drag on the floor, the door in closing being thus guided to the center of the floor-plate. These guides may be used for locking one door when desired by dropping the bolt into the slot provided for it in the floor-plate. They are also referred to by the manufacturers as forming a perfect lock for a pair of doors when used in connection with a hook, as the floor-plate

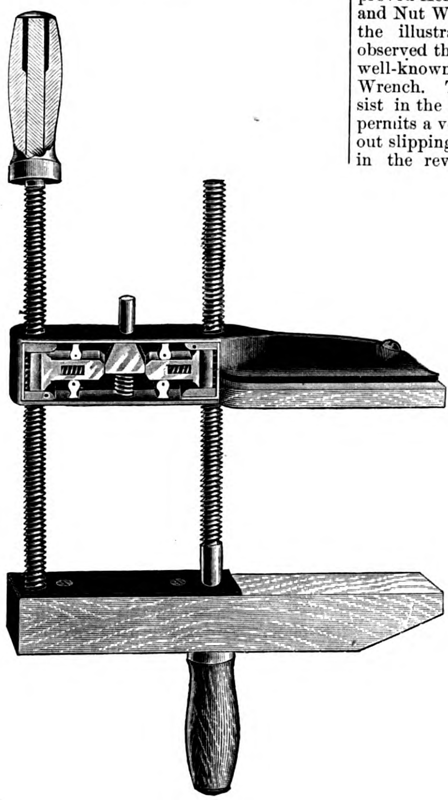



*New Snatch-Block.—Fig. 11—Open.—Fig. 12.—Closed.*

holds them in the center of the opening and will not allow them to move on their hangers. The point is also made that these guides may be used to prevent doors from sliding back into the pocket by placing the guide which comes with the hanger so that the bolt will strike against it when the door is pushed back to its proper position. The goods are made nickel-plated and bronzed.

### A New Snatch-Block.

Shubert & Cottingham, Philadelphia, Pa., have patented and are putting on the market a new snatch-block, which is represented herewith, Fig. 11 showing it open and Fig. 12 closed, thus indicating its construction and use. The point is emphasized that it has but two working parts to the snatch device and will not unclasp of itself in any position when the slightest strain is on the fall. The rope may be thrown out of the block instantly by depressing the hook and cross-head. It will thus be seen that this block is very simple in its construction and of great strength and durability.



*Novelties.—Fig. 13.—Rapid-Adjusting Hand-Screw.*

It is referred to as having met with a very satisfactory reception, indicating that it meets a want of the trade. It is made in either wood or iron.

### Rapid-Adjusting Hand-Screw.

The Capitol Mfg. Company, of Chicago, Ill., the makers of the hand-screw which we illustrate in Fig. 13, aimed to produce a hand-screw that would meet all the requirements as to strength, durability and economy of labor. The upper jaw is made of iron faced with wood where it comes in contact with the material to be clamped, to prevent its being marred. This jaw is very strong and is made partly hollow, and contains the mechanism for adjusting instantaneously the upper to the lower jaw without turning the screws, which are only used for tightening the clamps after they are adjusted. The mechanism is plain and effective and there is nothing to get out of order. The screws are made of wrought-iron and are fastened to the jaws in such a way as to prevent their coming apart, which is a frequent and annoying occurrence with the common hand-screw. The lower jaw is made of hard wood thoroughly seasoned and dry, and there is only one smooth hole penetrating the wood, which in no way impairs the strength of the jaw. The construction of the screw is such that a parallel movement of the jaws is assured. These hand-screws are made in all sizes from 6 to 20 inches inclusive. The same firm also manufacture clamps on the same principle, made entirely of iron, for use in machine shops and foundries for clamping molding-flasks together.

### A New Combination Wrench.

Capitol Mfg. Company, Chicago, Ill., are putting on the market Holland's Improved Acme Steel Combination Pipe, Bolt and Nut Wrench, which is represented in the illustration Fig. 14. It will be observed that this wrench contains all the well-known features of the Acme Steel Wrench. The Holland improvements consist in the peculiarly-shaped head, which permits a very tight grip on the pipe without slipping or crushing it, but principally in the reversible double-face grip-jaw, which is made of the best quality of tool steel and has two faces with teeth. After the teeth on one side have been worn away the other side can be used, thus making the one grip-jaw equivalent to two. The pin which holds the grip-jaw in place to prevent it from falling out can easily be removed and the jaw reversed in a moment's time. The construction of the lower side is such that the pin holding the grip-jaw receives absolutely none of the strain, the entire strain coming on the shoulders of the grip-jaw carriers, which are shaped in such a manner as to give the greatest strength. The teeth on the grip-jaw as they are worn dull can easily be resharpened and tempered a number of times, thus giving the tool an exceptional durability. Separate grip-jaws are also furnished at a small cost to take the place of worn ones. The capacity of these wrenches is large and the strength great. They are manufactured in four sizes—5, 10, 12 and 15 inch. The 5-inch combination wrench is especially adapted for a bicycle-spoke wrench and for work on small pipe, wire or gas-burners.

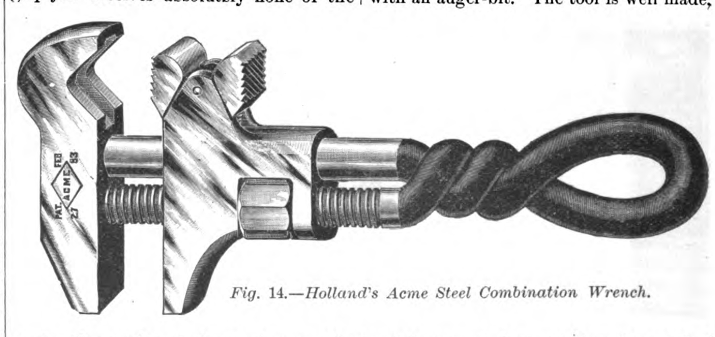



*Fig. 14.—Holland's Acme Steel Combination Wrench.*

### Ratchet Auger-Handle.

Fig. 15 of the accompanying cuts represents a new auger-handle embodying several new features, which is put on the market by the Millers Falls Company, Millers Falls, Mass., and 93 Reade street, New York. The illustration indicates the manner in which the handles are attached, and shows the general construction of the tool, the operation of which can thus be readily inferred. If desired the action of the ratchet can be prevented and the handles held rigid. The cut also indicates the manner in which the handle can be used in a place in which there is not room for turning it, one of the handles being taken out and inserted in the top, as shown. The chuck is adapted for use with an auger with nut, or it can be used with an auger-bit. The tool is well made, and is regarded as meeting the want of the trade for such an article.

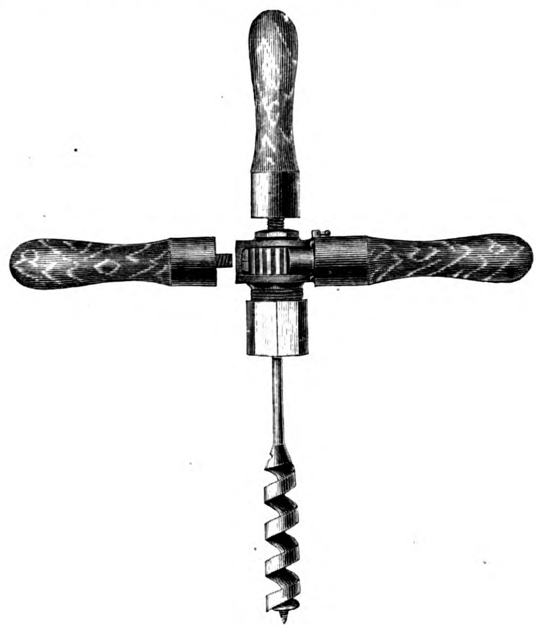


*Fig. 15.—Ratchet Auger-Handle.*

### Anti-Rattler and Window-Holder.

The Terre Haute Improvement Company, Terre Haute, Ind., are manufacturing this article, which is represented in the accompanying illustrations, Fig. 16 showing the holder attached to a window-sash and Fig. 17 showing it attached to the window-frame. It can thus, it will be observed, be employed in either case with equal facility. The construction of the holder will be apprehended from the illustrations. The pressure required to sustain

*Novelties.—Fig. 16.—Anti-Rattler and Window-Holder.—Attached to Sash.*

the window in any position is obtained by the movement of the lever, and the manufacturers make the point that the rubber will not deface the sash. The utility and efficiency of this device in holding a window in any desired position and its excellence as an anti-rattler are also referred to.

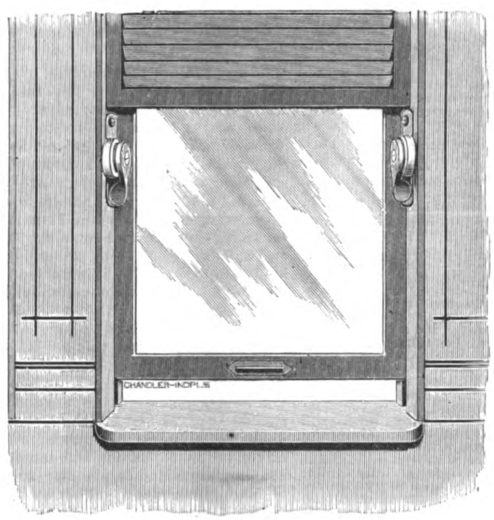


*Fig. 17.—Attached to Frame.*

### Vulcan Hollow-Handle Screw-Driver.

In Fig. 18 of the accompanying illustrations we show a sectional view of a screw-driver which is being placed upon the market by the Clement Mfg. Company, of Northampton, Mass. This screw-driver is provided, as will be seen from an inspection of the cut, with a hollow handle, and is offered to the trade under the name Vulcan. The handle of the screw-driver is made of sheet-steel welded to the blade, so that it cannot by any possibility become detached. The screw-driver is made in eight sizes, ranging from $2\frac{1}{2}$ inches to 12 inches in length.

*Fig. 18.—Vulcan Hollow-Handle Screw-Driver.*

### The Universal Padlock.

The illustrations Figs. 19 and 20 represent a new line of padlocks which are put on the market by the Universal Lock Company, New York, for whom John H. Graham & Co., 113 Chambers street, New York, are agents. Fig. 20 represents one of the locks and Fig. 19 some of the keys which may be used with it. The special feature of these locks is that more than 4000 different keys will operate the locks. When the tumblers are in an unlocked position they are ready to be acted upon by the combination on any key that may be selected and the lock will set itself to the key used, which will then be the only key that will unlock it. The advantage to the user is that when it is desirable to change the means of securing the premises it is only necessary to buy a new key and not a new lock. Keys are numbered from 1 to 4013 inclusive. The manufacturers advise us that they have used every precaution in the inspection of these locks to insure their being in perfect working order. They emphasize the point that these locks from their construction are absolutely unpickable and allude to the advantages in the range of combination. The locks are made in three sizes, No. 1 also being furnished with chain.

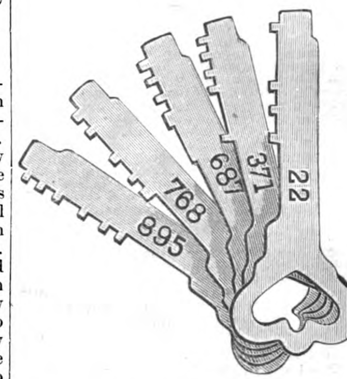



*Fig. 19.—Keys for Universal Padlock.*

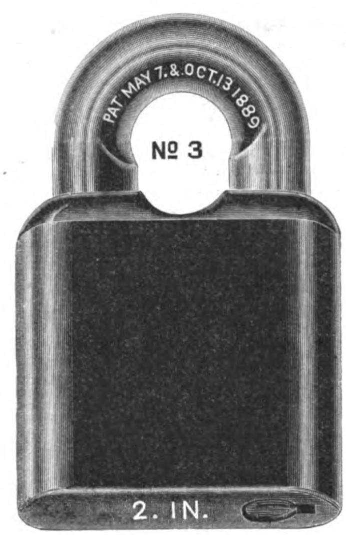



*Fig. 20.—The Universal Padlock.*

AMONG THE IMPOSING STRUCTURES now in process of erection in New York City is that designed for occupancy by the New York *World*. The building is located on Park row and Frankfort street, having a frontage on the former of 115 feet 4 inches and on the latter 136 feet 8 inches. The style of architecture is the Renaissance. The base course is of granite, above which, to the four-story cornice, is red sandstone, and from there to the roof buff terra-cotta and sandstone, with polished granite columns and tablets. On the top story front will be four supporting Persians 14 feet high that will support a cornice and a pediment 56 feet long and 18 feet high. Rising from the roof will be a dome 86 feet in hight and 52 feet in diameter and a cupola 20 feet in hight. The distance from the sidewalk to the top of the cupola will be 300 feet. The main entrance to the building on the Park row side is arched, the span being 26 feet 6 inches and the hight 39 feet above the sidewalk. This arch is supported by four polished granite columns. The main entrace leads to three elevators and the stair-ways. Above the ground-floor rise 11 stories, which will be given up entirely to offices, of which there will be 150.

# TRADE NOTES.

ONE OF THE ATTRACTIVE EXHIBITS at the American Institute Fair was that of the Vassar Burglar Alarm Mfg. Company, whose office is located at 56 Warren street, New York City. The company displayed a variety of their mechanical alarm locks, and by means of doors and windows showed their practical application. These locks are simple in construction and embody all the features of a lock or bolt for doors, windows, scuttles and transoms. The alarm bolt differs from the locks in that it cannot be opened from the outside. The window alarm is of such a character that it may be placed upon a window partially open, while any further movement of the sash sets the alarm in motion. The company's portable alarm is designed for the use of travelers and can readily be attached to any door or transom.

C. E. JENNINGS & Co., of 97 Chambers street, New York, direct the attention of the building trade to Thompson's Perfect Plumb-Bobs, the merits of which are set forth in their advertisement elsewhere in this issue. These bobs are made of bronze, carefully finished with fine steel points and are offered the trade in a variety of sizes.

THE STEWART CERAMIC COMPANY, of 312 Pearl street, New York City, made a very interesting display of their sinks and tubs at the American Institute Fair. The space occupied by the exhibit was neatly covered with tile, while around three sides were marble slabs extending to a hight just above the top of the tubs. The exhibit consisted of five varieties of the company's solid white crockery sinks and tubs arranged in position. Above the marble slabs the walls were finished in hard wood. On the rear wall, directly in the center, was a sign in a gilt frame and containing the business card of the company, the letters appearing upon a solid black ground.

THE D. FRISBIE COMPANY, of 117 Liberty street, New York, call attention elsewhere in this issue to their line of elevators adapted to meet varying requirements.

THE PRESCOTT HARDWARE MFG. COMPANY, through their New York agent, H. A. Berry, whose office is at 39 Dey street, made a very interesting exhibit of their door-hangers at the American Institute Fair held in this city. The company had a small house provided with two varieties of their trackless door-hangers, one door showing the hanger adapted for barn-doors, while the other showed the application of the parlor-door hanger.

GEORGE HAYES, of No. 71 Eighth avenue, New York, had an exhibit at the American Institute Fair, held in this city during October and November, which was of great interest to builders. He made use of a small two-room house covered inside and out with his patent metallic lathing, while here and there were places to which plaster had been applied. The lathing is put on in strips or sheets and tends to add materially to the fire-proof qualities of the structure in which it is employed.

THE MOTION for an injunction in the case of the Bridgeport Wood Finishing Company *vs.* The New York Wood Finishing Company was heard before his Honor Judge Wheeler, in the Circuit Court for the Southern District of New York, Friday, November 15. The Judge reserved his opinion, but handed it down the next day, sustaining the Wheeler patent and ordering the injunction to issue.

THE E. D. ALBRO COMPANY, of Cincinnati, Ohio, are at present busy on orders, and report that up to the present time they have enjoyed a very good business. Their department for veneered panel stock and tt ree-ply built-up work is crowded with orders and the outlook is very encouraging. They state that in fancy cabinet woods for furniture and interior work Prima Vera, or white mahogany, is much in demand, this wood being very similar to satin-wood, but possessing the advantage of being more economical.

WE HAVE RECEIVED from the Bentel & Margedant Company, of Hamilton, Ohio, a very interesting catalogue of wood-working machinery manufactured by them. The volume consists of 96 pages of letterpresss, carefully printed upon a good quality of paper and bound in flexible covers of neat design. In their introduction to the trade the company state that it is not a descriptive catalogue nor a miscellaneous collection of cuts illustrating the products of various manufacturers, but on the contrary a distinctive feature is that each and every machine illustrated is a representation of a portion of their product. The goods shown consist of representative machines selected from the company's line of manufactures and are adapted for use in planing-mills, sash, door and blind factories, railroad and car-shops, furniture establishments and wagon, carriage and wheel factories. The assortment presented is a varied and interesting one, and the volume as a whole cannot fail to possess both interest and value to those engaged in the industries mentioned.

THE BRIDGEPORT GUN IMPLEMENT COMPANY, of 17 Maiden lane, New York, have recently issued a circular to the trade in which they announce a reduction in the price of the Forstner New and Improved Auger-Bit, adapted for smooth, round, oval or square boring, scroll and twist work.

ONE OF THE FEATURES of the American Institute Fair, held in this city, of special interest to builders, was the exhibit of the Ducker Portable House Company, of 735 Broadway, New York. The company had on exhibition one of their portable houses, showing the general method of construction and other features of interest to those engaged in the building trades. These houses are built in sections and are put up without the use of screws, nails or any exterior appliances whatever. It is stated that two men can put up a building on ordinary ground in the space of two hours without the aid of skilled labor.

THE VENETIAN BLIND COMPANY, Burlington, Vt., with New York office at 18 Cortlandt street, exhibited at the American Institute Fair, held in this city, the practical application of their inside sliding-blinds and screens and also of their improved Venetian blinds. The company had a small house erected at the fair, the windows of which were provided with various styles of blinds which they manufacture.

JOHN T. PUGH, of Philadelphia, Pa., states that he is meeting with a good demand for his specialties and that he has added the Pugh Extension Lip-Bit to his line of manufactures.

THE STAR STEAM HEATER COMPANY, of Harrisburg, Pa., have been meeting with a good demand for their apparatus and report recent sales of water-tube boilers, which they make under Lindemuth's patent, to the following: Alabama Institute for the Deaf, Talladega, Ala.; Gettysburg court-house, Gettysburg, Pa.; Bedford court-house and jail, Bedford, Pa.; Carlisle Mfg. Company, Carlisle, Pa.; Irving College, Mechanicsburg, Pa.; Mount Pleasant Printing House and hotel for Fleming & McCarrol, Harrisburg, Pa.

WE HAVE RECEIVED from Goodell & Waters, Philadelphia, Pa., two pictures handsomely framed in oak, one showing a general view of one of their molding-machines, weighing 4500 pounds, and the other the company's extra heavy planer and matcher, weighing 23,000 pounds, a description of which recently appeared in *Carpentry and Building*. At the top of the frame is an oxidized plate containing the name of the firm, while at the bottom is a similar plate bearing the word "Philadelphia." These pictures are gotten up in very attractive style and will prove an ornament for the office of any who may be interested in wood-working machinery.

THE JOS. DIXON CRUCIBLE COMPANY, Jersey City, N. J., are distributing circulars relating to Dixon's Graphite Grease, which they manufacture. This lubricant is useful for wood or metal surface and is especially recommended for loose-fitting bearings, wire-rope, &c.

OUR READERS will remember that last month we referred in our editorial columns to the formal opening of the new Master Builders' Exchange in Philadelphia and to the fact that a portion of the building would be devoted to business purposes. Among the concerns making that structure their headquarters may be mentioned the Peerless Brick Company, heretofore located at 1003 Walnut street. This company occupy two spacious offices, just at the head of the stairs, on the second floor of the exchange. As already noted, the first floor of the building is devoted entirely to a permanent exhibition of materials and manufactures entering into the construction of modern buildings, and among the more important displays is that of the company referred to. The exhibit consists of artistically-arranged samples of the many shapes and designs of plain and ornamental bricks made by them, and also beautifully-constructed fire-places and mantel-pieces made entirely of bricks manufactured by the company.

THE W. C. EDGE COMPANY, 46 Green street, Newark, N. J., are offering the trade an interesting assortment of their new Star Chains, adapted for a variety of purposes. This chain is made in brass and steel and designed to work on either flat or round pulleys. It is especially adapted for sash chain, wire belt, or for use where great strength and evenness is required. Cards containing samples of chain with interesting information will be sent on application.

THE ELLRICH HARDWARE MFG. COMPANY, of Plantsville, Conn., direct the attention of the building trade to the Ellrich Saw-Set, reference to which is made in their advertisement contained elsewhere in this issue.

THE PRESCOTT HARDWARE MFG. COMPANY, Chicago, Ill., announce the removal of their Boston agency from 169 Devonshire street to the store of Chandler & Barber, Nos. 15 and 17 Eliot street.

AMONG THE NEW ADVERTISEMENTS found in this issue may be mentioned that of Charles P. Willard & Co., Chicago, Ill., who solicit applications for illustrated catalogue of their steam-launches, steam-yachts, marine engines, boilers, &c.

THE CLEMENT MFG. COMPANY, of Northampton, Mass., have recently placed upon the market what is known as the Vulcan Hollow-Handle Screw-Driver, which is made in eight sizes. Robert Murray, of 24 Duane street, is the New York agent for these goods.

EDWIN W. ABBE, of New Britain, Conn., is offering the building trade a new and improved fastener for cotton sash-cord, some of the merits of which are set forth in his advertisement elsewhere in this issue.

IN THEIR ADVERTISEMENT this month the Montague - Woodrough Saw Company, Chicago, Ill., call attention to the B. M. T. Patent Tooth Saw, which is claimed to be three saws in one. It may be employed as a rip, cross-cut or miter saw, as may be desired.

FRANCIS B. MARKS, of Ashland, Ohio, has recently patented a slate-dressing machine possessing numerous features of interest. The main point of distinction in this invention consists in arranging the cutting and punching devices on two independent supports, the punching mechanism being of such construction that it may be used independent of the cutting mechanism. An automatic locking device securely holds the two supports of the cutting and punching mechanism together as they perform their work and releases them from each other as soon as they reach their normal positions. This allows the punching mechanism to be operated separately in case such action is desired. The arrangement of the treadle is also such that while the punching mechanism may be operated separately from that of the cutting it may also be operated in unison with it.

IN THEIR ADVERTISEMENT this month Merchant & Co. present some remarks on the question of Roofing-Plate which will be found of more than usual interest to the trade. What they have to say touches on the value of this material and embodies an explanation of their position in regard to guaranteed brands of Plates for roofing purposes. They also solicit applications for a copy of their book entitled "A Tin Roof."

## Gravel Roofs.

In speaking of the merits of gravel roofs as a protection against fire the *Centralblatt der Bauverwaltung* says: "On request of the Prussian Minister of Public Works, notice has been posted in all the government and railroad districts respecting the making and maintenance of wood-cement roofs. . . . Such roofs were declared fire-proof by the Prussian police in 1861, and in Breslau since that date two-thirds of the new private buildings have adopted it. The formation is as follows: The rafters are covered with good, dry boards, and on the latter is placed roof paste-board and a thin stratum of fine, dry sand. Upon this are placed three with 'wood-cement,' and this material or four layers of thick paper fastened on is liberally put over the whole. On the cement is sifted first fine sand, then gravel; finally a topping of gravel and lime, mixed so as to harden like mortar. The roof is maintained in place by use of strips of strong tin-plate. The wood-cement makes a mass resembling asphalt, being composed mostly of tar, pitch and sulphur. The mixture is about the consistence and color of inferior molasses, is exceedingly viscous, hardens gradually and thereafter retains elasticity."

Commenting on the above a Vienna paper remarks: "The journal mentioned continues in considerable space to praise the tightness, fire-proof quality and cheapness of the so-called cement roofs. In a following number of its issue, however, appears a communication from Fire Director Stude, of Berlin, who calls attention to the fact that the 'fire-proof' quality of cement roofs is only as to resisting flying cinders from near burning buildings. On the contrary, much can be said against the rapid and successful extinguishment of fires in buildings having such roofs. The exact interior locality of the fire is long in being discovered, owing to the smoke having impeded exit through the slow burning of the roof. As one result (?) the fire spreads much more through the building than it otherwise might, and the losses will in many cases be greater than in buildings having combustible roofs."

No. 132

# Carpentry and Building

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CONTENTS.



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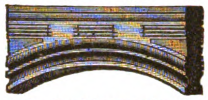

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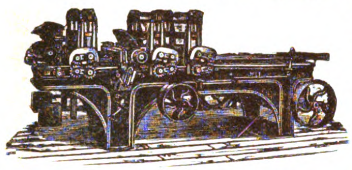

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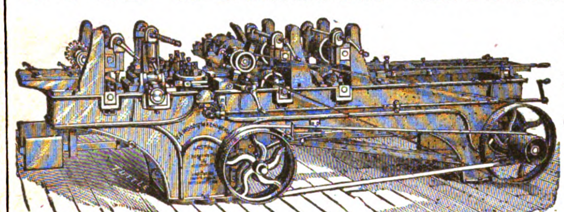

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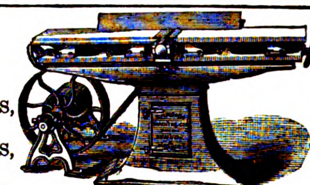

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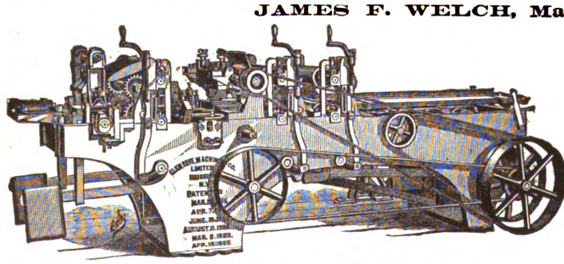

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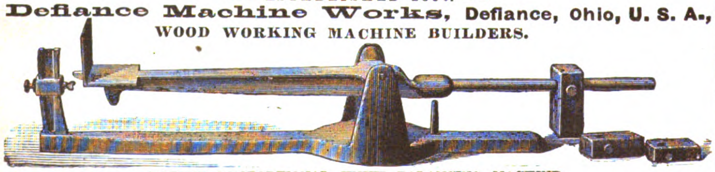

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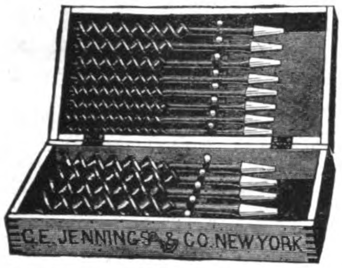


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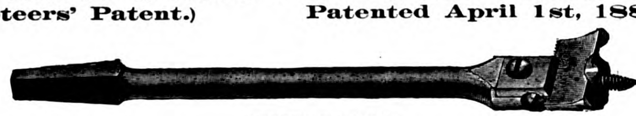

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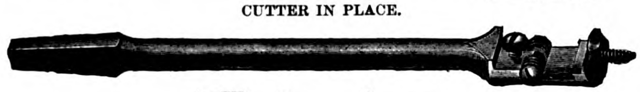

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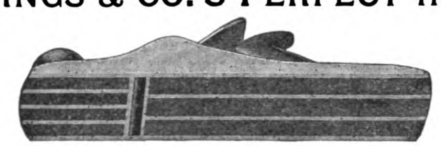

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